9 すばる *FITS* ヘッダ統一案 (観測装置開発者に向けて)

「すばる」共同利用が始まった現在、「すばる」観測装置の *FITS* データの共通ヘッダ規約、観測装置固有ヘッダ規約の検討結果が以下の通りまとまっているのでここに紹介する (キーワードの辞書やサンプルヘッダは量が膨大なので後の章に示す)。ここの項目は改訂が頻繁に行なわれているので最新情報は Web 上を参照のこと (2.3.4 節参照。`naoj` サイトはアクセス制限があるが、`smoka` サイトは一般閲覧可)。

(この節は「すばる *FITS* 検討会 (SFITS)」(小杉、市川、濱部、水本、矢動丸、金光、高田、洞口、泉浦、渡邊、青木 (賢)、青木 (和)、宮田)、および、すばる各観測装置開発グループの検討に基づくものである。)

9.1 すばる *FITS* ヘッダルール (Ver.1.3.0(Dec 10, 2003))

すばるの観測装置で取得されたデータは、全て観測装置から *FITS* フォーマットで出力される。これらの *FITS* データはハワイ島ヒロの山麓施設 (ハワイ観測所) でアーカイブされ、将来公開される予定である。アーカイブの検索項目は、基本的に全て *FITS* ヘッダに含まれていなければならない。また、いくつもの観測装置のデータを一括して検索できるようにするためにも、*FITS* キーワードは可能な限り観測装置間で共通化すべきである。データ解析に関しては、解析に必要なパラメータは *FITS* ヘッダから抽出される場合が多い。解析処理ソフトウェアの共通化による開発作業の省力化を図るためにも *FITS* キーワードの共通化が望まれる。

そこで、すばるでは以下の *FITS* ヘッダルールを定める。

- 基本的に *FITS* のルール (NOST Standard、 この手引き第 5 章参照) に従う。
- ヘッダ辞書 (後の章参照) で定義されたキーワードを、定義した意味以外では使用しない。また、ヘッダ辞書内で Common と分類されたキーワードは必ず使用しなければならない。(なぜこれらのキーワードがすばる *FITS* データで重要なのか、は下の注を参照。後のページに表としてもまとめてある。)
- 観測装置固有ヘッダ一覧は共通ヘッダキーワードと同様に観測装置グループが辞書を作成し、公開しなければならない (装置固有ヘッダ辞書参照)。装置固有辞書は装置グループ内の決定により改訂を行なって良いが、辞書の改訂、および、改訂履歴を Web で公表すること。公表は、ASCII テキストファイルを `ftp://www2.naoj.org/` にアップロード (最新のもので上書き) することとする。
- 当該観測装置からデータが生産されはじめて以降は、過去に使用したキーワードは別の意味で使用しないこと。また、単位も変更しないこと。
- 当該観測装置からデータが生産されはじめて以降は、辞書の改訂を行なったら、ヘッダキーワード `INS-VER` の記述に何らかの変更を加えること。
- 観測装置固有キーワードは、以下に例示するような '`COMMENT`' で始まる行を挿入することによりブロック化する。

```
COMMENT Subaru Device Dependent Header Block for FOCAS
```

- 観測装置固有のヘッダは、頭 2 文字を装置 ID として与え、残り 6 文字を装置開発者が自由に使用する。その際可能な限り略号表に従った記述を行う。装置 ID は 'A_', 'B_', 'C_' のような形式とし、重複は許されない。現在、'A_': AO、'C_': CIAO、'F_': FOCAS、'H_': HDS、'M_': MIRTOS、'O_': OHS、'S_': Suprime-Cam, 'Q_': COMICS, 'V_': VTOS, 'I_': IRCS が予約されている。(CAC には装置固有のヘッダはない。)
- キーワード作成時の略号の組み合わせ順序は、キーワードのカテゴリを参照して
  Image,Instrument,Telescope / Time / Environment / Statistics,Unit / Action
  とする (略号表 (10.3 節) 参照、各略号はさらに短縮可能)。例えば、露出開始時のスリット位置角は、スリット: SLT、ポジションアングル: P/PA、露出開始時: STR を組み合わせて作成するが、その順序は、SLT (Category = Instrument)、P/PA (Statistics / Unit)、STR (Action) となり、キーワードは `SLT_PSTR` となる。
- 撮像観測の場合は WCS を記述する。
- Extension については ASCII Table Extension のみが使用可能である。
- 天体名は可能な限り IAU 表記に従う。
- 値の単位は辞書の記述に従うが、基本的に SI 単位系とする。
- インラインコメントにはキーワードの意味、および、値の単位が明示される。
- ピクセルの座標値はピクセル中央を基準とし、ピクセル番号は 1 から始まる。
- キーワード `OBS-MOD` について　当該データがどのようなタイプのデータかが一目でわかるように統一する。最初の 4 文字は以下のどれかを使用することとする。なお、文字は全て大文字とする。

  撮像関連：`IMAG`
  分光関連：`SPEC`
  偏光撮像：`IPOL`
  偏光分光：`SPOL`

  '_' (アンダースコア) を 1 文字つけて、それ以降は何を書いても良いこととするが、その文字列についても、同じものを時期によって違う意味で使ってはならない。観測制御と解析の連携をとるために、`OBS-MOD` は山頂観測制御システムからステータスとして取得することを推奨する (抽象化コマンドを用いた観測時)。
- キーワード `DATA-TYP` について　現在は以下のキーワードが指定可能である。これ以外のものを使用する必要が生じた場合、登録をおこなってから使用することとする。

  ```
  OBJECT
  FLAT
  DOMEFLAT
  DOMEFLAT_ON
  DOMEFLAT_OFF
  SKYFLAT
  DARK
  COMPARISON
  BIAS
  STANDARD
  STANDARD_STAR
  TEST
  ```
- フィルターやグリズムについて　フィルターやグリズムを複数持っている観測装置の場合、それぞれの一意性を保証できるように名前付け、あるいは、番号付けすること。新しいものに置き換わった場合は、名前を必ず変更すること。

(注: なぜ COMMON キーワードがすばる FITS データで重要なのか)

Keyword Name	**Reason**
AIRMASS	Roughly estimated one is convenient in archival search
BIN-FCT1	The basic keyword for image features
BIN-FCT2	The basic keyword for image features
BITPIX	The basic keyword for image features
BLANK	The basic keyword for image features
BSCALE	The basic keyword for image features
BUNIT	The basic keyword for image features
BZERO	The basic keyword for image features
CDELT1	The basic keyword for image features
CDELT2	The basic keyword for image features
CRPIX1	The basic keyword for image features
CRPIX2	The basic keyword for image features
CRVAR1	The basic keyword for image features
CRVAR2	The basic keyword for image features
CTYPE1	The basic keyword for image features
CTYPE2	The basic keyword for image features
CUNIT1	The basic keyword for image features
CUNIT2	The basic keyword for image features
DATASET(*)	Only needed to OBJECT type data. Needed by DASH.
DATA-TYP	Used as an key for archival search and essential for data analysis.(DASH etc)
DATE-OBS	The basic keyword for image features
DEC	The basic keyword for image features (origin of RA2000 & DEC2000)
DEC2000	DEC may not be written in J2000.0. The key for archival search by coordinate.
DETECTOR	The basic keyword for image features
DET-TMP	The basic keyword for image features
DISPAXIS(S)	Convenient in spectrum plotting of raw data.
DISPERSR(S)	The basic keyword for image features
END	Essential for FITS data
EQUINOX	Essential for knowing RA and DEC epoch, and calculating RA2000 & DEC2000
EXP-ID	For the grouping of data by simultaneous exposure.
EXPTIME	The basic keyword for image features
EXTEND	Essential for FITS data with ASCII Table Extension.
FOC-POS	The basic keyword for observation description
FOC-VAL	Needed by QDAS in focusing task.
FRAMEID	This is the unique key for archival system.
GAIN	The basic keyword for image features
HST	The basic keyword for observation description
INSTRUME	This is used in online data registration at Hilo.
LONGPOLE(I)	The basic keyword for image features
LST	The basic keyword for observation description
MJD	This is used in data search as a unique key for time.
NAXIS	Essential for FITS data
NAXIS1	Essential for FITS data with 2-d image
NAXIS2	Essential for FITS data with 2-d image
NAXIS3	Essential for FITS data with 3-d image as those from MIRTOS
OBJECT	The basic keyword for observation description
OBS-ALOC	Can identify the control mode and where the instrument was.
OBSERVAT	The basic keyword for observation description
OBSERVER	The basic keyword for observation description
OBS-MOD	The key for selecting data in data search in archival system
PCnnnmmm(I)	Essential for setting control command to telescope (moving object onto the slit etc)
POLARIZn(P)	The basic keyword for observation description
PROP-ID	Essential for setting view parameter in archival system
RA	The basic keyword for observation description (origin of RA2000 & DEC2000)
RA2000	RA may not be written in J2000.0. Key for archival search by coordinate.
RADECSYS	RA and DEC may not be written in FK5.
RET-ANGn(P)	Essential in data analysis of polarimetric data.
RETPLATn	The basic keyword for observation description
SIMPLE	Essential for FITS data
SLIT(S)	The basic keyword for observation description
SLTCPIX1(S)	Convenient in making plot of raw data spectrum
SLTCPIX2(S)	Convenient in making plot of raw data spectrum
SLT-LEN(S)	The basic keyword for observation description
SLT-PA(S)	The basic keyword for observation description
SLT-WID(S)	The basic keyword for observation description
TELESCOP	Essential for knowing the origin of data
TELFOCUS	Can be one of the key for identifying the causality of empty image.
TIMESYS	Essential for knowing time system used in the data
UT	The basic keyword for observation description
WAVELEN(S)	Convenient in making plot of raw data spectrum.
WAV-MAX(S)	Convenient in making plot of raw data spectrum.
WAV-MIN(S)	Convenient in making plot of raw data spectrum.
WCS-ORIG(I)	Used for identifying WCS is written by toolkit or not.

10 すばる関係の *FITS* キーワード辞書類

10.1 基本ヘッダ辞書

10.1.1 基本ヘッダ辞書各項目の説明

観測装置間で共通化できるキーワードは、基本ヘッダ辞書に記述される。基本ヘッダ辞書内の各項目の意味は以下の通りである。

Header Key Word： *FITS* ヘッダキーワード

Revised: 最終更新日付

Category: 分類。

Importance： 重要度。以下の値をもつ

Common： 必須キーワード

Imaging： 撮像データに必須なキーワード

Spectroscopy： 分光観測データに必須なキーワード

Polarimetry： 偏光観測データに必須なキーワード

Object: 天体フレームに必須なキーワード

Optional： キーワードの定義のみで、必須ではない。ただし、装置固有キーワードの中で基本ヘッダ (Optional) と同じ意味のものがある場合には、基本ヘッダを優先する。

Alias: ツールキットの Status Distribution Service を利用して OBS からステータスを取得する場合の指定キーワード。ここに Toolkit と書かれていれば、(*FITS* 化)Toolkit により入力が可能である。また、Next Toolkit となっていれば、次バージョンのツールキットで計算ツールを提供予定。全観測装置に共通なものは、“FITS.SBR.????” の形式をとり、観測装置ごとに参照ステータスが変化するものは、“FITS.#Inst.????” の形式をとる。ただし、’#Inst’ は観測装置の 3 文字略称で、以下の通り。

- IRCS − > IRC
- AO − > AOS
- CIAO − > CIA
- OHS − > OHS
- FOCAS − > FCS
- HDS − > HDS
- COMICS − > COM
- Suprime-Cam − > SUP
- MIRTOS − > MIR
- CAC − > CAC

FormatC： キーワード値の記述形式 (C 言語形式)。

FormatF: キーワード値の記述形式 (FORTRAN 形式)。

Unit： キーワード値の単位。キーワード値の単位は基本的にこの単位で記述するものとする。ただし、どうしても問題が生じる場合には、別途すばる側担当者と相談のこと。

Recommended： すばるが推奨する規定値。矛盾が生じない限りこの値を使用する。`SIMPLE`, `OBSERVAT` については必ずこの値を使用する。

Sample: 値の例。

Obsolete: すでに使われなくなったキーワードを表わす。

Comment： *FITS* ヘッダ内に記述されるインラインコメントの内容。値に単位が必要な場合は、単位の記述もおこなう。

DescriptionE： キーワードの意味や定義 (英語)

DescriptionJ: キーワードの意味や定義 (日本語)

10.1.2 基本ヘッダ辞書 (2003/12/10)

紙面の都合により、上記項目の内 HeaderKeyWord, Category, Importance, FormatF, Unit, Recommended, Alias (DistributionService) の 7 個の項目を ABC 順の辞書に収録し、HeaderKeyWord, Category, Importance, FormatF, Unit, Recommended, Sample, Comment, DescriptionE, DescriptionJ の 10 個の項目を Category 順の辞書に収録した。

● Key Word の ABC 順基本辞書

[Dictionary = Basic] (Key Word の ABC 順、その 1(1/4): A 〜 CD)

Header KeyWord	Category	Importance	FormatF	Unit	Recommend	RevisedDate	Alias (DistributionService)
ADC	Telescope	Optional	F20.3	degree	-	1998/12/10	FITS.SBR.ADC
ADC-END	Telescope	Optional	F20.3	degree	-	1998/12/10	FITS.SBR.ADC
ADC-STR	Telescope	Optional	F20.3	degree	-	1998/12/10	FITS.SBR.ADC
ADC-TYPE	Telescope	Optional	A20	-	-	1998/12/10	FITS.SBR.ADC-TYPE
AG-PRB1	Telescope	Optional	F20.3	mm	-	1998/12/10	-
AG-PRB2	Telescope	Optional	F20.3	degree	-	1998/12/10	-
AIRM-END	Time	Optional	F20.3	-	-	1999/03/01	FITS.SBR.AIRMASS
AIRM-STR	Time	Optional	F20.3	-	-	1998/11/25	FITS.SBR.AIRMASS
AIRMASS	Time	Common	F20.3	-	-	1998/11/25	FITS.SBR.AIRMASS
ALT-END	Telescope	Optional	F20.5	degree	-	1998/11/24	FITS.SBR.ALTITUDE
ALT-STR	Telescope	Optional	F20.5	degree	-	1998/11/24	FITS.SBR.ALTITUDE
ALTITUDE	Telescope	Optional	F20.5	degree	-	1998/11/24	FITS.SBR.ALTITUDE
AO-FREQ	Telescope	Optional	I20	Hz	-	1998/12/10	-
AO-TIP	Telescope	Optional	A8	-	-	1999/03/01	-
AO-WFS	Telescope	Optional	F20.5	-	-	1998/12/14	-
APERTURE	Spectroscopy	Optional	A30	-	-	1998/12/14	-
APT-SIZE	Spectroscopy	Optional	F20.3	arcsec	-	1998/12/14	-
APTC-DEC	Spectroscopy	Optional	F20.8	degree	-	1999/03/01	-
APTC-RA	Spectroscopy	Optional	F20.8	degree	-	1999/03/01	-
APTCPIX1	Spectroscopy	Optional	F20.1	pixel	-	1998/12/10	-
APTCPIX2	Spectroscopy	Optional	F20.1	pixel	-	1998/12/10	-
AUTOGUID	Instrument	Optional	A8	-	-	1998/12/10	-
AZ-END	Telescope	Optional	F20.5	degree	-	1998/11/24	FITS.SBR.AZIMUTH
AZ-STR	Telescope	Optional	F20.5	degree	-	1998/11/24	FITS.SBR.AZIMUTH
AZIMUTH	Telescope	Optional	F20.5	degree	-	1998/11/24	FITS.SBR.AZIMUTH
BIN-FCT1	Instrument	Common	I20	pixel	-	1998/11/24	-
BIN-FCT2	Instrument	Common	I20	pixel	-	1998/11/24	-
BITPIX	FITS	Common	I20	-	-	1998/12/14	-
BLANK	File	Common	I20	-	-	1999/03/01	-
BSCALE	File	Common	F20.8	-	-	1998/12/14	-
BUNIT	File	Common	A10	-	-	1998/11/25	-
BZERO	File	Common	F20.8	-	-	1998/12/14	-
C2ELT1	WCS	Optional	F20.8	degree	-	1998/11/24	Toolkit
C2ELT2	WCS	Optional	F20.8	degree	-	1998/11/24	Toolkit
C2NIT1	WCS	Optional	A8	-	degree	1998/11/25	Toolkit
C2NIT2	WCS	Optional	A8	-	degree	1998/11/25	Toolkit
C2PIX1	WCS	Optional	F20.1	pixel	-	1999/03/01	Toolkit
C2PIX2	WCS	Optional	F20.1	pixel	-	1999/03/01	Toolkit
C2VAL1	WCS	Optional	F20.8	degree	-	1998/11/24	Toolkit
C2VAL2	WCS	Optional	F20.8	degree	-	1998/11/24	Toolkit
C2YPE1	WCS	Optional	A8	-	RA---TAN	1998/11/25	Toolkit
C2YPE2	WCS	Optional	A8	-	DEC--TAN	1998/11/25	Toolkit
CDELT1	File	Common	F20.8	-	-	1998/12/14	Toolkit
CDELT2	File	Common	F20.8	-	-	1998/11/24	Toolkit
CDj_i	WCS	Optional	F20.8	-	-	1999/09/28	Toolkit

[Dictionary = Basic] (Key Word の ABC 順、その 2(2/4): COADD 〜 IMR-END)

Header KeyWord	Category	Importance	FormatF	Unit	Recommend	RevisedDate	Alias (DistributionService)
COADD	Instrument	Optional	I20	-	-	1998/12/10	-
COMMENT	Comment	Optional	A79	-	-	1998/12/14	-
CRPIX1	File	Common	F20.1	pixel	-	1999/03/01	Toolkit
CRPIX2	File	Common	F20.1	pixel	-	1999/03/01	Toolkit
CRVAL1	File	Common	F20.8	-	-	1998/11/24	Toolkit
CRVAL2	File	Common	F20.8	-	-	1998/11/24	Toolkit
CTYPE1	File	Common	A10	-	RA---TAN	1998/11/25	Toolkit
CTYPE2	File	Common	A10	-	DEC--TAN	1998/11/25	Toolkit
CUNIT1	File	Common	A10	-	degree	1998/11/25	Toolkit
CUNIT2	File	Common	A10	-	degree	1998/11/25	Toolkit
DATA-TYP	Object	Common	A30	-	-	1998/11/25	-
DATASET	Object	Object	A20	-	-	1998/12/14	FITS.#Inst.DATASET
DATE-OBS	Time	Common	A10	UTC	-	1998/11/25	Toolkit
DEC	Object	Common	A12	-	-	1998/12/14	FITS.SBR.DEC
DEC2000	Object	Common	A12	-	-	1998/11/25	Toolkit
DET-Ann	Instrument	Optional	F20.3	degree	-	1998/12/14	-
DET-ID	Instrument	Optional	I20	-	-	1998/12/10	-
DET-NSMP	Instrument	Optional	I20	-	-	1998/12/10	-
DET-P1nn	Instrument	Optional	F20.3	arcsec	-	1999/03/01	-
DET-P2nn	Instrument	Optional	F20.3	arcsec	-	1999/03/01	-
DET-RST	Instrument	Optional	I20	-	-	1998/12/14	-
DET-SMPL	Instrument	Optional	A20	-	-	1998/12/14	-
DET-TAVE	Instrument	Optional	F20.2	K	-	1998/12/14	-
DET-TMAX	Instrument	Optional	F20.2	K	-	1999/03/01	-
DET-TMED	Instrument	Optional	F20.2	K	-	1999/03/01	-
DET-TMIN	Instrument	Optional	F20.2	K	-	1999/03/01	-
DET-TMP	Instrument	Common	F20.2	K	-	1999/03/01	-
DET-TSD	Instrument	Optional	F20.2	K	-	1999/03/01	-
DET-Tnn	Instrument	Optional	F20.2	K	-	1999/03/01	-
DET-VER	Instrument	Optional	A30	-	-	1998/12/14	-
DETECTOR	Instrument	Common	A20	-	-	1998/12/10	-
DETPXSZ1	Instrument	Optional	F20.4	mm	-	1998/12/14	-
DETPXSZ2	Instrument	Optional	F20.4	mm	-	1998/12/14	-
DISPAXIS	Spectroscopy	Spectroscopy	I20	-	-	1998/12/10	-
DISPERSR	Spectroscopy	Spectroscopy	A20	-	-	1998/12/10	-
DOM-HEND	Environment	Optional	F20.1	%	-	1999/03/01	FITS.SBR.DOM-HUM
DOM-HSTR	Environment	Optional	F20.1	%	-	1999/03/01	FITS.SBR.DOM-HUM
DOM-HUM	Environment	Optional	F20.1	%	-	1999/03/01	FITS.SBR.DOM-HUM
DOM-PEND	Environment	Optional	F20.2	hpa	-	1998/12/14	FITS.SBR.DOM-PRS
DOM-PRS	Environment	Optional	F20.2	hpa	-	1998/12/14	FITS.SBR.DOM-PRS
DOM-PSTR	Environment	Optional	F20.2	hpa	-	1998/12/14	FITS.SBR.DOM-PRS
DOM-TEND	Environment	Optional	F20.2	K	-	1999/03/01	FITS.SBR.DOM-TMP
DOM-TMP	Environment	Optional	F20.2	K	-	1998/12/14	FITS.SBR.DOM-TMP
DOM-TSTR	Environment	Optional	F20.2	K	-	1999/03/01	FITS.SBR.DOM-TMP
DOM-WEND	Environment	Optional	F20.2	m/s	-	1999/03/01	FITS.SBR.DOM-WND
DOM-WMAX	Environment	Optional	F20.2	m/s	-	1999/03/01	-
DOM-WMIN	Environment	Optional	F20.2	m/s	-	1999/03/01	-
DOM-WND	Environment	Optional	F20.2	m/s	-	1999/03/01	FITS.SBR.DOM-WND
DOM-WSTR	Environment	Optional	F20.2	m/s	-	1999/03/01	FITS.SBR.DOM-WND
EFP-MIN1	Instrument	Optional	I20	pixel	-	1999/03/01	-
EFP-MIN2	Instrument	Optional	I20	pixel	-	1999/03/01	-
EFP-RNG1	Instrument	Optional	I20	pixel	-	1998/12/14	-
EFP-RNG2	Instrument	Optional	I20	pixel	-	1998/12/14	-
END	FITS	Common	-	-	-	1998/11/24	Toolkit
EQUINOX	Object	Common	F20.1	year	-	1998/12/14	FITS.SBR.EQUINOX
EXP-ID	Instrument	Common	A12	-	-	1998/12/14	-
EXP1TIME	Time	Optional	F20.3	sec	-	1998/12/14	-
EXPTIME	Time	Common	F20.2	sec	-	1998/12/14	-
EXTEND	FITS	Common	BOOLEAN	-	-	1998/11/24	-
F-RATIO	Origin	Optional	F20.2	-	-	1998/12/14	-
FILTERnn	Instrument	Optional	A30	-	-	1998/12/14	-
FLT-Ann	Instrument	Optional	F20.2	degree	-	1998/12/14	-
FOC-LEN	Origin	Optional	F20.3	mm	-	1998/11/24	-
FOC-POS	Origin	Common	A12	-	-	1998/12/14	FITS.#Inst.FOC-POS
FOC-VAL	Origin	Common	F20.3	mm	-	1999/03/01	FITS.SBR.FOC-VAL
FRAMEID	Instrument	Common	A12	-	-	1998/12/14	-
GAIN	Instrument	Common	F20.3	e/ADU	-	1998/12/14	-
HISTORY	Comment	Optional	A60	-	-	1998/12/14	-
HST	Time	Common	A12	HST	-	1998/12/14	-
HST-END	Time	Optional	%12s	HST	-	1998/11/25	-
HST-STR	Time	Optional	%12s	HST	-	1998/11/25	-
IMGROT	Telescope	Optional	F20.3	degree	-	1999/03/01	FITS.SBR.IMGROT
IMR-END	Telescope	Optional	F20.3	degree	-	1999/03/01	FITS.SBR.IMGROT

[Dictionary = Basic] (Key Word の ABC 順、その 3(3/4): IMR-STR ～ SEEING)

Header KeyWord	Category	Importance	FormatF	Unit	Recommend	RevisedDate	Alias (DistributionService)
IMR-STR	Telescope	Optional	F20.3	degree	-	1999/03/01	FITS.SBR.IMGROT
IMR-TYPE	Telescope	Optional	A20	-	-	1999/03/01	FITS.SBR.IMR-TYPE
INR-END	Telescope	Optional	F20.3	degree	-	1999/03/01	FITS.SBR.INSROT
INR-STR	Telescope	Optional	F20.3	degree	-	1999/03/01	FITS.SBR.INSROT
INS-VER	Instrument	Optional	A30	-	-	1999/03/01	-
INSROT	Telescope	Optional	F20.3	degree	-	1999/03/01	FITS.SBR.INSROT
INST-PA	Instrument	Optional	F20.3	degree	-	1999/03/01	FITS.SBR.INST-PA
INSTRUME	Instrument	Common	A20	-	-	1999/03/01	-
LONGPOLE	WCS	Imaging	F20.1	degree	180.0	1999/03/01	Toolkit
LST	Time	Common	A12	LST	-	1999/03/01	Toolkit
LST-END	Time	Optional	A12	LST	-	1999/03/01	Toolkit
LST-STR	Time	Optional	A12	LST	-	1999/03/01	Toolkit
M2-ANG1	Telescope	Optional	F20.3	arcmin	-	2000/07/07	-
M2-ANG2	Telescope	Optional	F20.3	arcmin	-	2000/07/07	-
M2-ANG3	Telescope	Optional	F20.3	arcmin	-	2000/07/07	FITS.SBR.M2-ANG3
M2-POS1	Telescope	Optional	F20.3	mm	-	1998/12/14	-
M2-POS2	Telescope	Optional	F20.3	mm	-	1998/12/14	-
M2-POS3	Telescope	Optional	F20.3	mm	-	2000/07/07	FITS.SBR.M2-POS3
M2-TIP	Telescope	Optional	A8	-	-	1998/12/10	FITS.SBR.M2-TIP
M2-TYPE	Telescope	Optional	A8	-	-	1998/12/10	FITS.SBR.M2-TYPE
MJD	Time	Common	F20.8	day	-	1998/12/10	Toolkit
MJD-END	Time	Optional	F20.8	days	-	1999/03/01	Toolkit
MJD-STR	Time	Optional	F20.8	days	-	1999/03/01	Toolkit
N2XIS	WCS	Optional	I20	-	2	1999/03/01	Toolkit
N2XIS1	WCS	Optional	I20	pixel	-	1998/12/10	Toolkit
N2XIS2	WCS	Optional	I20	-	-	1999/03/01	Toolkit
NAS-TAVE	Environment	Optional	F20.2	K	-	1999/03/01	-
NAS-TMAX	Environment	Optional	F20.2	K	-	1999/03/01	-
NAS-TMIN	Environment	Optional	F20.2	K	-	1999/03/01	-
NAS-TSD	Environment	Optional	F20.1	K	-	1999/03/01	-
NAXIS	FITS	Common	I20	-	-	1999/03/01	Toolkit
NAXIS1	FITS	Common	I20	pixel	-	1999/03/01	Toolkit
NAXIS2	FITS	Common	I20	-	-	1999/03/01	Toolkit
NAXIS3	FITS	Optional	I20	-	-	1999/03/01	-
OBJECT	Object	Common	A30	-	-	1998/11/25	FITS.#Inst.OBJECT
OBS-ALOC	Telescope	Common	A12	-	-	1999/03/01	FITS.#Inst.OBS-ALOC
OBS-MOD	Instrument	Common	A30	-	-	1999/03/01	-
OBSERVAT	Origin	Common	A20	-	NAOJ	1999/03/01	Toolkit
OBSERVER	Origin	Common	A50	-	-	1999/03/01	FITS.#Inst.OBSERVER
OUT-HEND	Environment	Optional	F20.1	%	-	1999/03/01	FITS.SBR.OUT-HUM
OUT-HSTR	Environment	Optional	F20.1	%	-	1999/03/01	FITS.SBR.OUT-HUM
OUT-HUM	Environment	Optional	F20.1	%	-	1999/03/01	FITS.SBR.OUT-HUM
OUT-PEND	Environment	Optional	F20.2	hpa	-	1999/03/01	FITS.SBR.OUT-PRS
OUT-PRS	Environment	Optional	F20.2	hpa	-	1999/03/01	FITS.SBR.OUT-PRS
OUT-PSTR	Environment	Optional	F20.2	hpa	-	1999/03/01	FITS.SBR.OUT-PRS
OUT-TEND	Environment	Optional	F20.2	K	-	1999/03/01	FITS.SBR.OUT-TMP
OUT-TMP	Environment	Optional	F20.2	K	-	1999/03/01	FITS.SBR.OUT-TMP
OUT-TSTR	Environment	Optional	F20.2	K	-	1999/03/01	FITS.SBR.OUT-TMP
OUT-WEND	Environment	Optional	F20.2	m/s	-	1999/03/01	FITS.SBR.OUT-WND
OUT-WMAX	Environment	Optional	F20.2	m/s	-	1999/03/01	-
OUT-WMIN	Environment	Optional	F20.2	m/s	-	1999/03/01	-
OUT-WND	Environment	Optional	F20.2	m/s	-	1999/03/01	FITS.SBR.OUT-WND
OUT-WSTR	Environment	Optional	F20.2	m/s	-	1999/03/01	FITS.SBR.OUT-WND
P2OJP1	WCS	Optional	F20.1	-	0.0	1998/12/10	-
P2OJP2	WCS	Optional	F20.1	-	0.0	1998/12/10	-
P2iiijjj	WCS	Optional	F20.8	-	-	1998/12/10	Toolkit
PCiiijjj	WCS	Imaging	F20.8	-	-	1998/12/10	Toolkit
POL-ANGn	Polarimetry	Optional	F20.2	degree	-	1999/03/01	-
POLARIZn	Polarimetry	Polarimetry	A30	-	-	1999/03/01	-
PRD-MIN1	Instrument	Optional	I20	pixel	-	1999/03/01	-
PRD-MIN2	Instrument	Optional	I20	pixel	-	1999/03/01	-
PRD-RNG1	Instrument	Optional	I20	pixel	-	1999/03/01	-
PRD-RNG2	Instrument	Optional	I20	pixel	-	1999/03/01	-
PROJP1	WCS	Optional	F20.1	-	0.0	1998/12/10	-
PROJP2	WCS	Optional	F20.1	-	0.0	1998/12/10	-
PROP-ID	Origin	Common	A8	-	-	1998/11/25	FITS.#Inst.PROP-ID
RA	Object	Common	A12	-	-	1998/12/14	FITS.SBR.RA
RA2000	Object	Common	A12	-	-	1998/12/14	Toolkit
RADECSYS	Object	Common	A8	-	FK5	1998/11/25	Toolkit
RET-ANGn	Polarimetry	Polarimetry	F20.2	degree	-	1998/12/14	-
RETPLATn	Polarimetry	Polarimetry	A30	-	-	1998/11/25	-
SECZ	Time	Optional	F20.3	-	-	1998/12/14	FITS.SBR.SECZ
SECZ-END	Time	Optional	F20.3	-	-	1998/11/24	FITS.SBR.SECZ

[Dictionary = Basic] (Key Word の ABC 順、その 4(4/4): SECZ-STR 〜 Z)

Header KeyWord	Category	Importance	FormatF	Unit	Recommend	RevisedDate	Alias (DistributionService)
SECZ-STR	Time	Optional	F20.3	-	-	1998/11/24	FITS.SBR.SECZ
SEEING	Environment	Optional	F20.2	arcsec	-	1998/12/14	FITS.SBR.SEEING
SIMPLE	FITS	Common	BOOLEAN	-	T	1998/11/25	Toolkit
SLIT	Spectroscopy	Spectroscopy	A20	-	-	1998/12/10	-
SLT-LEN	Spectroscopy	Spectroscopy	F20.3	arcsec	-	1998/12/14	-
SLT-OBJP	Spectroscopy	Optional	F20.3	arcsec	-	1998/12/14	-
SLT-PA	Spectroscopy	Spectroscopy	F20.1	degree	-	1998/12/14	-
SLT-PEND	Spectroscopy	Optional	F20.1	degree	-	1998/12/14	-
SLT-PSTR	Spectroscopy	Optional	F20.1	degree	-	1998/12/14	-
SLT-WID	Spectroscopy	Spectroscopy	F20.3	arcsec	-	1998/12/14	-
SLTC-DEC	Spectroscopy	Optional	F20.5	degree	-	1998/12/10	-
SLTC-RA	Spectroscopy	Optional	F20.5	degree	-	1998/12/10	-
SLTCPIX1	Spectroscopy	Spectroscopy	F20.1	pixel	-	1998/12/14	-
SLTCPIX2	Spectroscopy	Spectroscopy	F20.1	pixel	-	1998/12/14	-
SV-PRB	Telescope	Optional	F20.3	mm	-	1998/12/14	-
TELESCOP	Origin	Common	A30	-	-	1998/12/14	FITS.SBR.TELESCOP
TELFOCUS	Telescope	Common	A30	-	-	1998/12/14	FITS.SBR.TELFOCUS
TIMESYS	Time	Common	A8	-	UTC	1998/12/14	Toolkit
TRAN-END	Environment	Optional	F20.3	-	-	1998/12/14	FITS.SBR.TRANSP
TRAN-STR	Environment	Optional	F20.3	-	-	1998/12/14	FITS.SBR.TRANSP
TRANSP	Environment	Optional	F20.3	-	-	1998/12/14	FITS.SBR.TRANSP
UT	Time	Common	A12	UTC	-	1998/12/10	Toolkit
UT-END	Time	Optional	A12	UTC	-	1998/12/10	Toolkit
UT-STR	Time	Optional	A12	UTC	-	1998/12/10	Toolkit
UT1-UTC	Time	Optional	F20.5	sec	-	1998/12/14	FITS.SBR.UT1-UTC
WAV-MAX	Spectroscopy	Spectroscopy	F20.4	nm	-	1998/12/14	-
WAV-MIN	Spectroscopy	Spectroscopy	F20.4	nm	-	1998/12/14	-
WAVELEN	Spectroscopy	Spectroscopy	F20.4	nm	-	1998/12/10	-
WCS-ORIG	WCS	Imaging	A20	-	-	1998/12/10	Toolkit
WEATHER	Environment	Optional	A30	-	-	1998/12/14	FITS.SBR.WEATHER
ZD	Time	Optional	F20.5	degree	-	1998/11/24	FITS.SBR.ZD
ZD-END	Time	Optional	F20.5	degree	-	1998/11/25	FITS.SBR.ZD
ZD-STR	Time	Optional	F20.5	degree	-	1999/03/01	FITS.SBR.ZD

● Category 順基本辞書 (詳細説明付)

[Dictionary = Basic] (Category 順、その 1-1: Comment)

```
------------------------------------------------------------
HeaderKeyWord: COMMENT
Category     : Comment
Importance   : Optional
FormatF      : A79
Unit         : -
Recommend    : -
Sample       : 'Comment '
Comment      : Comment
DescriptionE : Used for describing the comments about what can not be described by Keyword and
               parameters.
DescriptionJ : ヘッダ中にキーワードとパラメータで表現しきれないようなコメントを記述したい場合に用いる。
------------------------------------------------------------
HeaderKeyWord: HISTORY
Category     : Comment
Importance   : Optional
FormatF      : A60
Unit         : -
Recommend    : -
Sample       : 'QDAS ok'
Comment      : History
DescriptionE : Used for describing the history of data analysis and so on performed to the data.
DescriptionJ : 当該データに対してなされた処理履歴。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 2-1: Environment)

```
------------------------------------------------------------
HeaderKeyWord: DOM-HEND
Category     : Environment
Importance   : Optional
FormatF      : F20.1
Unit         : %
Recommend    : -
Sample       : 5.4
Comment      : Humidity in the dome at exp. end (%)
DescriptionE : Humidity measured in the dome at the exposure end. Unit is %.
DescriptionJ : 露出終了時のドーム内湿度。単位はパーセント (%)。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 2-2: Environment(続))

```
------------------------------------------------------------
HeaderKeyWord: DOM-HSTR
Category     : Environment
Importance   : Optional
FormatF      : F20.1
Unit         : %
Recommend    : -
Sample       : 5.3
Comment      : Humidity in the dome at exp. start (%)
DescriptionE : Humidity measured in the dome at the exposure start. Unit is %.
DescriptionJ : 露出開始時のドーム内湿度。単位はパーセント (%)。
------------------------------------------------------------
HeaderKeyWord: DOM-HUM
Category     : Environment
Importance   : Optional
FormatF      : F20.1
Unit         : %
Recommend    : -
Sample       : 23.1
Comment      : Humidity measured in the dome
DescriptionE : Humidity measured in the dome. Unit is %.
DescriptionJ : ドーム内で測定した湿度。単位はパーセント (%)。
------------------------------------------------------------
HeaderKeyWord: DOM-PEND
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : hpa
Recommend    : -
Sample       : 645.83
Comment      : Dome atm. pressure at exposure end (hpa)
DescriptionE : Atmospheric pressure in the dome at the end of the exposure. Unit is hpa.
DescriptionJ : 露出終了時のドーム内気圧。単位は hpa。
------------------------------------------------------------
HeaderKeyWord: DOM-PRS
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : hpa
Recommend    : -
Sample       : 648.21
Comment      : Atmospheric pressure in the Dome (hpa)
DescriptionE : Atmospheric pressure in the Dome. Unit is hpa.
DescriptionJ : 露出中の典型的な時刻に測定されたドーム内での気圧。単位は hpa。
------------------------------------------------------------
HeaderKeyWord: DOM-PSTR
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : hpa
Recommend    : -
Sample       : 645.14
Comment      : Dome Atm. pressure at exp.start (hpa)
DescriptionE : Atmospheric pressure in the dome at the start of the exposure. Unit is hpa.
DescriptionJ : 露出開始時のドーム内気圧。単位は hpa。
------------------------------------------------------------
HeaderKeyWord: DOM-TEND
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 273.16
Comment      : Temp. in the dome at exp. end (K)
DescriptionE : Temperature measured in the dome/enclosure at the exposure end. Unit is Kelvin (K).
DescriptionJ : 露出終了時にドーム内で測定された気温。単位はケルビン (K)。
------------------------------------------------------------
HeaderKeyWord: DOM-TMP
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 273.39
Comment      : Temperature measured in the dome (K)
DescriptionE : Temperature measured in the dome/enclosure. Unit is Kelvin (K).
DescriptionJ : 露出中の典型的な時刻にドーム内で測定された気温。単位はケルビン (K)。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 2-3: Environment(続))

```
----------------------------------------------------------
HeaderKeyWord: DOM-TSTR
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 273.14
Comment      : Temp. in the dome at exp. start (K)
DescriptionE : Temperature measured in the dome/enclosure at the exposure start. Unit is Kelvin
               (K).
DescriptionJ : 露出開始時にドーム内で測定された気温。単位はケルビン (K)。
----------------------------------------------------------
HeaderKeyWord: DOM-WEND
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : m/s
Recommend    : -
Sample       : 10.88
Comment      : Wind vel. in dome at exp. end (m/s)
DescriptionE : Wind velocity measured in the dome/enclosure at the exposure end (m/s).
DescriptionJ : 露出終了時に測定したドーム内風速 (m/s)。
----------------------------------------------------------
HeaderKeyWord: DOM-WMAX
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : m/s
Recommend    : -
Sample       : 8.34
Comment      : Max wind vel. in dome during exp. (m/s)
DescriptionE : Maximum wind velocity (m/s) measured inside of the dome/enclosure during the
               exposure.
DescriptionJ : 露出中にドーム内部で測定された最大風速。単位は m/s。
----------------------------------------------------------
HeaderKeyWord: DOM-WMIN
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : m/s
Recommend    : -
Sample       : 5.22
Comment      : Min wind vel. in dome during exp. (m/s)
DescriptionE : Minimum wind velocity (m/s) measured inside of the dome/enclosure during the
               exposure.
DescriptionJ : 露出中にドーム内部で測定された最小風速。単位は m/s。
----------------------------------------------------------
HeaderKeyWord: DOM-WND
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : m/s
Recommend    : -
Sample       : 9.12
Comment      : Wind velocity in the dome (m/s)
DescriptionE : Wind velocity measured in the dome/enclosure (m/s).
DescriptionJ : ドーム内で測定した風速 (m/s)。
----------------------------------------------------------
HeaderKeyWord: DOM-WSTR
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : m/s
Recommend    : -
Sample       : 10.99
Comment      : Wind vel. in dome at exp. end (m/s)
DescriptionE : Wind velocity measured in the dome/enclosure at the exposure start (m/s).
DescriptionJ : 露出開始時に測定したドーム内風速 (m/s)。
----------------------------------------------------------
HeaderKeyWord: NAS-TAVE
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 274.01
Comment      : Averaged Temperature in Nas.enclosure(K)
DescriptionE : The average of the temperature (Kelvin) in the Nasmyth enclosure.
DescriptionJ : 露出中のナスミス室内の平均温度。単位はケルビン (K)。
----------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 2-4: Environment(続))

```
-------------------------------------------------------------
HeaderKeyWord: NAS-TMAX
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 274.13
Comment      : Max temperature in Nasmyth enclosure (K)
DescriptionE : Maximum temperature (Kelvin) in the Nasmyth enclosure.
DescriptionJ : 露出中のナスミス室内の最高温度。単位はケルビン (K)。
-------------------------------------------------------------
HeaderKeyWord: NAS-TMIN
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 273.66
Comment      : Min temperature in Nasmyth enclosure (K)
DescriptionE : Minimum temperature (Kelvin) in the Nasmyth enclosure.
DescriptionJ : 露出中のナスミス室内の最低温度。単位はケルビン (K)。
-------------------------------------------------------------
HeaderKeyWord: NAS-TSD
Category     : Environment
Importance   : Optional
FormatF      : F20.1
Unit         : K
Recommend    : -
Sample       : 0.3
Comment      : Standard Dev. of the Nas. room Temp. (K)
DescriptionE : Standard deviation of the temperature (Kelvin) in the Nasmyth enclosure.
DescriptionJ : 露出中のナスミス室内における温度変化の標準偏差。単位はケルビン (K)。
-------------------------------------------------------------
HeaderKeyWord: OUT-HEND
Category     : Environment
Importance   : Optional
FormatF      : F20.1
Unit         : %
Recommend    : -
Sample       : 5.7
Comment      : Outside humidity at exp. end (%)
DescriptionE : Humidity (%) measured outside of the dome/enclosure at the exposure end.
DescriptionJ : 露出終了時にドーム外部で測定された湿度。単位はパーセント (%)。
-------------------------------------------------------------
HeaderKeyWord: OUT-HSTR
Category     : Environment
Importance   : Optional
FormatF      : F20.1
Unit         : %
Recommend    : -
Sample       : 5.5
Comment      : Outside humidity at exp. start (%)
DescriptionE : Humidity (%) measured outside of the dome/enclosure at the exposure start.
DescriptionJ : 露出開始時にドーム外部で測定された湿度。単位はパーセント (%)。
-------------------------------------------------------------
HeaderKeyWord: OUT-HUM
Category     : Environment
Importance   : Optional
FormatF      : F20.1
Unit         : %
Recommend    : -
Sample       : 15.3
Comment      : Humidity measured outside of dome (%)
DescriptionE : Humidity (%) measured outside of the dome/enclosure.
DescriptionJ : ドーム外部で測定された湿度。単位はパーセント (%)。
-------------------------------------------------------------
HeaderKeyWord: OUT-PEND
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : hpa
Recommend    : -
Sample       : 623.12
Comment      : Outside Atmos.press. at exp. end (hpa)
DescriptionE : Atmospheric pressure (hpa) outside of the dome/enclosure at the exposure end.
DescriptionJ : 露出終了時にドーム外部で測定された気圧。単位は hpa。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 2-5: Environment(続))

```
-------------------------------------------------------------
HeaderKeyWord: OUT-PRS
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : hpa
Recommend    : -
Sample       : 621.45
Comment      : Atmospheric pressure outside dome (hpa)
DescriptionE : Atmospheric pressure (hpa) outside of the dome/enclosure.
DescriptionJ : ドーム外部で測定された気圧。単位は hpa。
-------------------------------------------------------------
HeaderKeyWord: OUT-PSTR
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : hpa
Recommend    : -
Sample       : 621.32
Comment      : Outside Atmos.press. at exp. start (hpa)
DescriptionE : Atmospheric pressure (hpa) outside of the dome/enclosure at the exposure start.
DescriptionJ : 露出開始時にドーム外部で測定された気圧。単位は hpa。
-------------------------------------------------------------
HeaderKeyWord: OUT-TEND
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 274.01
Comment      : Outside temperature at exp. end (K)
DescriptionE : Temperature (Kelvin) measured outside of the dome/enclosure at the exposure end.
DescriptionJ : 露出終了時にドーム外部で測定された気温。単位はケルビン (K)。
-------------------------------------------------------------
HeaderKeyWord: OUT-TMP
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 277.39
Comment      : Temperature measured outside of dome (K)
DescriptionE : Temperature (Kelvin) measured outside of the dome/enclosure.
DescriptionJ : ドーム外部で測定された気温。単位はケルビン (K)。
-------------------------------------------------------------
HeaderKeyWord: OUT-TSTR
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 273.44
Comment      : Outside temperature at exp. start (K)
DescriptionE : Temperature (Kelvin) measured outside of the dome/enclosure at the exposure start.
DescriptionJ : 露出開始時にドーム外部で測定された気温。単位はケルビン (K)。
-------------------------------------------------------------
HeaderKeyWord: OUT-WEND
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : m/s
Recommend    : -
Sample       : 11.24
Comment      : Outside wind velocity at exp. end (m/s)
DescriptionE : Wind velocity (m/s) measured outside of the dome/enclosure at the exposure end.
DescriptionJ : 露出終了時にドーム外部で測定された風速。単位は m/s。
-------------------------------------------------------------
HeaderKeyWord: OUT-WMAX
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : m/s
Recommend    : -
Sample       : 13.19
Comment      : Max Outside wind vel. during exp. (m/s)
DescriptionE : Maximum wind velocity (m/s) measured outside of the dome/enclosure during the
               exposure.
DescriptionJ : 露出中にドーム外部で測定された最大風速。単位は m/s。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 2-6: Environment(続))

```
------------------------------------------------------------
HeaderKeyWord: OUT-WMIN
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : m/s
Recommend    : -
Sample       : 9.59
Comment      : Min Outside wind vel. during exp. (m/s)
DescriptionE : Minimum wind velocity (m/s) measured outside of the dome/enclosure during the
               exposure.
DescriptionJ : 露出中にドーム外部で測定された最小風速。単位は m/s。
------------------------------------------------------------
HeaderKeyWord: OUT-WND
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : m/s
Recommend    : -
Sample       : 6.49
Comment      : Wind velocity outside of dome (m/s)
DescriptionE : Wind velocity (m/s) measured outside of the dome/enclosure.
DescriptionJ : ドーム外部で測定された風速。単位は m/s。
------------------------------------------------------------
HeaderKeyWord: OUT-WSTR
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : m/s
Recommend    : -
Sample       : 9.43
Comment      : Outside wind velocity at exp. start(m/s)
DescriptionE : Wind velocity (m/s) measured outside of the dome/enclosure at the exposure start.
DescriptionJ : 露出開始時にドーム外部で測定された風速。単位は m/s。
------------------------------------------------------------
HeaderKeyWord: SEEING
Category     : Environment
Importance   : Optional
FormatF      : F20.2
Unit         : arcsec
Recommend    : -
Sample       : 0.34
Comment      : StarSize FWHM at telescope focus(arcsec)
DescriptionE : FWHM of the star size at telescope focus. It'll be measured with autoguider.
               Unit is arcsec.
DescriptionJ : 望遠鏡焦点部における星像の FWHM。オートガイダーを用いて測定される。単位は arcsec。
------------------------------------------------------------
HeaderKeyWord: TRAN-END
Category     : Environment
Importance   : Optional
FormatF      : F20.3
Unit         : -
Recommend    : -
Sample       : 0.875
Comment      : Sky transparency at the end of exposure
DescriptionE : Sky transparency at the end of exposure
DescriptionJ : 露出終了時の大気透過率。
------------------------------------------------------------
HeaderKeyWord: TRAN-STR
Category     : Environment
Importance   : Optional
FormatF      : F20.3
Unit         : -
Recommend    : -
Sample       : 0.875
Comment      : Sky transparency at beginning of exp.
DescriptionE : Sky transparency at the beginning of the exposure.
DescriptionJ : 露出開始時の大気透過率。
------------------------------------------------------------
HeaderKeyWord: TRANSP
Category     : Environment
Importance   : Optional
FormatF      : F20.3
Unit         : -
Recommend    : -
Sample       : 0.875
Comment      : Sky transparency
DescriptionE : Sky transparency
DescriptionJ : 露出中の典型的な時刻における大気透過率。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 2-7: Environment(続))

```
------------------------------------------------------------
HeaderKeyWord: WEATHER
Category     : Environment
Importance   : Optional
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'CLEAR   '
Comment      : Weather condition
DescriptionE : Weather condition. CLEAR/FINE/nn%CLOUD...?
DescriptionJ : 天候情報。CLEAR/FINE/nn%CLOUD... などがある。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 3-1: File)

```
------------------------------------------------------------
HeaderKeyWord: BLANK
Category     : File
Importance   : Common
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : -32768
Comment      : Value used for NULL pixels
DescriptionE : Value used to specify the absence of pixel values. BLANK is normally used to fill
               out regions of the frame that have not been exposed e.g. because of windowing.
DescriptionJ : ピクセル値がこの BLANK 値と等しい場合、このピクセル値は意味のない値であると解釈される。
------------------------------------------------------------
HeaderKeyWord: BSCALE
Category     : File
Importance   : Common
FormatF      : F20.8
Unit         : -
Recommend    : -
Sample       : 1.12345678
Comment      : Real=fits-value*BSCALE+BZERO
DescriptionE : This keyword shall be used, along with the BZERO keyword, when the array pixel
               values are not the true physical values. Equation:
               physical_value = BZERO + BSCALE x array_value
DescriptionJ : データのピクセル値が実際の物理値を表わしていない時に、そのピクセル値を実際の物理値へ変換するた
               めに用いる。その値は、キーワード BZERO と共に書き下される以下の変換式により求められる。
               物理値 = BZERO + BSCALE x ピクセル値
------------------------------------------------------------
HeaderKeyWord: BUNIT
Category     : File
Importance   : Common
FormatF      : A10
Unit         : -
Recommend    : -
Sample       : 'ADU     '
Comment      : Unit of original pixel values
DescriptionE : The value field shall contain a character string, describing the physical units in
               which the quantities in the array, after application of BSCALE and BZERO, are
               expressed.
DescriptionJ : データが表わす実際の物理値（キーワード BSCALE とキーワード BZERO による変換式を使ってピクセル
               値から計算される）の単位であり、文字列で与えられる。
------------------------------------------------------------
HeaderKeyWord: BZERO
Category     : File
Importance   : Common
FormatF      : F20.8
Unit         : -
Recommend    : -
Sample       : 0.00000001
Comment      : Real=fits-value*BSCALE+BZERO
DescriptionE : This keyword shall be used, along with the BSCALE keyword, when the array pixel
               values are not the true physical values, to transform the primary data array values
               to the true values. Equation: physical_value = BZERO + BSCALE x array_value.
DescriptionJ : データのピクセル値が実際の物理値を表わしていない時に、そのピクセル値を実際の物理値へ変換するた
               めに用いられる。この変換式は以下の通りである。物理値 = BZERO + BSCALE x ピクセル値
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 3-2: File(続))

```
-------------------------------------------------------------
HeaderKeyWord: CDELT1
Category     : File
Importance   : Common
FormatF      : F20.8
Unit         : -
Recommend    : -
Sample       : 0.00001212
Comment      : X Scale projected on detector (#/pix)
DescriptionE : The value is a floating point number giving the partial derivative of the
               coordinate specified by the CTYPE1 keywords with respect to the pixel index,
               evaluated at the reference point CRPIX1, in units of the coordinate specified by
               the CTYPE1 keyword.
DescriptionJ : キーワード CRPIX1 で表わされる基準ピクセルの位置において+1 ピクセル移動した時の、キーワード
               CTYPE1 で表わされる座標値の増分を表わす。
-------------------------------------------------------------
HeaderKeyWord: CDELT2
Category     : File
Importance   : Common
FormatF      : F20.8
Unit         : -
Recommend    : -
Sample       : 0.00001155
Comment      : Y scale projected on detector (#/pix)
DescriptionE : The value is a floating point number giving the partial derivative of the
               coordinate specified by the CTYPE2 keywords with respect to the pixel index,
               evaluated at the reference point CRPIX2, in units of the coordinate specified by
               the CTYPE2 keyword.
DescriptionJ : キーワード CRPIX2 で表わされる基準ピクセルの位置において+1 ピクセル移動した時の、キーワード
               CTYPE2 で表わされる座標値の増分を表わす。
-------------------------------------------------------------
HeaderKeyWord: CRPIX1
Category     : File
Importance   : Common
FormatF      : F20.1
Unit         : pixel
Recommend    : -
Sample       : 512.5
Comment      : Reference pixel in X (pixel)
DescriptionE : Pixel position of the reference point along #1 axis. By convention the center of
               the pixel is pix.0, pix.5 gives the right edge of the pixel and (pix-1).5 its left
               edge. Origin is (1,1).
DescriptionJ : 第 1 軸方向での参照基準点の位置を、その軸上での目盛であるインデックスで表わした浮動小数点値であ
               る。ピクセル中央が xxx.0、右端が xxx.5、左端が (xxx-1).5 となる。原点は (1,1)。
-------------------------------------------------------------
HeaderKeyWord: CRPIX2
Category     : File
Importance   : Common
FormatF      : F20.1
Unit         : pixel
Recommend    : -
Sample       : 512.5
Comment      : Reference pixel in Y (pixel)
DescriptionE : Pixel position of the reference point along #2 axis. By convention the center of
               the pixel is pix.0,pix.5 gives the bottom edge of pixel and (pix-1).5 its top edge.
               Origin is (1,1).
DescriptionJ : 第 2 軸方向での参照基準点の位置を、その軸上での目盛であるインデックスで表わした浮動小数点値であ
               る。ピクセル中央が xxx.0、右端が xxx.5、左端が (xxx-1).5 となる。原点は (1,1)。
-------------------------------------------------------------
HeaderKeyWord: CRVAL1
Category     : File
Importance   : Common
FormatF      : F20.8
Unit         : -
Recommend    : -
Sample       : 29.33333333
Comment      : Physical value of the reference pixel X
DescriptionE : The value field shall contain a floating point number giving the value of the
               partial coordinate specified by the CTYPE1 keyword at the reference point CRPIX1.
DescriptionJ : 参照基準点 CRPIX1 での CTYPE1 の座標における値であり、浮動小数点値で表わされる。
-------------------------------------------------------------
HeaderKeyWord: CRVAL2
Category     : File
Importance   : Common
FormatF      : F20.8
Unit         : -
Recommend    : -
Sample       : 2.09777777
Comment      : Physical value of the reference pixel Y
DescriptionE : The value field shall contain a floating point number giving the value of the
               partial coordinate specified by the CTYPE2 keyword at the reference point CRPIX2.
DescriptionJ : 参照基準点 CRPIX2 での CTYPE2 の座標における値であり、浮動小数点値で表わされる。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 3-3: File(続))

```
------------------------------------------------------------
HeaderKeyWord: CTYPE1
Category     : File
Importance   : Common
FormatF      : A10
Unit         : -
Recommend    : RA---TAN
Sample       : 'RA---TAN'
Comment      : Pixel coordinate system
DescriptionE : Type of projection used for X axis.  RA---TAN or DEC--TAN for imaging mode, and
               WAVELENGTH for dispersion axis of spectroscopy mode.
DescriptionJ : 座標名を表わす文字列。撮像観測の場合は 'RA---TAN' あるいは、'DEC--TAN' となり、分光観測の
               場合は 'WAVELENGTH' が推奨される。
------------------------------------------------------------
HeaderKeyWord: CTYPE2
Category     : File
Importance   : Common
FormatF      : A10
Unit         : -
Recommend    : DEC--TAN
Sample       : 'DEC--TAN'
Comment      : Pixel coordinate system
DescriptionE : Type of projection used for Y axis. RA---TAN or DEC--TAN for Imaging mode, and
               WAVELENGTH for dispersion axis of spectroscopy mode.
DescriptionJ : 座標名を表わす文字列。撮像観測の場合は 'RA---TAN' あるいは、'DEC--TAN' となり、分光観測の
               場合は 'WAVELENGTH' が推奨される。
------------------------------------------------------------
HeaderKeyWord: CUNIT1
Category     : File
Importance   : Common
FormatF      : A10
Unit         : -
Recommend    : degree
Sample       : 'degree  '
Comment      : Units used in both CRVAL1 and CDELT1
DescriptionE : Physical unit used in both CRVAL1 and CDELT1.  'nm' is recommended for spectroscopy
               mode.
DescriptionJ : 第 1 軸が表わす実際の座標値の単位であり、文字列で与えられる。空間情報の場合は 'degree'、波長情
               報の場合は 'nm' が推奨される。
------------------------------------------------------------
HeaderKeyWord: CUNIT2
Category     : File
Importance   : Common
FormatF      : A10
Unit         : -
Recommend    : degree
Sample       : 'degree  '
Comment      : Units used in both CRVAL2 and CDELT2
DescriptionE : Physical unit used in both CRVAL2 and CDELT2.  'nm' is recommended for spectroscopy
               mode.
DescriptionJ : 第 2 軸が表わす実際の座標値の単位であり、文字列で与えられる。空間情報の場合は 'degree'、波長情
               報の場合は 'nm' が推奨される。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 4-1: FITS)

```
------------------------------------------------------------
HeaderKeyWord: BITPIX
Category     : FITS
Importance   : Common
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : 32
Comment      : # of bits storing pix values
DescriptionE : The absolute value specify the number of bits that represent a data value. The only
               valid values are: 8, 16 (16-bit integer), 32 (32-bit integer), -32 (IEEE single
               precision floating point), -64 (IEEE double precision floating point).
DescriptionJ : キーワードの値は整数であり、その絶対値はデータ構造のサイズを求める際に用いられ、一つのデータ
               値を表現するために使われるビット数を表わす。有効な値は次の 5 つである: 8、16 (16 ビット整数)、
               32 (32 ビット整数)、-32 (単精度浮動小数点値)、-64 (倍精度浮動小数点値)
------------------------------------------------------------
HeaderKeyWord: END
Category     : FITS
Importance   : Common
FormatF      : -
Unit         : -
Recommend    : -
Sample       : -
Comment      : -
DescriptionE : This keyword has no associated value.  Columns 9-80 shall be filled with ASCII
               blanks.
DescriptionJ : このキーワードは値を持たない。9-80 列は ASCII 空白となる。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 4-2: FITS(続))

```
-------------------------------------------------------------
HeaderKeyWord: EXTEND
Category     : FITS
Importance   : Common
FormatF      : BOOLEAN
Unit         : -
Recommend    : -
Sample       : F
Comment      : Presence of FITS Extension
DescriptionE : If FITS file contains extensions, the keyword EXTEND and the value T must appear
               in the primary header just after the last NAXISn card image. The presence of this
               keyword with the value T in the primary header does not require that extensions be
               present.
DescriptionJ : FITS ファイルが extension を持つ場合は、Primary ヘッダ内にこのキーワードを記述し、値を'T'
               とする。記述位置は最後に記述されている NAXISn の直後である。このキーワードの記述があり、
               その値が'T' であっても、実際には extension を持たない、ということも許される。
-------------------------------------------------------------
HeaderKeyWord: NAXIS
Category     : FITS
Importance   : Common
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : 2
Comment      : # of axes in frame
DescriptionE : The value field shall contain a non-negative integer no greater than 999,
               representing the number of axes in an ordinary data array. A value of zero
               signifies that no data follow the header in the HDU (Header and Data Unit).
DescriptionJ : このキーワードの値は 999 を越えない非負の整数であり、データ配列中の軸の数を表わす。この値が 0
               の場合は、その FITS 要素の中にデータが存在しないことを示す。
-------------------------------------------------------------
HeaderKeyWord: NAXIS1
Category     : FITS
Importance   : Common
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 1024
Comment      : # of pixels/row
DescriptionE : Number of pixels along the X axis (rows). If NAXIS is equal to 0, there should not
               be any NAXISn keywords.
DescriptionJ : データ配列の第 l 軸方向のデータ要素数を表わす。NAXIS が 0 の場合、NAXISn には一切記述してはなら
               ない。
-------------------------------------------------------------
HeaderKeyWord: NAXIS2
Category     : FITS
Importance   : Common
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : 1024
Comment      : # of rows (also # of scan lines)
DescriptionE : Number of pixels along the Y axis (lines). If NAXIS is equal to 0, there should not
               be any NAXISn keywords.
DescriptionJ : データ配列の第２軸方向のデータ要素数を表わす。NAXIS が 0 の場合、NAXISn には一切記述してはなら
               ない。
-------------------------------------------------------------
HeaderKeyWord: NAXIS3
Category     : FITS
Importance   : Optional
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : 36
Comment      : # of the 3rd axis
DescriptionE : Number of pixels along the Z (3rd) axis. If NAXIS is equal to 0, there should not
               be any NAXISn keywords.
DescriptionJ : データ配列の第３軸方向のデータ要素数を表わす。NAXIS が 0 の場合、NAXISn には一切記述してはなら
               ない。
-------------------------------------------------------------
HeaderKeyWord: SIMPLE
Category     : FITS
Importance   : Common
FormatF      : BOOLEAN
Unit         : -
Recommend    : T
Sample       : T
Comment      : Standard FITS format
DescriptionE : SIMPLE must be equal to T to conform to FITS. This keyword should be appeared at
               the top of the HDU.
DescriptionJ : ファイルが FITS の規約に準拠していれば値を T とする。すばるでは必ず T としなければならない。
               プライマリヘッダ部の先頭になければならない。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 5-1: Instrument)

```
-------------------------------------------------------------
HeaderKeyWord: AUTOGUID
Category     : Instrument
Importance   : Optional
FormatF      : A8
Unit         : -
Recommend    : -
Sample       : 'OFF     '
Comment      : Auto Guide ON/OFF
DescriptionE : This keyword shows whether the Auto Guider (AG) was ON or OFF. If the value is ON,
               it means that the telescope is tracking by using the AG system.
DescriptionJ : Auto Guider(AG) が積分中に ON か OFF かを記述する。AG が ON とは、AG による tracking が行われ
               ている事を意味する
-------------------------------------------------------------
HeaderKeyWord: BIN-FCT1
Category     : Instrument
Importance   : Common
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 1
Comment      : Binning factor of X axis (pixel)
DescriptionE : Binning factor of X axis (pixel) when reading the data. X means a direction of
               NAXIS1.
DescriptionJ : データ読みだし時の X 方向のビニング数。X 方向とは CCD の NAXIS1 に沿った方向。
-------------------------------------------------------------
HeaderKeyWord: BIN-FCT2
Category     : Instrument
Importance   : Common
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 1
Comment      : Binning factor of Y axis (pixel)
DescriptionE : Binning factor of Y axis (pixel) when reading the data. Y means a direction of
               NAXIS2.
DescriptionJ : データ読みだし時の Y 方向のビニング数。Y 方向とは CCD の NAXIS2 に沿った方向。
-------------------------------------------------------------
HeaderKeyWord: COADD
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : 10
Comment      : Frame is created by # of sub-exposures
DescriptionE : 'COADD' shows how many sub-exposures were co-added into a frame. Integration time
               of each sub-exposure is shown in 'EXP1TIME'. Total integration time of a frame
               corresponds to the product of 'EXP1TIME' and this 'COADD'.
               (EXPTIME = EXP1TIME * COADD)
DescriptionJ : 1 frame が何枚の sub-exposure を足しあわせた物かを記述する。sub-exposure の積分時間は
               EXP1TIME で記述され、EXP1TIME と COADD を掛け合わせた物が最終的な 1 frame の積分時間に対応す
               る。(EXPTIME = EXP1TIME * COADD)
-------------------------------------------------------------
HeaderKeyWord: DET-Ann
Category     : Instrument
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : 0.045
Comment      : Relative angle of nn-th detector (deg)
DescriptionE : Angle between nn-th detector and instrument's standard line (degree)
DescriptionJ : nn 番目の検出器の基準線に対する相対的な取付角 (degree)
-------------------------------------------------------------
HeaderKeyWord: DET-ID
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : 2
Comment      : ID of the detector used for this data
DescriptionE : ID of the detector used for this fits data.  The detector can be identified by the
               number when the instrument equips multi detectors.
DescriptionJ : 複数の検出器からなる観測装置の場合、当該データを生成させた検出器 (CCD) 等の識別子
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 5-2: Instrument(続))

```
------------------------------------------------------------
HeaderKeyWord: DET-NSMP
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : 1
Comment      : # of multi-sampling in an exposure
DescriptionE : number of multi-sampling in an exposure
DescriptionJ : 1 回の露出中に複数回の読み出しを行う場合にその回数
------------------------------------------------------------
HeaderKeyWord: DET-P1nn
Category     : Instrument
Importance   : Optional
FormatF      : F20.3
Unit         : arcsec
Recommend    : -
Sample       : 61.875
Comment      : Relative X pos of nn-th detector(arcsec)
DescriptionE : X Position of the nn-th detector center relative from the field center or
               instrument standard position
DescriptionJ : 複数個の検出器を持つ装置の場合に、装置基準位置、あるいは、フィールドセンターから nn 番目の検出
               器の中心位置までの X 軸 (第 1 軸) 方向の相対位置
------------------------------------------------------------
HeaderKeyWord: DET-P2nn
Category     : Instrument
Importance   : Optional
FormatF      : F20.3
Unit         : arcsec
Recommend    : -
Sample       : 120.125
Comment      : Relative Y pos of nn-th detector(arcsec)
DescriptionE : Y Position of the nn-th detector center relative from the field center or
               instrument standard position
DescriptionJ : 複数個の検出器を持つ装置の場合に、装置基準位置、あるいは、フィールドセンターから nn 番目の検出
               器の中心位置までの Y 軸 (第 2 軸) 方向の相対位置
------------------------------------------------------------
HeaderKeyWord: DET-RST
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : 2
Comment      : reset number before exposure
DescriptionE : Number of detector reset performed before exposure.
DescriptionJ : 露出前に検出器をリセットした回数。
------------------------------------------------------------
HeaderKeyWord: DET-SMPL
Category     : Instrument
Importance   : Optional
FormatF      : A20
Unit         : -
Recommend    : -
Sample       : 'destructive'
Comment      : sampling method
DescriptionE : Sampling method of produced image.
DescriptionJ : どのようなパターンでデータをサンプリングしたかを示す文字列。
------------------------------------------------------------
HeaderKeyWord: DET-TAVE
Category     : Instrument
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 121.87
Comment      : Average of the detector temperature (K)
DescriptionE : Average of the detector temperature during exposure. Unit is Kelvin (K).
DescriptionJ : 検出器の平均の温度。基本的には時間平均を意味している。単位はケルビン (K)。
------------------------------------------------------------
HeaderKeyWord: DET-TMAX
Category     : Instrument
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 121.99
Comment      : Max detector temperature during exp. (K)
DescriptionE : Maximum detector temperature during the exposure. Unit is Kelvin (K).
DescriptionJ : 露出中の検出器の最高温度。単位はケルビン (K)。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 5-3: Instrument(続))

```
------------------------------------------------------------
HeaderKeyWord: DET-TMED
Category     : Instrument
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 121.54
Comment      : Median of the detector temperature (K)
DescriptionE : Median of the detector temperature during the exposure. Unit is Kelvin (K).
DescriptionJ : 露出中の検出器温度のメジアン値。単位はケルビン (K)。
------------------------------------------------------------
HeaderKeyWord: DET-TMIN
Category     : Instrument
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 125.88
Comment      : Min detector temperature during exp. (K)
DescriptionE : Minimum detector temperature during the exposure. Unit is Kelvin (K).
DescriptionJ : 露出中の検出器の最低温度。単位はケルビン (K)。
------------------------------------------------------------
HeaderKeyWord: DET-TMP
Category     : Instrument
Importance   : Common
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 165.12
Comment      : Detector temperature (K)
DescriptionE : Detectors' typical (representative) temperature. Unit is Kelvin (K).
DescriptionJ : 検出器の温度の典型的な値 (代表値)。単位はケルビン (K)。
------------------------------------------------------------
HeaderKeyWord: DET-Tnn
Category     : Instrument
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 165.13
Comment      : nn-th Detector temperature (K)
DescriptionE : nn-th Detectors' typical (representative) temperature. Unit is Kelvin (K).
DescriptionJ : nn 番目の検出器温度の典型的な値 (代表値)。単位はケルビン (K)。
------------------------------------------------------------
HeaderKeyWord: DET-TSD
Category     : Instrument
Importance   : Optional
FormatF      : F20.2
Unit         : K
Recommend    : -
Sample       : 0.21
Comment      : Standard Dev. of the detector temp (K)
DescriptionE : Standard deviation of the detector temperature during the exposure. Unit is Kelvin
               (K).
DescriptionJ : 露出中の検出器温度の標準偏差。単位はケルビン (K)。
------------------------------------------------------------
HeaderKeyWord: DET-VER
Category     : Instrument
Importance   : Optional
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'Ver.1-c-2'
Comment      : Detector control command script name
DescriptionE : Detector control command script name
DescriptionJ : 検出器制御コマンドスクリプトの名前。
------------------------------------------------------------
HeaderKeyWord: DETECTOR
Category     : Instrument
Importance   : Common
FormatF      : A20
Unit         : -
Recommend    : -
Sample       : 'CCD0001 '
Comment      : Name of the detector/CCD
DescriptionE : Name/Identification of the detector/CCD.
DescriptionJ : CCD 等の検出器の名称
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 5-4: Instrument(続))

```
-------------------------------------------------------------
HeaderKeyWord: DETPXSZ1
Category     : Instrument
Importance   : Optional
FormatF      : F20.4
Unit         : mm
Recommend    : -
Sample       : 0.0401
Comment      : Detector pixel size in axis1 (mm)
DescriptionE : Detector pixel size in first axis (NAXIS1). Unit is mm.
DescriptionJ : 検出器の第 1 軸 (NAXIS1) 方向のピクセルサイズ。単位は mm。
-------------------------------------------------------------
HeaderKeyWord: DETPXSZ2
Category     : Instrument
Importance   : Optional
FormatF      : F20.4
Unit         : mm
Recommend    : -
Sample       : 0.0399
Comment      : Detector pixel size in axis2 (mm)
DescriptionE : Detector pixel size in second axis (NAXIS2). Unit is mm.
DescriptionJ : 検出器の第 2 軸 (NAXIS2) 方向のピクセルサイズ。単位は mm。
-------------------------------------------------------------
HeaderKeyWord: EFP-MIN1
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 5
Comment      : Start X pos. of effective area (pix)
DescriptionE : Start pixel position of effective data region in first axis(NAXIS1).
               Effective data region means the region excluding overscan region and includes the
               information from the sky.
DescriptionJ : 第 1 軸 (NAXIS1) 方向の有効領域の開始ピクセル位置。有効領域とはオーバースキャン領域を含まない、
               天体の情報を含む領域を指す。
-------------------------------------------------------------
HeaderKeyWord: EFP-MIN2
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 10
Comment      : Start Y pos. of effective area (pix)
DescriptionE : Start pixel position of effective data region in second axis(NAXIS2).
               Effective data region means the region excluding overscan region and includes the
               information from the sky.
DescriptionJ : 第 2 軸 (NAXIS2) 方向の有効領域の開始ピクセル位置。有効領域とはオーバースキャン領域を含まない、
               天体の情報を含む領域を指す。
-------------------------------------------------------------
HeaderKeyWord: EFP-RNG1
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 1024
Comment      : X Range of overscan area (pix)
DescriptionE : Range of effective data region in first axis(NAXIS1). Unit is pixel.
               Effective data region means the region excluding overscan region and includes the
               information from the sky.
DescriptionJ : 第 1 軸 (NAXIS1) 方向の有効領域のピクセル単位での大きさ。有効領域とはオーバースキャン領域を含ま
               ない、天体の情報を含む領域を指す。
-------------------------------------------------------------
HeaderKeyWord: EFP-RNG2
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 1024
Comment      : Y Range of overscan area (pix)
DescriptionE : Range of effective data region in second axis(NAXIS2). Unit is pixel.
               Effective data region means the region excluding overscan region and includes the
               information from the sky.
DescriptionJ : 第 2 軸 (NAXIS2) 方向の有効領域のピクセル単位での大きさ。有効領域とはオーバースキャン領域を含ま
               ない、天体の情報を含む領域を指す。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 5-5: Instrument(続))

```
------------------------------------------------------------
HeaderKeyWord: EXP-ID
Category     : Instrument
Importance   : Common
FormatF      : A12
Unit         : -
Recommend    : -
Sample       : CACE00000231
Comment      : ID of the exposure this data was taken
DescriptionE : ID of an exposure this data was taken. Effective for multi detectors. First 3
               characters represent instrument. The 4th character is 'E'. Remaining 8 digits are
               sequential number. The representation of first 3 characters are the same with for
               FRAMEID.
DescriptionJ : このデータの撮られた露出を表わす ID 番号。複数の検出器に対してこの ID 番号が使われる。最初の３
               文字は観測装置を表わす。４文字目は常に'E'。残りの８桁の数字が通し番号を表わす。最初の３文字の
               表記方法は FRAMEID と同じ。
------------------------------------------------------------
HeaderKeyWord: FLT-Ann
Category     : Instrument
Importance   : Optional
FormatF      : F20.2
Unit         : degree
Recommend    : -
Sample       : 6.12
Comment      : Inclination of nn-th Filter (degree)
DescriptionE : Inclination of the nn-th filter reference to optical axis. Unit is degree.
               When filter surface is normal to optical axis, this value is 0.0.
DescriptionJ : nn 番目のフィルターの光軸に対する角度。単位は度 (degree)。０度の時に光軸とフィルター面が直交
               する。
------------------------------------------------------------
HeaderKeyWord: FILTERnn
Category     : Instrument
Importance   : Optional
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'FILTER:R'
Comment      : Filter name/ID
DescriptionE : Filter/Grism name/ID in nn-th filter wheel which is used in the exposure.
DescriptionJ : nn 番目のフィルターホイールに入っている、観測に使用されたフィルターまたはグリズムの識別子。
               nn は２桁の整数。
------------------------------------------------------------
HeaderKeyWord: FRAMEID
Category     : Instrument
Importance   : Common
FormatF      : A12
Unit         : -
Recommend    : -
Sample       : CACA00000478
Comment      : Image sequential number
DescriptionE : Sequential number identifying the frame. First 3 characters represent instrument.
               The 4th character is 'A' for raw data or 'Q' for reduced data. The following 8
               digit is for a sequential number.
DescriptionJ : フレームを識別するための通し番号。最初の３文字は観測装置を表わす。４文字目は生データは'A'、
               処理済みには 'Q' がつく。残りの８桁の数字が通し番号を表わす。
------------------------------------------------------------
HeaderKeyWord: GAIN
Category     : Instrument
Importance   : Common
FormatF      : F20.3
Unit         : e/ADU
Recommend    : -
Sample       : 1.456
Comment      : AD conversion factor (electron/ADU)
DescriptionE : AD conversion factor of the detector. Unit is electron/ADU.
DescriptionJ : 検出器の A/D 変換の係数。単位は electron/ADU。
------------------------------------------------------------
HeaderKeyWord: INS-VER
Category     : Instrument
Importance   : Optional
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'FOCAS-H01C01M01F01'
Comment      : Version of the instrument /control-soft
DescriptionE : INS-VER describes a version of both the instrument hardware and control-software,
               including the detector control-software (Messia) and version of FITS keyword
               dictionary.
DescriptionJ : 観測装置のハードおよび制御ソフトウェアのバージョンが記述される。また、CCD 制御ソフトウェア
               (Messia) のバージョンや FITS 辞書のバージョンも含まれる。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 5-6: Instrument(続))

```
-------------------------------------------------------------
HeaderKeyWord: INST-PA
Category     : Instrument
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : 89.999
Comment      : P.A. of Instrument flange (degree)
DescriptionE : Position Angle of the instrument flange (degree). This value will be used for
               calculating the Slit P.A. and CCD P.A. The angle is 0 in north direction and 90
               degree in east.
DescriptionJ : 観測装置フランジの方位角 (Position Angle:P.A.)。スリットと CCD の方位角を計算するのに使わ
               れる。単位は度 (degree) で、北を 0 度とし、東を 90 度とする。
-------------------------------------------------------------
HeaderKeyWord: INSTRUME
Category     : Instrument
Importance   : Common
FormatF      : A20
Unit         : -
Recommend    : -
Sample       : 'OHS     '
Comment      : Name of instrument
DescriptionE : Character string representing the name of the instrument.
DescriptionJ : 観測装置の名称を表わす文字列。
-------------------------------------------------------------
HeaderKeyWord: OBS-MOD
Category     : Instrument
Importance   : Common
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'Imaging '
Comment      : Observation Mode
DescriptionE : Observation Mode of the data taken (Spectroscopy, Imaging, Imaging-Polarimetry,
               Spectro-Polarimetry, etc.). The value is defined by Instrument Developers.
DescriptionJ : データ取得時の観測モードが記述される (Spectroscopy, Imaging, Imaging-Polarimetry,
               Spectro-Polarimetry, etc.)。値は装置開発者が定義する。
-------------------------------------------------------------
HeaderKeyWord: PRD-MIN1
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 1
Comment      : Start X pos. of partial readout (pix)
DescriptionE : If the CCD data is taken by partial readout, this keyword shows a start X-position
               of partial readout. The value presents a physical CCD pixel where a partial readout
               is started (greater than 0).
DescriptionJ : 部分読み出しデータにおいて CCD 上の読み出し開始 X 位置を示す。ここで X とは NAXIS1 軸に沿っ
               た方向。部分読み出しをしない時は、開始が 1 となる。もしビニングをした場合でも、この項目の値は
               読み出しを開始する CCD 上の物理的ピクセル位置を表わす。
-------------------------------------------------------------
HeaderKeyWord: PRD-MIN2
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 1
Comment      : Start pos Y of partial readout (pix)
DescriptionE : If the CCD data is taken by partial readout, this keyword shows a start Y-position
               of partial readout. The value presents a physical CCD pixel where a partial readout
               is started (greater than 0).
DescriptionJ : 部分読み出しデータにおいて CCD 上の読み出し開始 Y 位置を示す。ここで Y とは NAXIS2 軸に沿っ
               た方向。部分読み出しをしない時は、開始が 1 となる。もしビニングをした場合でも、この項目の値は
               読み出しを開始する CCD 上の物理的ピクセル位置を表わす。
-------------------------------------------------------------
HeaderKeyWord: PRD-RNG1
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 2048
Comment      : X Range of the partial readout (pix)
DescriptionE : If the data is taken by partial readout, this keyword shows a range of partial
               readout along a X-direction. The value is a actually CCD range being used for
               data. PRD-RNG1 = BIN-FCT1 * EFP-RNG1.
DescriptionJ : 部分読み出しデータにおいて PRD-MIN1 (CCD 上の部分読み出し開始 X 位置) からの NAXIS1 方向の
               読みだしの幅を示す。ビニングをした場合でも、この項目の値は読み出しをする CCD 上の物理的
               ピクセル幅を表わしている。PRD-RNG1 = BIN-FCT1 * EFP-RNG1
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 5-7: Instrument(続))

```
------------------------------------------------------------
HeaderKeyWord: PRD-RNG2
Category     : Instrument
Importance   : Optional
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 1024
Comment      : Y range of the partial readout (pix)
DescriptionE : If the data is taken by partial readout, this keyword shows a range of partial
               readout along a Y-direction. The value is a actually CCD range being used for
               data. PRD-RNG2 = BIN-FCT2 * EFP-RNG2.
DescriptionJ : 部分読み出しデータにおいて PRD-MIN2 (CCD 上の部分読み出し開始 Y 位置) からの NAXIS2 方向の
               読みだしの幅を示す。ビニングをした場合でも、この項目の値は読み出しをする CCD 上の物理的
               ピクセル幅を表わしている。PRD-RNG2 = BIN-FCT2 * EFP-RNG2
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 6-1: Object)

```
------------------------------------------------------------
HeaderKeyWord: DATA-TYP
Category     : Object
Importance   : Common
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'BIAS    '
Comment      : Type / Characteristics of  this data
DescriptionE : This keyword describe a data type/characteristics.
               /OBJECT/BIAS/DARK/DOMEFLAT/SKYFLAT/INSTFLAT/COMPARISON/STANDARD_STAR/...
DescriptionJ : 取得データの種類を記述する。/OBJECT/BIAS/DARK/DOMEFLAT/SKYFLAT/INSTFLAT/COMPARISON
               /STANDARD_STAR/...
------------------------------------------------------------
HeaderKeyWord: DATASET
Category     : Object
Importance   : Object
FormatF      : A20
Unit         : -
Recommend    : -
Sample       : 'o98003d1021'
Comment      : ID of an observation dataset
DescriptionE : ID of an observation dataset
DescriptionJ : 観測データセットの ID。この値は必要に応じて制御系から撮像、あるいはフレーム生成コマンドのパ
               ラメータとして投入される。
------------------------------------------------------------
HeaderKeyWord: DEC
Category     : Object
Importance   : Common
FormatF      : A12
Unit         : -
Recommend    : -
Sample       : '-01:23:45.67'
Comment      : DEC of pointing (+/-DD:MM:SS.SS)
DescriptionE : Declination of telescope pointing. This value is based on an EQUINOX of observer's
               target table. Notice that this value dose NOT show accurate field center of the
               instrument.
DescriptionJ : 望遠鏡指向位置の赤緯で、分点は項目 EQUINOX に記述されている。必ずしも観測装置の視野中心と一致
               する必要はない。
------------------------------------------------------------
HeaderKeyWord: DEC2000
Category     : Object
Importance   : Common
FormatF      : A12
Unit         : -
Recommend    : -
Sample       : '+20:00:12.34'
Comment      : DEC(J2000) of pointing (+/-DD:MM:SS.SS)
DescriptionE : Declination of pointing based on J2000 equinox. If telescope control system is
               based on the J2000, this value is equals to the value of keyword DEC. Notice that
               this value dose NOT show accurate field center of the instrument.
DescriptionJ : 分点 J2000 に準拠した赤緯。もし項目 EQUINOX に J2000 が用いられていれば、DEC と同じ値と
               なる。必ずしも観測装置の視野中心と一致する必要はない。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 6-2: Object)

```
-------------------------------------------------------------
HeaderKeyWord: EQUINOX
Category     : Object
Importance   : Common
FormatF      : F20.1
Unit         : year
Recommend    : -
Sample       : 1999.01
Comment      : Standard FK5 (years)
DescriptionE : Epoch of the mean equator and equinox of the coordinate system used to express the
               WCS mapping. (FK5).
DescriptionJ : 望遠鏡指向の基準となる分点。この分点を基準として、RA, DEC をヘッダ中に記述する。
-------------------------------------------------------------
HeaderKeyWord: OBJECT
Category     : Object
Importance   : Common
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : '3C120   '
Comment      : Target Description
DescriptionE : Identification of object observed.
DescriptionJ : 観測対象天体の名称、あるいは、識別子
-------------------------------------------------------------
HeaderKeyWord: RA
Category     : Object
Importance   : Common
FormatF      : A12
Unit         : -
Recommend    : -
Sample       : '01:01:02.003'
Comment      : RA of telescope pointing (HH:MM:SS.SSS)
DescriptionE : Right Ascension of telescope pointing. This value is based on an EQUINOX. Notice
               that this value dose NOT show accurate  field center of an instrument.
DescriptionJ : 望遠鏡指向位置の赤経で、分点は項目 EQUINOX に記述されている。必ずしも観測装置の視野中心と一致
               する必要はない。
-------------------------------------------------------------
HeaderKeyWord: RA2000
Category     : Object
Importance   : Common
FormatF      : A12
Unit         : -
Recommend    : -
Sample       : '21:54:32.123'
Comment      : RA(J2000) pointing (HH:MM:SS.SSS)
DescriptionE : Right Ascension of pointing based on J2000 equinox. If telescope control system is
               based on the J2000, this value is equals to the value of keyword RA. Notice that
               this value dose NOT show accurate field center of the instrument.
DescriptionJ : 分点 J2000 に準拠した望遠鏡指向位置の赤経。必ずしも観測装置の視野中心と一致する必要はない。
-------------------------------------------------------------
HeaderKeyWord: RADECSYS
Category     : Object
Importance   : Common
FormatF      : A8
Unit         : -
Recommend    : FK5
Sample       : 'FK5     '
Comment      : The equatorial coordinate system
DescriptionE : The equatorial coordinate system used at observatory. FK5 is the default system at
               SUBARU.
DescriptionJ : すばるで用いている空間座標系の基準。推奨値、FK5。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 7-1: Origin)

```
-------------------------------------------------------------
HeaderKeyWord: F-RATIO
Category     : Origin
Importance   : Optional
FormatF      : F20.2
Unit         : -
Recommend    : -
Sample       : 6.12
Comment      : Monochromatic F-Ratio of the camera
DescriptionE : Monochromatic F-Ratio of the instrument camera.
DescriptionJ : 装置の F 値。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 7-2: Origin(続))

```
-------------------------------------------------------------
HeaderKeyWord: FOC-LEN
Category     : Origin
Importance   : Optional
FormatF      : F20.3
Unit         : mm
Recommend    : -
Sample       : 100000.111
Comment      : Focal length of the telescope (mm)
DescriptionE : Focal length of the telescope.
DescriptionJ : 望遠鏡の焦点距離。
-------------------------------------------------------------
HeaderKeyWord: FOC-POS
Category     : Origin
Importance   : Common
FormatF      : A12
Unit         : -
Recommend    : -
Sample       : 'CASSEGRAIN'
Comment      : Focus where the instrument is attached
DescriptionE : Focus name where the instrument is attached. /PRIME/CASSEGRAIN/NASMYTH-IR
               /NASMYTH-OPT/COUDE/
DescriptionJ : 観測装置が装着されている焦点名。
-------------------------------------------------------------
HeaderKeyWord: FOC-VAL
Category     : Origin
Importance   : Common
FormatF      : F20.3
Unit         : mm
Recommend    : -
Sample       : 100000.254
Comment      : Encoder value of the focus unit (mm)
DescriptionE : Position of the telescope focus unit (secondary mirror, prime focus unit).
DescriptionJ : 望遠鏡の合焦に使用されるユニットの位置。
-------------------------------------------------------------
HeaderKeyWord: OBSERVAT
Category     : Origin
Importance   : Common
FormatF      : A20
Unit         : -
Recommend    : NAOJ
Sample       : 'NAOJ    '
Comment      : Observatory
DescriptionE : Observatory where the data was taken. Recommended values are 'NAOJ    ' or
               'Natl.Astr.Obs.Japan'.
DescriptionJ : データの取得された観測所名。'NAOJ    ' あるいは、'Natl.Astr.Obs.Japan' を使用すること。
-------------------------------------------------------------
HeaderKeyWord: OBSERVER
Category     : Origin
Importance   : Common
FormatF      : A50
Unit         : -
Recommend    : -
Sample       : 'G.KOSUGI, et al.'
Comment      : Name(s) of observer(s)
DescriptionE : This keyword shows the name(s) of observer(s) who took the data.
DescriptionJ : 当該データを取得した観測者 (グループ)。
-------------------------------------------------------------
HeaderKeyWord: PROP-ID
Category     : Origin
Importance   : Common
FormatF      : A8
Unit         : -
Recommend    : -
Sample       : 'o98003  '
Comment      : Proposal ID
DescriptionE : Proposal ID of the observation.
DescriptionJ : 観測プロポーザル ID。
-------------------------------------------------------------
HeaderKeyWord: TELESCOP
Category     : Origin
Importance   : Common
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'Subaru  '
Comment      : Telescope/System which Inst. is attached
DescriptionE : Subaru / Hilo Software Simulator / Hilo Optical Simulator
               / Mitaka Software Simulator / Mitaka Optical Simulator
DescriptionJ : データ取得に使用された望遠鏡・システム名。Subaru / Hilo Software Simulator
               / Hilo Optical Simulator / Mitaka Software Simulator / Mitaka Optical Simulator。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 8-1: Polarimetry)

```
------------------------------------------------------------
HeaderKeyWord: POL-ANGn
Category     : Polarimetry
Importance   : Optional
FormatF      : F20.2
Unit         : degree
Recommend    : -
Sample       : 45.01
Comment      : P.A. of n-th Polarizer (degree)
DescriptionE : Position Angle (degree) of the n-th Polarizer. The angle for the north is 0 degree,
               and increases for eastwardrotation.
DescriptionJ : 偏光素子のセットされた位置角。北方向を 0 度とし、東回りに増加する。単位は degree。
------------------------------------------------------------
HeaderKeyWord: POLARIZn
Category     : Polarimetry
Importance   : Polarimetry
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'Polarizer01'
Comment      : Identifier of n-th Polarizer
DescriptionE : Name or identifier of n-th Polarizer.
DescriptionJ : ｎ番目の偏光素子の名前あるいは ID。
------------------------------------------------------------
HeaderKeyWord: RET-ANGn
Category     : Polarimetry
Importance   : Polarimetry
FormatF      : F20.2
Unit         : degree
Recommend    : -
Sample       : 30.12
Comment      : P.A. of n-th Retarder Plate (degree)
DescriptionE : Position angle of n-th Retarder Plate
DescriptionJ : ｎ番目の波長板の回転角。単位は degree。
------------------------------------------------------------
HeaderKeyWord: RETPLATn
Category     : Polarimetry
Importance   : Polarimetry
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'Retarder01'
Comment      : Identifier of n-th Retarder Plate
DescriptionE : Name or identifier of n-th Retarder Plate for Polarimetry
DescriptionJ : ｎ番目の波長板の名前あるいは ID。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 9-1: Spectroscopy)

```
------------------------------------------------------------
HeaderKeyWord: APERTURE
Category     : Spectroscopy
Importance   : Optional
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'Aperture01'
Comment      : Identifier of the entrance aperture
DescriptionE : This keyword shows an ID of the aperture mask. Detailed parameters of the aperture
               mask can be seen in an aperture list which is provided by the instrument group.
DescriptionJ : 用いられた Aperture mask の ID を記述する。各 Aperture の詳細なパラメータについては各観測装置
               グループが用意する Aperture List を参照の事。
------------------------------------------------------------
HeaderKeyWord: APT-SIZE
Category     : Spectroscopy
Importance   : Optional
FormatF      : F20.3
Unit         : arcsec
Recommend    : -
Sample       : 0.805
Comment      : Diameter of the aperture (arcsec)
DescriptionE : This keyword shows a diameter of the aperture mask (arcsec). Detailed parameters of
               the aperture mask (e.g. shape and size) can be seen in an Aperture list which will
               be provided by the instrument group. (See also 'APERTURE'.)
DescriptionJ : Aperture の直径の大きさを記述する。単位は arcsec。詳しい Aperture の形状等は装置ごとに用意さ
               れる Aperture list を参照の事。(APERTURE の項も参照の事)
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 9-2: Spectroscopy(続))

```
------------------------------------------------------------
HeaderKeyWord: APTC-DEC
Category     : Spectroscopy
Importance   : Optional
FormatF      : F20.8
Unit         : degree
Recommend    : -
Sample       : 138.28976543
Comment      : DEC of the aperture center (degree)
DescriptionE : This keyword shows a declination of the aperture center (degree). A position
               described by 'APTC-RA' and this 'APTC-DEC' corresponds to that on the detector
               described by 'APTCPIX1' and 'APTCPIX2'. (See 'APTCPIX1' and 'APTCPIX2')
DescriptionJ : Aperture 中心の Dec. を記述する。単位は degree。これと APTC-RA で記述される位置が、検出器上で
               は APTCPIX1, APTCPIX2 に対応する。(APTCPIX1,APTCPIX2 も参照の事)
------------------------------------------------------------
HeaderKeyWord: APTC-RA
Category     : Spectroscopy
Importance   : Optional
FormatF      : F20.8
Unit         : degree
Recommend    : -
Sample       : 23.45678901
Comment      : RA of the aperture center (degree)
DescriptionE : 'APTC-RA' shows a right ascension of the aperture center (degree). A position
               described by 'APTC-DEC' and this 'APTC-RA' corresponds to a position on the
               detector described by 'APTCPIX1' and 'APTCPIX2'. (See 'APTCPIX1' and 'APTCPIX2')
DescriptionJ : Aperture 中心の R.A. を記述する。単位は degree。これと APTC-DEC で記述される位置が、検出器上
               では APTCPIX1, APTCPIX2 に対応する。(APTCPIX1,APTCPIX2 も参照の事)
------------------------------------------------------------
HeaderKeyWord: APTCPIX1
Category     : Spectroscopy
Importance   : Optional
FormatF      : F20.1
Unit         : pixel
Recommend    : -
Sample       : 511.5
Comment      : Aperture center projected on det.(pix)
DescriptionE : This keyword shows a position on the detector where a ray of 'WAVELEN' come from
               the aperture center was dropped. This is written in a unit of pixel along the first
               axis described by NAXIS1 keyword.
DescriptionJ : Aperture 中心から来た波長 WAVELEN の光が落ちる検出器上の位置を記述する。NAXIS1 で記述される
               軸に沿った値で、単位は pixel。
------------------------------------------------------------
HeaderKeyWord: APTCPIX2
Category     : Spectroscopy
Importance   : Optional
FormatF      : F20.1
Unit         : pixel
Recommend    : -
Sample       : 511.5
Comment      : Aperture center projected on det.(pix)
DescriptionE : This keyword shows a position on the detector where a ray of 'WAVELEN' come from
               the aperture center was dropped. This is written in a unit of pixel along the
               second axis described by NAXIS2 keyword.
DescriptionJ : Aperture 中心から来た波長 WAVELEN の光が落ちる検出器上の位置を記述する。NAXIS2 で記述される
               軸に沿った値で、単位は pixel。
------------------------------------------------------------
HeaderKeyWord: DISPAXIS
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : 1
Comment      : Dispersion axis in frame
DescriptionE : The number of axis (n of NAXISn) along to dispersion.
DescriptionJ : スペクトルの分散方向の軸番号 (NAXISn の n に対応)
------------------------------------------------------------
HeaderKeyWord: DISPERSR
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : A20
Unit         : -
Recommend    : -
Sample       : 'Grism500-6400'
Comment      : Identifier of the disperser used
DescriptionE : Identifier (Name, grooves, etc.) of the disperser used.
DescriptionJ : 使用している分散素子の名前など
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 9-3: Spectroscopy(続))

```
-------------------------------------------------------------
HeaderKeyWord: SLIT
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : A20
Unit         : -
Recommend    : -
Sample       : 'Longslit03'
Comment      : Identifier of the entrance slit used
DescriptionE : Identifier (Name, etc.) of the entrance slit used.
DescriptionJ : 使用しているスリットの名前
-------------------------------------------------------------
HeaderKeyWord: SLT-LEN
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : F20.3
Unit         : arcsec
Recommend    : -
Sample       : 65.255
Comment      : Length of the slit used (arcsec)
DescriptionE : Length of the slit used. (arcsec)
DescriptionJ : スリットを天球面に投影したときの空間的な長さ (arcsec)
-------------------------------------------------------------
HeaderKeyWord: SLT-OBJP
Category     : Spectroscopy
Importance   : Optional
FormatF      : F20.3
Unit         : arcsec
Recommend    : -
Sample       : 30.254
Comment      : Object position on the slit (arcsec)
DescriptionE : Object's position on the slit (arcsec). The zero point is defined for each
               instrument.
DescriptionJ : スリット上の天体の位置 (スリットに沿った方向)。原点は観測装置ごとに定める。
-------------------------------------------------------------
HeaderKeyWord: SLT-PA
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : F20.1
Unit         : degree
Recommend    : -
Sample       : 33.3
Comment      : Slit Position Angle (degree)
DescriptionE : Typical position angle of the slit during exposure (degree). 0 degree for the
               north, and increased for the east direction.
DescriptionJ : 露出中のスリットの典型的な位置角。北を 0 度とし、東回りに取った角度で表わされる。
-------------------------------------------------------------
HeaderKeyWord: SLT-PEND
Category     : Spectroscopy
Importance   : Optional
FormatF      : F20.1
Unit         : degree
Recommend    : -
Sample       : 32.2
Comment      : Slit PA at exposure end (degree)
DescriptionE : Position angle of the slit at the end of exposure (degree). The method of defining
               the angle is the same with 'SLT-PA'.
DescriptionJ : 露出終了時のスリットの位置角。角度の定義は'SLT-PA' に同じ。
-------------------------------------------------------------
HeaderKeyWord: SLT-PSTR
Category     : Spectroscopy
Importance   : Optional
FormatF      : F20.1
Unit         : degree
Recommend    : -
Sample       : 34.4
Comment      : Slit PA at exposure start (degree)
DescriptionE : Position angle of the slit at the start of exposure (degree). The method of
               defining the angle is the same with 'SLT-PA'.
DescriptionJ : 露出開始時のスリットの位置角。角度の定義は'SLT-PA' に同じ。
-------------------------------------------------------------
HeaderKeyWord: SLT-WID
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : F20.3
Unit         : arcsec
Recommend    : -
Sample       : 0.155
Comment      : Width of the slit used (arcsec)
DescriptionE : Width of the slit used. (arcsec)
DescriptionJ : 天球面に投影した時のスリット幅 (arcsec)
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 9-4: Spectroscopy(続))

```
-------------------------------------------------------------
HeaderKeyWord: SLTC-DEC
Category     : Spectroscopy
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : 188.73662
Comment      : slit center DEC at the EQUINOX (degree)
DescriptionE : DEC corresponding to slit center described by the EQUINOX (degree)
DescriptionJ : EQUINOX で示される分点でのスリット中心の赤緯
-------------------------------------------------------------
HeaderKeyWord: SLTC-RA
Category     : Spectroscopy
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : -12.58243
Comment      : slit center RA at the EQUINOX (degree)
DescriptionE : RA corresponding to slit center described by the EQUINOX (degree).
DescriptionJ : EQUINOX で示される分点でのスリット中心の赤経
-------------------------------------------------------------
HeaderKeyWord: SLTCPIX1
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : F20.1
Unit         : pixel
Recommend    : -
Sample       : 512.5
Comment      : Slit center projected on detector(pixel)
DescriptionE : Slit center projected on detector at WAVELENGTH for the axis 1 (pixel)
DescriptionJ : 検出器上での WAVELEN にあたる波長とスリット中心に相当する位置。第 1 軸について。
-------------------------------------------------------------
HeaderKeyWord: SLTCPIX2
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : F20.1
Unit         : pixel
Recommend    : -
Sample       : 512.5
Comment      : Slit center projected on detector(pixel)
DescriptionE : Slit center projected on detector at WAVELENGTH for the axis 2 (pixel)
DescriptionJ : 検出器上での WAVELEN にあたる波長とスリット中心に相当する位置。第 2 軸について。
-------------------------------------------------------------
HeaderKeyWord: WAV-MAX
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : F20.4
Unit         : nm
Recommend    : -
Sample       : 6522.1234
Comment      : Longest wavelen. focused on detector(nm)
DescriptionE : Longest wavelength focused on the detector (nm).
DescriptionJ : 検出器に写っている波長の最大値。
-------------------------------------------------------------
HeaderKeyWord: WAV-MIN
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : F20.4
Unit         : nm
Recommend    : -
Sample       : 6585.5432
Comment      : Shortest wavelen.focused on detector(nm)
DescriptionE : Shortest wavelength focused on the detector (nm).
DescriptionJ : 検出器に写っている波長の最小値。
-------------------------------------------------------------
HeaderKeyWord: WAVELEN
Category     : Spectroscopy
Importance   : Spectroscopy
FormatF      : F20.4
Unit         : nm
Recommend    : -
Sample       : 655.3278
Comment      : Wavelength at detector center (nm)
DescriptionE : Central wavelength of focused on the detector (nm).
DescriptionJ : 観測されたデータの中心波長
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 10-1: Telescope)

```
------------------------------------------------------------
HeaderKeyWord: ADC
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : 11.244
Comment      : ADC PA during exposure (degree)
DescriptionE : Typical position angle of atmospheric dispersion compensator during exposure
               (degree).
DescriptionJ : 露出中の大気分散補償器の位置角の典型的な値。(degree)
------------------------------------------------------------
HeaderKeyWord: ADC-END
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : 12.929
Comment      : ADC PA at exposure end (degree)
DescriptionE : Position angle of atmospheric dispersion compensator at the end of exposure
               (degree).
DescriptionJ : 露出終了時の大気分散補償器の位置角。(degree)
------------------------------------------------------------
HeaderKeyWord: ADC-STR
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : 12.989
Comment      : ADC PA at exposure start (degree)
DescriptionE : Position angle of atmospheric dispersion compensator at the start of exposure
               (degree).
DescriptionJ : 露出開始時の大気分散補償器の位置角。
------------------------------------------------------------
HeaderKeyWord: ADC-TYPE
Category     : Telescope
Importance   : Optional
FormatF      : A20
Unit         : -
Recommend    : -
Sample       : 'BLUE    '
Comment      : ADC name/type if used
DescriptionE : Identifier of atmospheric dispersion compensator used (BLUE, NONE).
DescriptionJ : 用いられた大気分散補償器の種類。(BLUE, NONE)
------------------------------------------------------------
HeaderKeyWord: AG-PRB1
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : mm
Recommend    : -
Sample       : 25.234
Comment      : AG Probe position (r:mm,x:mm)
DescriptionE : First axis component of auto guider's probe position(mm). (CASS/NAS:r:mm, PF:x:mm).
DescriptionJ : オートガイダーの位置の第 1 軸成分 (mm)。主焦点ではX方向、その他の焦点では動径方向を意味する。
------------------------------------------------------------
HeaderKeyWord: AG-PRB2
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : 25.234
Comment      : AG Probe position (Theta:degree, y:mm)
DescriptionE : Second axis component of auto guider probe position(CASS/NAS:Theta:degree,PF:y:mm).
DescriptionJ : オートガイダーの位置の第２軸成分。主焦点ではY方向、その他の焦点では回転方向を意味する。
------------------------------------------------------------
HeaderKeyWord: ALT-END
Category     : Telescope
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : 78.12345
Comment      : Altitude at exposure end (degree)
DescriptionE : Altitude of telescope pointing at exposure end (degree).
DescriptionJ : 露出終了時の仰角。単位は degree。多重露出フレームの場合は、最終露出終了時の仰角。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 10-2: Telescope(続))

```
------------------------------------------------------------
HeaderKeyWord: ALT-STR
Category     : Telescope
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : 78.15678
Comment      : Altitude at start exposure (degree)
DescriptionE : Altitude of telescope pointing at exposure start (degree).
DescriptionJ : 露出終了時の仰角。単位は degree。多重露出フレームの場合は、最初の露出開始の仰角。
------------------------------------------------------------
HeaderKeyWord: ALTITUDE
Category     : Telescope
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : 78.23456
Comment      : Altitude of telescope pointing (degree)
DescriptionE : Typical altitude of telescope pointing (degree).  Altitude changes during the
               exposure.
DescriptionJ : 観測中の典型的な仰角。露出の中間時刻における仰角が望ましい。
------------------------------------------------------------
HeaderKeyWord: AO-FREQ
Category     : Telescope
Importance   : Optional
FormatF      : I20
Unit         : Hz
Recommend    : -
Sample       : 10
Comment      : frequency of AO loop (Hz)
DescriptionE : Frequency of AO control (Hz). Times per second the deformable mirror was
               transformed.
DescriptionJ : AO の制御 (波面補正) 周波数 (Hz)。可変形鏡を 1 秒間に変形させた (=波面補正) 回数。
------------------------------------------------------------
HeaderKeyWord: AO-TIP
Category     : Telescope
Importance   : Optional
FormatF      : A8
Unit         : -
Recommend    : -
Sample       : 'ON      '
Comment      :  Action of AO tip-tilt Mirror (ON/OFF)
DescriptionE : Action of AO tip-tilt Mirror (ON/OFF)
DescriptionJ : AO の tip-tilt 鏡を作動させたか否か (有/無)。値: 'ON      ' または 'OFF     '
------------------------------------------------------------
HeaderKeyWord: AO-WFS
Category     : Telescope
Importance   : Optional
FormatF      : F20.5
Unit         : -
Recommend    : -
Sample       : 1.21111??
Comment      : sigma of residual wave front??
DescriptionE : sigma of residual wave front??
DescriptionJ : ウェーブフロントセンサーでの補正後の残差??
------------------------------------------------------------
HeaderKeyWord: AZ-END
Category     : Telescope
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : -23.45678
Comment      : Azimuth angle at exposure end (degree)
DescriptionE : Azimuth angle of telescope when an exposure ends (degree). North is 0, East is 90
               degree.
DescriptionJ : 露出終了時の方位角。多重露出フレームの場合は、最終露出の終了時の方位角。北が 0 度、東が 90 度。
------------------------------------------------------------
HeaderKeyWord: AZ-STR
Category     : Telescope
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : 23.56789
Comment      : Azimuth angle at exposure start (degree)
DescriptionE : Azimuth angle of telescope when an exposure begins (degree). North is 0, East is 90
               degree.
DescriptionJ : 露出開始時の方位角。多重露出フレームの場合は、最初の露出の開始時の方位角。北が 0 度、東が 90
               度。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 10-3: Telescope(続))

```
------------------------------------------------------------
HeaderKeyWord: AZIMUTH
Category     : Telescope
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : 23.51111
Comment      : Azimuth of telescope pointing (degree)
DescriptionE : Typical azimuth angle of the telescope during the exposure (degree).  North is 0,
               and East is 90.
DescriptionJ : 露出中の典型的な方位角。北が0度、東が9 0度。露出の中間時刻における方位角が望ましい。
------------------------------------------------------------
HeaderKeyWord: IMGROT
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : 45.998
Comment      : Angle of the Image Rotator (degree)
DescriptionE : This keyword shows a typical angle of the Image Rotator during the exposure
               (degree). (See 'IMR-END' and 'IMR-STR'.) The angle for the north is 0, and
               increases for eastwardrotation. The range of the angle is from 0 to 360 degree.
DescriptionJ : Image Rotator の露出中の典型的な角度を記述する。単位は degree。(IMR-END、IMR-STR も参照の
               事)。北の方角が 0 度、東回りで増加する。値の範囲は 0 度から 360 度である。
------------------------------------------------------------
HeaderKeyWord: IMR-TYPE
Category     : Telescope
Importance   : Optional
FormatF      : A20
Unit         : -
Recommend    : -
Sample       : 'RED     '
Comment      : Identifier of the image rotator
DescriptionE : This keyword shows a kind of the Image Rotator used for the observation. 'RED',
               'BLUE', 'IR' indicate the Image Rotators for opt-red wavelength, opt-blue
               wavelength, and IR wavelength, respectively. If the Image Rotator is not used, the
               value is 'NONE'.
DescriptionJ : 使用されている Image rotator の種類を記述する。種類としては RED(可視赤用)、BLUE(可視青用)、
               IR(赤外用) および NONE(rotator なし) がある。
------------------------------------------------------------
HeaderKeyWord: IMR-END
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : 45.954
Comment      : Image rotator angle at end (degree)
DescriptionE : This keyword shows an angle of the Image Rotator (degree) at the end of the
               exposure. (See also 'IMGROT')
DescriptionJ : 露出終了時点での、Image Rotator の原点位置からの角度を記述する。単位は degree。角度の定義に
               ついては IMGROT を参照のこと。
------------------------------------------------------------
HeaderKeyWord: IMR-STR
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : 46.229
Comment      : Image rotator angle at start (degree)
DescriptionE : This keyword shows an angle of the Image Rotator (degree) at the beginning of the
               exposure. (See also 'IMGROT')
DescriptionJ : 露出開始時点での、Image Rotator の原点位置からの角度を記述する。単位は degree。角度の定義に
               ついては IMGROT を参照のこと。
------------------------------------------------------------
HeaderKeyWord: INR-END
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : -23.456
Comment      : Instrument Rotator angle at end (degree)
DescriptionE : Angle of instrument rotator at the end of the exposure (degree).
DescriptionJ : 露出終了時の instrument rotator 回転角。多重露出フレームの場合は、最終露出の終了時の回転角。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 10-4: Telescope(続))

```
------------------------------------------------------------
HeaderKeyWord: INR-STR
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : 14.567
Comment      : Instrument Rotator angle at Start (deg)
DescriptionE : Angle of instrument rotator at the start of the exposure (degree).
DescriptionJ : 露出開始時の instrument rotator 回転角。多重露出フレームの場合は、最初の露出開始時の回転角。
------------------------------------------------------------
HeaderKeyWord: INSROT
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : degree
Recommend    : -
Sample       : -23.444
Comment      : Typical inst. rot. angle at exp.(degree)
DescriptionE : Typical angle of instrument rotator during the exposure (degree).
DescriptionJ : 露出時の典型的 instrument rotator 回転角。露出開始時と終了時の中間時刻における回転角が望ま
               しい。
------------------------------------------------------------
HeaderKeyWord: M2-ANG1
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : arcmin
Recommend    : -
Sample       : 0.015
Comment      : Theta X of the M2 (arcmin)
DescriptionE : X-direction Angle of the secondary mirror (arcmin).
DescriptionJ : 第２鏡のＸ方向の角度 (arcmin)。
------------------------------------------------------------
HeaderKeyWord: M2-ANG2
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : arcmin
Recommend    : -
Sample       : 0.026
Comment      : Theta Y of the M2 (arcmin)
DescriptionE : Y-direction Angle of the secondary mirror (arcmin).
DescriptionJ : 第２鏡のＹ方向の角度 (arcmin)
------------------------------------------------------------
HeaderKeyWord: M2-ANG3
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : arcmin
Recommend    : -
Sample       : 0.026
Comment      : Theta Z of the M2 (arcmin)
DescriptionE : Z-direction Angle of the secondary mirror (arcmin).
DescriptionJ : 第２鏡のＺ方向の角度 (arcmin)
------------------------------------------------------------
HeaderKeyWord: M2-POS1
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : mm
Recommend    : -
Sample       : 5.123
Comment      : X-Position of the M2 (mm)
DescriptionE : X-direction Position of the secondary mirror (mm).
DescriptionJ : 第２鏡のＸ方向の位置 (mm)
------------------------------------------------------------
HeaderKeyWord: M2-POS2
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : mm
Recommend    : -
Sample       : 0.023
Comment      : Y-Position of the M2 (mm)
DescriptionE : Y-direction Position of the secondary mirror (mm).
DescriptionJ : 第２鏡のＹ方向の位置 (mm)
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 10-5: Telescope(続))

```
------------------------------------------------------------
HeaderKeyWord: M2-POS3
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : mm
Recommend    : -
Sample       : 0.023
Comment      : Z-Position of the M2 (mm)
DescriptionE : Z-direction Position of the secondary mirror (mm).
DescriptionJ : 第２鏡のＺ方向の位置 (mm)
------------------------------------------------------------
HeaderKeyWord: M2-TIP
Category     : Telescope
Importance   : Optional
FormatF      : A8
Unit         : -
Recommend    : -
Sample       : 'OFF     '
Comment      : Tip/Tilt of the Secondary Mirror(ON/OFF)
DescriptionE : Tip-Tilt of the secondary mirror (ON/OFF).
DescriptionJ : 第２鏡の Tip-Tilt の有無 (ON/OFF)
------------------------------------------------------------
HeaderKeyWord: M2-TYPE
Category     : Telescope
Importance   : Optional
FormatF      : A8
Unit         : -
Recommend    : -
Sample       : 'Opt     '
Comment      : Type of the Secondary Mirror (Opt/IR)
DescriptionE : Type of the Secondary Mirror (Opt/IR)
DescriptionJ : 第２鏡の種類 (Opt/IR)
------------------------------------------------------------
HeaderKeyWord: OBS-ALOC
Category     : Telescope
Importance   : Common
FormatF      : A12
Unit         : -
Recommend    : -
Sample       : 'OBSERVATION'
Comment      : Allocation mode for Instrument
DescriptionE : The status of the allocation mode for Instrument. This keyword describes whether
               the instrument is in Observing or Stand-by mode.
DescriptionJ : 観測装置の取り付け状態 (観測状態で望遠鏡に付いているか待機状態で待機室内にあるかの区別) を示
               す項目。観測装置が待機室内にあってもデータの取得が可能なので、装置の状況を区別する必要が
               ある。取り得る値は、STAND-BY と OBSERVATION。
------------------------------------------------------------
HeaderKeyWord: SV-PRB
Category     : Telescope
Importance   : Optional
FormatF      : F20.3
Unit         : mm
Recommend    : -
Sample       : 10.598
Comment      : SV Probe position (mm)
DescriptionE : This keyword shows the (radius) position of slit viewer's probe. The value of 0
               corresponds to center of optical axis and unit is in mm.
DescriptionJ : Slit Viewer Probe の位置 (動径方向成分) を記述する。原点は光軸中心であり単位は mm。Slit Viewer
               の probe の位置は 1 次元で表わされる。
------------------------------------------------------------
HeaderKeyWord: TELFOCUS
Category     : Telescope
Importance   : Common
FormatF      : A30
Unit         : -
Recommend    : -
Sample       : 'CASSEGRAIN'
Comment      : Focus where a beam is  reachable
DescriptionE : Focus where a beam is reachable. /PRIME/CASSEGRAIN/NASMYTH-IR/NASMYTH-OPT/COUDE/
DescriptionJ : 天体からの光がどの焦点に到達するかを記述。取り得る値は PRIME, CASSEGRAIN, NASMYTH-IR,
               NASMYTH-OPT, COUDE。FOC-POS と比較することで、装置に光が届いているかをチェックできる。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 11-1: Time)

```
-------------------------------------------------------------
HeaderKeyWord: AIRM-END
Category     : Time
Importance   : Optional
FormatF      : F20.3
Unit         : -
Recommend    : -
Sample       : 1.221
Comment      : Air mass at exposure end
DescriptionE : Air mass when an exposure ends.
DescriptionJ : 露出終了時の大気量。多重露出の場合は、最終露出の終了時刻の大気量。
-------------------------------------------------------------
HeaderKeyWord: AIRM-STR
Category     : Time
Importance   : Optional
FormatF      : F20.3
Unit         : -
Recommend    : -
Sample       : 1.224
Comment      : Air mass at exposure start
DescriptionE : Air mass when an exposure begins.
DescriptionJ : 露出開始時の大気量。多重露出の場合は、最初の露出の開始時刻の大気量。
-------------------------------------------------------------
[Dictionary = Basic] (Category 順、その 11-2: Time(続))
HeaderKeyWord: AIRMASS
Category     : Time
Importance   : Common
FormatF      : F20.3
Unit         : -
Recommend    : -
Sample       : 1.223
Comment      : Typical air mass during exposure
DescriptionE : Typical air mass during the exposure.
DescriptionJ : 露出中の典型的な大気量。露出中の平均大気量、あるいは、露出中間時刻の大気量が望ましい。
-------------------------------------------------------------
HeaderKeyWord: DATE-OBS
Category     : Time
Importance   : Common
FormatF      : A10
Unit         : UTC
Recommend    : -
Sample       : '1998-09-14'
Comment      : Observation start date  (yyyy-mm-dd)
DescriptionE : UTC date at the beginning of the exposure. Format : yyyy-mm-dd
DescriptionJ : 露出開始の時点の日時。単位は UTC で、yyyy-mm-dd の形式とする。
-------------------------------------------------------------
HeaderKeyWord: EXP1TIME
Category     : Time
Importance   : Optional
FormatF      : F20.3
Unit         : sec
Recommend    : -
Sample       : 0.015
Comment      : Exposure time of a frame(sec)
DescriptionE : 'EXP1TIME' shows an integration time (sec) of each sub-exposure. Total integration
               time of a frame is accumulated by this 'EXP1TIME' and 'COADD' which shows how many
               sub-exposures were coadded. ('COADD' and 'EXPTIME'). (EXPTIME = EXP1TIME * COADD)
DescriptionJ : 各々の sub-exposure の積分時間を記述する。単位は sec。1 frame あたりの積分時間はこの EXP1TIME
               と枚数 COADD の積となる。(COADD,EXPTIME も参照)(EXPTIME = EXP1TIME * COADD)
-------------------------------------------------------------
HeaderKeyWord: EXPTIME
Category     : Time
Importance   : Common
FormatF      : F20.2
Unit         : sec
Recommend    : -
Sample       : 1234.56
Comment      : Total integration time of the frame(sec)
DescriptionE : 'EXPTIME' shows an integration time [sec] of a frame. If a frame was made from
               some sub-exposures, the 'EXPTIME' corresponds to the product of 'EXP1TIME' and
               'COADD'. (EXPTIME = EXP1TIME * COADD)
DescriptionJ : このデータの、1 frame あたりの積分時間を記述する。単位は sec。1 frame が sub-exposure の足
               し合わせである場合 EXPTIME は EXP1TIME と COADD の積と等しくなる。(EXPTIME= EXP1TIME * COADD)
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 11-2: Time(続))

```
------------------------------------------------------------
HeaderKeyWord: HST
Category     : Time
Importance   : Common
FormatF      : A12
Unit         : HST
Recommend    : -
Sample       : '14:25:00.012'
Comment      : Typical HST at exposure (HH:MM:SS.SSS)
DescriptionE : Typical Hawaii Standard Time of exposure (HH:MM:SS.SSS). A middle time of the
               exposure is recommended.
DescriptionJ : 露出中の典型的 Hawaii Standard Time (ハワイ標準時)。露出開始と終了の中間でのハワイ標準時を、
               多重露出の場合には、最初の露出開始と最終の露出終了の中間におけるハワイ標準時が望ましい。
------------------------------------------------------------
HeaderKeyWord: HST-END
Category     : Time
Importance   : Optional
FormatF      : %12s
Unit         : HST
Recommend    : -
Sample       : '14:27:00.012'
Comment      : HST at exposure end (HH:MM:SS.SSS)
DescriptionE : Hawaii Standard Time when an exposure ends (HH:MM:SS.SSS).
DescriptionJ : 露出終了時の Hawaii Standard Time (ハワイ標準時)。多重露出の場合は、最終露出終了の時刻。
------------------------------------------------------------
HeaderKeyWord: HST-STR
Category     : Time
Importance   : Optional
FormatF      : %12s
Unit         : HST
Recommend    : -
Sample       : '14:23:00.012'
Comment      : HST at exposure start (HH:MM:SS.SSS)
DescriptionE : Hawaii Standard Time when an exposure begins (HH:MM:SS.SSS).
DescriptionJ : 露出開始時の Hawaii Standard Time (ハワイ標準時)。多重露出の場合は、最初の露出開始時の時刻。
------------------------------------------------------------
HeaderKeyWord: LST
Category     : Time
Importance   : Common
FormatF      : A12
Unit         : LST
Recommend    : -
Sample       : '00:25:00.012'
Comment      : Typical LST during exp. (HH:MM:SS.SSS)
DescriptionE : Typical Local Sidereal Time during the exposure (HH:MM:SS.SSS). A middle time of
               the exposure is recommended.
DescriptionJ : 露出中の典型的 Local Sidereal Time (地方恒星時)。単一露出の場合には露出開始と終了の中間に
               おける地方恒星時を、多重露出の場合には、最初の露出開始と最終の露出終了の中間における地方恒星
               時が望ましい。
------------------------------------------------------------
HeaderKeyWord: LST-END
Category     : Time
Importance   : Optional
FormatF      : A12
Unit         : LST
Recommend    : -
Sample       : '00:27:00.012'
Comment      : LST at end of exposure (HH:MM:SS.SSS)
DescriptionE : Local Sidereal Time at the end of the exposure (HH:MM:SS.SSS).
DescriptionJ : 露出終了時の Local Sidereal Time (地方恒星時)。多重露出の場合は、最終露出終了時の恒星時。
------------------------------------------------------------
HeaderKeyWord: LST-STR
Category     : Time
Importance   : Optional
FormatF      : A12
Unit         : LST
Recommend    : -
Sample       : '00:23:00.012'
Comment      : LST at start of exposure (HH:MM:SS.SSS)
DescriptionE : Local Sidereal Time at start of the exposure (HH:MM:SS.SSS).
DescriptionJ : 露出開始時の Local Sidereal Time (地方恒星時)。多重露出の場合は、最初の露出が開始された時
               の恒星時。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 11-3: Time(続))

```
-------------------------------------------------------------
HeaderKeyWord: MJD
Category     : Time
Importance   : Common
FormatF      : F20.8
Unit         : day
Recommend    : -
Sample       : 51137.01789537
Comment      : Modified Julian Date at typical time
DescriptionE : Modified Julian Date at typical time during the exposure. MJD=JD-2400000.5
               (JD:Julian Date)
DescriptionJ : 露出中の典型的な時刻における修正ユリウス日。MJD は MJD = ユリウス日-2400000.5 と定義されて
               いる。「典型的な」をどのように解釈定義するかは観測機器によって任意。
-------------------------------------------------------------
HeaderKeyWord: MJD-END
Category     : Time
Importance   : Optional
FormatF      : F20.8
Unit         : days
Recommend    : -
Sample       : 51137.01789537
Comment      : Modified Julian Date at the end of exp.
DescriptionE : Modified Julian Date at the end of the exposure. MJD=JD-2400000.5 (JD:Julian Date)
DescriptionJ : 露出終了時点における修正ユリウス日
-------------------------------------------------------------
HeaderKeyWord: MJD-STR
Category     : Time
Importance   : Optional
FormatF      : F20.8
Unit         : days
Recommend    : -
Sample       : 51137.01789537
Comment      : Modified Julian Date of the start exp.
DescriptionE : Modified Julian Date at the start of the exposure. MJD=JD-2400000.5 (JD:Julian
               Date)
DescriptionJ : 露出開始時点における修正ユリウス日
-------------------------------------------------------------
HeaderKeyWord: SECZ
Category     : Time
Importance   : Optional
FormatF      : F20.3
Unit         : -
Recommend    : -
Sample       : 1.026
Comment      : SEC(Zenith Distance) at typical time
DescriptionE : A secant of zenith distance at typical time of exposure. A middle time of the
               exposure is recommended.
DescriptionJ : 露出中の典型的 sec Z (天頂距離のセカント)。露出開始と終了の中間時刻における値を、多重露出フ
               レームの場合には、最初の露出開始と最終の露出終了の中間時刻における値が望ましい。
-------------------------------------------------------------
HeaderKeyWord: SECZ-END
Category     : Time
Importance   : Optional
FormatF      : F20.3
Unit         : -
Recommend    : -
Sample       : 1.027
Comment      : SEC(Zenith Distance) at exposure end
DescriptionE : A secant of zenith distance at exposure end time.
DescriptionJ : 露出終了時の sec Z (天頂距離のセカント)。多重露出フレームの場合は、最終露出終了時の sec Z。
-------------------------------------------------------------
HeaderKeyWord: SECZ-STR
Category     : Time
Importance   : Optional
FormatF      : F20.3
Unit         : -
Recommend    : -
Sample       : 1.025
Comment      : SEC(Zenith Distance) at exposure start
DescriptionE : A secant of zenith distance at exposure start time.
DescriptionJ : 露出開始時の sec Z (天頂距離のセカント)。多重露出フレームの場合は、最初の露出開始時の sec Z。
-------------------------------------------------------------
HeaderKeyWord: TIMESYS
Category     : Time
Importance   : Common
FormatF      : A8
Unit         : -
Recommend    : UTC
Sample       : 'UTC     '
Comment      : Time System used in the header
DescriptionE : Explicit time scale specification of the Telescope. UTC is default/defined time
               system for SUBARU.
DescriptionJ : 時刻系の基準。すばるでは既定値、'UTC     '。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 11-4: Time(続))

```
------------------------------------------------------------
HeaderKeyWord: UT
Category     : Time
Importance   : Common
FormatF      : A12
Unit         : UTC
Recommend    : -
Sample       : '00:25:36.160'
Comment      : HH:MM:SS.SSS typical UTC at exposure
DescriptionE : UTC at typical time (for example, middle) of exposure (format HH:MM:SS.SSS).
DescriptionJ : 積分を代表わする (例えば中間) 時刻の UTC。形式は HH:MM:SS.SSS
------------------------------------------------------------
HeaderKeyWord: UT-END
Category     : Time
Importance   : Optional
FormatF      : A12
Unit         : UTC
Recommend    : -
Sample       : '00:25:37.660'
Comment      : HH:MM:SS.SSS UT at end of the exposure
DescriptionE : Coordinated Universal Time at the end of the exposure (HH:MM:SS.SSS).
DescriptionJ : 露出終了時における UTC
------------------------------------------------------------
HeaderKeyWord: UT-STR
Category     : Time
Importance   : Optional
FormatF      : A12
Unit         : UTC
Recommend    : -
Sample       : '00:25:34.660'
Comment      : HH:MM:SS.SSS UTC at start exposure time
DescriptionE : Coordinated Universal Time at start of the exposure (HH:MM:SS.SSS).
DescriptionJ : 露出開始時刻における UTC
------------------------------------------------------------
HeaderKeyWord: UT1-UTC
Category     : Time
Importance   : Optional
FormatF      : F20.5
Unit         : sec
Recommend    : -
Sample       : 0.43893
Comment      : difference between UT1 and UTC
DescriptionE : Difference between UT1 and UTC.  This value is used for calculating LST.
DescriptionJ : UT1 と UTC の差。LST の計算に用いられる。
------------------------------------------------------------
HeaderKeyWord: ZD
Category     : Time
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : 12.34567
Comment      : Zenith Distance at typical time (degree)
DescriptionE : Zenith Distance at typical time in exposure (degree). A middle time of the exposure
               is recommended.
DescriptionJ : 露出中の典型的な天頂距離。露出開始と終了の中間時刻における天頂距離を、多重露出フレームの場合
               には、最初の露出開始と最終の露出終了の中間時刻における天頂距離が望ましい。
------------------------------------------------------------
HeaderKeyWord: ZD-END
Category     : Time
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : 12.34577
Comment      : Zenith Distance at exposure end (degree)
DescriptionE : Zenith Distance at the exposure end time (degree).
DescriptionJ : 露出終了時の天頂距離。多重露出フレームの場合は、最終の露出終了時の天頂距離。
------------------------------------------------------------
HeaderKeyWord: ZD-STR
Category     : Time
Importance   : Optional
FormatF      : F20.5
Unit         : degree
Recommend    : -
Sample       : 12.34557
Comment      : Zenith Distance at exp. start (degree)
DescriptionE : Zenith Distance at the exposure start time (degree).
DescriptionJ : 露出開始時の天頂距離。多重露出フレームの場合は、最初の露出が開始された時の天頂距離。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 12-1: WCS)

```
-------------------------------------------------------------
HeaderKeyWord: C2ELT1
Category     : WCS
Importance   : Optional
FormatF      : F20.8
Unit         : degree
Recommend    : -
Sample       : 0.00001233
Comment      : Size projected to detector pix.X(degree)
DescriptionE : The value is a floating point number giving the partial derivative of the
               coordinate specified by the C2YPE1 keywords with respect to the pixel index,
               evaluated at the reference point C2PIX1, in units of the coordinate specified by
               the C2YPE1 keyword.
DescriptionJ : キーワード C2PIX1 で表わされる基準ピクセルの位置において+1 ピクセル移動した時の、キーワード
               C2YPE1 で表わされる座標値の増分を表わす。
-------------------------------------------------------------
HeaderKeyWord: C2ELT2
Category     : WCS
Importance   : Optional
FormatF      : F20.8
Unit         : degree
Recommend    : -
Sample       : 0.00001234
Comment      : Size projected on detector Y-axis (deg)
DescriptionE : The value is a floating point number giving the partial derivative of the
               coordinate specified by the C2YPE2 keywords with respect to the pixel index,
               evaluated at the reference point C2PIX2, in units of the coordinate specified by
               the C2YPE2 keyword.
DescriptionJ : キーワード C2PIX2 で表わされる基準ピクセルの位置において+1 ピクセル移動した時の、キーワード
               C2YPE2 で表わされる座標値の増分を表わす。
-------------------------------------------------------------
HeaderKeyWord: C2NIT1
Category     : WCS
Importance   : Optional
FormatF      : A8
Unit         : -
Recommend    : degree
Sample       : 'degree  '
Comment      : Units used in both C2VAL1 and C2ELT1
DescriptionE : Physical unit used in both C2VAL1 and C2ELT1.  'degree  ' is recommended for the
               2nd WCS for spectroscopy/polarimetry.
DescriptionJ : 第２ WCS の第１軸方向が表わす実際の座標値の単位であり、文字列で与えられる。分光・偏光観測の
               場合、第２ WCS としては 'degree  ' が推奨される。
-------------------------------------------------------------
HeaderKeyWord: C2NIT2
Category     : WCS
Importance   : Optional
FormatF      : A8
Unit         : -
Recommend    : degree
Sample       : 'degree  '
Comment      : Units used in both C2VAL2 and C2ELT2
DescriptionE : Physical unit used in both C2VAL2 and C2ELT2.  'degree  ' is recommended for the
               2nd WCS for spectroscopy/polarimetry.
DescriptionJ : 第２ WCS の第２軸方向が表わす実際の座標値の単位であり、文字列で与えられる。分光・偏光観測の
               場合、第２ WCS としては 'degree  ' が推奨される。
-------------------------------------------------------------
HeaderKeyWord: C2PIX1
Category     : WCS
Importance   : Optional
FormatF      : F20.1
Unit         : pixel
Recommend    : -
Sample       : 512.5
Comment      : Reference pixel X on detector (pixel)
DescriptionE : Slit projected pixel position of the reference point along #1 axis in the spectro-
               scopy/polarimetry mode. By convention the center of the pixel is pix.0, pix.5
               gives the right edge of the pixel and (pix-1).5 its left edge. Origin is (1,1).
DescriptionJ : 第２ WCS 系列の参照点の検出器座標系第１軸方向での値。この WCS 系列は、分光・偏光観測でスリット
               やダイアフラムの CCD 上への投影位置を正確に示すために用いられる。簡便のためピクセル中心を pix.0、
               ピクセル右端が pix.5、左端が (pix-1).6 とする。原点 (1,1)。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 12-2: WCS(続))

```
------------------------------------------------------------
HeaderKeyWord: C2PIX2
Category     : WCS
Importance   : Optional
FormatF      : F20.1
Unit         : pixel
Recommend    : -
Sample       : 512.5
Comment      : Reference pixel Y on detector (pixel)
DescriptionE : Slit projected pixel position of the reference point along #2 axis in the spectro-
               scopy/polarimetry mode. By convention the center of the pixel is pix.0, pix.5
               gives the right edge of the pixel and (pix-1).5 its left edge. Origin is (1,1).
DescriptionJ : 第 2 WCS 系列の参照点の検出器座標系第 2 軸方向での値。この WCS 系列は、分光・偏光観測でスリット
               やダイアフラムの CCD 上への投影位置を正確に示すために用いられる。簡便のためピクセル中心を pix.0、
               ピクセル右端が pix.5、左端が (pix-1).5 とする。原点 (1,1)。
------------------------------------------------------------
HeaderKeyWord: C2VAL1
Category     : WCS
Importance   : Optional
FormatF      : F20.8
Unit         : degree
Recommend    : -
Sample       : 188.73662083
Comment      : Physical value of ref. pixel X (degree)
DescriptionE : The value field shall contain a floating point number giving the value of the
               partial coordinate specified by the C2YPE1 keyword at the reference point C2PIX1.
DescriptionJ : 第 2 WCS 系列で参照基準点 C2PIX1 の C2YPE1 の座標系における値。この WCS 系列は、分光・偏光観測
               でスリットやダイアフラムの CCD 上への投影位置を正確に示すために用いられる。
------------------------------------------------------------
HeaderKeyWord: C2VAL2
Category     : WCS
Importance   : Optional
FormatF      : F20.8
Unit         : degree
Recommend    : -
Sample       : 12.48544329
Comment      : Physical value of ref. pixel Y (degree)
DescriptionE : The value field shall contain a floating point number giving the value of the
               partial coordinate specified by the C2YPE2 keyword at the reference point C2PIX2.
DescriptionJ : 第 2 WCS 系列で参照基準点 C2PIX2 の C2YPE2 の座標系における値。この WCS 系列は、分光・偏光観測
               でスリットやダイアフラムの CCD 上への投影位置を正確に示すために用いられる。
------------------------------------------------------------
HeaderKeyWord: C2YPE1
Category     : WCS
Importance   : Optional
FormatF      : A8
Unit         : -
Recommend    : RA---TAN
Sample       : 'RA---TAN'
Comment      : Pixel coordinate system
DescriptionE : Type of projection used for #1 axis in 2nd WCS.  'RA---TAN' or 'DEC--TAN' is
               recommended for spectroscopy/polarimetry mode.
DescriptionJ : 第 2 WCS 第 1 座標軸の座標名を表わす文字列。分光データの第 2 WCS の場合は 'RA---TAN' あるいは、
               'DEC--TAN' が推奨される。
------------------------------------------------------------
HeaderKeyWord: C2YPE2
Category     : WCS
Importance   : Optional
FormatF      : A8
Unit         : -
Recommend    : DEC--TAN
Sample       : 'DEC--TAN'
Comment      : Pixel coordinate system
DescriptionE : Type of projection used for #2 axis in 2nd WCS.  'RA---TAN' or 'DEC--TAN' is
               recommended for spectroscopy/polarimetry mode.
DescriptionJ : 第 2 WCS 第 2 座標軸の座標名を表わす文字列。分光データの第 2 WCS の場合は 'RA---TAN' あるいは、
               'DEC--TAN' が推奨される。
------------------------------------------------------------
HeaderKeyWord: LONGPOLE
Category     : WCS
Importance   : Imaging
FormatF      : F20.1
Unit         : degree
Recommend    : 180.0
Sample       : 180.0
Comment      : The North Pole of standard system (deg)
DescriptionE : The north pole of the standard system in the native system (degree).
DescriptionJ : 局所球面座標系における天球座標の北極の方向 (degree)。撮像観測に対応する TAN 変換の場合は 180.0
               度として良い。
------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 12-3: WCS(続))

```
-------------------------------------------------------------
HeaderKeyWord: N2XIS
Category     : WCS
Importance   : Optional
FormatF      : I20
Unit         : -
Recommend    : 2
Sample       : 2
Comment      : Dimension of axes in 2nd WCS
DescriptionE : Dimension of the 2nd WCS
DescriptionJ : スリットの投影を WCS で記述するときの軸の数。通常 2。主に分光モードで用いられる。
-------------------------------------------------------------
HeaderKeyWord: N2XIS1
Category     : WCS
Importance   : Optional
FormatF      : I20
Unit         : pixel
Recommend    : -
Sample       : 1024
Comment      : # of pixels/row for slit projection
DescriptionE : Number of pixels along the X axis of the slit projection.
DescriptionJ : スリットの投影を WCS で記述するときの X 軸 (第 1 軸) 方向の画素数。主に分光モードで用いられる。
-------------------------------------------------------------
HeaderKeyWord: N2XIS2
Category     : WCS
Importance   : Optional
FormatF      : I20
Unit         : -
Recommend    : -
Sample       : 1024
Comment      : # of scan lines for slit projection
DescriptionE : Number of pixels along the Y axis of the slit projection.
DescriptionJ : スリットの投影を WCS で記述するときの Y 軸 (第 2 軸) 方向の画素数。主に分光モードで用いられる。
-------------------------------------------------------------
HeaderKeyWord: P2iiijjj
Category     : WCS
Importance   : Optional
FormatF      : F20.8
Unit         : -
Recommend    : -
Sample       : 1.00000000
Comment      : Pixel Coordinate translation matrix
DescriptionE : Pixel Coordinate translation matrix for spectroscopy: iii and jjj are the axis
               numbers, 001 or 002.
DescriptionJ : データの画素値座標系から歪みや回転を取り除くのに用いられる変換行列。主に分光モードで使用され
               る。
-------------------------------------------------------------
HeaderKeyWord: P2OJP1
Category     : WCS
Importance   : Optional
FormatF      : F20.1
Unit         : -
Recommend    : 0.0
Sample       : 0.0
Comment      : Projection type of the first axis
DescriptionE : Projection type of the X (1-st) axis for slit projection: fixed to 0.0
DescriptionJ : スリットの投影について、いくつかの投影法で必要となるパラメータの X(第 1 ) 軸方向の値。主に分光
               モードで使用される。
-------------------------------------------------------------
HeaderKeyWord: P2OJP2
Category     : WCS
Importance   : Optional
FormatF      : F20.1
Unit         : -
Recommend    : 0.0
Sample       : 0.0
Comment      : Projection type of the second axis
DescriptionE : Projection type of the Y (2-nd) axis for slit projection: fixed to 0.0
DescriptionJ : スリットの投影について、いくつかの投影法で必要となるパラメータの Y(第 2 ) 軸方向の値。主に分光
               モードで使用される。
-------------------------------------------------------------
HeaderKeyWord: PCiiijjj
Category     : WCS
Importance   : Imaging
FormatF      : F20.8
Unit         : -
Recommend    : -
Sample       : 1.00000000
Comment      : Pixel Coordinate translation matrix
DescriptionE : Pixel Coordinate translation matrix: iii and jjj are the axis numbers, 001 or 002.
DescriptionJ : データの画素値座標系から歪みや回転を取り除くのに用いられる変換行列。PCi_j のすばる版だが、
               CDi_j との共存は可能。
-------------------------------------------------------------
```

[Dictionary = Basic] (Category 順、その 12-4: WCS(続))

```
------------------------------------------------------------
HeaderKeyWord: PROJP1
Category     : WCS
Importance   : Optional
FormatF      : F20.1
Unit         : -
Recommend    : 0.0
Sample       : 0.0
Comment      : Projection type of the first axis
DescriptionE : Projection type of the X (1-st) axis: fixed to 0.0
DescriptionJ : 局所球面座標から平面座標へのいくつかの投影法で必要となる。パラメータの X(第 1 ) 軸方向の値。
               撮像観測に対応する TAN 変換では 0.0
------------------------------------------------------------
HeaderKeyWord: PROJP2
Category     : WCS
Importance   : Optional
FormatF      : F20.1
Unit         : -
Recommend    : 0.0
Sample       : 0.0
Comment      : Projection type of the second axis
DescriptionE : Projection type of the Y (2-nd) axis: fixed to 0.0
DescriptionJ : 局所球面座標から平面座標へのいくつかの投影法で必要となる。パラメータの Y(第 2) 軸方向の値。
               撮像観測に対応する TAN 変換では 0.0
------------------------------------------------------------
HeaderKeyWord: WCS-ORIG
Category     : WCS
Importance   : Imaging
FormatF      : A20
Unit         : -
Recommend    : -
Sample       : 'SUBARU Toolkit'
Comment      : Origin of the WCS value
DescriptionE : Origin of the World coordinate values.  Specify 'SUBARU Toolkit' if it's
               calculated using toolkit.
DescriptionJ : WCS パラメータの出処。すばるツールキットを使用した場合、'SUBARU Toolkit' という値が入る。
------------------------------------------------------------
HeaderKeyWord: CDj_i
Category     : WCS
Importance   : Optional
FormatF      : F20.8
Unit         : -
Recommend    : -
Sample       : 0.0445
Comment      : Pixel coordinate transformation matrix
DescriptionE : Pixel Coordinate transformation matrix which will be a default for world coordinate
               description in FITS format.
DescriptionJ : データの画素値空間座標系から歪みや回転を取り除くのに用いられる変換行列。
------------------------------------------------------------
```

10.2 装置固有ヘッダ辞書

観測装置固有のキーワードは、頭２文字を定められた装置 ID とし、残り 6 文字を装置開発グループが定義して利用する。共通ヘッダキーワードと同様な辞書が観測装置グループによって作成され、公開されることになっている。

10.2.1 CIAO 固有ヘッダ辞書

[CIAO Dictionary 1/2]

```
Header   Value
Key Word Format Type     Unit    Comment
--------+-----+---------+-------+-------------------------------------------------------------------
C_OMASK  %15s  string             Identifier of the Occulting Mask
C_LYOTST %15s  string             Identifier of the Lyot Stop
C_LYOANG %5.1f double    degree   Lyot stop position angle
C_CAMERA %15s  string             Camera mode
C_BNCTMP %6.2f double    K        Optical bench temperature
C_COLX   %6.2f double    um       Collimator lens x position
C_COLY   %6.2f double    um       Collimator lens y position
C_VACUUM %8.3f double    torr     Vacuum inside dewar
C_SHUTTR %3s   string             Shutter above CIAO on/off
C_DETPOS %5d   integer   um       Detector stage position
```

[CIAO Dictionary 2/2]

Header Key Word	Value Format	Type	Unit	Comment
C_WATER1	%5.2f	double	1/min	Water flow to rack1
C_WATER2	%5.2f	double	1/min	Water flow to rack2
C_AO	%15s	string		On or off of adaptive optics
C_AO-WFS	%7.5f	double		Sigma of deformable mirror
C_AO-TIP	%15s	string		AO tip-tilt on/off
C_AO-FRE	%5d	integer	Hz	Frequency of AO loop
C_VGGCL	%5.2f	double	V	Vggcl
C_VDET	%5.2f	double	V	Vdet
C_VDDUC	%5.2f	double	V	Vdduc
C_VBIAS	%5.2f	double	V	Vdduc
C_SLWCNT	%5d	integer		slow count
C_NDR	%5d	integer		Non destructive readout
C_GRSTNS	%5d	integer		gloval reset count
C_SHTPOS	%5d	integer		Shutter position
C_FPOS01	%5d	integer		Filter position
C_FPOS02	%5d	integer		Filter position
C_FPOS03	%5d	integer		Filter position
C_PIXSCL	%5.1f	double	mas/pix	Pixel scale
C_PXSCAL	%s	string		Pixel scale
C_CAMPOS	%d	integer		Position of camera optics
C_MSKDIM	%f	double	mm	mask diameter
C_MSKPSX	%f	double	pix	mask position in X
C_MSKPSY	%f	double	pix	mask position in Y
C_MSKPOS	%d	integer		position of mask
C_STOPID	%s	string		Identifier of the stop
C_STPANG	%6.2f	double	degree	position angle of the stop
C_CRSDIS	%s	string		Cross disperser
C_RTPOS1	%f	double	mm	Reterder1 position
C_RTAGL1	%f	double	degree	Reterder1 angle
C_RTOFS1	%f	double	degree	Reterder1 offset angle
C_RTPOS2	%f	double	mm	Reterder2 position
C_RTAGL2	%f	double	degree	Reterder2 angle
C_RTOFS2	%f	double	degree	Reterder2 offset angle
C_RTPOS3	%f	double	mm	Reterder3 position
C_RTAGL3	%f	double	degree	Reterder3 angle
C_RTOFS3	%f	double	degree	Reterder3 offset angle
C_RTOFS3	%f	double	degree	Reterder3 offset angle
C_POSSLT	%s	string		Slit for polarimetry
C_PSANG	%f	double	degree	Position angle of pol slit

10.2.2 COMICS 固有ヘッダ辞書

[COMICS Dictionary 1/3]

Header Key Word	Value Format	Type	Unit	Comment
Q_DTYPE	%10s	string		type of this file spec/img/slitview
Q_OBSID	%8d	integer		Observation ID of COMICS
Q_WINDOW	%10s	string		Entrance Window
Q_M1MOTA	%8d	integer		Pulse count of 1st mir. para to bench
Q_M1MOTB	%8d	integer		Pulse count of 1st mir. vert to bench
Q_SLTVEW	%8s	string		Slit Viewer on/off
Q_SPFILE	%20s	string		File name of spectroscopy
Q_SVWMIN	%10.4f	double	nm	Observed Wavelength of S Viewer min
Q_SVWMAX	%10.4f	double	nm	Observed Wavelength of S Viewer max
Q_DETTP1	%10.5f	double	K	Temperature of the detector spec-1
Q_DETTP2	%10.5f	double	K	Temperature of the detector spec-2
Q_DETTP3	%10.5f	double	K	Temperature of the detector spec-3
Q_DETTP4	%10.5f	double	K	Temperature of the detector spec-4
Q_DETTP5	%10.5f	double	K	Temperature of the detector spec-5
Q_DETTPI	%10.5f	double	K	Temperature of the detector img
Q_DETTS1	%s	string		COMICS DETECTOR TEMP SPEC POS-1
Q_DETTS2	%s	string		COMICS DETECTOR TEMP SPEC POS-2
Q_DETTS3	%s	string		COMICS DETECTOR TEMP SPEC POS-3
Q_DETTS4	%s	string		COMICS DETECTOR TEMP SPEC POS-4
Q_DETTS5	%s	string		COMICS DETECTOR TEMP SPEC POS-5
Q_CFTPS	%s	string		COMICS COLD FINGER TEMP SPEC
Q_CFTP1	%6.2f	double	K	Temp. of the cooled finger spec
Q_CFTP2	%6.2f	double	K	Temp. of the cooled finger img
Q_CFTPI	%s	string	K	COMICS COLD FINGER TEMP IMAGING
Q_OPTTP	%s	string		COMICS OPTICS TEMP
Q_OPTTP1	%6.2f	double	K	Temp. of the optics spec-A
Q_OPTTP2	%6.2f	double	K	Temp. of the optics spec-B

[COMICS Dictionary 2/3]

Header Key Word	Value Format	Type	Unit	Comment
Q_OPTTP3	%6.2f	double	K	Temp. of the optics spec-C
Q_OPTTP4	%6.2f	double	K	Temp. of the optics img-A
Q_OPTTP5	%6.2f	double	K	Temp. of the optics img-B
Q_OPTTP6	%6.2f	double	K	Temp. of the optics img-C
Q_COHTP1	%6.2f	double	K	Temp. of the cooler head spec
Q_COHTP2	%6.2f	double	K	Temp. of the cooler head img
Q_SHDTP1	%6.2f	double	K	Temp. of the shield A
Q_SHDTP2	%6.2f	double	K	Temp. of the shield B
Q_ABTTP1	%6.2f	double	K	Temperature of Ambient thermometer
Q_ABTTP2	%6.2f	double	K	Temperature of Ambient thermometer
Q_ABTTP3	%6.2f	double	K	Temperature of Ambient thermometer
Q_IMCHIP	%s	string		COMICS IMAGING CHIP ID
Q_IMVSC	%s	string		COMICS IMAGING CHIP VSSCLK VOLTAGE
Q_IMVSS	%s	string		COMICS IMAGING CHIP VSS VOLTAGE
Q_IMBS0	%s	string		COMICS IMAGING CHIP BIAS0 VOLTAGE
Q_IMBS1	%s	string		COMICS IMAGING CHIP BIAS1 VOLTAGE
Q_IMBS2	%s	string		COMICS IMAGING CHIP BIAS2 VOLTAGE
Q_IMBS3	%s	string		COMICS IMAGING CHIP BIAS3 VOLTAGE
Q_IMBS4	%s	string		COMICS IMAGING CHIP BIAS4 VOLTAGE
Q_IMBS5	%s	string		COMICS IMAGING CHIP BIAS5 VOLTAGE
Q_IMBS6	%s	string		COMICS IMAGING CHIP BIAS6 VOLTAGE
Q_IMBS7	%s	string		COMICS IMAGING CHIP BIAS7 VOLTAGE
Q_IMBS8	%s	string		COMICS IMAGING CHIP BIAS8 VOLTAGE
Q_IMBS9	%s	string		COMICS IMAGING CHIP BIAS9 VOLTAGE
Q_IMCS00	%s	string		COMICS IMAGING CHIP CS00 CURRENT
Q_IMCS02	%s	string		COMICS IMAGING CHIP CS02 CURRENT
Q_IMCS03	%s	string		COMICS IMAGING CHIP CS03 CURRENT
Q_DETST	%s	string		Detector Readout Status
Q_S1CHIP	%s	string		COMICS SPEC-POSITION-1 CHIP ID
Q_S2CHIP	%s	string		COMICS SPEC-POSITION-2 CHIP ID
Q_S3CHIP	%s	string		COMICS SPEC-POSITION-3 CHIP ID
Q_S4CHIP	%s	string		COMICS SPEC-POSITION-4 CHIP ID
Q_S5CHIP	%s	string		COMICS SPEC-POSITION-5 CHIP ID
Q_SPVSC	%s	string		COMICS SPECTROSCOPY CHIP VSSCLK VOLTAGE
Q_SPVSS	%s	string		COMICS SPECTROSCOPY CHIP VSS VOLTAGE
Q_SPBS0	%s	string		COMICS SPECTROSCOPY CHIP BIAS0 VOLTAGE
Q_SPBS1	%s	string		COMICS SPECTROSCOPY CHIP BIAS1 VOLTAGE
Q_SPBS2	%s	string		COMICS SPECTROSCOPY CHIP BIAS2 VOLTAGE
Q_SPBS3	%s	string		COMICS SPECTROSCOPY CHIP BIAS3 VOLTAGE
Q_SPBS4	%s	string		COMICS SPECTROSCOPY CHIP BIAS4 VOLTAGE
Q_SPBS5	%s	string		COMICS SPECTROSCOPY CHIP BIAS5 VOLTAGE
Q_SPBS6	%s	string		COMICS SPECTROSCOPY CHIP BIAS6 VOLTAGE
Q_SPBS7	%s	string		COMICS SPECTROSCOPY CHIP BIAS7 VOLTAGE
Q_SPBS8	%s	string		COMICS SPECTROSCOPY CHIP BIAS8 VOLTAGE
Q_SPBS9	%s	string		COMICS SPECTROSCOPY CHIP BIAS9 VOLTAGE
Q_SPCS00	%s	string		COMICS SPECTROSCOPY CHIP CS00 CURRENT
Q_SPCS02	%s	string		COMICS SPECTROSCOPY CHIP CS02 CURRENT
Q_SPCS03	%s	string		COMICS SPECTROSCOPY CHIP CS03 CURRENT
Q_SPCS10	%s	string		COMICS SPECTROSCOPY CHIP CS10 CURRENT
Q_SPCS12	%s	string		COMICS SPECTROSCOPY CHIP CS12 CURRENT
Q_SPCS13	%s	string		COMICS SPECTROSCOPY CHIP CS13 CURRENT
Q_SPCS20	%s	string		COMICS SPECTROSCOPY CHIP CS20 CURRENT
Q_SPCS22	%s	string		COMICS SPECTROSCOPY CHIP CS22 CURRENT
Q_SPCS23	%s	string		COMICS SPECTROSCOPY CHIP CS23 CURRENT
Q_SPCS30	%s	string		COMICS SPECTROSCOPY CHIP CS30 CURRENT
Q_SPCS32	%s	string		COMICS SPECTROSCOPY CHIP CS32 CURRENT
Q_SPCS33	%s	string		COMICS SPECTROSCOPY CHIP CS33 CURRENT
Q_SPCS40	%s	string		COMICS SPECTROSCOPY CHIP CS40 CURRENT
Q_SPCS42	%s	string		COMICS SPECTROSCOPY CHIP CS42 CURRENT
Q_SPCS43	%s	string		COMICS SPECTROSCOPY CHIP CS43 CURRENT
Q_RRSTRT	%d	integer		Reset Row Start Width (ND)
Q_CHWB	%d	integer		Wipe Exporsure Number in a Chop-beam
Q_CHEB	%d	integer		Exporsure Number in a Chop-beam
Q_CHCN	%d	integer		Chopping Number in this file
Q_CHAM	%d	integer		Add Mode 0:RAW 1:ADD 2:ECO
Q_CTYPE	%1d	integer		Clock Type 0-9
Q_YSTRT	%d	integer		Readout Region Y start
Q_1EXP	%.3f	double	sec	Integration time per exp. (sec) = EXPTIME
Q_1FRAME	%.3f	double	sec	Integration time per frame(co-added) (sec)
Q_CHTHRW	%.2f	double		Chopping Throw
Q_CHDEG	%.2f	double		Chopping Degree
Q_GETVER	%s	string		FITS header VERSION
Q_CLKVER	%30s	string		Clock version
Q_CLKFL	%30s	string		Clock macro file name
Q_CLKMCC	%30s	string		Comment on clock pattern macro
Q_CLKNM	%30s	string		Clock pattern name
Q_CLKCLC	%30s	string		Comment on each clock pattern

[COMICS Dictionary 3/3]

Header Key Word	Value Format	Type	Unit	Comment
Q_PIXTIM	%6.2f	double	microsec	Clock duration for a pixel
Q_FRRATE	%8.4f	double	Hz	Detector Framerate
Q_READTM	%12.8f	double	sec	Time for reading out 1 exp
Q_NDRATE	%3d	integer	1/243	N.D. rate of the detector
Q_NDEFF	%10.8f	double		efficiency of the integ by using N.D.
Q_CHOP	%8s	string		Chopping on/off
Q_CPWTP	%8s	string		Tip-tilt with chopping on/off
Q_CPBMST	%16s	string		Chopping beam at the 1st exp.
Q_CPFREQ	%8.4f	double	Hz	Chopping Frequency
Q_CPTIME	%10.6f	double	sec	Chopping period per 1 beam
Q_CPEXP	%d	integer		Number of exp of 1 chopping beam
Q_CPEXAD	%d	integer		Number of coadded exp.
Q_CPFRAM	%d	integer		Number of frame of 1 chopping beam
Q_CPNUM	%d	integer		Number of chopping in this file
Q_INT1BM	%.6f	double	sec	Integration time per 1 position
Q_CPTHRW	%10.4f	double	arcsec	Chopping throw
Q_CPPA	%8.4f	double	deg	Chopping P.A.
Q_NDTIME	%.2f	double	sec	Nodding period
Q_NDOFRA	%10.4f	double	arcsec	Nodding offset R.A.
Q_NDOFDE	%8.4f	double	arcsec	Nodding offset Dec
Q_NDBEM	%12s	string		Nodding Beam main/offset
Q_NDCOM	%30s	string		Comment about Nodding
Q_GRTMOT	%d	integer		Pulse count of grating motor
Q_GRTPOS	%d	integer		Grating Position in pulse
Q_GRTANG	%10.6f	double	deg	Grating Tilt Angle
Q_WVMIN1	%10.4f	double	nm	Observed Wavelen on Spec Det-1 min
Q_WVMAX1	%10.4f	double	nm	Observed Wavelen on Spec Det-1 max
Q_WVMIN2	%10.4f	double	nm	Observed Wavelen on Spec Det-2 min
Q_WVMAX2	%10.4f	double	nm	Observed Wavelen on Spec Det-2 max
Q_WVMIN3	%10.4f	double	nm	Observed Wavelen on Spec Det-3 min
Q_WVMAX3	%10.4f	double	nm	Observed Wavelen on Spec Det-3 max
Q_WVMIN4	%10.4f	double	nm	Observed Wavelen on Spec Det-4 min
Q_WVMAX4	%10.4f	double	nm	Observed Wavelen on Spec Det-4 max
Q_WVMIN5	%10.4f	double	nm	Observed Wavelen on Spec Det-5 min
Q_WVMAX5	%10.4f	double	nm	Observed Wavelen on Spec Det-5 max

10.2.3 FOCAS 固有ヘッダ辞書

(注: ASCII Table Extension あり。)

Header Key Word	Value Format	Type	Unit	Comment
F_TMP-A	F6.2	double	K	Temperature of MOS unit(K)
F_TMP-B	F6.2	double	K	Temperature of lens unit (K)
F_TMP-C1	F6.2	double	K	Temperature of collimator beam unit-1 (K)
F_TMP-C2	F6.2	double	K	Temperature of collimator beam unit-2 (K)
F_TMP-C3	F6.2	double	K	Temperature of collimator beam unit-3 (K)
F_TMP-D	F6.2	double	K	Temperature of Camera lens unit (K)
F_TMP-E1	F6.2	double	K	Temperature of VME-1 (K)
F_TMP-E2	F6.2	double	K	Temperature of VME-2 (K)
F_TMP-F1	F6.2	double	K	Temperature of driver-unit A-1 (K)
F_TMP-F2	F6.2	double	K	Temperature of driver-unit A-2 (K)
F_TMP-G1	F6.2	double	K	Temperature of driver-unit B-1 (K)
F_TMP-G2	F6.2	double	K	Temperature of driver-unit B-2 (K)
F_TMP-H1	F6.2	double	K	Temperature of driver-unit C-1 (K)
F_TMP-H2	F6.2	double	K	Temperature of driver-unit C-2 (K)
F_TMP-I1	F6.2	double	K	Temperature of driver-unit D-1 (K)
F_TMP-I2	F6.2	double	K	Temperature of driver-unit D-2 (K)
F_TMP-J1	F6.2	double	K	Temperature of driver-unit E-1 (K)
F_TMP-J2	F6.2	double	K	Temperature of driver-unit E-2 (K)
F_DEWERX	SP,F8.2	double	um	X-position of dewer stage (micron meter)
F_DEWERY	SP,F8.2	double	um	Y-position of dewer stage (micron meter)
F_DEWERZ	SP,F8.2	double	um	Z-position of dewer stage (micron meter)
F_HOLANG	F3.1	double	degree	angle of mask holder (degree)
F_MSK-ID	A9	string		ID of mask (for all mode)
F_CAD-ID	A9	string		ID of CAD data for mask cutting
F_CADREF	A50	string		ID/name of image/catalog data for mask design
F_DISPER	F5.3	double	nm/pixel	dispersion of grism (nm / pixel)
F_SLT-NO	I3	integer		total # of slit on mask
F_POSANG	F6.2	double	degree	PA of cross-dispersion axis (degree)
F_FCSMOD	%s	string		Observation Mode
F_WIPE	%s	string		CCD Wipe Rate
F_READ	%s	string		CCD Readout Rate

10.2.4 HDS 固有ヘッダ辞書

(注: ASCII Table Extension 有。)

Header KeyWord	Value Format	Type	Unit	Comment
H_INPOWR	f6.2	double	Volt	Input power for the flat lamp
H_IMSLCR	a8	string		Image slicer (ON, OFF)
H_ISTYPE	a10	string		Type of the image slicer
H_S-MSK1	f6.3	double	mm	Upper mask position from the center
H_S-MSK2	f6.3	double	mm	Lower mask position from the center
H_S-INCL	f7.2	double		Slit inclination angle at the horizontal plane
H_D-UNIT	i1	integer		ID number of the detector unit
H_D-OTHR	a10	string		Use of the other CCD in this mosaic
H_SHUTTR	a10	string		Entrance shutter (OPEN, CLOSE)
H_HARTMN	a10	string		Hartmann shutter (U-OPEN,L-OPEN,ALL-OPEN,ALL-CLOSE)
H_COLLIM	a10	string		Collimator (BLUE, RED)
H_CLPSTN	f6.2	double	mm	Collimator position (mm)
H_CLFOCL	f10.5	double	mm	Collimator focal length (mm)
H_CLOFFA	f10.5	double	degree	Collimator offset angle (degree)
H_ECHELL	a10	string		Echelle (BLUE, RED, NIR)
H_ECONST	f7.3	double	grooves/mm	Ruling pitch (grooves/mm)
H_EBLAZE	f7.3	double	degree	Blaze Angle (degree)
H_EEPSRN	f7.3	double	degree	Offset Angle of the Incident Beam (degree)
H_EGAMMA	f7.3	double	degree	Echelle Gamma Angle (constant)
H_EROTAN	f10.5	double	degree	Echelle Rotation Angle (degree)
H_CROSSD	a10	srting		Cross Disperser (BLUE, RED, MIRROR, NIR)
H_CCONST	f7.3	double	grooves/mm	Ruling pitch (grooves/mm)
H_CBLAZE	f7.3	double	degree	Blaze Angle (degree)
H_CEPSRN	f7.3	double	degree	Offset Angle at Blaze Wavelength (degree)
H_CGAMMA	f7.3	double	degree	Cross Disperser Gamma Angle (constant)
H_CTABAN	f10.5	double	degree	Rotation angle of the turn table (degree)
H_CROTAN	f10.5	double	degree	Cross Disperser Rotation Angle (degree)
H_CMRFL	f10.5	double	mm	Camera focal length (mm)
H_FOCUS	f10.5	double	mm	Focusing unit position (mm)
H_PITCH	f9.5	double	degree	Focusing unit pitching angle (degree)
H_YAWING	f9.5	double	degree	Focusing unit yawing angle (degree)
H_F-DRV1	f9.5	double	mm	Focusing driver1 position (mm)
H_F-DRV2	f9.5	double	mm	Focusing driver2 position (mm)
H_F-DRV3	f9.5	double	mm	Focusing driver3 position (mm)
H_DETROT	f9.5	double	degree	Rotation angle of the detector unit (degree)
H_ET1AVE	f6.2	double	K	Average (Kelvin)
H_ET1MIN	f6.2	double	K	Minimum (Kelvin)
H_ET1MAX	f6.2	double	K	Maximum (Kelvin)
H_ET1DEV	f6.2	double	K	Standard deviation (Kelvin)
H_AO-TYP	a20	string		Type of correction (Tip-Tilt)
H_AO-ORD	i3	integer		Maximum order included
H_AO-OBJ	a20	string		star used for wavefront correction
H_AO-RA	a20	string		RA of star used for wavefront correction
H_AO-DEC	a20	string		Dec of star used for wavefront correction
H_ZAXIS1	a20	string		Axis1 of zeroth order light monitor of Echelle (Along slit/Cross slit/None)
H_ZAXIS2	a20	string		Axis2 of zeroth order light monitor of Echelle (Along slit/Cross slit/None)
H_ZA1POS	f7.2	double	pixel	peak position in axis1
H_ZA2POS	f7.2	double	pixel	peak position in axis2
H_ZWID1	f7.2	double	pixel	Width in axis1 of the stellar image (pixel)
H_ZWID2	f7.2	double	pixel	Width in axis2 of the stellar image (pixel)
H_ZDELT	f6.4	double	mm	Pixel size (mm)
H_ZSCALE	f8.5	double	mm/pixel	Physical length on the slit plane projected into one pixel
H_ZTMP	f5.1	double	K	Detector temperature (Kelvin)
H_SUPER	a10	string		Super Resolution Mode (POS1, POS2, NONE)
H_AG-OBJ	a20	string		Guide object name
H_AG-ORA	a20	string		RA of the guide object
H_AG-ODE	a20	string		Dec of the guide object
H_AG-RA	a20	string		RA of the tracked pos. on the slit guide pos.
H_AG-DEC	a20	string		Dec of the tracked pos. on the slit guide pos.
H_AG-EQN	f6.1	double		Equinox of H_AG-RA and H_AG_DEC
H_I2CELL	a8	string		I2 Cell Mode(USE/NOUSE)
H_LM	a8	string		(USE/NOUSE)
H_I2TEMP	f5.1	double		
H_LMINTG	f5.1	double		
H_I2POS	a8	string		
H_LMPOS	a8	string		
H_ETMP1	f5.1	double	K	Nasmyth Temperature 1 (Kelvin)
H_ETMP2	f5.1	double	K	Nasmyth Temperature 2 (Kelvin)
H_GAIN1	f6.3	double		Readout gain of left (smaller X) side of CCD
H_GAIN2	f6.3	double		Readout gain of right (larger X) side of CCD
H_OSMIN1	i4	integer		Start of overscan region for AXIS1
H_OSMAX1	i4	integer		End of overscan region for AXIS1
H_OSMIN2	i4	integer		Start of overscan region for AXIS2
H_OSMAX2	i4	integer		End of overscan region for AXIS2

10.2.5 CISCO/OHS 固有ヘッダ辞書

Header Key Word	Value Format	Type	Unit	Comment
O_MSK	%30s	string		MASK name of OH Suppression
O_SLT	%30s	string		OHS slit
O_SLTLEN	%7.3f	double	arcsec	OHS slit length (arcsec)
O_SLTWID	%7.3f	double	arcsec	OHS slit width (arcsec)
O_FOCVAL	%7.3f	double		OHS FOCUS Value

10.2.6 SuprimeCam 固有ヘッダ辞書

Header Key Word	Value Format	Type	Unit	Comment
S_UFNAME	A40	CHARACTER		User assigned file name
S_FRMPOS	A4	CHARACTER		Frame position (IIJJ)
S_BCTAVE	F9.3	REAL	ADU	Average count outside effective data
S_BCTSD	F9.3	REAL	ADU	S.D. of the count outside the eff. data
S_AG-OBJ	A40	CHARACTER		Name of the guide-star
S_AG-RA	A12	CHARACTER		R.A. of the guide-star
S_AG-DEC	A12	CHARACTER		Dec. of the guide-star
S_AG-EQN	F6.1	REAL	y	Equinox of the guide-star position
S_AG-X	F7.2	REAL	mm	Position of the guiding probe (X)
S_AG-Y	F7.2	REAL	mm	Position of the guiding probe (Y)
S_AG-R	F7.2	REAL	mm	Position of the guiding probe (R)
S_AG-TH	F7.2	REAL	degree	Position of the guiding probe (theta)
S_ETMED	F6.2	REAL	K	Averaged temp. in Camera enclosure (Kelvin)
S_ETMAX	F6.2	REAL	K	Maximum temp. in Camera enclosure (Kelvin)
S_ETMIN	F6.2	REAL	K	Minimum temp. in Camera enclosure (Kelvin)
S_XFLIP		BOOLEAN		CCD readout is x-flipped when create image
S_YFLIP		BOOLEAN		CCD readout is y-flipped when create image
S_M2OFF1	F6.3	REAL	mm	Stewart Platform x-offset
S_M2OFF2	F6.3	REAL	mm	Stewart Platform y-offset
S_M2OFF3	F6.3	REAL	mm	Stewart Platform z-offset
S_DELTAZ	F6.3	REAL	mm	delta z for FocusTest
S_DELTAD	F6.2	REAL	arcsec	delta Dec for FocusTest
S_SENT		BOOLEAN		Already send to OBC

10.2.7 MIRTOS 固有ヘッダ辞書

[MIRTOS Dictionary 1/2]

Header Key Word	Value Format	Type	Unit	Comment
M_WINDOW	%-8s			MIRTOS dewar entrance window
M_M1MOT1	%6d			Beam Stearing Mirror Direction (count)
M_M1MOT2	%6d			Beam Stearing Mirror Direction (count)
M_M2MOT1	%6d			Beam Splitter Direction (count)
M_M2MOT2	%6d			Beam Splitter Direction (count)
M_BEAM	%d			Number of Beam Description M_BEAMn
M_BEAM1	%-8.68s			
M_BEAM2	%-8.68s			
M_BEAM3	%-8.68s			
M_BEAM4	%-8.68s			
M_CHID	%-8.16s			ID of camera channel of MIRTOS
M_OBSID	%-8.16s			ID of set of chop/nod observation
M_TWID	%-8.16s			ID of two-wavelength simultaneous file
M_FLATID	%-8.16s			ID of the most recent flat field file
M_DARKID	%-8.16s			ID of the most recent dark exposure file
M_DET01	%8.5f			Rel X pos of NIR from MIR on sky (pixel)
M_DET02	%8.5f			Rel Y pos of NIR from MIR on sky (pixel)
M_CHOPTM	%8.2f			Chopping period (sec)
M_CHOPTH	%8.2f			Chopping throw (arcsec)
M_CHOPPA	%8.2f			Chopping P.A. origin:source/pointing (deg)
M_NODTM	%8.1f			Nodding period (sec)
M_NODTH	%8.2f			Nodding throw (arcsec)
M_NODPA	%8.2f			Nodding P.A. origin:source/pointing (deg)
M_RFX1PP	%d			Corner 1 X for Chop+ Nod+
M_RFY1PP	%d			Corner 1 Y for Chop+ Nod+
M_RFX2PP	%d			Corner 2 X for Chop+ Nod+
M_RFY2PP	%d			Corner 2 Y for Chop+ Nod+
M_RFX1MP	%d			Corner 1 X for Chop- Nod+
M_RFY1MP	%d			Corner 1 Y for Chop- Nod+

[MIRTOS Dictionary 2/2]

Header Key Word	Value Format	Type	Unit	Comment
M_RFX2MP	%d			Corner 2 X for Chop- Nod+
M_RFY2MP	%d			Corner 2 Y for Chop- Nod+
M_RFX1PM	%d			Corner 1 X for Chop+ Nod-
M_RFY1PM	%d			Corner 1 Y for Chop+ Nod-
M_RFX2PM	%d			Corner 2 X for Chop+ Nod-
M_RFY2PM	%d			Corner 2 Y for Chop+ Nod-
M_RFX1MM	%d			Corner 1 X for Chop- Nod-
M_RFY1MM	%d			Corner 1 Y for Chop- Nod-
M_RFX2MM	%d			Corner 2 X for Chop- Nod-
M_RFY2MM	%d			Corner 2 Y for Chop- Nod-
M_O-TMP	%4.1f			Optics Temp(K) %%d
M_C-TMP1	%4.1f			CCC 1st stage(K) %%d
M_C-TMP2	%4.1f			CCC 2nd stage(K) %%d
M_A-TMP1	%4.1f			Ambient #1(K) %%d
M_A-TMP2	%4.1f			Ambient #2(K) %%d
M_A-TMP3	%4.1f			Ambient #3(K) %%d
M_W-TMP	%4.1f			CCC Coolant Out (K) %%d
M_W-CUR	%4.1f			CCC Coolant (l/min) %%d
M_CLKFL	%-8s			Clock file name
M_CLKMR	%-8s			Clock pattern macro name %%d
M_CLKMC	%-8s			Comment on clock pattern macro
M_PIXTIM	%9.4G			Clock duration for a pixel (sec)
M_FRTIME	%9.4f			Time to sweep one frame (sec)
M_CBANK	%-8s			Running clock bank when data was taken
M_CEFCT	%c			Clock activity when data taken (T:Conv F:Idle)
M_A-GAIN	%d			Wallace Instruments pre-amp gain
M_A-BWTH	%d			Wallace Instruments pre-amp BW(KHz)
M_JPORT	%2d			Jump port value when data got at %%d
M_REFSUB	%c			Subtraction of reference column T:done
M_ARRANG	%-8.10s			Data sequence FITS/Raw-hardware version
M_BANK	%-8s			Bank name where the data was stored
M_BBPOS	%c			Black Body Position T:In F:Out
M_BBTMP	%4.1f			Temperature of Black Body (K) %%d

10.2.8 IRCS 固有ヘッダ辞書

[IRCS Dictionary 1/3]

Header Key Word	Value Comment	Format
I_ARCH	ARCHIVED? 0:No 1:Yes	%1d
I_HDRVER	IRCS HEADER VERSION	%f
I_FNAME	FILE NAME	%s
I_TC-SEQ	Telescope controlling sequence	%40s
I_NSQ	Number of the frame in the sequence	%3d
I_NSQMAX	Maximum number of the sequence	%3d
I_MCW1NM	Camera Wheel 1 element name	%s
I_MCW1PK	Camera Wheel 1 puka	%d
I_CW1HV	Camera Wheel 1 Hall Value	%5d
I_CW1MP	Camera Wheel 1 motor position	%5d
I_MCW2NM	Camera Wheel 2 element name	%s
I_CW2PK	Camera Wheel 2 puka	%1d
I_CW2HV	Camera Wheel 2 Hall Value	%5d
I_CW2MP	Camera Wheel 2 motor position	%5d
I_MCW3NM	Camera Wheel 3 element name	%s
I_CW3PK	Camera Wheel 3 puka	%1d
I_CW3HV	Camera Wheel 3 Hall Value	%5d
I_CW3MP	Camera Wheel 3 motor position	%5d
I_MFOCMC	Focus Stage microns	%d
I_MFOCHV	Focus Stage hall value	%d
I_MFOCMP	Focus Stage motor position	%d
I_MDFMST	Dual Flipmirror State	%s
I_MFM1ST	Flipmirror 1 State IN/OUT	%s
I_MFM1HV	Flipmirror 1 Hall Value	%d
I_MFM1MP	FlipMirror 1 motor position	%d
I_MFM2ST	Flipmirror 2 state IN/OUT	%s
I_MFM2HV	Flipmirror 2 Hall Value	%d
I_MFM2MP	FlipMirror 1 motor position	%d
I_SLWNM	SlitWheel element name	%s
I_SLWPK	Slitwheel puka	%d
I_SLWHV	Slitwheel Hall Value	%d
I_SLWMP	SlitWheel motor position	%d
I_SPWNM	Spectrograph Wheel element name	%s

[IRCS Dictionary 2/3]

Header Key Word	Value Comment	Format
I_SPWPK	Spectrograph Filter Wheel Puka	%d
I_SPWHV	Spectrograph Filter Wheel Hall Value	%d
I_SPWMP	Spectrograph Filter Wheel Motor Position	%d
I_SLWCNT	Number of detector Slow Counts	%d
I_MECHAS	Echelle Arcsec	%d
I_MECHHV	Echelle Hall value	%d
I_MECHMP	Echelle Motor Position	%d
I_MXDSAS	Cross Disperser Arcsec	%d
I_MXDSHV	Cross Disperser Hall value	%d
I_MXDSMP	Cross Disperser motor position	%d
I_CKMODE	Detector clock mode	%s
I_GRNS	Detector global reset pulsewidth (ns)	%d
I_BGRFL	Backgroud Resets flag T:Yes F:No	boolean
I_BGRRT	Detector backgroud resets rate (ms)	%d
I_BGRDL	Detector backgroud reset delay (ms)	%d
I_BGRPW	Backgroud Resets pulsewidth (nanoseconds)	%d
I_VGGCL	Detector VGGCL volts	%.2f
I_VDET	Detector VDET (volts)	%.2f
I_VDDUC	Detector VDDUC (volts)	%.2f
I_VBIAS	Detector Bias= I_VDET - I_VDDUC (volts)	%.2f
I_PGAIN	Gain of Redline Preamp Boards	%.3f
I_NSUBAR	Number of Sub Arrays	%d
I_SAR1CX	Subarray 1 center x pixel coord	%3d
I_SAR1CY	Subarray 1 center y pixel coord	%3d
I_SAR1WD	Subarray 1 width	%4d
I_SAR1HT	Subarray 1 height	%4d
I_NDRASZ	Nod R.A. size (arc seconds)	%10.8f
I_NDDCSZ	Nod DEC size (arc seconds)	%10.8f
I_DTHSZ	Dither step size (arc seconds)	%10.8f
I_DTHPAT	Dither pattern shape	%s
I_DTHNUM	N positions in dither	%d
I_DTHPOS	Dither position number	%d
I_ROTAO	Array Rotation AO M1 IN	%13.8f
I_ROTNAO	Array Rotation AO M1 OUT	%13.8f
I_ABOFFX	Absolute offset from the center of the pattern (RA)	%8.2f
I_ABOFFY	Absolute offset from the center of the pattern (Dec)	%8.2f
I_RLOFFX	Relative offset from the last frame of the pattern (RA)	%8.2f
I_RLOFFY	Relative offset from the last frame of the pattern(Dec)	%8.2f
I_AG-OBJ	Name of the guide-star	%40s
I_AG-RA	R.A. of the guide-star	%12s
I_AG-DEC	Dec. of the guide-star	%12s
I_AG-EQN	Equinox of the guide-star position	%6.1f
I_AG-X	Position of the guiding probe (X)	%6.2f
I_AG-Y	Position of the guiding probe (Y)	%6.2f
I_AG-R	Position of the guiding probe (R)	%6.2f
I_AG-TH	Position of the guiding probe (theta)	%6.2f
I_TT-OBJ	Name of the tip-tilt guide-star	%40s
I_TT-RA	R.A. of the tip-tilt guide-star	%12s
I_TT-DEC	Dec. of the tip-tilt guide-star	%12s
I_TT-EQN	Equinox of the tip-tilt guide-star position	%6.1f
I_TT-X	Position of the guiding probe (X)	%6.2f
I_TT-Y	Position of the guiding probe (Y)	%6.2f
I_TT-R	Position of the guiding probe (R)	%6.2f
I_TT-TH	Position of the guiding probe (theta)	%6.2f
I_AOMODE	AO mode	%3s
I_AO-WFS	Wavefront sensor used for AO	%10s
I_AO-GS	Name of the AO guide star	%40s
I_AO-GSM	Magnitude of the AO guide star	%3.1f
I_AO-GSB	Band for the magnitude of the AO guide star	%3s
I_AO-EQN	Equinox of the guide-star position	%6.1f
I_AO-X	Position of the guiding probe (X)	%6.2f
I_AO-Y	Position of the guiding probe (Y)	%6.2f
I_AO-R	Position of the guiding probe (R)	%6.2f
I_AO-TH	Position of the guiding probe (theta)	%6.2f
I_UFNAME	User assigned file name	%40s
I_M-HAT	Status of mechanisms (hatch) HOME/OPEN/CLOSE	%5s
I_M-SW	Status of mechanisms (slit wheel)	%10s
I_M-FM1	Status of mechanisms (flip mirror 1) HOME/22mas/60mas	%5s
I_M-FM2	Status of mechanisms (flip mirror 2) HOME/22mas/60mas	%5s
I_M-CFW1	Status of mechanisms (camera filter wheel 1)	%10s
I_M-CFW2	Status of mechanisms (camera filter wheel 2)	%10s
I_M-CFW3	Status of mechanisms (camera filter wheel 2)	%10s
I_M-FS	Status of mechanisms (camera filter wheel 2)	%20s
I_M-SFW	Status of mechanisms (spectrograph filter wheel)	%30s
I_M-ECH	Status of mechanisms (Echelle drive)	%30s
I_M-XD	Status of mechanisms (X-disperser drive)	%30s
I_M-ECHE	Hall sensor value of Echelle drive	%10d
I_M-XDE	Hall sensor value of X-disperser drive	%10d

[IRCS Dictionary 3/3]

Header Key Word	Value Comment	Format
I_DMIN	MIN DATA VALUE IN FILE	%6d
I_DMAX	MAX DATA VALUE IN FILE	%6d
I_DMEAN	MEAN DATA VALUE IN FILE	%6.2f
I_DIV	Normalization value	%3d
I_NSARRY	Number of Sub Arrays	%3d
I_AR1MIN	x of Sub Arrays	%4d
I_AR2MIN	y of Sub Arrays	%4d
I_AR1RNG	wid of Sub Arrays	%4d
I_AR2RNG	hgt of Sub Arrays	%4d
I_SUBAB	SubAB flag. 0=off, 1=on	%1d
I_CBMODE	CB Mode is ARC_D	%1d
I_SLCNT	Number of Slow Counts	%2d
I_GRCNT	Global Reset Count. 1 cnt = 25 nsec	%4d
I_BGRSTF	Background Reset's flag	%2d
I_BGRSTT	Background Reset's msec	%4d
I_BGRSTC	Background Reset's cnt	%3d
I_GOSIM	GO simulation flag. 0=off, 1=on	%1d

10.2.9 AO(Adaptive Optics) 固有ヘッダ辞書

Header Key Word	Value Format	Type	Comment
A_STATE	%s	string	AO state ALIVE,OFF
A_APDAV	%6.1f	double	APD average counts
A_LOOP	%s	string	Loop state OFF,READ,DM,TT,ALL
A_DMGAIN	%8.5f	double	DM gain
A_TTGAIN	%8.5f	double	TT gain
A_DMCMTX	%s	string	DM control matrix
A_TTCMTX	%s	string	TT control matrix
A_VMVOLT	%4.1f	double	VM voltage(optical gain)
A_VMFREQ	%6.1f	double	VM frequency
A_M1POS	%s	string	AO pick-up mirror position IN,OUT,UNDEF
A_M1STAT	%s	string	AO pick-up mirror state INIT,SIM,UNDEF
A_M1PULS	%d	integer	AO pick-up mirror pulses
A_ISTAT	%s	string	VM Iris state INIT,SIM,UNDEF
A_IPULS	%5d	integer	VM Iris pulses
A_RSTAT	%s	string	GSAU radius state INIT,SIM,UNDEF
A_TSTAT	%s	string	GSAU theta state INIT,SIM,UNDEF
A_FSTAT	%s	string	GSAU focus state INIT,SIM,UNDEF
A_CSTAT	%s	string	GSAU con-length state INIT,SIM,UNDEF
A_RPULS	%4d	integer	GSAU radius pulses
A_TPULS	%5d	integer	GSAU theta pulses
A_FPULS	%d	integer	GSAU focus pulses
A_CPULS	%5d	integer	GSAU con-length pulses
A_IDXOFF	%f	double	Ins. detector X pixel offset
A_IDYOFF	%f	double	Ins. detector Y pixel offset
A_IDX0	%f	double	Ins. detector X zero point
A_IDY0	%f	double	Ins. detector Y zero point
A_GS_RA	%s	string	AO guide star RA
A_GS_DEC	%s	string	AO guide star DEC
A_GS_MAG	%f	double	AO guide star magnitude

10.3 略号表 (1998/09/09)

次ページ参照

Abbreviation	meaning	Category
END	END	Action
MID	MIDdle	Action
STR	STaRt	Action
HUM	HUMidity	Environment
PRS	PReSsure	Environment
TMP	TeMPerature	Environment
WND	WiND	Environment
BIN	BINning	Image
PRD	Partly ReaD out	Image
AO	Adaptive Optics	Instrument
APT	APerTure	Instrument
DET	DETector	Instrument
FLT	FiLTer	Instrument
PIX	PIXel	Instrument
PX	PiXel	Instrument
RET	RETarder	Instrument
SLT	SLiT	Instrument
ANG	ANGle	Statistics/Unit
AVE	AVErage	Statistics/Unit
CEN	CENter	Statistics/Unit
DIR	DIRection	Statistics/Unit
DISP	DISPersion	Statistics/Unit
FCT	FaCTor	Statistics/Unit
LEN	LENgth	Statistics/Unit
MAX	MAXimum	Statistics/Unit
MED	MEDian	Statistics/Unit
MIN	MINimum	Statistics/Unit
MOD	MODe	Statistics/Unit
PA	Position Angle	Statistics/Unit
RES	RESolution	Statistics/Unit
RNG	RaNGe	Statistics/Unit
SD	Standard Deviation	Statistics/Unit
SPC	SPaCial/SPaCe	Statistics/Unit
SPD	SPeeD	Statistics/Unit
SZ	SiZe	Statistics/Unit
TYP	TYPe	Statistics/Unit
VAL	VALue	Statistics/Unit
WAV	WAVelength	Statistics/Unit
WID	WIDth	Statistics/Unit
ADC	Atmospheric Dispersion Corrector	Telescope
AE	Absolute Encoder	Telescope
AG	AutoGuider	Telescope
AIRM	AIR Mass	Telescope
AZ	AZimuth	Telescope
CAL	CALibration source	Telescope
CS	CaSsegrain focus	Telescope
DEC	DEClination	Telescope
DOM	DOMe / enclosure	Telescope
EL	ELevation	Telescope
ELBX	ELectric terminal BoX	Telescope
FOC	telescope FOCus	Telescope
FV	Field Viewer	Telescope
IE	Incremental Encoder	Telescope
IMR	IMage Rotator	Telescope
INR	INstrumental Rotator	Telescope
M2	2-ndary Mirror	Telescope
M3	Tertiary Mirror	Telescope
NS	NaSmyth focus	Telescope
PF	Primary Focus	Telescope
PM	Primary Mirror	Telescope
PMA	Primary Mirror Actuator	Telescope
POS	POSition	Telescope
PRB	PRoBe	Telescope
RA	Right Ascension	Telescope
SECZ	SECant of Zenith distance	Telescope
TEL	TELescope	Telescope
TIP	TiP/Tilt	Telescope
ZD	Zenith Distance	Telescope
HST	Hawaii Standard Time	Time
JD	Julian Date	Time
LST	Local Sidereal Time	Time
MJD	Modified Julian Date	Time
UT	Universal Time	Time

表 19: 略号

10.4 *FITS* ヘッダサンプル

現時点ではすばる *FITS* ヘッダルールやNOSTの規約に反する箇所も見受けられるが、鋭意整備中であり、最新情報を参照願いたい (2.3.4 節参照)。

10.4.1 CIAO(2003/12/31)

● CIAO の Imaging mode

```
         1         2         3         4         5         6         7
1234567890123456789012345678901234567890123456789012345678901234567890123456789
--------------------------------------------------------------------------------
SIMPLE  =                    T / DATA IS IN FITS FORMAT
BITPIX  =                   32 / 32 BITS TWOS COMPLEMENT INTEGERS
NAXIS   =                    2 / NUMBER OF AXIS
NAXIS1  =                 1024 / PIXELS ON 1st MOST VARYING AXIS
NAXIS2  =                 1024 / PIXELS ON 2nd MOST VARYING AXIS
EXTEND  =                    F / Existence of extension or not
BLANK   =                32768 / Value used for NULL pixels
BSCALE  =                 1.00 / Real = fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =                 0.00 / Real = fits-value*BSCALE+BZERO
COMMENT
COMMENT
COMMENT ***** Telescope, Instrument and FITS header version
COMMENT
OBSERVAT= 'NAOJ    '           / Observatory name
TELESCOP= 'SUBARU  '           / The name of telescope data obtained
INSTRUME= 'CIAO    '           / The name of instrument
OBS-ALOC= 'Observation'        / Allocation mode for Instrument
INS-VER =          CIAO-H01S02 / version of the instrument / control-soft
COMMENT
COMMENT
COMMENT ***** Observation *****
COMMENT
OBSERVER= 'CIAO    '           / Observer
PROP-ID = 'o11227  '           / Proposal ID
DATE-OBS= '2011-10-17'         / Observation start date ('yyyy-mm-dd')
UT      = '03:58:55.642'       / HH:MM:SS.S start UTC at exposure
HST     = '17:58:55.642'       / HH:MM:SS.S start HST at exposure
LST     = '20:40:48.382'       / HH:MM:SS.S start LST at exposure
MJD     =       52950.16591746 / Modified Julian day
TIMESYS = 'UTC     '           / Time system used in this header
DATASET = 'DS0000  '           / ID of an observation dataset
FRAMEID = 'CIAA00091707'       / Image sequential number
EXP-ID  = 'CIAE00091402'       / ID of the exposure this data was taken
OBS-MOD = 'IMAG_SINGLE'        / Observation mode
DATA-TYP= 'DARK    '           / Type / Characteristics of this data
OBJECT  = 'DARK    '           / target Description
RADECSYS= 'FK5     '           / The equatorial coordinate system
RA      = '20:40:41.637'       / HH:MM:SS.SSS RA pointing
DEC     = '+19:48:49.03'       / +/-DD:MM:SS.SS DEC pointing
EQUINOX =                2000.0 / Standard FK5 (years)
RA2000  = '20:40:41.637'       / HH:MM:SS.SSS RA (J2000) pointing
DEC2000 = '+19:48:49.03'       / +/-DD:MM:SS.SS DEC (J2000) pointing
EXP1TIME=                 2.00 / Each exposure time (sec)
COADD   =                    5 / number of coadd
EXPTIME =                10.00 / Total exposure time (sec)
SEEING  =                 0.01 / seeing size (arcsec)
AIRMASS =              1.00000 / Air Mass at start
ZD      =                 0.01 / Zenith distance at start
COMMENT : DARK
COMMENT
COMMENT ***** Telescope Status *****
COMMENT
AZIMUTH =             89.92588 / Azimuth of telescope pointing
M2-TYPE = 'CS_IR   '           / 2nd mirror type
M2-TIP  = 'OFF     '           / 2nd mirror tip-tilt on-off
INSROT  =               -0.000 / Angle of instrument rotator
INST-PA =               49.760 / Offset of instrument rotator
TELFOCUS= 'Cassegrain'         / Focus where a beam is reachable
FOC-POS = 'Cassegrain'         / Focus where the instrument is attached
FOC-VAL =                0.752 / Encoder value of the focus unit
COMMENT
COMMENT
COMMENT ***** Coordinate *****
COMMENT
WCS-ORIG= 'SUBARU Toolkit'     / Origin of the WCS value
```

```
CRPIX1  =                  512 / Reference pixel in X
CRPIX2  =                  512 / Reference pixel in Y
CRVAL1  =         310.08782083 / Physical value of the reference pixel X
CRVAL2  =          19.81363611 / Physical value of the reference pixel Y
CDELT1  =           0.00000604 / Size projected into a detector pixel X
CDELT2  =           0.00000604 / Size projected into a detector pixel Y
CTYPE1  = 'RA---TAN'           / Pixel coordinate system
CTYPE2  = 'DEC--TAN'           / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree  '           / Units used in both CRVAL2 and CDELT2
PROJP1  =                  0.0 / Projection type of the first axis
PROJP2  =                  0.0 / Projection type of the second axis
LONGPOLE=                180.0 / The North Pole of the standard system
PC001001=           1.00000000 / Pixel coordinate translation matrix
PC001002=           0.00000000 / Pixel coordinate translation matrix
PC002001=           0.00000000 / Pixel coordinate translation matrix
PC002002=           1.00000000 / Pixels coordinate translation matrix
COMMENT
COMMENT
COMMENT ***** Environment Condition *****
COMMENT
DOM-HUM =                  4.2 / Dome humidity (%)
OUT-HUM =                  4.1 / Outside humidity (%)
DOM-TMP =               277.25 / Dome temperature (C)
OUT-TMP =               277.65 / Outside temperature (C)
DOM-WND =                 1.50 / Dome wind speed (m/sec)
OUT-WND =                 7.40 / Outside wind speed (m/sec)
DOM-PRS =               622.10 / Dome pressure (hpa)
OUT-PRS =               622.10 / Outside pressure (hpa)
WEATHER = 'Fare    '           / Weather condition
C_VACUUM=               999.99 / Vacuum inside dewar (torr)
C_WATER1=               -99.99 / Water flow rack1 (l/min)
C_WATER2=               -99.99 / Water flow rack2 (l/min)
C_BNCTMP=                57.86 / Optical bench tenperature (K)
COMMENT
COMMENT
COMMENT ***** Detector *****
COMMENT
DETECTOR= 'Alladin2'           / Name of the detector/CCD
DET-TMP =                29.00 / Detector temperature
DET-TSD =                 0.00 / Standard deviation of detector temp.(K)
GAIN    =                 7.4 / AD conversion factor
C_VGGCL =               -3.25 / Vggcl (v)
C_VDET  =               -3.45 / Vdet (v)
C_VDDUC =               -3.75 / Vdduc (v)
C_VBIAS =                0.30 / Vdduc (v)
C_SLWCNT=                  12 / slow count
C_NDR   =                   6 / Non destructive readout
C_GRSTNS=                 800 / gloval reset count.
DET-SMPL= 'ARC_D   '           / Sample method of detector
BIN-FCT1=                   1 / Binning factor of X axis
BIN-FCT2=                   1 / Binning factor of Y axis
PRD-MIN1=                   1 / Start x pos. of partialy read out
PRD-MIN2=                   1 / Start y pos. of partialy read out
PRD-RNG1=                1024 / x range of partialy read out
PRD-RNG2=                1024 / y range of partialy read out
DET-RST =                  12 / Reset number before exposure
DET-NSMP=                   6 / # of multiple sample in each exposure
COMMENT
COMMENT
COMMENT ***** General Optical Configuration *****
COMMENT
C_SHUTTR= 'open    '           / Shutter OPEN/CLOSE
C_SHTPOS=                   0 / Shutter position (pulses)
C_COLX  =              -21000 / Collimator lens x position (pix)
C_COLY  =             -192000 / Collimator lens y position (pix)
FILTER01= 'block   '           / Filter name/ID
C_FPOS01=                80000 / Filter position (pulses)
FILTER02= 'open    '           / Filter name/ID
C_FPOS02=                   0 / Filter position (pulses)
FILTER03= 'none    '           / Filter name/ID
C_FPOS03=                     / Filter position (pulses)
C_CAMERA= 'MRM     '           / Camera mode
C_PIXSCL=                 21.7 / Pixel scale (mas/pix)
C_PXSCAL=                22MAS / Pixel scale (mas/pix)
C_CAMPOS=                   0 / Position of camera optics (pulses)
C_DETPOS=               130000 / Detector stage position (mm)
COMMENT
COMMENT
COMMENT ***** Adaptive Optics *****
COMMENT
A_STATE =                UNDEF / AO state ALIVE,OFF
A_APDAV =                241.1 / APD average counts
A_LOOP  = 'OFF     '           / Loop state OFF,READ,DM,TT,ALL
```

```
A_DMGAIN=              0.01000 / DM gain
A_TTGAIN=              0.00005 / TT gain
A_DMCMTX=         C_MTX_DM.cfg / DM control matrix
A_TTCMTX=         C_MTX_TT.cfg / TT control matrix
A_VMVOLT=                  0.1 / VM voltage(optical gain)
A_VMFREQ=               2060.0 / VM frequency
A_M1POS = 'OUT     '           / AO pick-up mirror position IN,OUT,UNDEF
A_M1STAT= 'UNDEF   '           / AO pick-up mirror state INIT,SIM,UNDEF
A_M1PULS=                      / AO pick-up mirror pulses
A_ISTAT = 'UNDEF   '           / VM Iris state INIT,SIM,UNDEF
A_IPULS =                10000 / VM Iris pulses
A_RSTAT = 'UNDEF   '           / GSAU radius state INIT,SIM,UNDEF
A_TSTAT = 'UNDEF   '           / GSAU theta state INIT,SIM,UNDEF
A_FSTAT = 'UNDEF   '           / GSAU focus state INIT,SIM,UNDEF
A_CSTAT = 'UNDEF   '           / GSAU con-length state INIT,SIM,UNDEF
A_RPULS =                 5618 / GSAU radius pulses
A_TPULS =                72243 / GSAU theta pulses
A_FPULS =                    0 / GSAU focus pulses
A_CPULS =                19782 / GSAU con-length pulses
A_IDXOFF=                      / Ins. detector X pixel offset
A_IDYOFF=                      / Ins. detector Y pixel offset
A_IDX0  =                      / Ins. detector X zero point
A_IDY0  =                      / Ins. detector Y zero point
A_GS_RA =                      / AO guide star RA
A_GS_DEC=                      / AO guide star DEC
A_GS_MAG=                      / AO guide star magnitude
COMMENT
COMMENT
COMMENT ***** Coronagraph *****
COMMENT
C_OMASK = 'sapphire'           / Identifier of occulting mask
C_MSKDIM=                UNDEF / mask diameter (mm)
C_MSKPSX=                UNDEF / mask position in X (pix)
C_MSKPSY=                UNDEF / mask position in Y (pix)
C_MSKPOS=                      / position of mask (pulses)
C_STOPID= '8mm     '           / Identifier of the stop
C_STPANG=               208.00 / position angle of the stop (deg)
COMMENT
COMMENT
COMMENT ***** Spectroscopy *****
COMMENT
SLIT    = 'none    '           / Identifier of the entrance slit used
SLT-LEN =                0.000 / Length of the slit used
SLT-WID =                0.000 / Width of the slit used
SLT-PA  =                  0.0 / Slit position angle
DISPERSR= 'none    '           / Disperser
C_CRSDIS= 'none    '           / Cross disperser
WAVELEN =               0.0000 / Wavelength at detector center
WAV-MIN =               0.0000 / Shortest wavelength focused on detector
WAV-MAX =               0.0000 / Longest wavelength focused on detector
SLTC-RA =            310.08782 / RA of slit center (degree)
SLTC-DEC=             19.81364 / DEC of slit center (degree)
SLTCPIX1=                  0.0 / Pixel of slit center (AXIS1)
SLTCPIX2=                  0.0 / Pixel of slit center (AXIS2)
COMMENT
COMMENT
COMMENT ***** Polarimtry *****
COMMENT
RETPLAT1= 'OUT     '           / Identifier of the retarder plate1
C_RTPOS1=                  0.0 / Reterder1 position (mm)
C_RTAGL1=                  0.0 / Reterder1 angle (deg)
C_RTOFS1=                  0.0 / Reterder1 offset angle (deg)
RET-ANG1=                  0.0 / Position angle of retarder1 (deg)
RETPLAT2= 'OUT     '           / Identifier of the retarder plate2
C_RTPOS2=                  0.0 / Reterder2 position (mm)
C_RTAGL2=                  0.0 / Reterder2 angle (deg)
C_RTOFS2=                  0.0 / Reterder2 offset angle (deg)
RET-ANG2=                0.000 / Position angle of retarder2 (deg)
RETPLAT3= 'OUT     '           / Identifier of the retarder plate3
C_RTPOS3=                  0.0 / Reterder3 position (mm)
C_RTAGL3=                  0.0 / Reterder3 angle (deg)
C_RTOFS3=                  0.0 / Reterder3 offset angle (deg)
RET-ANG3=                0.000 / Position angle of retarder3 (deg)
C_POSSLT= 'none    '           / Slit for polarimetry
C_PSANG =                      / Position angle of pol slit (deg)
POLARIZ1= 'none    '           / Name of the polarizer
POL-AGL1=                  0.0 / Position angle of polarizer (deg)
COMMENT
COMMENT ***** FITS end *****
COMMENT
END
```

● CIAO の Polarimetry mode

```
         1         2         3         4         5         6         7
1234567890123456789012345678901234567890123456789012345678901234567890123456789
--------------------------------------------------------------------------------
SIMPLE  =                    T / DATA IS IN FITS FORMAT
BITPIX  =                   32 / 32 BITS TWOS COMPLEMENT INTEGERS
NAXIS   =                    2 / NUMBER OF AXIS
NAXIS1  =                 1024 / PIXELS ON 1st MOST VARYING AXIS
NAXIS2  =                 1024 / PIXELS ON 2nd MOST VARYING AXIS
OBSERVER= 'Itoh    '           / Observer
PROP-ID = 'o99002  '           / Proposal ID
DATASET = '#       '           / ID of an observation dataset
FRAMEID = 'CIAA00000249'       / Image sequential number
EXP-ID  = 'CIAE00000434'       / ID of the exposure this data was taken
OBS-MOD = 'Imaging '           / Observation mode
DATA-TYP= 'OBJECT  '           / Type / Characteristics of this data
DISPAXIS=                    1 / Dispersion axis in frame
WCS-ORIG= 'SUBARU Toolkit'     / Origin of the WCS value
CRPIX1  =                  512 / Reference pixel in X
CRPIX2  =                  512 / Reference pixel in Y
CRVAL1  =         283.69570000 / Physical value of the reference pixel X
CRVAL2  =           5.00658333 / Physical value of the reference pixel Y
CDELT1  =           0.00000000 / Size projected into a detector pixel X
CDELT2  =           0.00000000 / Size projected into a detector pixel Y
CTYPE1  = 'RA---TAN'           / Pixel coordinate system
CTYPE2  = 'DEC--TAN'           / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree  '           / Units used in both CRVAL2 and CDELT2
PROJP1  =                  0.0 / Projection type of the first axis
PROJP2  =                  0.0 / Projection type of the second axis
LONGPOLE=                180.0 / The North Pole of the standard system
PC001001=           1.00000000 / Pixel coordinate translation matrix
PC001002=           0.00000000 / Pixel coordinate translation matrix
PC002001=           0.00000000 / Pixel coordinate translation matrix
PC002002=           1.00000000 / Pixels coordinate translation matrix
COMMENT
COMMENT
COMMENT
DATE-OBS= '1999-12-06'         / Observation start date ('yyyy-mm-dd')
UT      = '18:29:04.817'       / HH:MM:SS.S middle UTC at exposure
UT-STR  = '18:29:04.817'       / HH:MM:SS.S middle UTC at start
UT-END  = '18:29:07.726'       / HH:MM:SS.S middle UTC at end
HST     = '08:29:04.817'       / HH:MM:SS.S middle HST at exposure
LST     = '13:07:34.101'       / HH:MM:SS.S middle LST at exposure
MJD     =       51518.77020055 / Modified Julian day
TIMESYS = 'UTC     '           / Time system used in this header
INSTRUME= 'CIAO    '           / The name of instrument
OBJECT  = 'dummy   '           / target Description
RADECSYS= 'FK5     '           / The equatorial coordinate system
RA      = '18:54:46.968'       / HH:MM:SS.SSS RA pointing
DEC     = '+05:00:23.70'       / +/-DD:MM:SS.SS DEC pointing
EQUINOX =                2000.0 / Standard FK5 (years)
RA2000  = '18:54:46.968'       / HH:MM:SS.SSS RA (J2000) pointing
DEC2000 = '+05:00:23.70'       / +/-DD:MM:SS.SS DEC (J2000) pointing
TELFOCUS= 'Cassegrain'         / Focus where a beam is reachable
FOC-POS = 'Cassegrain'         / Focus where the instrument is attached
FOC-VAL =              -0.025 / Encoder value of the focus unit
FILTER01= 'open    '           / Filter name/ID
FILTER02= 'open    '           / Filter name/ID
AIRMASS =              4.11500 / averaged Air Mass
ZD      =                76.14 / Zenith distance at typical time
ZD-STR  =                76.14 / Zenith distance at start
ZD-END  =                76.14 / Zenith distance at end
AZIMUTH =             89.61928 / Azimuth of telescope pointing
AUTOGUID= 'OFF     '           / Auto guider on/off
M2-TYPE = '#       '           / 2nd mirror type
M2-TIP  = '#       '           / 2nd mirror tip-tilt on-off
INSROT  =            -152.886 / Angle of instrument rotator
COMMENT
COMMENT
COMMENT
DETECTOR= 'Aladdin2'           / Name of the detector/CCD
DET-TMP =                0.00 / Detector temperature
GAIN    =                1.26 / AD conversion factor
BIN-FCT1=                   1 / Binning factor of X axis
BIN-FCT2=                   1 / Binning factor of Y axis
DET-RST =                 800 / Reset number before exposure
DET-SMPL= 'ARC_D   '           / Sample method of detector
DET-NSMP=                   1 / # of multiple sample in each exposure
DET-VER = 'bigdog99.12'        / Array control command script name
DET-TSD =                0.00 / Standard deviation of detector temp.(K)
PRD-MIN1=                   1 / Start x pos. of partially read out
PRD-MIN2=                   1 / Start y pos. of partially read out
```

```
PRD-RNG1=                 1024 / x range of partially read out
PRD-RNG2=                 1024 / y range of partially read out
EXP1TIME=               1.0000 / Each exposure time (sec)
COADD   =                    1 / # of coadd
EXPTIME =               1.0000 / Total exposure time (sec)
COMMENT
COMMENT
COMMENT
SLIT    = 'none    '           / Identifier of the entrance slit used
SLT-LEN =                0.000 / Length of the slit used
SLT-WID =                0.000 / Width of the slit used
SLT-PA  =                  0.0 / Slit position angle
DISPERSR= 'none    '           / Disperser
WAVELEN =               0.0000 / Wavelength at detector center
WAV-MIN =               0.0000 / Shortest wavelength focused on detector
WAV-MAX =               0.0000 / Longest wavelength focused on detector
SLTC-RA =            283.69570 / RA of slit center (degree)
SLTC-DEC=              5.00658 / DEC of slit center (degree)
SLTCPIX1=                  0.0 / Pixel of slit center (AXIS1)
SLTCPIX2=                  0.0 / Pixel of slit center (AXIS2)
COMMENT
COMMENT
COMMENT
RETPLAT1= 'none    '           / Identifier of the retarder plate1
RETPLAT2= 'none    '           / Identifier of the retarder plate2
RET-ANG1=                0.000 / Position angle of retarder1
RET-ANG2=                0.000 / Position angle of retarder2
POLARIZ1= 'none    '           / Name of the polarizer
POL-ANG =                 0.00 / Position angle of polarizer
COMMENT
COMMENT
COMMENT
C_AO    = 'Off     '           / On or off of adaptive optics
C_AO-WFS=              0.00000 / Sigma of deformable mirror
C_AO-TIP= 'unknown '           / AO tip-tilt on/off
C_AO-FRE=                  -99 / Frequency of AO loop (Hz)
COMMENT
COMMENT
COMMENT
C_OMASK = '1.5     '           / Identifier of occulting mask
C_LYOTST= 'MTK8    '           / Identifier of Lyot stop
C_LYOANG=                   31 / Lyot stop position angle (degree)
C_CAMERA= 'PIM     '           / Camera mode
C_BNCTMP=               296.68 / Optical bench temperature (K)
C_COLX  =                    0 / Collimator lens x position (um)
C_COLY  =                    0 / Collimator lens y position (um)
C_VACUUM=               -99.99 / Vacuum inside dewar (torr)
C_SHUTTR= 'unknown '           / Shutter above CIAO on/off
C_DETPOS=                    0 / Detector stage position (um)
C_WATER1=               -99.99 / Water flow rack1 (l/min)
C_WATER2=               -99.99 / Water flow rack2 (l/min)
INS-VER = 'ver9908 '           / Version of the instrument soft/hard
DOM-HUM =                 33.0 / Dome humidity (%)
OUT-HUM =                 14.5 / Outside humidity (%)
DOM-TMP =               277.95 / Dome temperature (C)
OUT-TMP =               280.85 / Outside temperature (C)
DOM-WND =                 0.10 / Dome wind speed (m/sec)
OUT-WND =                 4.40 / Outside wind speed (m/sec)
DOM-PRS =               622.90 / Dome pressure (hpa)
OUT-PRS =               622.90 / Outside pressure (hpa)
SEEING  =               0.0000 / seeing size (arcsec)
WEATHER = 'Clear   '           / Weather condition
EXTEND  =                    F / Existence of extension or not
TELESCOP= 'SUBARU  '           / The name of telescope data obtained
OBSERVAT= 'NAOJ    '           / Observatory name
OBS-ALOC= 'Observation '       / Allocation mode for Instrument
BLANK   =             32768.00 / Value used for NULL pixels
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =                 0.00 / Real = fits-value*BSCALE+BZERO
END
```

● CIAO の SpectroPolarimetry mode

```
        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
--------------------------------------------------------------------------------
SIMPLE  =                    T / DATA IS IN FITS FORMAT
BITPIX  =                   32 / 32 BITS TWOS COMPLEMENT INTEGERS
NAXIS   =                    2 / NUMBER OF AXIS
NAXIS1  =                 1024 / PIXELS ON 1st MOST VARYING AXIS
NAXIS2  =                 1024 / PIXELS ON 2nd MOST VARYING AXIS
OBSERVER= 'Itoh    '           / Observer
```

```
PROP-ID = 'o99002  '           / Proposal ID
DATASET = '#       '           / ID of an observation dataset
FRAMEID = 'CIAA00000249'       / Image sequential number
EXP-ID  = 'CIAE00000434'       / ID of the exposure this data was taken
OBS-MOD = 'Imaging '           / Observation mode
DATA-TYP= 'OBJECT  '           / Type / Characteristics of this data
DISPAXIS=                    1 / Dispersion axis in frame
WCS-ORIG= 'SUBARU Toolkit'     / Origin of the WCS value
CRPIX1  =                  512 / Reference pixel in X
CRPIX2  =                  512 / Reference pixel in Y
CRVAL1  =         283.69570000 / Physical value of the reference pixel X
CRVAL2  =           5.00658333 / Physical value of the reference pixel Y
CDELT1  =           0.00000000 / Size projected into a detector pixel X
CDELT2  =           0.00000000 / Size projected into a detector pixel Y
CTYPE1  = 'RA---TAN'           / Pixel coordinate system
CTYPE2  = 'DEC--TAN'           / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree  '           / Units used in both CRVAL2 and CDELT2
PROJP1  =                  0.0 / Projection type of the first axis
PROJP2  =                  0.0 / Projection type of the second axis
LONGPOLE=                180.0 / The North Pole of the standard system
PC001001=           1.00000000 / Pixel coordinate translation matrix
PC001002=           0.00000000 / Pixel coordinate translation matrix
PC002001=           0.00000000 / Pixel coordinate translation matrix
PC002002=           1.00000000 / Pixels coordinate translation matrix
COMMENT
COMMENT
COMMENT
DATE-OBS= '1999-12-06'         / Observation start date ('yyyy-mm-dd')
UT      = '18:29:04.817'       / HH:MM:SS.S middle UTC at exposure
UT-STR  = '18:29:04.817'       / HH:MM:SS.S middle UTC at start
UT-END  = '18:29:07.726'       / HH:MM:SS.S middle UTC at end
HST     = '08:29:04.817'       / HH:MM:SS.S middle HST at exposure
LST     = '13:07:34.101'       / HH:MM:SS.S middle LST at exposure
MJD     =       51518.77020055 / Modified Julian day
TIMESYS = 'UTC     '           / Time system used in this header
INSTRUME= 'CIAO    '           / The name of instrument
OBJECT  = 'dummy   '           / target Description
RADECSYS= 'FK5     '           / The equatorial coordinate system
RA      = '18:54:46.968'       / HH:MM:SS.SSS RA pointing
DEC     = '+05:00:23.70'       / +/-DD:MM:SS.SS DEC pointing
EQUINOX =                2000.0 / Standard FK5 (years)
RA2000  = '18:54:46.968'       / HH:MM:SS.SSS RA (J2000) pointing
DEC2000 = '+05:00:23.70'       / +/-DD:MM:SS.SS DEC (J2000) pointing
TELFOCUS= 'Cassegrain'         / Focus where a beam is reachable
FOC-POS = 'Cassegrain'         / Focus where the instrument is attached
FOC-VAL =                -0.025 / Encoder value of the focus unit
FILTER01= 'open    '           / Filter name/ID
FILTER02= 'open    '           / Filter name/ID
AIRMASS =              4.11500 / averaged Air Mass
ZD      =                76.14 / Zenith distance at typical time
ZD-STR  =                76.14 / Zenith distance at start
ZD-END  =                76.14 / Zenith distance at end
AZIMUTH =             89.61928 / Azimuth of telescope pointing
AUTOGUID= 'OFF     '           / Auto guider on/off
M2-TYPE = '#       '           / 2nd mirror type
M2-TIP  = '#       '           / 2nd mirror tip-tilt on-off
INSROT  =            -152.886 / Angle of instrument rotator
COMMENT
COMMENT
COMMENT
DETECTOR= 'Aladdin2'           / Name of the detector/CCD
DET-TMP =                 0.00 / Detector temperature
GAIN    =                 1.26 / AD conversion factor
BIN-FCT1=                    1 / Binning factor of X axis
BIN-FCT2=                    1 / Binning factor of Y axis
DET-RST =                  800 / Reset number before exposure
DET-SMPL= 'ARC_D   '           / Sample method of detector
DET-NSMP=                    1 / # of multiple sample in each exposure
DET-VER = 'bigdog99.12'        / Array control command script name
DET-TSD =                 0.00 / Standard deviation of detector temp.(K)
PRD-MIN1=                    1 / Start x pos. of partially read out
PRD-MIN2=                    1 / Start y pos. of partially read out
PRD-RNG1=                 1024 / x range of partially read out
PRD-RNG2=                 1024 / y range of partially read out
EXP1TIME=               1.0000 / Each exposure time (sec)
COADD   =                    1 / # of coadd
EXPTIME =               1.0000 / Total exposure time (sec)
COMMENT
COMMENT
COMMENT
SLIT    = 'none    '           / Identifier of the entrance slit used
SLT-LEN =                0.000 / Length of the slit used
SLT-WID =                0.000 / Width of the slit used
```

```
SLT-PA  =                  0.0 / Slit position angle
DISPERSR= 'none    '           / Disperser
WAVELEN =               0.0000 / Wavelength at detector center
WAV-MIN =               0.0000 / Shortest wavelength focused on detector
WAV-MAX =               0.0000 / Longest wavelength focused on detector
SLTC-RA =            283.69570 / RA of slit center (degree)
SLTC-DEC=              5.00658 / DEC of slit center (degree)
SLTCPIX1=                  0.0 / Pixel of slit center (AXIS1)
SLTCPIX2=                  0.0 / Pixel of slit center (AXIS2)
COMMENT
COMMENT
COMMENT
RETPLAT1= 'none    '           / Identifier of the retarder plate1
RETPLAT2= 'none    '           / Identifier of the retarder plate2
RET-ANG1=                0.000 / Position angle of retarder1
RET-ANG2=                0.000 / Position angle of retarder2
POLARIZ1= 'none    '           / Name of the polarizer
POL-ANG =                 0.00 / Position angle of polarizer
COMMENT
COMMENT
COMMENT
C_AO    = 'Off     '           / On or off of adaptive optics
C_AO-WFS=              0.00000 / Sigma of deformable mirror
C_AO-TIP= 'unknown '           / AO tip-tilt on/off
C_AO-FRE=                  -99 / Frequency of AO loop (Hz)
COMMENT
COMMENT
COMMENT
C_OMASK = '1.5     '           / Identifier of occulting mask
C_LYOTST= 'MTK8    '           / Identifier of Lyot stop
C_LYOANG=                   31 / Lyot stop position angle (degree)
C_CAMERA= 'PIM     '           / Camera mode
C_BNCTMP=                296.68 / Optical bench temperature (K)
C_COLX  =                     0 / Collimator lens x position (um)
C_COLY  =                     0 / Collimator lens y position (um)
C_VACUUM=                -99.99 / Vacuum inside dewar (torr)
C_SHUTTR= 'unknown '           / Shutter above CIAO on/off
C_DETPOS=                     0 / Detector stage position (um)
C_WATER1=                -99.99 / Water flow rack1 (l/min)
C_WATER2=                -99.99 / Water flow rack2 (l/min)
INS-VER = 'ver9908 '           / Version of the instrument soft/hard
DOM-HUM =                  33.0 / Dome humidity (%)
OUT-HUM =                  14.5 / Outside humidity (%)
DOM-TMP =                277.95 / Dome temperature (C)
OUT-TMP =                280.85 / Outside temperature (C)
DOM-WND =                  0.10 / Dome wind speed (m/sec)
OUT-WND =                  4.40 / Outside wind speed (m/sec)
DOM-PRS =                622.90 / Dome pressure (hpa)
OUT-PRS =                622.90 / Outside pressure (hpa)
SEEING  =                0.0000 / seeing size (arcsec)
WEATHER = 'Clear   '           / Weather condition
EXTEND  =                     F / Existence of extension or not
TELESCOP= 'SUBARU  '           / The name of telescope data obtained
OBSERVAT= 'NAOJ    '           / Observatory name
OBS-ALOC= 'Observation '       / Allocation mode for Instrument
BLANK   =             32768.00 / Value used for NULL pixels
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =                 0.00 / Real = fits-value*BSCALE+BZERO
END
```

● CIAO の Spectroscopy mode

```
        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
--------------------------------------------------------------------------------
SIMPLE  =                    T / DATA IS IN FITS FORMAT
BITPIX  =                   32 / 32 BITS TWOS COMPLEMENT INTEGERS
NAXIS   =                    2 / NUMBER OF AXIS
NAXIS1  =                 1024 / PIXELS ON 1st MOST VARYING AXIS
NAXIS2  =                 1024 / PIXELS ON 2nd MOST VARYING AXIS
OBSERVER= 'Itoh    '           / Observer
PROP-ID = 'o99002  '           / Proposal ID
DATASET = '#       '           / ID of an observation dataset
FRAMEID = 'CIAA00000249'       / Image sequential number
EXP-ID  = 'CIAE00000434'       / ID of the exposure this data was taken
OBS-MOD = 'Imaging '           / Observation mode
DATA-TYP= 'OBJECT  '           / Type / Characteristics of this data
DISPAXIS=                    1 / Dispersion axis in frame
WCS-ORIG= 'SUBARU Toolkit'     / Origin of the WCS value
CRPIX1  =                  512 / Reference pixel in X
CRPIX2  =                  512 / Reference pixel in Y
CRVAL1  =         283.69570000 / Physical value of the reference pixel X
```

```
CRVAL2  =           5.00658333 / Physical value of the reference pixel Y
CDELT1  =           0.00000000 / Size projected into a detector pixel X
CDELT2  =           0.00000000 / Size projected into a detector pixel Y
CTYPE1  = 'RA---TAN'           / Pixel coordinate system
CTYPE2  = 'DEC--TAN'           / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree  '           / Units used in both CRVAL2 and CDELT2
PROJP1  =                  0.0 / Projection type of the first axis
PROJP2  =                  0.0 / Projection type of the second axis
LONGPOLE=                180.0 / The North Pole of the standard system
PC001001=           1.00000000 / Pixel coordinate translation matrix
PC001002=           0.00000000 / Pixel coordinate translation matrix
PC002001=           0.00000000 / Pixel coordinate translation matrix
PC002002=           1.00000000 / Pixels coordinate translation matrix
COMMENT
COMMENT
COMMENT
DATE-OBS= '1999-12-06'         / Observation start date ('yyyy-mm-dd')
UT      = '18:29:04.817'       / HH:MM:SS.S middle UTC at exposure
UT-STR  = '18:29:04.817'       / HH:MM:SS.S middle UTC at start
UT-END  = '18:29:07.726'       / HH:MM:SS.S middle UTC at end
HST     = '08:29:04.817'       / HH:MM:SS.S middle HST at exposure
LST     = '13:07:34.101'       / HH:MM:SS.S middle LST at exposure
MJD     =       51518.77020055 / Modified Julian day
TIMESYS = 'UTC     '           / Time system used in this header
INSTRUME= 'CIAO    '           / The name of instrument
OBJECT  = 'dummy   '           / target Description
RADECSYS= 'FK5     '           / The equatorial coordinate system
RA      = '18:54:46.968'       / HH:MM:SS.SSS RA pointing
DEC     = '+05:00:23.70'       / +/-DD:MM:SS.SS DEC pointing
EQUINOX =                2000.0 / Standard FK5 (years)
RA2000  = '18:54:46.968'       / HH:MM:SS.SSS RA (J2000) pointing
DEC2000 = '+05:00:23.70'       / +/-DD:MM:SS.SS DEC (J2000) pointing
TELFOCUS= 'Cassegrain'         / Focus where a beam is reachable
FOC-POS = 'Cassegrain'         / Focus where the instrument is attached
FOC-VAL =               -0.025 / Encoder value of the focus unit
FILTER01= 'open    '           / Filter name/ID
FILTER02= 'open    '           / Filter name/ID
AIRMASS =              4.11500 / averaged Air Mass
ZD      =                76.14 / Zenith distance at typical time
ZD-STR  =                76.14 / Zenith distance at start
ZD-END  =                76.14 / Zenith distance at end
AZIMUTH =             89.61928 / Azimuth of telescope pointing
AUTOGUID= 'OFF     '           / Auto guider on/off
M2-TYPE = '#       '           / 2nd mirror type
M2-TIP  = '#       '           / 2nd mirror tip-tilt on-off
INSROT  =            -152.886 / Angle of instrument rotator
COMMENT
COMMENT
COMMENT
DETECTOR= 'Aladdin2'           / Name of the detector/CCD
DET-TMP =                 0.00 / Detector temperature
GAIN    =                 1.26 / AD conversion factor
BIN-FCT1=                    1 / Binning factor of X axis
BIN-FCT2=                    1 / Binning factor of Y axis
DET-RST =                  800 / Reset number before exposure
DET-SMPL= 'ARC_D   '           / Sample method of detector
DET-NSMP=                    1 / # of multiple sample in each exposure
DET-VER = 'bigdog99.12'        / Array control command script name
DET-TSD =                 0.00 / Standard deviation of detector temp.(K)
PRD-MIN1=                    1 / Start x pos. of partially read out
PRD-MIN2=                    1 / Start y pos. of partially read out
PRD-RNG1=                 1024 / x range of partially read out
PRD-RNG2=                 1024 / y range of partially read out
EXP1TIME=               1.0000 / Each exposure time (sec)
COADD   =                    1 / # of coadd
EXPTIME =               1.0000 / Total exposure time (sec)
COMMENT
COMMENT
COMMENT
SLIT    = 'none    '           / Identifier of the entrance slit used
SLT-LEN =                0.000 / Length of the slit used
SLT-WID =                0.000 / Width of the slit used
SLT-PA  =                  0.0 / Slit position angle
DISPERSR= 'none    '           / Disperser
WAVELEN =               0.0000 / Wavelength at detector center
WAV-MIN =               0.0000 / Shortest wavelength focused on detector
WAV-MAX =               0.0000 / Longest wavelength focused on detector
SLTC-RA =            283.69570 / RA of slit center (degree)
SLTC-DEC=              5.00658 / DEC of slit center (degree)
SLTCPIX1=                  0.0 / Pixel of slit center (AXIS1)
SLTCPIX2=                  0.0 / Pixel of slit center (AXIS2)
COMMENT
COMMENT
```

```
COMMENT
RETPLAT1= 'none    '           / Identifier of the retarder plate1
RETPLAT2= 'none    '           / Identifier of the retarder plate2
RET-ANG1=                 0.000 / Position angle of retarder1
RET-ANG2=                 0.000 / Position angle of retarder2
POLARIZ1= 'none    '           / Name of the polarizer
POL-ANG =                  0.00 / Position angle of polarizer
COMMENT
COMMENT
COMMENT
C_AO    = 'Off     '           / On or off of adaptive optics
C_AO-WFS=              0.00000 / Sigma of deformable mirror
C_AO-TIP= 'unknown '           / AO tip-tilt on/off
C_AO-FRE=                  -99 / Frequency of AO loop (Hz)
COMMENT
COMMENT
COMMENT
C_OMASK = '1.5     '           / Identifier of occulting mask
C_LYOTST= 'MTK8    '           / Identifier of Lyot stop
C_LYOANG=                   31 / Lyot stop position angle (degree)
C_CAMERA= 'PIM     '           / Camera mode
C_BNCTMP=                296.68 / Optical bench temperature (K)
C_COLX  =                     0 / Collimator lens x position (um)
C_COLY  =                     0 / Collimator lens y position (um)
C_VACUUM=                -99.99 / Vacuum inside dewar (torr)
C_SHUTTR= 'unknown '           / Shutter above CIAO on/off
C_DETPOS=                     0 / Detector stage position (um)
C_WATER1=                -99.99 / Water flow rack1 (l/min)
C_WATER2=                -99.99 / Water flow rack2 (l/min)
INS-VER = 'ver9908 '           / Version of the instrument soft/hard
DOM-HUM =                  33.0 / Dome humidity (%)
OUT-HUM =                  14.5 / Outside humidity (%)
DOM-TMP =                277.95 / Dome temperature (C)
OUT-TMP =                280.85 / Outside temperature (C)
DOM-WND =                  0.10 / Dome wind speed (m/sec)
OUT-WND =                  4.40 / Outside wind speed (m/sec)
DOM-PRS =                622.90 / Dome pressure (hpa)
OUT-PRS =                622.90 / Outside pressure (hpa)
SEEING  =                0.0000 / seeing size (arcsec)
WEATHER = 'Clear   '           / Weather condition
EXTEND  =                     F / Existence of extension or not
TELESCOP= 'SUBARU  '           / The name of telescope data obtained
OBSERVAT= 'NAOJ    '           / Observatory name
OBS-ALOC= 'Observation '       / Allocation mode for Instrument
BLANK   =             32768.00 / Value used for NULL pixels
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =                  0.00 / Real = fits-value*BSCALE+BZERO
END
```

10.4.2 COMICS(2003/12/31)

● COMICS の Imaging mode

```
         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
--------------------------------------------------------------------------------
SIMPLE  =                    T / Standard FITS format
BITPIX  =                   32 / # of bits per pixel
NAXIS   =                    4 / of axis in frame
NAXIS1  =                  320 / # of pixels/row
NAXIS2  =                  100 / # of pixels/row
NAXIS3  =                  102 / # of pixels/row
NAXIS4  =                    1 / # of pixels/row
EXTEND  =                    F / ASCII Extension Table
COMMENT = ' +++++++++++++++++++ SUBARU COMMON'
COMMENT = ' ------------------------- About This DATA'
FRAMEID = 'COMA00041887'       / Data Serial Num of COMICS A-sequence
EXP-ID  = 'COME00041887'       / Exporsure ID
OBS-ALOC= 'Observation '       / Allocation Mode
COMMENT = ' ------------------------- Observation ID'
OBSERVER= 'COMICS                                              ' / Observers
PROP-ID = 'o11424      '       / Proposal ID
OBSERVAT= 'NAOJ                '           / Observatory
TELESCOP= 'Subaru                      '   / Telescope name
INSTRUME= 'COMICS              '           / Instrument
INS-VER = '2001-09-29                  '   / Version of the instrument
DETECTOR= 'Si:As IBC-104 SG    '           / Name of the detector/CCD
COMMENT = ' ------------------------- Telescope Settings'
FOC-POS = 'Cassegrain  '       / Focus where the instrument is attached
TELFOCUS= 'Cassegrain                  '   / Focus where a beam is reachable
```

```
FOC-LEN =           100000.111 / Focal length of the telescope (mm)
FOC-VAL =                0.786 / Encoder value of the focus unit (mm)
INSROT  =               48.342 / Instrument Rotator angle (deg)
INST-PA =                0.000 / Instrument Rotator P.A. (deg)
AUTOGUID= 'OFF     '           / Auto Guider on/off
M2-TYPE = 'CS_IR   '           / Type of the Secondary Mirror (Opt/IR)
M2-TIP  = 'CHOPPING'           / 2nd Mirror tip-tilt on/off
M2-ANG1 =               -0.960 / 2nd Mirror Angle-1
M2-ANG2 =                2.107 / 2nd Mirror Angle-2
M2-POS1 =               -3.386 / 2nd Mirror Position-1
M2-POS2 =               -1.542 / 2nd Mirror Position-2
COMMENT = ' ------------------------- Size, Coordinate etc..'
DETPXSZ1=               0.0500 / Detector pixel size in axis1 (mm)
DETPXSZ2=               0.0500 / Detector pixel size in axis2 (mm)
CDELT1  =           0.00003611 / X Scale projected on detector(#/pix)
CDELT2  =           0.00003611 / Y scale projected on detector(#/pix)
CTYPE1  = 'RA---TAN  '         / Pixel coordinate system
CTYPE2  = 'DEC--TAN  '         / Pixel coordinate system
CUNIT1  = 'degree    '         / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree    '         / Units used in both CRVAL2 and CDELT2
CRPIX1  =                185.0 / Reference pixel in X (pixel,IMG)
CRPIX2  =                 46.0 / Reference pixel in Y (pixel,IMG)
CRVAL1  =          68.97903333 / Physical value of the reference pixel X
CRVAL2  =          16.50808333 / Physical value of the reference pixel Y
PROJP1  =                  0.0 / Projection type of the first axis
PROJP2  =                  0.0 / Projection type of the second axis
PC001001=           0.00000000 / Pixel Coordinate translation matrix
CD1_1   =           0.00000000 / Pixel Coordinate translation matrix
PC001002=           1.00000000 / Pixel Coordinate translation matrix
CD1_2   =          -0.00003611 / Pixel Coordinate translation matrix
PC002001=           1.00000000 / Pixel Coordinate translation matrix
CD2_1   =          -0.00003611 / Pixel Coordinate translation matrix
PC002002=           0.00000000 / Pixel Coordinate translation matrix
CD2_2   =          -0.00000000 / Pixel Coordinate translation matrix
BSCALE  =           1.00000000 / Real=fits-value*BSCALE+BZERO
BZERO   =           0.00000000 / Real=fits-value*BSCALE+BZERO
BUNIT   = 'ADU       '         / Unit of original pixel values
BLANK   =                    0 / Value used for NULL pixels
WCS-ORIG= 'comics20001209      '             / Origin of the WCS value
COMMENT = '  (So far, WCS parameters may be incorrect?)'
COMMENT = '                                     (dummy)'
COMMENT = ' ------------------------- Date'
TIMESYS = 'UTC     '           / Time System used in the header. UTC fix.
DATE-OBS= '2011-10-12'         / yyyy-mm-dd UTC obs start date
UT      = '13:53:29.000'       / HH:MM:SS.SSS Universal Time
HST     = '03:53:29.000'       / HH:MM:SS.SSS HST ?
UT1-UTC =          -0.36211000 / UT1-UTC
LST     = '04:54:28.982'       / HH:MM:SS.SSS LST
MJD     =       52924.57880368 / Modified Julian Date
COMMENT = ' ------------------------- Object'
DATA-TYP= 'OBJECT                        '   / Type of this data
RADECSYS= 'FK5     '           / The equatorial coordinate system
OBJECT  = 'Nandesuka                     '   / Target Description
EQUINOX =                2000.0 / Equinox
RA      = '04:35:54.968'       / HH:MM:SS.SSS RA pointing (given EQ)
RA2000  = '04:35:54.968'       / HH:MM:SS.SSS RA pointing (J2000)
DEC     = '+16:30:29.10'       / +/-DD:MM:SS.SS DEC pointing (given EQ)
DEC2000 = '+16:30:29.10'       / +/-DD:MM:SS.SS DEC pointing (J2000)
AZIMUTH =            229.43447 / Azimuth of telescope pointing (degree)
ALTITUDE=             84.97427 / Altitude of telescope pointing(degree)
AIRMASS =                1.004 / Air Mass
ZD      =              5.02632 / Zenith Distance
SECZ    =                1.004 / SEC(Zenith Distance)
LONGPOLE=                180.0 / The North Pole of standard system (deg)
COMMENT = ' ------------------------- COMICS Optics'
OBS-MOD = 'imaging                       '   / Observation Mode
FILTER01= 'H13                           '   / Filter name/ID (pre-opt filter-1)
FILTER02= 'H21                           '   / Filter name/ID (pre-opt filter-2)
FILTER03= 'F11C24.50W2.20                '   / Filter name/ID (img-opt filter)
FILTER04= 'LO2L20I                       '   / Lens  name/ID (img-opt)
DISPERSR= 'G01L10L                       '   / Identifier of the disperser used
SLIT    = 'S01W000             '             / Identifier of the slit
SLT-LEN =               39.600 / Length of the slit used
SLT-PA  =                  0.0 / Slit Position Angle (degree)
SLT-WID =                0.000 / Width of the slit used
SLTCPIX1=                120.0 / Slit center projected on detector(pix)
SLTCPIX2=                160.0 / Slit center projected on detector(pix)
COMMENT = ' ------------------------- COMICS Detector'
EXPTIME =                0.026 / 1 exposure integration time per exp(sec)
DET-TMP =                 4.82 / Detector temperature (K)
GAIN    =              350.000 / AD conversion factor (electron/ADU)
PRD-MIN1=                    1 / Start X pos. of partialy read out (pix)
PRD-MIN2=                    1 / Start Y pos. of partialy read out (pix)
PRD-RNG1=                  336 / X Range of partialy read out (pix)
```

```
PRD-RNG2=                  241 / Y Range of partialy read out (pix)
BIN-FCT1=                    1 / Binning factor of X axis (pixel)
BIN-FCT2=                    1 / Binning factor of Y axis (pixel)
COMMENT = ' ------------------------- Weather Condition'
WEATHER = 'Fare                           '   / Weather condition
SEEING  =                 0.00 / Long integ PSF FWHM in optical (arcsec)
DOM-WND =                 0.10 / Wind speed in the dome (m/s)
OUT-WND =                 8.20 / Wind speed outside (m/s)
DOM-TMP =               277.35 / Temperature measured in the dome (K)
OUT-TMP =               277.55 / Temperature measured outside dome (K)
DOM-HUM =                  9.7 / Humidity measured in the dome
OUT-HUM =                  9.3 / Humidity measured outside dome
DOM-PRS =               622.70 / Atmospheric pressure in the Dome (hpa)
OUT-PRS =               622.70 / Atmospheric pressure outside (hpa)
COMMENT = ' +++++++++++++++++++ COMICS ORIGINAL'
COMMENT = ' ------------------------- Type of the data'
Q_DTYPE = 'imaging           ' / type of this data  spec/img/slitview
COMMENT = ' ------------------------- Pre-Optics'
Q_WINDOW= 'W05KBr            ' / Entrance Window
Q_M1MOTA=                 1420 / Pulse count of 1st mir. outer frame
Q_M1MOTB=                 1775 / Pulse count of 1st mir. inner frame
Q_GRTPOS=                24335 / Grating Position in pulse
COMMENT = ' ------------------------- Temperature '
COMMENT = ' (Not yet completed)'
Q_DETTPI= 'unknown           ' / COMICS DETECTOR TEMP IMAGING
Q_CFTPI = '4.82              ' / COMICS COLD FINGER TEMP IMAGING
Q_DETTS1= 'unknown           ' / COMICS DETECTOR TEMP SPEC POS-1
Q_DETTS2= 'unknown           ' / COMICS DETECTOR TEMP SPEC POS-2
Q_DETTS3= 'unknown           ' / COMICS DETECTOR TEMP SPEC POS-3
Q_DETTS4= 'unknown           ' / COMICS DETECTOR TEMP SPEC POS-4
Q_DETTS5= 'unknown           ' / COMICS DETECTOR TEMP SPEC POS-5
Q_CFTPS = '5.56              ' / COMICS COLD FINGER TEMP SPEC
Q_OPTTP = '30.97             ' / COMICS OPTICS TEMP
COMMENT = ' ------------------------- Detector bias,clock'
Q_IMCHIP= 'IBC-104           ' / COMICS IMAGING CHIP ID
Q_IMVSC = '-5.0032           ' / COMICS IMAGING CHIP VSSCLK VOLTAGE
Q_IMVSS = '-5.8722           ' / COMICS IMAGING CHIP VSS VOLTAGE
Q_IMBS0 = '-6.9115           ' / COMICS IMAGING CHIP BIAS0 VOLTAGE
Q_IMBS1 = '-7.0651           ' / COMICS IMAGING CHIP BIAS1 VOLTAGE
Q_IMBS2 = '-5.1021           ' / COMICS IMAGING CHIP BIAS2 VOLTAGE
Q_IMBS3 = '-3.8124           ' / COMICS IMAGING CHIP BIAS3 VOLTAGE
Q_IMBS4 = '-2.8108           ' / COMICS IMAGING CHIP BIAS4 VOLTAGE
Q_IMBS5 = '-3.5052           ' / COMICS IMAGING CHIP BIAS5 VOLTAGE
Q_IMBS6 = '-2.0008           ' / COMICS IMAGING CHIP BIAS6 VOLTAGE
Q_IMBS7 = '-6.0237           ' / COMICS IMAGING CHIP BIAS7 VOLTAGE
Q_IMBS8 = '-3.0170           ' / COMICS IMAGING CHIP BIAS8 VOLTAGE
Q_IMBS9 = '-4.1090           ' / COMICS IMAGING CHIP BIAS9 VOLTAGE
Q_IMCS00= '84.2              ' / COMICS IMAGING CHIP CS00 CURRENT
Q_IMCS02= '168.3             ' / COMICS IMAGING CHIP CS02 CURRENT
Q_IMCS03= '147.3             ' / COMICS IMAGING CHIP CS03 CURRENT
Q_DETST = '100000              '             / Detector Readout Status
Q_CLKFL = '/home/comics/cbin/clk/clkgen/013/c030.00030.001.03' / Macro File
Q_PIXTIM=                   30 / Clock duration for a pixel (0.1us)
Q_RRSTRT=                    1 / Reset Row Start Width (ND)
Q_CHWB  =                    5 / Wipe Exporsure Number in a Chop-beam
Q_CHEB  =                   38 / Exporsure Number in a Chop-beam
Q_CHCN  =                  102 / Chopping Number in this file
Q_CHAM  =                    1 / Add Mode 0:RAW 1:ADD 2:ECO
Q_CHOP  =                    1 / Chopping ON=1 OFF=0
Q_CTYPE =                    0 / Clock Type 0-9
Q_YSTRT =                   70 / Readout Region Y start
Q_1EXP  =                0.026 / Integration time per exp. (sec) = EXPTIME
Q_1FRAME=                0.983 / Integration time per frame(co-added) (sec)
COMMENT = ' ------------------------- CHOPPING'
Q_CHTHRW=                10.00 / Chopping Throw
Q_CHDEG =               390.04 / Chopping Degree
COMMENT = ' ------------------------- FITS VERSION'
Q_GETVER= '4.24              ' / FITS header VERSION
END
```

● COMICS の Spectroscopy mode

```
        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
SIMPLE  =                    T / Standard FITS format
BITPIX  =                   32 / # of bits per pixel
NAXIS   =                    4 / of axis in frame
NAXIS1  =                  320 / # of pixels/row
NAXIS2  =                  240 / # of pixels/row
NAXIS3  =                    4 / # of pixels/row
NAXIS4  =                    2 / # of pixels/row
```

```
EXTEND  =                    F / ASCII Extension Table
COMMENT = ' ++++++++++++++++++ SUBARU COMMON'
COMMENT = ' ------------------------- About This DATA'
FRAMEID = 'COMA00044302'       / Data Serial Num of COMICS A-sequence
EXP-ID  = 'COME00044301'       / Exporsure ID
OBS-ALOC= 'Observation '       / Allocation Mode
COMMENT = ' ------------------------ Observation ID'
OBSERVER= 'COMICS        '     / Observers
PROP-ID = 'o11111      '       / Proposal ID
OBSERVAT= 'NAOJ                '             / Observatory
TELESCOP= 'Subaru                        '   / Telescope name
INSTRUME= 'COMICS              '             / Instrument
INS-VER = '2001-09-29                    '   / Version of the instrument
DETECTOR= 'Si:As IBC-104 SG    '             / Name of the detector/CCD
COMMENT = ' ------------------------- Telescope Settings'
FOC-POS = 'Cassegrain  '       / Focus where the instrument is attached
TELFOCUS= 'Cassegrain                    '   / Focus where a beam is reachable
FOC-LEN =           100000.111 / Focal length of the telescope (mm)
FOC-VAL =                0.800 / Encoder value of the focus unit (mm)
INSROT  =              -16.209 / Instrument Rotator angle (deg)
INST-PA =              -30.000 / Instrument Rotator P.A. (deg)
AUTOGUID= 'OFF     '           / Auto Guider on/off
M2-TYPE = 'CS_IR   '           / Type of the Secondary Mirror (Opt/IR)
M2-TIP  = 'CHOPPING'           / 2nd Mirror tip-tilt on/off
M2-ANG1 =                -0.005 / 2nd Mirror Angle-1
M2-ANG2 =                 2.775 / 2nd Mirror Angle-2
M2-POS1 =                -4.459 / 2nd Mirror Position-1
M2-POS2 =                -0.008 / 2nd Mirror Position-2
COMMENT = ' ------------------------- Size, Coordinate etc..'
DETPXSZ1=                0.0500 / Detector pixel size in axis1 (mm)
DETPXSZ2=                0.0500 / Detector pixel size in axis2 (mm)
CDELT1  =           0.00004583 / X Scale projected on detector(#/pix)
CDELT2  =           0.00004583 / Y scale projected on detector(#/pix)
CTYPE1  = 'RA---TAN  '         / Pixel coordinate system
CTYPE2  = 'DEC--TAN  '         / Pixel coordinate system
CUNIT1  = 'degree    '         / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree    '         / Units used in both CRVAL2 and CDELT2
CRPIX1  =                185.0 / Reference pixel in X (pixel,IMG)
CRPIX2  =                115.0 / Reference pixel in Y (pixel,IMG)
CRVAL1  =         101.47376250 / Physical value of the reference pixel X
CRVAL2  =         -52.40964167 / Physical value of the reference pixel Y
PROJP1  =                  0.0 / Projection type of the first axis
PROJP2  =                  0.0 / Projection type of the second axis
PC001001=           0.86602540 / Pixel Coordinate translation matrix
CD1_1   =          -0.00003969 / Pixel Coordinate translation matrix
PC001002=          -0.50000000 / Pixel Coordinate translation matrix
CD1_2   =           0.00002292 / Pixel Coordinate translation matrix
PC002001=          -0.50000000 / Pixel Coordinate translation matrix
CD2_1   =           0.00002292 / Pixel Coordinate translation matrix
PC002002=          -0.86602540 / Pixel Coordinate translation matrix
CD2_2   =           0.00003969 / Pixel Coordinate translation matrix
BSCALE  =           1.00000000 / Real=fits-value*BSCALE+BZERO
BZERO   =           0.00000000 / Real=fits-value*BSCALE+BZERO
BUNIT   = 'ADU       '         / Unit of original pixel values
BLANK   =                    0 / Value used for NULL pixels
WCS-ORIG= 'comics20001209      '           / Origin of the WCS value
COMMENT = '  (So far, WCS parameters may be incorrect?)'
COMMENT = '                                    (dummy)'
COMMENT = ' ------------------------- Date'
TIMESYS = 'UTC     '           / Time System used in the header. UTC fix.
DATE-OBS= '2011-11-11'         / yyyy-mm-dd UTC obs start date
UT      = '12:41:04.000'       / HH:MM:SS.SSS Universal Time
HST     = '02:41:04.000'       / HH:MM:SS.SSS HST ?
UT1-UTC =          -0.38291000 / UT1-UTC
LST     = '07:42:21.943'       / HH:MM:SS.SSS LST
MJD     =       52985.52851409 / Modified Julian Date
COMMENT = ' ------------------------- Object'
DATA-TYP= 'OBJECT                        '   / Type of this data
RADECSYS= 'FK5     '           / The equatorial coordinate system
OBJECT  = 'Nandesuka                   '     / Target Description
EQUINOX =               2000.0 / Equinox
RA      = '06:45:53.703'       / HH:MM:SS.SSS RA pointing (given EQ)
RA2000  = '06:45:53.703'       / HH:MM:SS.SSS RA pointing (J2000)
DEC     = '-52:24:34.71'       / +/-DD:MM:SS.SS DEC pointing (given EQ)
DEC2000 = '-52:24:34.71'       / +/-DD:MM:SS.SS DEC pointing (J2000)
AZIMUTH =            188.88210 / Azimuth of telescope pointing (degree)
ALTITUDE=             16.73436 / Altitude of telescope pointing(degree)
AIRMASS =                3.439 / Air Mass
ZD      =             73.26570 / Zenith Distance
SECZ    =                3.473 / SEC(Zenith Distance)
LONGPOLE=                180.0 / The North Pole of standard system (deg)
COMMENT = ' ------------------------- COMICS Optics'
OBS-MOD = 'spectroscopy                  '   / Observation Mode
FILTER01= 'F01C10.50W6.00                '   / Filter name/ID (pre-opt filter-1)
```

```
FILTER02= 'H21                          '   / Filter name/ID (pre-opt filter-2)
FILTER03= 'H01                          '   / Filter name/ID (img-opt filter)
FILTER04= 'L01L10I                      '   / Lens  name/ID (img-opt)
DISPERSR= 'G01L10L                      '   / Identifier of the disperser used
SLIT    = 'S02W160              '           / Identifier of the slit
SLT-LEN =               39.600 / Length of the slit used
SLT-PA  =                  0.0 / Slit Position Angle (degree)
SLT-WID =                0.330 / Width of the slit used
SLTCPIX1=                120.0 / Slit center projected on detector(pix)
SLTCPIX2=                160.0 / Slit center projected on detector(pix)
COMMENT = '         --- Spectroscopy only'
DISPAXIS=                    1 / Dispersion Axis  in frame
WAV-MIN =           7500.0000 / Shortest wavelen (nm)
WAV-MAX =          13500.0000 / Longest wavelen (nm)
WAVELEN =          10500.0000 / Central wavelen (nm)
COMMENT = ' ------------------------- COMICS Detector'
EXPTIME =               0.301 / 1 exposure integration time per exp(sec)
DET-TMP =                5.56 / Detector temperature (K)
GAIN    =             350.000 / AD conversion factor (electron/ADU)
PRD-MIN1=                    1 / Start X pos. of partialy read out (pix)
PRD-MIN2=                    1 / Start Y pos. of partialy read out (pix)
PRD-RNG1=                  336 / X Range of partialy read out (pix)
PRD-RNG2=                  241 / Y Range of partialy read out (pix)
BIN-FCT1=                    1 / Binning factor of X axis (pixel)
BIN-FCT2=                    1 / Binning factor of Y axis (pixel)
COMMENT = ' ------------------------- Weather Condition'
WEATHER = 'Fare                         '   / Weather condition
SEEING  =                0.42 / Long integ PSF FWHM in optical (arcsec)
DOM-WND =                0.10 / Wind speed in the dome (m/s)
OUT-WND =                8.20 / Wind speed outside (m/s)
DOM-TMP =              273.75 / Temperature measured in the dome (K)
OUT-TMP =              274.75 / Temperature measured outside dome (K)
DOM-HUM =                 7.3 / Humidity measured in the dome
OUT-HUM =                 6.8 / Humidity measured outside dome
DOM-PRS =              623.30 / Atmospheric pressure in the Dome (hpa)
OUT-PRS =              623.30 / Atmospheric pressure outside (hpa)
COMMENT = ' ++++++++++++++++++ COMICS ORIGINAL'
COMMENT = ' ------------------------- Type of the data'
Q_DTYPE = 'blindslit         ' / type of this data  spec/img/slitview
COMMENT = ' ------------------------- Pre-Optics'
Q_WINDOW= 'W05KBr            ' / Entrance Window
Q_M1MOTA=                1420 / Pulse count of 1st mir. outer frame
Q_M1MOTB=                1775 / Pulse count of 1st mir. inner frame
Q_GRTPOS=               24335 / Grating Position in pulse
COMMENT = ' ------------------------- Temperature '
COMMENT = ' (Not yet completed)'
Q_DETTPI= 'unknown           ' / COMICS DETECTOR TEMP IMAGING
Q_CFTPI = '4.82              ' / COMICS COLD FINGER TEMP IMAGING
Q_DETTS1= 'unknown           ' / COMICS DETECTOR TEMP SPEC POS-1
Q_DETTS2= 'unknown           ' / COMICS DETECTOR TEMP SPEC POS-2
Q_DETTS3= 'unknown           ' / COMICS DETECTOR TEMP SPEC POS-3
Q_DETTS4= 'unknown           ' / COMICS DETECTOR TEMP SPEC POS-4
Q_DETTS5= 'unknown           ' / COMICS DETECTOR TEMP SPEC POS-5
Q_CFTPS = '5.56              ' / COMICS COLD FINGER TEMP SPEC
Q_OPTTP = '30.97             ' / COMICS OPTICS TEMP
COMMENT = ' ------------------------- Detector bias,clock'
Q_S1CHIP= 'IBC-105           ' / COMICS SPEC-POSITION-1 CHIP ID
Q_S2CHIP= 'IBC-30388         ' / COMICS SPEC-POSITION-2 CHIP ID
Q_S3CHIP= 'IBC-30814         ' / COMICS SPEC-POSITION-3 CHIP ID
Q_S4CHIP= 'IBC-30394         ' / COMICS SPEC-POSITION-4 CHIP ID
Q_S5CHIP= 'IBC-131           ' / COMICS SPEC-POSITION-5 CHIP ID
Q_SPVSC = '-4.9963           ' / COMICS SPECTROSCOPY CHIP VSSCLK VOLTAGE
Q_SPVSS = '-5.8527           ' / COMICS SPECTROSCOPY CHIP VSS VOLTAGE
Q_SPBS0 = '-6.9088           ' / COMICS SPECTROSCOPY CHIP BIAS0 VOLTAGE
Q_SPBS1 = '-7.0406           ' / COMICS SPECTROSCOPY CHIP BIAS1 VOLTAGE
Q_SPBS2 = '-5.1111           ' / COMICS SPECTROSCOPY CHIP BIAS2 VOLTAGE
Q_SPBS3 = '-3.8042           ' / COMICS SPECTROSCOPY CHIP BIAS3 VOLTAGE
Q_SPBS4 = '-2.8033           ' / COMICS SPECTROSCOPY CHIP BIAS4 VOLTAGE
Q_SPBS5 = '-3.5046           ' / COMICS SPECTROSCOPY CHIP BIAS5 VOLTAGE
Q_SPBS6 = '-2.0001           ' / COMICS SPECTROSCOPY CHIP BIAS6 VOLTAGE
Q_SPBS7 = '-6.0121           ' / COMICS SPECTROSCOPY CHIP BIAS7 VOLTAGE
Q_SPBS8 = '-3.0010           ' / COMICS SPECTROSCOPY CHIP BIAS8 VOLTAGE
Q_SPBS9 = '-4.1060           ' / COMICS SPECTROSCOPY CHIP BIAS9 VOLTAGE
Q_SPCS00= '106.3             ' / COMICS SPECTROSCOPY CHIP CS00 CURRENT
Q_SPCS02= '127.5             ' / COMICS SPECTROSCOPY CHIP CS02 CURRENT
Q_SPCS03= '148.7             ' / COMICS SPECTROSCOPY CHIP CS03 CURRENT
Q_SPCS10= '85.0              ' / COMICS SPECTROSCOPY CHIP CS10 CURRENT
Q_SPCS12= '148.7             ' / COMICS SPECTROSCOPY CHIP CS12 CURRENT
Q_SPCS13= '148.7             ' / COMICS SPECTROSCOPY CHIP CS13 CURRENT
Q_SPCS20= '106.3             ' / COMICS SPECTROSCOPY CHIP CS20 CURRENT
Q_SPCS22= '127.5             ' / COMICS SPECTROSCOPY CHIP CS22 CURRENT
Q_SPCS23= '148.7             ' / COMICS SPECTROSCOPY CHIP CS23 CURRENT
Q_SPCS30= '106.3             ' / COMICS SPECTROSCOPY CHIP CS30 CURRENT
Q_SPCS32= '127.5             ' / COMICS SPECTROSCOPY CHIP CS32 CURRENT
```

```
Q_SPCS33= '148.7             ' / COMICS SPECTROSCOPY CHIP CS33 CURRENT
Q_SPCS40= '85.0              ' / COMICS SPECTROSCOPY CHIP CS40 CURRENT
Q_SPCS42= '127.5             ' / COMICS SPECTROSCOPY CHIP CS42 CURRENT
Q_SPCS43= '127.5             ' / COMICS SPECTROSCOPY CHIP CS43 CURRENT
Q_DETST = '100101              '            / Detector Readout Status
Q_CLKFL = '/home/comics/cbin/clk/clkgen/013/c050.00150.001.00' / Macro File
Q_PIXTIM=                  150 / Clock duration for a pixel (0.1us)
Q_RRSTRT=                    1 / Reset Row Start Width (ND)
Q_CHWB  =                    2 / Wipe Exporsure Number in a Chop-beam
Q_CHEB  =                    3 / Exporsure Number in a Chop-beam
Q_CHCN  =                    4 / Chopping Number in this file
Q_CHAM  =                    1 / Add Mode 0:RAW 1:ADD 2:ECO
Q_CHOP  =                    1 / Chopping ON=1 OFF=0
Q_CTYPE =                    0 / Clock Type 0-9
Q_YSTRT =                    1 / Readout Region Y start
Q_1EXP  =                0.301 / Integration time per exp. (sec) = EXPTIME
Q_1FRAME=                0.904 / Integration time per frame(co-added) (sec)
COMMENT = ' ------------------------- CHOPPING'
Q_CHTHRW=                15.00 / Chopping Throw
Q_CHDEG =                29.51 / Chopping Degree
COMMENT = ' ------------------------ FITS VERSION'
Q_GETVER= '4.24              ' / FITS header VERSION
END
```

10.4.3 FOCAS(2003/12/31)

● FOCAS の Imaging mode

```
        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
SIMPLE  =                    T / Standard FITS format
BITPIX  =                   16 / # of bits storing pix values
NAXIS   =                    2 / # of axes in frame
NAXIS1  =                  683 / # of pixels/row
NAXIS2  =                 4095 / # of rows (also # of scan lines)
EXTEND  =                    F / Presence of FITS Extention
ADC     =               -0.040 / ADC PA during exposure (degree)
ADC-STR =               -0.040 / ADC PA at exposure start (degree)
ADC-END =               -0.040 / ADC PA at exposure end (degree)
ADC-TYPE= 'IN      '           / ADC name/type if used
AIRMASS =                1.000 / Typical air mass during exposure
AIRM-STR=                1.000 / Air mass at exposure start
AIRM-END=                1.000 / Air mass at exposure end
ALTITUDE=             89.95466 / Altitude of telescope pointing (degree)
ALT-STR =             89.95466 / Altitude at start exposure (degree)
ALT-END =             89.95466 / Altitude at exposure end (degree)
AZIMUTH =            187.02641 / Azimuth of telescope pointing (degree)
AZ-STR  =            187.02641 / Azimuth angle at exposure start (degree)
AZ-END  =            187.02641 / Azimuth angle at exposure end (degree)
DATASET = 'DS000   '           / ID of an observation dataset
DEC     = '+19:47:44.55'       / DEC of pointing (+/-DD:MM:SS.SS)
SLTC-DEC= '+19:47:44.55'       / slit center DEC at the EQUINOX (degree)
DOM-HUM =                 29.3 / Humidity measured in the dome
DOM-HSTR=                 29.3 / Humidity in the dome at exp. start (%)
DOM-HEND=                 29.3 / Humidity in the dome at exp. end (%)
DOM-PRS =               620.30 / Atmospheric pressure in the Dome (hpa)
DOM-PSTR=               620.30 / Dome Atm. pressure at exp.start (hpa)
DOM-PEND=               620.30 / Dome atm. pressure at exposure end (hpa)
DOM-TMP =               274.95 / Temperature measured in the dome (K)
DOM-TSTR=               274.95 / Temp. in the dome at exp. start (K)
DOM-TEND=               274.95 / Temp. in the dome at exp. end (K)
DOM-WND =                 0.00 / Wind velocity in the dome (m/s)
DOM-WSTR=                 0.00 / Wind vel. in dome at exp. end (m/s)
DOM-WEND=                 0.00 / Wind vel. in dome at exp. end (m/s)
EQUINOX =               2000.0 / Standard FK5 (years)
EFP-MIN1=                   20 / EFP-MIN1 Start X pos. of effective area (pix)
EFP-MIN2=                    1 / EFP-MIN1 Start Y pos. of effective area (pix)
EFP-RNG1=                  658 / EFP-MIN1 X Range of effective area (pix)
EFP-RNG2=                 4095 / EFP-MIN1 Y Range of effective area (pix)
EXP-ID  = 'DS000   '           / ID of the exposure this data was taken
FOC-POS = '#       '           / Focus where the instrument is attached
FOC-VAL =                -0.14 / Encoder value of the focus unit (mm)
GAIN    =                2.110 / AD conversion factor (electron/ADU)
INSROT  =                 -0.0 / Typical inst. rot. angle at exp.(degree)
INR-STR =                 -0.0 / Instrument Rotator angle at Start (deg)
INR-END =                 -0.0 / Instrument Rotator angle at end (degree)
INST-PA =                  0.6 / P.A. of Instrument flange (degree)
INSTRUME= 'FOCAS   '           / Name of instrument
M2-TIP  = 'OFF     '           / Tip/Tilt of the Secondary Mirror(ON/OFF)
M2-TYPE = 'Opt     '           / Type of the Secondary Mirror (Opt/IR)
```

```
OBJECT  = 'BIAS    '           / Target Description
OBS-ALOC= 'Observation'        / Allocation mode for Instrument
OBSERVER= 'FOCAS   '          / Name(s) of observer(s)
OBS-MOD = 'IMAG    '           / Observation Mode
OUT-HUM =                 35.0 / Humidity measured outside of dome (%)
OUT-HSTR=                 35.0 / Outside humidity at exp. start (%)
OUT-HEND=                 35.0 / Outside humidity at exp. end (%)
OUT-PRS =               620.30 / Atmospheric pressure outside dome (hpa)
OUT-PSTR=               620.30 / Outside Atmos.press. at exp. start (hpa)
OUT-PEND=               620.30 / Outside Atmos.press. at exp. end (hpa)
OUT-TMP =               275.55 / Temperature measured outside of dome (K)
OUT-TSTR=               275.55 / Outside temperature at exp. start (K)
OUT-TEND=               275.55 / Outside temperature at exp. end (K)
OUT-WND =                 0.60 / Wind velocity outside of dome (m/s)
OUT-WSTR=                 0.60 / Outside wind velocity at exp. start(m/s)
OUT-WEND=                 0.60 / Outside wind velocity at exp. end (m/s)
PROP-ID = 'o11426  '           / Proposal ID
RA      = '08:51:24.109'       / RA of telescope pointing (HH:MM:SS.SSS)
SLTC-RA = '08:51:24.109'       / slit center RA at the EQUINOX (degree)
SECZ    =                1.000 / SEC(Zenith Distance) at typical time
SECZ-STR=                1.000 / SEC(Zenith Distance) at exposure start
SECZ-END=                1.000 / SEC(Zenith Distance) at exposure end
SEEING  =                 0.00 / StarSize FWHM at telescope focus(arcsec)
TELESCOP= 'Subaru  '           / Telescope/System which Inst. is attached
TELFOCUS= 'Cassegrain'         / Focus where a beam is  reachable
TRANSP  =                0.600 / Sky transparency
TRAN-STR=                0.600 / Sky transparency at beginning of exp.
TRAN-END=                0.600 / Sky transparency at the end of exposure
UT1-UTC =             -0.37139 / difference between UT1 and UTC
WEATHER = 'Fare    '           / Weather condition
ZD      =              0.04534 / Zenith Distance at typical time (degree)
ZD-STR  =              0.04534 / Zenith Distance at exp. start (degree)
ZD-END  =              0.04534 / Zenith Distance at exposure end (degree)
BIN-FCT1=                    3 / Binning factor of X axis (pixel)
BIN-FCT2=                    1 / Binning factor of Y axis (pixel)
BLANK   =                -32768 / Value used for NULL pixels
BSCALE  =             1.000000 / Real=fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =          32768.000000 / Real=fits-value*BSCALE+BZERO
DATA-TYP= 'BIAS    '           / Type / Characteristics of  this data
DATE-OBS= '2011-11-28'         / Observation start date  (yyyy-mm-dd)
DEC2000 = '+19:47:44.55'       / DEC(J2000) of pointing (+/-DD:MM:SS.SS)
DETECTOR= 'MIT     '           / Name of the detector/CCD
DET-ID  =                    1 / Comment...
DETPXSZ1=              0.015000 / Detector pixel size in axis1 (mm)
DETPXSZ2=              0.015000 / Detector pixel size in axis2 (mm)
DET-TMP =           -99.800003 / Detector temperature (K)
DISPAXIS=                    2 / Dispersion axis in frame
DISPERSR= 'SCFCGRMB01'         / Identifier of the disperser used
EXPTIME =                  0.0 / Total integration time of the frame(sec)
FILTER01= 'SCFCFLL600'         / Filter name/ID
FILTER02= 'NONE    '           / Filter name/ID
FILTER03= 'NONE    '           / Filter name/ID
FRAMEID = 'FCSA00046275'       / Image sequential number
HST     = '06:47:06.231'       / Typical HST at exposure (HH:MM:SS.SSS)
HST-STR = '06:47:06.231'       / HST at exposure start (HH:MM:SS.SSS)
HST-END = '06:47:06.244'       / HST at exposure end (HH:MM:SS.SSS)
LST     = '08:51:39.611'       / Typical LST during exp. (HH:MM:SS.SSS)
LST-STR = '08:51:39.611'       / LST at start of exposure (HH:MM:SS.SSS)
LST-END = '08:51:39.624'       / LST at end of exposure (HH:MM:SS.SSS)
MJD     =       52940.69937338 / Modified Julian Date at typical time
MJD-STR =       52940.69937338 / Modified Julian Date of the start exp.
MJD-END =       52940.69937353 / Modified Julian Date at the end of exp.
PRD-MIN1=                   59 / Start X pos. of partial readout (pix)
PRD-MIN2=                    1 / Start pos Y of partial readout (pix)
PRD-RNG1=                 2049 / X Range of the partial readout (pix)
PRD-RNG2=                 4095 / Y Range of the partial readout (pix)
RA2000  = '08:51:24.109'       / RA(J2000) pointing (HH:MM:SS.SSS)
SLIT    = 'SCFCSLLC08'         / Identifier of the entrance slit used
SLTCPIX1=                  0.0 / Slit center projected on detector(pixel)
SLTCPIX2=                  0.0 / Slit center projected on detector(pixel)
SLT-LEN =              300.000 / Length of the slit used (arcsec)
SLT-PA  =                 -0.6 / Slit Position Angle (degree)
SLT-WID =                  0.5 / Width of the slit used (arcsec)
TIMESYS = 'UTC     '           / Time System used in the header
UT      = '16:47:06.231'       / HH:MM:SS.SSS typical UTC at exposure
UT-STR  = '16:47:06.231'       / HH:MM:SS.SSS UTC at start exposure time
UT-END  = '16:47:06.244'       / HH:MM:SS.SSS UT at end of the exposure
WAVELEN =            550.0000 / Wavelength at detector center (nm)
WAV-MAX =            655.0000 / Longest wavelen. focused on detector(nm)
WAV-MIN =            655.0000 / Shortest wavelen.focused on detector(nm)
CRVAL1  =         132.85044861 / Physical value of the reference pixel X
CRVAL2  =          19.79570770 / Physical value of the reference pixel Y
CRPIX1  =                -34.0 / Reference pixel in X (pixel)
```

```
CRPIX2  =               2041.0 / Reference pixel in Y (pixel)
CDELT1  =           0.10380000 / X Scale projected on detector (#/pix)
CDELT2  =           0.10380000 / Y Scale projected on detector (#/pix)
PC001001=           1.00000000 / Pixel Coordinate translation matrix
PC001002=           0.00000000 / Pixel Coordinate translation matrix
PC002001=           0.00000000 / Pixel Coordinate translation matrix
PC002002=           1.00000000 / Pixel Coordinate translation matrix
LONGPOLE=            180.00000 / The North Pole of standard system (deg)
CTYPE1  = 'RA---TAN'           / Pixel coordinate system
CTYPE2  = 'WAVELENGTH'         / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'nm      '           / Units used in both CRVAL2 and CDELT2
CD1_1   =           0.31140000 / Pixel Coordinate translation matrix
CD1_2   =           0.00000000 / Pixel Coordinate translation matrix
CD2_1   =           0.00000000 / Pixel Coordinate translation matrix
CD2_2   =           0.10380000 / Pixel Coordinate translation matrix
F_FCSMOD= 'SPEC    '           / Comment...
F_WIPE  = 'NORMAL  '           / CCD Wipe Rate
F_READ  = 'NORMAL  '           / CCD Readout Rate
C2VAL1  =         132.85045417 / Physical value of the ref. pixel X (degree)
C2VAL2  =          19.79570833 / Physical value of the ref. pixel Y (degree)
C2PIX1  =               -34.0 / Reference pixel in X on detector (pixel)
C2PIX2  =              2041.0 / Reference pixel in Y on detector (pixel)
C2ELT1  =           0.00008650 / X Scale projected on detector (#/pix)
C2ELT2  =           0.00002883 / Y Scale projected on detector (#/pix)
P2001001=           0.01113497 / Pixel Coordinate translation matrix
P2001002=           0.99993800 / Pixel Coordinate translation matrix
P2002001=          -0.99993800 / Pixel Coordinate translation matrix
P2002002=           0.01113497 / Pixel Coordinate translation matrix
C2YPE1  = 'RA---TAN'           / Pixel coordinate system
C2YPE2  = 'DEC--TAN'           / Pixel coordinate system
C2NIT1  = 'degree  '           / Units used in both C2VAL1 and C2ELT1
C2NIT2  = 'degree  '           / Units used in both C2VAL2 and C2ELT2
WCS-ORIG= 'SUBARU Toolkit'     / Origin of the WCS value
RADECSYS= 'FK5     '           / The equatorial coordinate system
END
```

● FOCAS の ImagingPolarimetry mode

```
        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
SIMPLE  =                    T / Standard FITS format
BITPIX  =                   16 / # of bits storing pix values
NAXIS   =                    2 / # of axes in frame
NAXIS1  =                 2047 / # of pixels/row
NAXIS2  =                 4095 / # of rows (also # of scan lines)
EXTEND  =                    F / Presence of FITS Extention
ADC     =                0.040 / ADC PA during exposure (degree)
ADC-STR =                0.040 / ADC PA at exposure start (degree)
ADC-END =               -0.040 / ADC PA at exposure end (degree)
ADC-TYPE= 'IN      '           / ADC name/type if used
AIRMASS =                1.000 / Typical air mass during exposure
AIRM-STR=                1.000 / Air mass at exposure start
AIRM-END=                1.000 / Air mass at exposure end
ALTITUDE=             89.93379 / Altitude of telescope pointing (degree)
ALT-STR =             89.93379 / Altitude at start exposure (degree)
ALT-END =             89.93379 / Altitude at exposure end (degree)
AZIMUTH =             89.99576 / Azimuth of telescope pointing (degree)
AZ-STR  =             89.99576 / Azimuth angle at exposure start (degree)
AZ-END  =             89.99576 / Azimuth angle at exposure end (degree)
DATASET = 'DS000   '           / ID of an observation dataset
DEC     = '+19:49:08.67'       / DEC of pointing (+/-DD:MM:SS.SS)
DOM-HUM =                  5.8 / Humidity measured in the dome
DOM-HSTR=                  5.8 / Humidity in the dome at exp. start (%)
DOM-HEND=                  5.8 / Humidity in the dome at exp. end (%)
DOM-PRS =               621.10 / Atmospheric pressure in the Dome (hpa)
DOM-PSTR=               621.10 / Dome Atm. pressure at exp.start (hpa)
DOM-PEND=               621.10 / Dome atm. pressure at exposure end (hpa)
DOM-TMP =               276.35 / Temperature measured in the dome (K)
DOM-TSTR=               276.35 / Temp. in the dome at exp. start (K)
DOM-TEND=               276.35 / Temp. in the dome at exp. end (K)
DOM-WND =                 0.00 / Wind velocity in the dome (m/s)
DOM-WSTR=                 0.00 / Wind vel. in dome at exp. end (m/s)
DOM-WEND=                 0.00 / Wind vel. in dome at exp. end (m/s)
EQUINOX =               2000.0 / Standard FK5 (years)
EFP-MIN1=                    1 / EFP-MIN1 Start X pos. of effective area (pix)
EFP-MIN2=                    1 / EFP-MIN1 Start Y pos. of effective area (pix)
EFP-RNG1=                 1972 / EFP-MIN1 X Range of effective area (pix)
EFP-RNG2=                 4095 / EFP-MIN1 Y Range of effective area (pix)
EXP-ID  = 'FCSE00020026'       / ID of the exposure this data was taken
FOC-POS = '#       '           / Focus where the instrument is attached
FOC-VAL =                1.11 / Encoder value of the focus unit (mm)
GAIN    =               1.910 / AD conversion factor (electron/ADU)
INSROT  =                 0.0 / Typical inst. rot. angle at exp.(degree)
```

```
INR-STR =                  0.0 / Instrument Rotator angle at Start (deg)
INR-END =                  0.0 / Instrument Rotator angle at end (degree)
INST-PA =                  0.6 / P.A. of Instrument flange (degree)
INSTRUME= 'FOCAS   '           / Name of instrument
M2-TIP  = 'OFF     '           / Tip/Tilt of the Secondary Mirror(ON/OFF)
M2-TYPE = 'Opt     '           / Type of the Secondary Mirror (Opt/IR)
OBJECT  = 'DOMEFLAT'           / Target Description
OBS-ALOC= 'Observation'        / Allocation mode for Instrument
OBSERVER= 'FOCAS     '         / Name(s) of observer(s)
OBS-MOD = 'IMAGPOL '           / Observation Mode
OUT-HUM =                  3.2 / Humidity measured outside of dome (%)
OUT-HSTR=                  3.2 / Outside humidity at exp. start (%)
OUT-HEND=                  3.6 / Outside humidity at exp. end (%)
OUT-PRS =               621.10 / Atmospheric pressure outside dome (hpa)
OUT-PSTR=               621.10 / Outside Atmos.press. at exp. start (hpa)
OUT-PEND=               621.10 / Outside Atmos.press. at exp. end (hpa)
OUT-TMP =               277.15 / Temperature measured outside of dome (K)
OUT-TSTR=               277.15 / Outside temperature at exp. start (K)
OUT-TEND=               277.15 / Outside temperature at exp. end (K)
OUT-WND =                 3.00 / Wind velocity outside of dome (m/s)
OUT-WSTR=                 3.00 / Outside wind velocity at exp. start(m/s)
OUT-WEND=                 3.00 / Outside wind velocity at exp. end (m/s)
PROP-ID = 'o11004  '           / Proposal ID
RA      = '23:23:37.303'       / RA of telescope pointing (HH:MM:SS.SSS)
SECZ    =                1.000 / SEC(Zenith Distance) at typical time
SECZ-STR=                1.000 / SEC(Zenith Distance) at exposure start
SECZ-END=                1.000 / SEC(Zenith Distance) at exposure end
SEEING  =                 0.00 / StarSize FWHM at telescope focus(arcsec)
TELESCOP= 'Subaru  '           / Telescope/System which Inst. is attached
TELFOCUS= 'Cassegrain'         / Focus where a beam is  reachable
TRANSP  =                0.900 / Sky transparency
TRAN-STR=                0.900 / Sky transparency at beginning of exp.
TRAN-END=                0.900 / Sky transparency at the end of exposure
UT1-UTC =             -0.22838 / difference between UT1 and UTC
WEATHER = 'Fare    '           / Weather condition
ZD      =              0.06621 / Zenith Distance at typical time (degree)
ZD-STR  =              0.06621 / Zenith Distance at exp. start (degree)
ZD-END  =              0.06621 / Zenith Distance at exposure end (degree)
BIN-FCT1=                    1 / Binning factor of X axis (pixel)
BIN-FCT2=                    1 / Binning factor of Y axis (pixel)
BLANK   =               -32768 / Value used for NULL pixels
BSCALE  =             1.000000 / Real=fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =         32768.000000 / Real=fits-value*BSCALE+BZERO
DATA-TYP= 'DOMEFLAT'           / Type / Characteristics of  this data
DATE-OBS= '2011-11-15'         / Observation start date  (yyyy-mm-dd)
DEC2000 = '+19:49:08.67'       / DEC(J2000) of pointing (+/-DD:MM:SS.SS)
DETECTOR= 'MIT     '           / Name of the detector/CCD
DET-ID  =                    2 / Comment...
DETPXSZ1=             0.015000 / Detector pixel size in axis1 (mm)
DETPXSZ2=             0.015000 / Detector pixel size in axis2 (mm)
DET-TMP =           -99.800003 / Detector temperature (K)
EXPTIME =                 22.0 / Total integration time of the frame(sec)
FILTER01= 'NONE    '           / Filter name/ID
FILTER02= 'SCFCFLN658'         / Filter name/ID
FILTER03= 'NONE    '           / Filter name/ID
FRAMEID = 'FCSA00020027'       / Image sequential number
HST     = '06:10:18.130'       / Typical HST at exposure (HH:MM:SS.SSS)
HST-STR = '06:10:18.130'       / HST at exposure start (HH:MM:SS.SSS)
HST-END = '06:10:43.123'       / HST at exposure end (HH:MM:SS.SSS)
LST     = '23:23:27.924'       / Typical LST during exp. (HH:MM:SS.SSS)
LST-STR = '23:23:27.924'       / LST at start of exposure (HH:MM:SS.SSS)
LST-END = '23:23:52.985'       / LST at end of exposure (HH:MM:SS.SSS)
MJD     =       52440.67187500 / Modified Julian Date at typical time
MJD-STR =       52440.67187500 / Modified Julian Date of the start exp.
MJD-END =       52440.67578125 / Modified Julian Date at the end of exp.
PRD-MIN1=                    1 / Start X pos. of partial readout (pix)
PRD-MIN2=                    1 / Start pos Y of partial readout (pix)
PRD-RNG1=                 2047 / X Range of the partial readout (pix)
PRD-RNG2=                 4095 / Y Range of the partial readout (pix)
RA2000  = '23:23:37.303'       / RA(J2000) pointing (HH:MM:SS.SSS)
SLIT    = 'SCFCMS0120'         / Identifier of the entrance slit used
TIMESYS = 'UTC     '           / Time System used in the header
UT      = '16:10:18.130'       / HH:MM:SS.SSS typical UTC at exposure
UT-STR  = '16:10:18.130'       / HH:MM:SS.SSS UTC at start exposure time
UT-END  = '16:10:43.123'       / HH:MM:SS.SSS UT at end of the exposure
CRVAL1  =         350.90542917 / Physical value of the reference pixel X
CRVAL2  =          19.81907500 / Physical value of the reference pixel Y
CRPIX1  =               1964.0 / Reference pixel in X (pixel)
CRPIX2  =               2043.0 / Reference pixel in Y (pixel)
CDELT1  =           0.00002883 / X Scale projected on detector (#/pix)
CDELT2  =           0.00002883 / Y Scale projected on detector (#/pix)
PC001001=           0.01113497 / Pixel Coordinate translation matrix
PC001002=           0.99993800 / Pixel Coordinate translation matrix
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PC002001=          -0.99993800 / Pixel Coordinate translation matrix
PC002002=           0.01113497 / Pixel Coordinate translation matrix
LONGPOLE=            180.00000 / The North Pole of standard system (deg)
CTYPE1  = 'RA---TAN'           / Pixel coordinate system
CTYPE2  = 'DEC--TAN'           / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree  '           / Units used in both CRVAL2 and CDELT2
CD1_1   =           0.00000032 / Pixel Coordinate translation matrix
CD2_1   =          -0.00002883 / Pixel Coordinate translation matrix
CD1_2   =           0.00002883 / Pixel Coordinate translation matrix
CD2_2   =           0.00000032 / Pixel Coordinate translation matrix
F_FCSMOD= 'IMAG_MOS_POL'       / Comment...
F_WIPE  = 'NORMAL  '           / CCD Wipe Rate
F_READ  = 'NORMAL  '           / CCD Readout Rate
WCS-ORIG= 'SUBARU Toolkit'     / Origin of the WCS value
RADECSYS= 'FK5     '           / The equatorial coordinate system
END
```

● FOCAS の Spectroscopy mode

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        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
SIMPLE  =                    T / Standard FITS format
BITPIX  =                   16 / # of bits storing pix values
NAXIS   =                    2 / # of axes in frame
NAXIS1  =                  683 / # of pixels/row
NAXIS2  =                 4095 / # of rows (also # of scan lines)
EXTEND  =                    F / Presence of FITS Extention
ADC     =               -0.040 / ADC PA during exposure (degree)
ADC-STR =               -0.040 / ADC PA at exposure start (degree)
ADC-END =                0.030 / ADC PA at exposure end (degree)
ADC-TYPE= 'IN      '           / ADC name/type if used
AIRMASS =                1.000 / Typical air mass during exposure
AIRM-STR=                1.000 / Air mass at exposure start
AIRM-END=                1.000 / Air mass at exposure end
ALTITUDE=             89.95366 / Altitude of telescope pointing (degree)
ALT-STR =             89.95366 / Altitude at start exposure (degree)
ALT-END =             89.95365 / Altitude at exposure end (degree)
AZIMUTH =            328.52454 / Azimuth of telescope pointing (degree)
AZ-STR  =            328.52454 / Azimuth angle at exposure start (degree)
AZ-END  =            328.52454 / Azimuth angle at exposure end (degree)
DATASET = 'DS000   '           / ID of an observation dataset
DEC     = '+19:52:45.14'       / DEC of pointing (+/-DD:MM:SS.SS)
SLTC-DEC= '+19:52:45.14'       / slit center DEC at the EQUINOX (degree)
DOM-HUM =                 28.8 / Humidity measured in the dome
DOM-HSTR=                 28.8 / Humidity in the dome at exp. start (%)
DOM-HEND=                 28.7 / Humidity in the dome at exp. end (%)
DOM-PRS =               620.10 / Atmospheric pressure in the Dome (hpa)
DOM-PSTR=               620.10 / Dome Atm. pressure at exp.start (hpa)
DOM-PEND=               620.10 / Dome atm. pressure at exposure end (hpa)
DOM-TMP =               275.15 / Temperature measured in the dome (K)
DOM-TSTR=               275.15 / Temp. in the dome at exp. start (K)
DOM-TEND=               275.15 / Temp. in the dome at exp. end (K)
DOM-WND =                 0.00 / Wind velocity in the dome (m/s)
DOM-WSTR=                 0.00 / Wind vel. in dome at exp. end (m/s)
DOM-WEND=                 0.00 / Wind vel. in dome at exp. end (m/s)
EQUINOX =               2000.0 / Standard FK5 (years)
EFP-MIN1=                   20 / EFP-MIN1 Start X pos. of effective area (pix)
EFP-MIN2=                    1 / EFP-MIN1 Start Y pos. of effective area (pix)
EFP-RNG1=                  658 / EFP-MIN1 X Range of effective area (pix)
EFP-RNG2=                 4095 / EFP-MIN1 Y Range of effective area (pix)
EXP-ID  = 'FCSE00046259'       / ID of the exposure this data was taken
FOC-POS = '#       '           / Focus where the instrument is attached
FOC-VAL =                -0.14 / Encoder value of the focus unit (mm)
GAIN    =                2.110 / AD conversion factor (electron/ADU)
INSROT  =               -234.4 / Typical inst. rot. angle at exp.(degree)
INR-STR =               -234.4 / Instrument Rotator angle at Start (deg)
INR-END =               -234.4 / Instrument Rotator angle at end (degree)
INST-PA =                  0.6 / P.A. of Instrument flange (degree)
INSTRUME= 'FOCAS   '           / Name of instrument
M2-TIP  = 'OFF     '           / Tip/Tilt of the Secondary Mirror(ON/OFF)
M2-TYPE = 'Opt     '           / Type of the Secondary Mirror (Opt/IR)
OBJECT  = 'DOMEFLAT'           / Target Description
OBS-ALOC= 'Observation'        / Allocation mode for Instrument
OBSERVER= 'FOCAS   '           / Name(s) of observer(s)
OBS-MOD = 'SPEC    '           / Observation Mode
OUT-HUM =                 18.3 / Humidity measured outside of dome (%)
OUT-HSTR=                 18.3 / Outside humidity at exp. start (%)
OUT-HEND=                 17.6 / Outside humidity at exp. end (%)
OUT-PRS =               620.10 / Atmospheric pressure outside dome (hpa)
OUT-PSTR=               620.10 / Outside Atmos.press. at exp. start (hpa)
OUT-PEND=               620.10 / Outside Atmos.press. at exp. end (hpa)
OUT-TMP =               276.65 / Temperature measured outside of dome (K)
OUT-TSTR=               276.65 / Outside temperature at exp. start (K)
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OUT-TEND=               276.65 / Outside temperature at exp. end (K)
OUT-WND =                 2.40 / Wind velocity outside of dome (m/s)
OUT-WSTR=                 2.40 / Outside wind velocity at exp. start(m/s)
OUT-WEND=                 2.40 / Outside wind velocity at exp. end (m/s)
PROP-ID = 'o11426  '           / Proposal ID
RA      = '08:36:27.242'       / RA of telescope pointing (HH:MM:SS.SSS)
SLTC-RA = '08:36:27.242'       / slit center RA at the EQUINOX (degree)
SECZ    =                 1.000 / SEC(Zenith Distance) at typical time
SECZ-STR=                 1.000 / SEC(Zenith Distance) at exposure start
SECZ-END=                 1.000 / SEC(Zenith Distance) at exposure end
SEEING  =                  0.00 / StarSize FWHM at telescope focus(arcsec)
TELESCOP= 'Subaru  '           / Telescope/System which Inst. is attached
TELFOCUS= 'Cassegrain'         / Focus where a beam is  reachable
TRANSP  =                 0.600 / Sky transparency
TRAN-STR=                 0.600 / Sky transparency at beginning of exp.
TRAN-END=                 0.600 / Sky transparency at the end of exposure
UT1-UTC =              -0.37139 / difference between UT1 and UTC
WEATHER = 'Fare    '           / Weather condition
ZD      =               0.04634 / Zenith Distance at typical time (degree)
ZD-STR  =               0.04634 / Zenith Distance at exp. start (degree)
ZD-END  =               0.04634 / Zenith Distance at exposure end (degree)
BIN-FCT1=                     3 / Binning factor of X axis (pixel)
BIN-FCT2=                     1 / Binning factor of Y axis (pixel)
BLANK   =                -32768 / Value used for NULL pixels
BSCALE  =              1.000000 / Real=fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =          32768.000000 / Real=fits-value*BSCALE+BZERO
DATA-TYP= 'DOMEFLAT'           / Type / Characteristics of  this data
DATE-OBS= '2011-11-28'         / Observation start date  (yyyy-mm-dd)
DEC2000 = '+19:52:45.14'       / DEC(J2000) of pointing (+/-DD:MM:SS.SS)
DETECTOR= 'MIT     '           / Name of the detector/CCD
DET-ID  =                     1 / Comment...
DETPXSZ1=              0.015000 / Detector pixel size in axis1 (mm)
DETPXSZ2=              0.015000 / Detector pixel size in axis2 (mm)
DET-TMP =            -99.900002 / Detector temperature (K)
DISPAXIS=                     2 / Dispersion axis in frame
DISPERSR= 'SCFCGRMB01'         / Identifier of the disperser used
EXPTIME =                   5.0 / Total integration time of the frame(sec)
FILTER01= 'SCFCFLL600'         / Filter name/ID
FILTER02= 'NONE    '           / Filter name/ID
FILTER03= 'NONE    '           / Filter name/ID
FRAMEID = 'FCSA00046259'       / Image sequential number
HST     = '06:32:15.649'       / Typical HST at exposure (HH:MM:SS.SSS)
HST-STR = '06:32:15.649'       / HST at exposure start (HH:MM:SS.SSS)
HST-END = '06:32:20.897'       / HST at exposure end (HH:MM:SS.SSS)
LST     = '08:36:46.591'       / Typical LST during exp. (HH:MM:SS.SSS)
LST-STR = '08:36:46.591'       / LST at start of exposure (HH:MM:SS.SSS)
LST-END = '08:36:51.853'       / LST at end of exposure (HH:MM:SS.SSS)
MJD     =       52940.68906571 / Modified Julian Date at typical time
MJD-STR =       52940.68906571 / Modified Julian Date of the start exp.
MJD-END =       52940.68912645 / Modified Julian Date at the end of exp.
PRD-MIN1=                    59 / Start X pos. of partial readout (pix)
PRD-MIN2=                     1 / Start pos Y of partial readout (pix)
PRD-RNG1=                  2049 / X Range of the partial readout (pix)
PRD-RNG2=                  4095 / Y Range of the partial readout (pix)
RA2000  = '08:36:27.242'       / RA(J2000) pointing (HH:MM:SS.SSS)
SLIT    = 'SCFCSLLC08'         / Identifier of the entrance slit used
SLTCPIX1=                   0.0 / Slit center projected on detector(pixel)
SLTCPIX2=                   0.0 / Slit center projected on detector(pixel)
SLT-LEN =               300.000 / Length of the slit used (arcsec)
SLT-PA  =                  -0.6 / Slit Position Angle (degree)
SLT-WID =                   0.5 / Width of the slit used (arcsec)
TIMESYS = 'UTC     '           / Time System used in the header
UT      = '16:32:15.649'       / HH:MM:SS.SSS typical UTC at exposure
UT-STR  = '16:32:15.649'       / HH:MM:SS.SSS UTC at start exposure time
UT-END  = '16:32:20.897'       / HH:MM:SS.SSS UT at end of the exposure
WAVELEN =             550.0000 / Wavelength at detector center (nm)
WAV-MAX =             655.0000 / Longest wavelen. focused on detector(nm)
WAV-MIN =             655.0000 / Shortest wavelen.focused on detector(nm)
CRVAL1  =         129.11351013 / Physical value of the reference pixel X
CRVAL2  =          19.87920570 / Physical value of the reference pixel Y
CRPIX1  =               -34.0 / Reference pixel in X (pixel)
CRPIX2  =              2041.0 / Reference pixel in Y (pixel)
CDELT1  =           0.10380000 / X Scale projected on detector (#/pix)
CDELT2  =           0.10380000 / Y Scale projected on detector (#/pix)
PC001001=           1.00000000 / Pixel Coordinate translation matrix
PC001002=           0.00000000 / Pixel Coordinate translation matrix
PC002001=           0.00000000 / Pixel Coordinate translation matrix
PC002002=           1.00000000 / Pixel Coordinate translation matrix
LONGPOLE=            180.00000 / The North Pole of standard system (deg)
CTYPE1  = 'RA---TAN'           / Pixel coordinate system
CTYPE2  = 'WAVELENGTH'         / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'nm      '           / Units used in both CRVAL2 and CDELT2
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```
CD1_1   =           0.31140000 / Pixel Coordinate translation matrix
CD1_2   =           0.00000000 / Pixel Coordinate translation matrix
CD2_1   =           0.00000000 / Pixel Coordinate translation matrix
CD2_2   =           0.10380000 / Pixel Coordinate translation matrix
F_FCSMOD= 'SPEC    '           / Comment...
F_WIPE  = 'NORMAL  '           / CCD Wipe Rate
F_READ  = 'NORMAL  '           / CCD Readout Rate
C2VAL1  =          129.11350833 / Physical value of the ref. pixel X (degree)
C2VAL2  =           19.87920556 / Physical value of the ref. pixel Y (degree)
C2PIX1  =                -34.0 / Reference pixel in X on detector (pixel)
C2PIX2  =               2041.0 / Reference pixel in Y on detector (pixel)
C2ELT1  =           0.00008650 / X Scale projected on detector (#/pix)
C2ELT2  =           0.00002883 / Y Scale projected on detector (#/pix)
P2001001=           0.01113497 / Pixel Coordinate translation matrix
P2001002=           0.99993800 / Pixel Coordinate translation matrix
P2002001=          -0.99993800 / Pixel Coordinate translation matrix
P2002002=           0.01113497 / Pixel Coordinate translation matrix
C2YPE1  = 'RA---TAN'           / Pixel coordinate system
C2YPE2  = 'DEC--TAN'           / Pixel coordinate system
C2NIT1  = 'degree  '           / Units used in both C2VAL1 and C2ELT1
C2NIT2  = 'degree  '           / Units used in both C2VAL2 and C2ELT2
WCS-ORIG= 'SUBARU Toolkit'     / Origin of the WCS value
RADECSYS= 'FK5     '           / The equatorial coordinate system
END
```

● FOCAS の Spectroscopy(MOS) mode

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        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
SIMPLE  =                    T / Standard FITS format
BITPIX  =                   16 / # of bits storing pix values
NAXIS   =                    2 / # of axes in frame
NAXIS1  =                 2047 / # of pixels/row
NAXIS2  =                 4095 / # of rows (also # of scan lines)
EXTEND  =                    F / Presence of FITS Extention
ADC     =               11.120 / ADC PA during exposure (degree)
ADC-STR =               11.120 / ADC PA at exposure start (degree)
ADC-END =               11.210 / ADC PA at exposure end (degree)
ADC-TYPE= 'IN      '           / ADC name/type if used
AIRMASS =                1.066 / Typical air mass during exposure
AIRM-STR=                1.066 / Air mass at exposure start
AIRM-END=                1.066 / Air mass at exposure end
ALTITUDE=             69.72246 / Altitude of telescope pointing (degree)
ALT-STR =             69.72246 / Altitude at start exposure (degree)
ALT-END =             69.68854 / Altitude at exposure end (degree)
AZIMUTH =            195.97508 / Azimuth of telescope pointing (degree)
AZ-STR  =            195.97508 / Azimuth angle at exposure start (degree)
AZ-END  =            196.33553 / Azimuth angle at exposure end (degree)
DATASET = 'DS000   '           / ID of an observation dataset
DEC     = '+00:15:12.23'       / DEC of pointing (+/-DD:MM:SS.SS)
DOM-HUM =                 23.5 / Humidity measured in the dome
DOM-HSTR=                 23.5 / Humidity in the dome at exp. start (%)
DOM-HEND=                 23.6 / Humidity in the dome at exp. end (%)
DOM-PRS =               621.30 / Atmospheric pressure in the Dome (hpa)
DOM-PSTR=               621.30 / Dome Atm. pressure at exp.start (hpa)
DOM-PEND=               621.30 / Dome atm. pressure at exposure end (hpa)
DOM-TMP =               275.85 / Temperature measured in the dome (K)
DOM-TSTR=               275.85 / Temp. in the dome at exp. start (K)
DOM-TEND=               275.85 / Temp. in the dome at exp. end (K)
DOM-WND =                 0.20 / Wind velocity in the dome (m/s)
DOM-WSTR=                 0.20 / Wind vel. in dome at exp. end (m/s)
DOM-WEND=                 0.10 / Wind vel. in dome at exp. end (m/s)
EQUINOX =               2000.0 / Standard FK5 (years)
EFP-MIN1=                   59 / EFP-MIN1 Start X pos. of effective area (pix)
EFP-MIN2=                    1 / EFP-MIN1 Start Y pos. of effective area (pix)
EFP-RNG1=                 1972 / EFP-MIN1 X Range of effective area (pix)
EFP-RNG2=                 4095 / EFP-MIN1 Y Range of effective area (pix)
EXP-ID  = 'FCSE00046377'       / ID of the exposure this data was taken
FOC-POS = '#       '           / Focus where the instrument is attached
FOC-VAL =                -0.14 / Encoder value of the focus unit (mm)
GAIN    =                4.070 / AD conversion factor (electron/ADU)
INSROT  =               -119.3 / Typical inst. rot. angle at exp.(degree)
INR-STR =               -119.3 / Instrument Rotator angle at Start (deg)
INR-END =               -119.0 / Instrument Rotator angle at end (degree)
INST-PA =               -134.4 / P.A. of Instrument flange (degree)
INSTRUME= 'FOCAS   '           / Name of instrument
M2-TIP  = 'OFF     '           / Tip/Tilt of the Secondary Mirror(ON/OFF)
M2-TYPE = 'Opt     '           / Type of the Secondary Mirror (Opt/IR)
OBJECT  = 'Nandesuka '           / Target Description
OBS-ALOC= 'Observation'        / Allocation mode for Instrument
OBSERVER= 'FOCAS    '     / Name(s) of observer(s)
OBS-MOD = 'SPEC_MOS'           / Observation Mode
OUT-HUM =                 24.5 / Humidity measured outside of dome (%)
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OUT-HSTR=                 24.5 / Outside humidity at exp. start (%)
OUT-HEND=                 24.4 / Outside humidity at exp. end (%)
OUT-PRS =               621.30 / Atmospheric pressure outside dome (hpa)
OUT-PSTR=               621.30 / Outside Atmos.press. at exp. start (hpa)
OUT-PEND=               621.30 / Outside Atmos.press. at exp. end (hpa)
OUT-TMP =               275.45 / Temperature measured outside of dome (K)
OUT-TSTR=               275.45 / Outside temperature at exp. start (K)
OUT-TEND=               275.45 / Outside temperature at exp. end (K)
OUT-WND =                 1.10 / Wind velocity outside of dome (m/s)
OUT-WSTR=                 1.10 / Outside wind velocity at exp. start(m/s)
OUT-WEND=                 1.20 / Outside wind velocity at exp. end (m/s)
PROP-ID = 'o11111  '           / Proposal ID
RA      = '22:17:50.291'       / RA of telescope pointing (HH:MM:SS.SSS)
SECZ    =                1.066 / SEC(Zenith Distance) at typical time
SECZ-STR=                1.066 / SEC(Zenith Distance) at exposure start
SECZ-END=                1.066 / SEC(Zenith Distance) at exposure end
SEEING  =                 0.26 / StarSize FWHM at telescope focus(arcsec)
TELESCOP= 'Subaru  '           / Telescope/System which Inst. is attached
TELFOCUS= 'Cassegrain'         / Focus where a beam is  reachable
TRANSP  =                0.600 / Sky transparency
TRAN-STR=                0.600 / Sky transparency at beginning of exp.
TRAN-END=                0.600 / Sky transparency at the end of exposure
UT1-UTC =             -0.37185 / difference between UT1 and UTC
WEATHER = 'Fare    '           / Weather condition
ZD      =             20.27777 / Zenith Distance at typical time (degree)
ZD-STR  =             20.27830 / Zenith Distance at exp. start (degree)
ZD-END  =             20.31168 / Zenith Distance at exposure end (degree)
BIN-FCT1=                    1 / Binning factor of X axis (pixel)
BIN-FCT2=                    1 / Binning factor of Y axis (pixel)
BLANK   =               -32768 / Value used for NULL pixels
BSCALE  =             1.000000 / Real=fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =         32768.000000 / Real=fits-value*BSCALE+BZERO
DATA-TYP= 'OBJECT  '           / Type / Characteristics of  this data
DATE-OBS= '2011-01-30'         / Observation start date  (yyyy-mm-dd)
DEC2000 = '+00:15:12.23'       / DEC(J2000) of pointing (+/-DD:MM:SS.SS)
DETECTOR= 'MIT     '           / Name of the detector/CCD
DET-ID  =                    1 / Comment...
DETPXSZ1=             0.015000 / Detector pixel size in axis1 (mm)
DETPXSZ2=             0.015000 / Detector pixel size in axis2 (mm)
DET-TMP =           -99.800003 / Detector temperature (K)
EXPTIME =                 30.0 / Total integration time of the frame(sec)
FILTER01= 'NONE    '           / Filter name/ID
FILTER02= 'NONE    '           / Filter name/ID
FILTER03= 'NONE    '           / Filter name/ID
FRAMEID = 'FCSA00046377'       / Image sequential number
HST     = '20:33:07.547'       / Typical HST at exposure (HH:MM:SS.SSS)
HST-STR = '20:33:07.547'       / HST at exposure start (HH:MM:SS.SSS)
HST-END = '20:33:38.175'       / HST at exposure end (HH:MM:SS.SSS)
LST     = '22:39:56.621'       / Typical LST during exp. (HH:MM:SS.SSS)
LST-STR = '22:39:56.621'       / LST at start of exposure (HH:MM:SS.SSS)
LST-END = '22:40:27.333'       / LST at end of exposure (HH:MM:SS.SSS)
MJD     =       52941.27299971 / Modified Julian Date at typical time
MJD-STR =       52941.27299971 / Modified Julian Date of the start exp.
MJD-END =       52941.27335420 / Modified Julian Date at the end of exp.
PRD-MIN1=                   59 / Start X pos. of partial readout (pix)
PRD-MIN2=                    1 / Start pos Y of partial readout (pix)
PRD-RNG1=                 2047 / X Range of the partial readout (pix)
PRD-RNG2=                 4095 / Y Range of the partial readout (pix)
RA2000  = '22:17:50.291'       / RA(J2000) pointing (HH:MM:SS.SSS)
SLIT    = 'SCFCMS0146'         / Identifier of the entrance slit used
TIMESYS = 'UTC     '           / Time System used in the header
UT      = '06:33:07.547'       / HH:MM:SS.SSS typical UTC at exposure
UT-STR  = '06:33:07.547'       / HH:MM:SS.SSS UTC at start exposure time
UT-END  = '06:33:38.175'       / HH:MM:SS.SSS UT at end of the exposure
CRVAL1  =         334.45954583 / Physical value of the reference pixel X
CRVAL2  =           0.25339722 / Physical value of the reference pixel Y
CRPIX1  =                -34.0 / Reference pixel in X (pixel)
CRPIX2  =               2041.0 / Reference pixel in Y (pixel)
CDELT1  =           0.00002883 / X Scale projected on detector (#/pix)
CDELT2  =           0.00002883 / Y Scale projected on detector (#/pix)
PC001001=          -0.71493656 / Pixel Coordinate translation matrix
PC001002=          -0.69918933 / Pixel Coordinate translation matrix
PC002001=           0.69918933 / Pixel Coordinate translation matrix
PC002002=          -0.71493656 / Pixel Coordinate translation matrix
LONGPOLE=            180.00000 / The North Pole of standard system (deg)
CTYPE1  = 'RA---TAN'           / Pixel coordinate system
CTYPE2  = 'DEC--TAN'           / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree  '           / Units used in both CRVAL2 and CDELT2
CD1_1   =          -0.00002061 / Pixel Coordinate translation matrix
CD2_1   =           0.00002016 / Pixel Coordinate translation matrix
CD1_2   =          -0.00002016 / Pixel Coordinate translation matrix
CD2_2   =          -0.00002061 / Pixel Coordinate translation matrix
```

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F_FCSMOD= 'IMAG_MOS'           / Comment...
F_WIPE  = 'FAST    '           / CCD Wipe Rate
F_READ  = 'FAST    '           / CCD Readout Rate
WCS-ORIG= 'SUBARU Toolkit'     / Origin of the WCS value
RADECSYS= 'FK5     '           / The equatorial coordinate system
END
```

● FOCAS の SpectroPolarimetry mode

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         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
SIMPLE  =                    T / Standard FITS format
BITPIX  =                   16 / # of bits storing pix values
NAXIS   =                    2 / # of axes in frame
NAXIS1  =                  683 / # of pixels/row
NAXIS2  =                 4095 / # of rows (also # of scan lines)
EXTEND  =                    F / Presence of FITS Extention
ADC     =                0.010 / ADC PA during exposure (degree)
ADC-STR =                0.010 / ADC PA at exposure start (degree)
ADC-END =               -0.040 / ADC PA at exposure end (degree)
ADC-TYPE= 'IN      '           / ADC name/type if used
AIRMASS =                1.000 / Typical air mass during exposure
AIRM-STR=                1.000 / Air mass at exposure start
AIRM-END=                1.000 / Air mass at exposure end
ALTITUDE=             89.93134 / Altitude of telescope pointing (degree)
ALT-STR =             89.93134 / Altitude at start exposure (degree)
ALT-END =             89.93134 / Altitude at exposure end (degree)
AZIMUTH =             89.99809 / Azimuth of telescope pointing (degree)
AZ-STR  =             89.99809 / Azimuth angle at exposure start (degree)
AZ-END  =             89.99809 / Azimuth angle at exposure end (degree)
DATASET = 'DS000   '           / ID of an observation dataset
DEC     = '+19:49:18.12'       / DEC of pointing (+/-DD:MM:SS.SS)
SLTC-DEC= '+19:49:18.12'       / slit center DEC at the EQUINOX (degree)
DOM-HUM =                 15.1 / Humidity measured in the dome
DOM-HSTR=                 15.1 / Humidity in the dome at exp. start (%)
DOM-HEND=                 15.1 / Humidity in the dome at exp. end (%)
DOM-PRS =               622.80 / Atmospheric pressure in the Dome (hpa)
DOM-PSTR=               622.80 / Dome Atm. pressure at exp.start (hpa)
DOM-PEND=               622.80 / Dome atm. pressure at exposure end (hpa)
DOM-TMP =               277.85 / Temperature measured in the dome (K)
DOM-TSTR=               277.85 / Temp. in the dome at exp. start (K)
DOM-TEND=               277.85 / Temp. in the dome at exp. end (K)
DOM-WND =                 0.10 / Wind velocity in the dome (m/s)
DOM-WSTR=                 0.10 / Wind vel. in dome at exp. end (m/s)
DOM-WEND=                 0.00 / Wind vel. in dome at exp. end (m/s)
EQUINOX =               2000.0 / Standard FK5 (years)
EFP-MIN1=                   20 / EFP-MIN1 Start X pos. of effective area (pix)
EFP-MIN2=                    1 / EFP-MIN1 Start Y pos. of effective area (pix)
EFP-RNG1=                  658 / EFP-MIN1 X Range of effective area (pix)
EFP-RNG2=                 4095 / EFP-MIN1 Y Range of effective area (pix)
EXP-ID  = 'FCSE00045147'       / ID of the exposure this data was taken
FOC-POS = '#       '           / Focus where the instrument is attached
FOC-VAL =                -0.14 / Encoder value of the focus unit (mm)
GAIN    =                2.110 / AD conversion factor (electron/ADU)
INSROT  =              -139.7 / Typical inst. rot. angle at exp.(degree)
INR-STR =              -139.7 / Instrument Rotator angle at Start (deg)
INR-END =              -139.7 / Instrument Rotator angle at end (degree)
INST-PA =               -49.4 / P.A. of Instrument flange (degree)
INSTRUME= 'FOCAS   '           / Name of instrument
M2-TIP  = 'OFF     '           / Tip/Tilt of the Secondary Mirror(ON/OFF)
M2-TYPE = 'Opt     '           / Type of the Secondary Mirror (Opt/IR)
OBJECT  = 'DOMEFLAT'           / Target Description
OBS-ALOC= 'Observation'        / Allocation mode for Instrument
OBSERVER= 'FOCAS       '       / Name(s) of observer(s)
OBS-MOD = 'SPEC_POL'           / Observation Mode
OUT-HUM =                 14.1 / Humidity measured outside of dome (%)
OUT-HSTR=                 14.1 / Outside humidity at exp. start (%)
OUT-HEND=                 14.3 / Outside humidity at exp. end (%)
OUT-PRS =               622.80 / Atmospheric pressure outside dome (hpa)
OUT-PSTR=               622.80 / Outside Atmos.press. at exp. start (hpa)
OUT-PEND=               622.80 / Outside Atmos.press. at exp. end (hpa)
OUT-TMP =               278.55 / Temperature measured outside of dome (K)
OUT-TSTR=               278.55 / Outside temperature at exp. start (K)
OUT-TEND=               278.55 / Outside temperature at exp. end (K)
OUT-WND =                 1.80 / Wind velocity outside of dome (m/s)
OUT-WSTR=                 1.80 / Outside wind velocity at exp. start(m/s)
OUT-WEND=                 1.80 / Outside wind velocity at exp. end (m/s)
PROP-ID = 'o11117  '           / Proposal ID
RA      = '18:54:11.499'       / RA of telescope pointing (HH:MM:SS.SSS)
SLTC-RA = '18:54:11.499'       / slit center RA at the EQUINOX (degree)
SECZ    =                1.000 / SEC(Zenith Distance) at typical time
SECZ-STR=                1.000 / SEC(Zenith Distance) at exposure start
```

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SECZ-END=                1.000 / SEC(Zenith Distance) at exposure end
SEEING  =                 0.00 / StarSize FWHM at telescope focus(arcsec)
TELESCOP= 'Subaru  '           / Telescope/System which Inst. is attached
TELFOCUS= 'Cassegrain'         / Focus where a beam is  reachable
TRANSP  =                0.600 / Sky transparency
TRAN-STR=                0.600 / Sky transparency at beginning of exp.
TRAN-END=                0.600 / Sky transparency at the end of exposure
UT1-UTC =             -0.35797 / difference between UT1 and UTC
WEATHER = 'Fare    '           / Weather condition
ZD      =              0.06866 / Zenith Distance at typical time (degree)
ZD-STR  =              0.06866 / Zenith Distance at exp. start (degree)
ZD-END  =              0.06866 / Zenith Distance at exposure end (degree)
BIN-FCT1=                    3 / Binning factor of X axis (pixel)
BIN-FCT2=                    1 / Binning factor of Y axis (pixel)
BLANK   =               -32768 / Value used for NULL pixels
BSCALE  =             1.000000 / Real=fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =          32768.000000 / Real=fits-value*BSCALE+BZERO
DATA-TYP= 'DOMEFLAT'           / Type / Characteristics of  this data
DATE-OBS= '2011-11-05'         / Observation start date  (yyyy-mm-dd)
DEC2000 = '+19:49:18.12'       / DEC(J2000) of pointing (+/-DD:MM:SS.SS)
DETECTOR= 'MIT     '           / Name of the detector/CCD
DET-ID  =                    1 / Comment...
DETPXSZ1=              0.015000 / Detector pixel size in axis1 (mm)
DETPXSZ2=              0.015000 / Detector pixel size in axis2 (mm)
DET-TMP =           -99.800003 / Detector temperature (K)
DISPAXIS=                    2 / Dispersion axis in frame
DISPERSR= 'SCFCGRMB01'         / Identifier of the disperser used
EXPTIME =                 11.0 / Total integration time of the frame(sec)
FILTER01= 'NONE    '           / Filter name/ID
FILTER02= 'SCFCFLSY47'         / Filter name/ID
FILTER03= 'NONE    '           / Filter name/ID
FRAMEID = 'FCSA00045147'       / Image sequential number
HST     = '18:22:13.842'       / Typical HST at exposure (HH:MM:SS.SSS)
HST-STR = '18:22:13.842'       / HST at exposure start (HH:MM:SS.SSS)
HST-END = '18:22:25.333'       / HST at exposure end (HH:MM:SS.SSS)
LST     = '18:54:04.099'       / Typical LST during exp. (HH:MM:SS.SSS)
LST-STR = '18:54:04.099'       / LST at start of exposure (HH:MM:SS.SSS)
LST-END = '18:54:15.621'       / LST at end of exposure (HH:MM:SS.SSS)
MJD     =       52917.18210051 / Modified Julian Date at typical time
MJD-STR =       52917.18210051 / Modified Julian Date of the start exp.
MJD-END =       52917.18223351 / Modified Julian Date at the end of exp.
PRD-MIN1=                   59 / Start X pos. of partial readout (pix)
PRD-MIN2=                    1 / Start pos Y of partial readout (pix)
PRD-RNG1=                 2049 / X Range of the partial readout (pix)
PRD-RNG2=                 4095 / Y Range of the partial readout (pix)
RA2000  = '18:54:11.499'       / RA(J2000) pointing (HH:MM:SS.SSS)
SLIT    = 'SCFCSLP004'         / Identifier of the entrance slit used
SLTCPIX1=                  0.0 / Slit center projected on detector(pixel)
SLTCPIX2=                  0.0 / Slit center projected on detector(pixel)
SLT-LEN =              300.000 / Length of the slit used (arcsec)
SLT-PA  =                 49.4 / Slit Position Angle (degree)
SLT-WID =                  0.5 / Width of the slit used (arcsec)
TIMESYS = 'UTC     '           / Time System used in the header
UT      = '04:22:13.842'       / HH:MM:SS.SSS typical UTC at exposure
UT-STR  = '04:22:13.842'       / HH:MM:SS.SSS UTC at start exposure time
UT-END  = '04:22:25.333'       / HH:MM:SS.SSS UT at end of the exposure
WAVELEN =             550.0000 / Wavelength at detector center (nm)
WAV-MAX =             655.0000 / Longest wavelen. focused on detector(nm)
WAV-MIN =             655.0000 / Shortest wavelen.focused on detector(nm)
CRVAL1  =         283.54791260 / Physical value of the reference pixel X
CRVAL2  =          19.82169914 / Physical value of the reference pixel Y
CRPIX1  =                -34.0 / Reference pixel in X (pixel)
CRPIX2  =               2041.0 / Reference pixel in Y (pixel)
CDELT1  =           0.10380000 / X Scale projected on detector (#/pix)
CDELT2  =           0.10380000 / Y Scale projected on detector (#/pix)
PC001001=           1.00000000 / Pixel Coordinate translation matrix
PC001002=           0.00000000 / Pixel Coordinate translation matrix
PC002001=           0.00000000 / Pixel Coordinate translation matrix
PC002002=           1.00000000 / Pixel Coordinate translation matrix
LONGPOLE=            180.00000 / The North Pole of standard system (deg)
CTYPE1  = 'RA---TAN'           / Pixel coordinate system
CTYPE2  = 'WAVELENGTH'         / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'nm      '           / Units used in both CRVAL2 and CDELT2
CD1_1   =           0.31140000 / Pixel Coordinate translation matrix
CD1_2   =           0.00000000 / Pixel Coordinate translation matrix
CD2_1   =           0.00000000 / Pixel Coordinate translation matrix
CD2_2   =           0.10380000 / Pixel Coordinate translation matrix
F_FCSMOD= 'SPEC_POL'           / Comment...
F_WIPE  = 'NORMAL  '           / CCD Wipe Rate
F_READ  = 'NORMAL  '           / CCD Readout Rate
C2VAL1  =         283.54791250 / Physical value of the ref. pixel X (degree)
C2VAL2  =          19.82170000 / Physical value of the ref. pixel Y (degree)
```

```
C2PIX1  =                -34.0 / Reference pixel in X on detector (pixel)
C2PIX2  =               2041.0 / Reference pixel in Y on detector (pixel)
C2ELT1  =           0.00008650 / X Scale projected on detector (#/pix)
C2ELT2  =           0.00002883 / Y Scale projected on detector (#/pix)
P2001001=          -0.75883953 / Pixel Coordinate translation matrix
P2001002=           0.65127764 / Pixel Coordinate translation matrix
P2002001=          -0.65127764 / Pixel Coordinate translation matrix
P2002002=          -0.75883953 / Pixel Coordinate translation matrix
C2YPE1  = 'RA---TAN'           / Pixel coordinate system
C2YPE2  = 'DEC--TAN'           / Pixel coordinate system
C2NIT1  = 'degree  '           / Units used in both C2VAL1 and C2ELT1
C2NIT2  = 'degree  '           / Units used in both C2VAL2 and C2ELT2
WCS-ORIG= 'SUBARU Toolkit'     / Origin of the WCS value
RADECSYS= 'FK5     '           / The equatorial coordinate system
END
```

● FOCAS の ASCII Table Extension サンプルヘッダとデータ
(Imaging and Spectroscopy mode) (注意：現状では付加されていない。)

```
        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
--------------------------------------------------------------------------------
XTENSION= 'TABLE   '           / Table extension
BITPIX  =                    8 / # of bits storing pix value
NAXIS   =                    2 / simple 2-D matrix
NAXIS1  =                  107 / # of characters per row
NAXIS2  =                    3 / # of rows
PCOUNT  =                    0 / No "random" parameters
GCOUNT  =                    1 / Only one group
TFIELDS =                   11 / # of fields in one row
EXTNAME = '        '           / Name of this table
TTYPE1  = 'SLT-ID  '           / Slit ID of mask design in CAD data
TBCOL1  =                    1 / start column of this field (= 1)
TFORM1  = 'I4      '           / integer
TTYPE2  = 'SLTCPIX1'           / X-position of slit center
TBCOL2  =                    6 / start column of this field (= 6)
TFORM2  = 'F7.2    '           / float
TUNIT2  = 'pixel   '           / unit of 2nd column
TTYPE3  = 'SLTCPIX2'           / Y-position of slit center
TBCOL3  =                   14 / start column of this field (= 14)
TFORM3  = 'F7.2    '           / float
TUNIT3  = 'pixel   '           / unit of 3rd column
TTYPE4  = 'SLTC-RA '           / RA of slit center
TBCOL4  =                   22 / start column of this field (= 22)
TFORM4  = 'A12     '           / character (format is HH:MM:SS.SSS)
TTYPE5  = 'SLTC-DEC'           / DEC of slit center
TBCOL5  =                   35 / start column of this field (= 35)
TFORM5  = 'A12     '           / character (format is +/-DD:MM:SS.SS)
TTYPE6  = 'SLT-LEN '           / Slit length (Semi-major-axis for ELLIPSE)
TBCOL6  =                   48 / start column of this field (= 48)
TFORM6  = 'F5.1    '           / float
TUNIT6  = 'arcsec  '           / unit of 6th column
TTYPE7  = 'SLT-WID '           / Slit width (Semi-minor-axis for ELLIPSE)
TBCOL7  =                   54 / start column of this field (= 54)
TFORM7  = 'F5.1    '           / float
TUNIT7  = 'arcsec  '           / unit of 7th column
TTYPE8  = 'SLT-PA  '           / Position angle of slit
TBCOL8  =                   60 / start column of this field (= 60)
TFORM8  = 'F5.1    '           / float
TUNIT8  = 'degree  '           / unit of 8th column
TTYPE9  = 'SLT-SHP '           / Shape of cutting slit
TBCOL9  =                   66 / start column of this field (= 66)
TFORM9  = 'A9      '           / character (ELLIPSE, RECTANGLE)
TTYPE10 = 'SLT-OPEN'           / Cutting shape is open or not, open is T(rue).
TBCOL10 =                   76 / start column of this field (= 76)
TFORM10 = 'A1      '           / logical (T or F)
TTYPE11 = 'OBJECT  '           / Name of observed
TBCOL11 =                   78 / start column of this field (= 78)
TFORM11 = 'A30     '           / character
TNULL11 = '                            '/ null data for this column
END
```

```
        1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345
-----------------------------------------------------------------------------------------------------------
   1  102.10  110.79 12:35:39.940 +42:05:30.82  13.8   0.2   0.0 RECTANGLE T
  52 1053.05 2090.23 12:35:44.555 +42:08:09.56 150.0   0.2   0.0 RECTANGLE T FOCAS123545+4208
1894 3179.93 3565.33 12:35:59.109 +42:11:12.74  18.0   0.2   0.0 RECTANGLE T
```

● FOCAS の ASCII Table Extension サンプルヘッダとデータ
(ImagingPolarimetry and SpectroPolarimetry mode) (注意：現状では付加されていない。)

```
         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
--------------------------------------------------------------------------------
XTENSION= 'TABLE   '           / Table extension
BITPIX  =                    8 / # of bits storing pix value
NAXIS   =                    2 / simple 2-D matrix
NAXIS1  =                  139 / # of characters per row
NAXIS2  =                    3 / # of rows
PCOUNT  =                    0 / No "random" parameters
GCOUNT  =                    1 / Only one group
TFIELDS =                   15 / # of fields in one row
EXTNAME = '        '           / Name of this table
TTYPE1  = 'SLT-ID  '           / Slit ID of mask design in CAD file
TBCOL1  =                    1 / start column of this field (= 1)
TFORM1  = 'I4      '           / integer
TTYPE2  = 'SLTCPIX1'           / X-position of slit center
TBCOL2  =                    6 / start column of this field (= 6)
TFORM2  = 'F7.2    '           / float
TUNIT2  = 'pixel   '           / unit of 2nd column
TTYPE3  = 'SLTCPIX2'           / Y-position of slit center
TBCOL3  =                   14 / start column of this field (= 14)
TFORM3  = 'F7.2    '           / float
TUNIT3  = 'pixel   '           / unit of 3rd column
TTYPE4  = 'SL2CPIX1'           / X-position of Ordinary-ray slit center
TBCOL4  =                   22 / start column of this field (= 22)
TFORM4  = 'F7.2    '           / float
TUNIT4  = 'pixel   '           / unit of 4th column
TTYPE5  = 'SL2CPIX2'           / Y-position of Ordinary-ray slit center
TBCOL5  =                   30 / start column of this field (= 30)
TFORM5  = 'F7.2    '           / float
TUNIT5  = 'pixel   '           / unit of 5th column
TTYPE6  = 'SL3CPIX1'           / X-position of Extraordinary-ray slit center
TBCOL6  =                   38 / start column of this field (= 38)
TFORM6  = 'F7.2    '           / float
TUNIT6  = 'pixel   '           / unit of 6th column
TTYPE7  = 'SL3CPIX2'           / Y-position of Extraordinary-ray slit center
TBCOL7  =                   46 / start column of this field (= 46)
TFORM7  = 'F7.2    '           / float
TUNIT7  = 'pixel   '           / unit of 7th column
TTYPE8  = 'SLTC-RA '           / RA of slit center
TBCOL8  =                   54 / start column of this field (= 54)
TFORM8  = 'A12     '           / character (format is HH:MM:SS.SSS)
TTYPE9  = 'SLTC-DEC'           / DEC of slit center
TBCOL9  =                   67 / start column of this field (= 67)
TFORM9  = 'A12     '           / character (format is +/-DD:MM:SS.SS)
TTYPE10 = 'SLT-LEN '           / Slit length (Semi-major-axis for ELLIPSE)
TBCOL10 =                   80 / start column of this field (= 80)
TFORM10 = 'F5.1    '           / float
TUNIT10 = 'arcsec  '           / unit of 10th column
TTYPE11 = 'SLT-WID '           / Slit width (Semi-minor-axis for ELLIPSE)
TBCOL11 =                   86 / start column of this field (= 86)
TFORM11 = 'F5.1    '           / float
TUNIT11 = 'arcsec  '           / unit of 11th column
TTYPE12 = 'SLT-PA  '           / Position angle of slit
TBCOL12 =                   92 / start column of this field (= 92)
TFORM12 = 'F5.1    '           / float
TUNIT12 = 'degree  '           / unit of 12th column
TTYPE13 = 'SLT-SHP '           / Shape of slit
TBCOL13 =                   98 / start column of this field (= 98)
TFORM13 = 'A9      '           / character (eclipse, rectangle)
TTYPE14 = 'SLT-OPEN'           / Cutting shape is open or not, open is T(rue)
TBCOL14 =                  108 / start column of this field (= 108)
TFORM14 = 'A1      '           / logical (T or F)
TTYPE15 = 'OBJECT  '           / Name of observed
TBCOL15 =                  110 / start column of this field (= 110)
TFORM15 = 'A30     '           / character
TNULL15 = '                            '/ null data for this column
END
```

```
        1         2         3         4         5         6         7         8         9         0         1         2
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------------------------------------------------------------------
   1  102.10  110.79  102.10   10.99  102.10  210.49 12:35:39.940 +42:05:30.8213.8   0.2   0.0 RECTANGLE T
  52 1053.05 2090.23 1053.05 1990.43 1053.05 2189.93 12:35:44.555 +42:08:09.5620.0   0.2   0.0 RECTANGLE T FOCAS123545+4208
1893 3179.93 3565.33 3179.93 3465.53 3179.93 3665.03 12:35:59.109 +42:11:12.7418.0   0.2   0.0 RECTANGLE T
```

10.4.4 HDS(2003/12/31)

```
         1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------------------
SIMPLE  =                    T / Standard FITS format
BITPIX  =                   16 / Number of bits for each pixel
NAXIS   =                    2 / Number of axes in frame
NAXIS1  =                 2148 / Number of pixels per row
NAXIS2  =                 4100 / Number of rows
EXTEND  =                    T / There is a standard extension 1 (ASCII table)
BSCALE  =              1.00000 / Real = (fits pixel value)*BSCALE+BZERO
BZERO   =         3.276700E+04 / Real = (fits pixel value)*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel value
BLANK   =               -32768 / Value used for NULL pixels
DISPAXIS=                    2 / Main dispersion axis in frame
CTYPE1  = 'pixel   '           / Pixel coordinate system
CTYPE2  = 'pixel   '           / Pixel coordinate system
CUNIT1  = 'pixel   '           / Units used in both CRVAl1 and CDELT1
CUNIT2  = 'pixel   '           / Units used in both CRVAL2 and CDELT2
CRPIX1  =                    1 / Reference pixel in axis1
CRVAL1  =                    1 / Physical value of the reference pixel
CDELT1  =                    1 / Size projected into a detector pixel in axis1
CRPIX2  =                    1 / Reference pixel in axis2
CRVAL2  =                    1 / Physical value of the reference pixel
CDELT2  =                    1 / Size projected into a detector pixel in axis2
PROJP1  =                  0.0 / Projection type of the first axis
PROJP2  =                  0.0 / Projection type of the second axis
PC001001=           1.00000000 / Pixel Coordinate translation matrix
PC001002=           0.00000000 / Pixel Coordinate translation matrix
PC002001=           0.00000000 / Pixel Coordinate translation matrix
PC002002=           1.00000000 / Pixel Coordinate translation matrix
BIN-FCT1=                    1 / Binning factor in axis1
BIN-FCT2=                    1 / Binning factor in axis2
N2XIS   =                    2 / Number of axes for the slit projection
N2XIS1  =                 2148 / Number of pixels per row for slit spectroscopy
N2XIS2  =                 4100 / Number of scan lines for slit projection
C2YPE1  = 'DEC-TAN '           / Type of projection used for #1 axis in 2nd WCS
C2PIX1  =                 1024 / Reference pixel in X
C2VAL1  =                 0.00 / Physical value of ref pix X for WCS
C2ELT1  =              0.00000 / Size projected into a detector pixel X
C2NIT1  = 'degree      '       / for C2VAL1 and C2ELT1
C2YPE2  = 'WAVELENGTH'         / Type of projection used for #2 axis in 2nd WCS
C2PIX2  =                 2050 / Reference pixel in Y
C2VAL2  =               419.68 / Physical value of ref pix Y for WCS
C2ELT2  =              0.00125 / Size projected into a detector pixel Y
C2NIT2  = 'nm      '           / for C2VAL2 and C2ELT2
P2OJP1  =                  0.0 / Projection type of the first axis
P2OJP2  =                  0.0 / Projection type of the second axis
P2001001=           1.00000000 / Pixel coordinate translation matrix
P2001002=           0.00000000 / Pixel coordinate translation matrix
P2002001=           0.00000000 / Pixel coordinate translation matrix
P2002002=           1.00000000 / Pixel coordinate translation matrix
PRD-MIN1=                    1 / Start X position of partialy read out
PRD-MIN2=                    1 / Start Y position of partialy read out
PRD-RNG1=                 2148 / X range of the partialy read out
PRD-RNG2=                 4100 / Y range of the partialy read out
OBJECT  = 'FLAT    '           / Target Description
DATA-TYP= 'FLAT    '           / Characteristics of this data
RA      = '07:33:41.212'       / RA of the tracked pos. on the slit guide pos.
DEC     = '+19:50:04.40'       / Dec of the tracked pos. on the slit guide pos.
RADECSYS= 'FK5     '           / The equatorial coordinate system
EQUINOX =               2000.0 / Standard FK5 (years)
RA2000  = '07:33:41.212'       / Right accention (HH.MM.SS.SSS)
DEC2000 = '+19:50:04.40'       / Declination (+/-HH:MM:SS.SS)
PROP-ID = 'o11129  '           / Proposal ID
OBSERVER= 'HDS     '           / Name(s) of observer(s)
OBS-MOD = 'SPEC    '           / SINGLE-ORDER, MULTIPLE-ORDER
DATE-OBS= '2011-01-07'         / Date of observation
EXPTIME =                 16.0 / Exposure time in second
UT      = '16:12:36.534'       / Typical Universal Time during exposure
UT-STR  = '16:12:36.523'       / UTC at start of exposure
UT-END  = '16:12:36.544'       / UTC at end of exposure
HST     = '06:12:36.534'       / Typical Hawaii Standard Time during exposure
HST-STR = '06:12:36.523'       / HST at start of exposure
HST-END = '06:12:36.544'       / HST at end of exposure
LST     = '07:33:42.601'       / Typical Local SideReal Time during exposure
LST-STR = '07:33:42.590'       / LST at start of exposure
LST-END = '07:33:42.611'       / LSR at end of exposure
TIMESYS = 'UTC     '           / Time System
MJD     =       52929.67541865 / Modified Julian Day
MJD-STR =       52929.67541852 / MJD at start of exposure
MJD-END =       52929.67541877 / MJD at end of exposure
SECZ    =                1.000 / typical sec(Zemith Distance) during exposure
```

```
SECZ-STR=                1.000 / secZ at start of exposure
SECZ-END=                1.000 / secZ at end of exposure
AIRMASS =               1.0000 / Typical air mass during exposure
AIRM-STR=               1.0000 / Air mass at start of exposure
AIRM-END=               1.0000 / Air mass at end of exposure
ALTITUDE=             89.94695 / Altitude of the telescope pointing (degree)
ALT-STR =             89.94695 / Altitude at start of exposure
ALT-END =             89.94695 / Altitude at end of exposure
AZIMUTH =             89.98937 / Azimuth of the telescope pointing (degree)
AZ-STR  =             89.98937 / Azimuth at start of exposure
AZ-END  =             89.98937 / Azimuth at end of exposure
OBSERVAT= 'NAOJ    '           / Observatory
TELESCOP= 'SUBARU  '           / Telescope
OBS-ALOC= 'Observation'        / Allocation mode (OBSERVATION/STAND-BY)
TELFOCUS= 'NASMYTH-OPT'        / Focus where beam is reachable
FOC-POS = 'NASMYTH-OPT'        / Focus where instrument attached
FOC-VAL =              -0.064 / Focus position of the telescope
FOC-LEN =           104207.0 / Focal length of the telescope (mm)
F-RATIO =               12.71 / F-ratio of incident beam
INSTRUME= 'HDS     '           / Name of instrument
FRAMEID = 'HDSA00012639'       / Frame ID number issued by OBS
EXP-ID  = 'UNKNOWN '           / Exposure ID number locally defined
DATASET = 'NOP     '           / ID of observation dataset
DISPERSR= 'echelle '           / Identifier of the disperser used
WAVELEN =               419.68 / Center wavelength of the center order (nm)
WAV-MAX =               461.22 / Maximum wavelength recorded (nm)
WAV-MIN =               382.14 / Minimum wavelength recorded (nm)
SLTCPIX1=              1065.00 / Pixel of slit center (Axis1)
SLTCPIX2=                 2050 / Pixel of slit center (Axis2)
FILTER01= 'U340    '           / Filter wheel No.1
FILTER02= 'FREE    '           / Filter wheel No.2
SLIT    = 'SHORT   '           / Identifier of the entrance slit used (SHORT/LON
SLT-WID =                0.200 / Slit width (mm)
SLT-LEN =                2.000 / Slit length (mm)
SLT-PA  =               147.18 / Slit position angle (degree)
SLT-PSTR=               147.18 / Slit position angle at start (degree)
SLT-PEND=               147.18 / Slit position angle at end (degree)
SLT-OBJP=                 0.00 / Object position on the slit (arcsec)
DET-ID  =                    1 / ID number of the CCD in the detector unit
DETECTOR= 'EEV     '           / Detector used to take this frame
DETPXSZ1=               0.0135 / pixel size in axis1 (mm)
DETPXSZ2=               0.0135 / pixel size in axis2 (mm)
DET-A01 =                0.000 / Rotation angle of the 1st detector (degree)
DET-A02 =                0.000 / Rotation angle of the 2nd detector (degree)
GAIN    =                 1.70 / Readout gain
DET-TMP =                157.0 / Nominal detector temperature (Kelvin)
DET-TAVE=                  0.0 / Average detector temperature (Kelvin)
DET-TMAX=                  0.0 / Maximum detector temperature (Kelvin)
DET-TMIN=                  0.0 / Minimum detector temperature (Kelvin)
DET-TSD =                 0.00 / Detector temperature fluctuation (Kelvin)
WEATHER = 'Fare    '           / Weather condition
SEEING  =                1.330 / FWHM of the star observed with Slit Viewer (arc
NAS-TAVE=                 0.00 / Average Nasmyth encl. temp. (Kelvin)
DOM-WND =                  0.0 / Wind speed inside dome (m/s)
DOM-TMP =               278.35 / Atmospheric temperature inside dome (Kelvin)
DOM-HUM =                  5.1 / Humidity inside dome (persent)
DOM-PRS =                621.9 / Nominal atmospheric pressure in dome (hPa)
OUT-WND =                  2.7 / Wind speed outside dome (m/s)
OUT-TMP =               278.35 / Atmospheric temperature outside dome (Kelvin)
OUT-HUM =                  3.4 / Humidity outside dome (persent)
OUT-PRS =                621.9 / Atmospheric pressure outside dome (hPa)
IMR-TYPE= 'BLUE    '           / Image Rotator (BLUE, RED, NONE)
IMGROT  =                 0.00 / IMR position during exposure (degree)
IMR-STR =                 0.00 / IMR position angle at start (degree)
IMR-END =                 0.00 / IMR position angle at end (degree)
ADC-TYPE= 'NONE    '           / Atm. Disp. Compensator (BLUE,RED,NONE)
ADC     =                -0.01 / ADC position during exposure (degree)
ADC-STR =                -0.01 / ADC position angle at start (degree)
ADC-END =                -0.01 / ADC position angle at end (degree)
DAQ-VER = '1.0.0   '           / Data Aquisition System
INS-VER = 'HDS-1.00'           / hardware/software version
COMMENT revised on 1 Nov. 1999 by W. Aoki
COMMENT Sample header for HDS revised on 7 July 1998 by W. Aoki
COMMENT Sample header for HDS revised on 6 May 1998 by W. Aoki
COMMENT Sample header for HDS written on 27 November 1997
COMMENT by H.Izumiura, S. Kawanomoto, W. Aoki.
COMMENT  Keywords specific to HDS
COMMENT
COMMENT /SLIT
H_S-INCL=                 0.00 / Slit inclination angle wrt the horizontal plane
COMMENT /Detector
H_D-UNIT= '1       '           / ID number of the detector unit
H_D-OTHR= 'YES     '           / Use of the other CCD in this mosaic
COMMENT /SHUTTERS
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H_SHUTTR= 'OPEN    '           / Entrance shutter (OPEN, CLOSE)
H_HARTMN= 'ALL-OPEN'           / Hartmann shutter (U-OPEN,L-OPEN,ALL-OPEN,ALL-CL
COMMENT /COLLIMATOR MIRROR
H_COLLIM= 'BLUE    '           / Collimator (BLUE, RED)
H_CLPSTN=                -5.18 / Collimator position (mm)
H_CLFOCL=              3396.51 / Collimator focal length (mm)
COMMENT /ECHELLE GRATING
H_ECONST=                31.60 / Ruling pitch (grooves/mm)
H_EBLAZE=                70.30 / Blaze Angle (degree)
H_EEPSRN=                 6.00 / Offset Angle of the Incident Beam (degree)
H_EGAMMA=                 0.00 / (degree)
H_EROTAN=              0.40031 / Echelle Rotation Angle (degree)
COMMENT /CROSS DISPERSER GRATING
H_CROSSD= 'BLUE    '           / Cross Disperser (BLUE, RED, MIRROR, NIR)
H_CCONST=              400.000 / Ruling pitch (grooves/mm)
H_CBLAZE=                4.760 / Blaze Angle (degree)
H_CEPSRN=                 0.00 / Offset Angle at Blaze Wavelengths (degree)
H_CGAMMA=                45.00 / (degree)
H_CROTAN=              4.74961 / Cross Disperser Rotation Angle (degree)
COMMENT /CAMERA
H_CMRFL =               770.85 / Camera focal length (mm)
COMMENT /Detector Focusinig Unit
H_FOCUS =              0.71001 / Focusing unit position (mm)
H_PITCH =             -0.00000 / Focusing unit pitching angle (degree)
H_YAWING=             -0.05000 / Focusing unit yawing angle (degree)
H_DETROT=             -0.99986 / Rotation angle of the detector unit (degree)
COMMENT /I2Cell and Light Monitor
H_I2CELL= 'NOUSE   '           / I2 Cell Mode (USE/NOUSE)
H_LM    = 'NOUSE   '
H_I2TEMP=                  0.0
H_LMINTG=                  0.0
H_I2POS = 'UNKNOWN '
H_LMPOS = 'UNKNOWN '
H_ETMP1 =                  5.1 / Nasmyth Temperature 1 (Kelvin)
H_ETMP2 =                  5.1 / Nasmyth Temperature 2 (Kelvin)
H_SUPER = 'NONE    '           / Super Resolution Mode (POS1, POS2, NONE)
COMMENT /Auto Guider (offset guider)
H_AG-OBJ= '        '
H_AG-ORA= '        '           / RA of the guide object
H_AG-ODE= '        '           / Dec of the guide object
H_AG-RA = '        '           / RA of the tracked pos. on the slit guide pos.
H_AG-DEC= '        '           / Dec of the tracked pos. on the slit guide pos.
H_GAIN1 =              1.628 / Readout gain of left (smaller X) side of CCD
H_GAIN2 =              1.615 / Readout gain of right (larger X) side of CCD
H_OSMIN1=               1025 / Start of overscan region for AXIS1
H_OSMAX1=               1124 / End of overscan region for AXIS1
H_OSMIN2=                  1 / Start of overscan region for AXIS2
H_OSMAX2=               4100 / End of overscan region for AXIS2
HISTORY   File modified by user 'hdsuser' with fv  on 2001-10-12T04:43:56
END

XTENSION= 'TABLE   '           / Table extension
BITPIX  =                    8 / 8-bits per "pixel"
NAXIS   =                    2 / simple 2-D matrix
NAXIS1  =                   72 / No. of characters per row
NAXIS2  =                   45 / The number of rows (= )
PCOUNT  =                    0 / No "random" parameters
GCOUNT  =                    1 / Only one group
TFIELDS =                   12 / There are 12 fields per row
TTYPE1  = 'ORDER   '           / Order number
TBCOL1  =                    1 / starting column
TFORM1  = 'I3      '           / Data format
TTYPE2  = 'X-MIN   '           / X-position of the blue-end of the order (pixel)
TBCOL2  =                    5 /
TFORM2  = 'I4      '           /
TUNIT2  = 'PIXEL   '           /
TTYPE3  = 'Y-MIN   '           / Y-position of the blue-end of the order (pixel)
TBCOL3  =                   10 /
TFORM3  = 'I4      '           /
TUNIT3  = 'PIXEL   '           /
TTYPE4  = 'WL-MIN  '           / Blue-end wavelength of the order (nm)
TBCOL4  =                   15 /
TFORM4  = 'F8.3    '           /
TUNIT4  = 'nanometer'          /
TTYPE5  = 'X-CEN   '           / X-position of the center of the order (pixel)
TBCOL5  =                   24 /
TFORM5  = 'I4      '           /
TUNIT5  = 'PIXEL   '           /
TTYPE6  = 'Y-CEN   '           / Y-position of the center of the order (pixel)
TBCOL6  =                   29 /
TFORM6  = 'I4      '           /
TUNIT6  = 'PIXEL   '           /
TTYPE7  = 'WL-CEN  '           / Center wavelength of the order (nm)
TBCOL7  =                   34 /
```

```
TFORM7  = 'F8.3    '           /
TUNIT7  = 'nanometer'          /
TTYPE8  = 'X-MAX   '           / X-position of the red-end of the order (pixel)
TBCOL8  =                   43 /
TFORM8  = 'I4      '           /
TUNIT8  = 'PIXEL   '           /
TTYPE9  = 'Y-MAX   '           / Y-position of the blue-end of the order (pixel)
TBCOL9  =                   48 /
TFORM9  = 'I4      '           /
TUNIT9  = 'PIXEL   '           /
TTYPE10 = 'WL-MAX  '           / Red-end wavelength of the order (nm)
TBCOL10 =                   53 /
TFORM10 = 'F8.3    '           /
TUNIT10 = 'nanometer'          /
TTYPE11 = 'SLIT INCLINATION'   / Slit inclination wrt the main dispersion direc.
TBCOL11 =                   62 /
TFORM11 = 'F5.5    '           /
TUNIT11 = 'degree  '           /
TTYPE12 = 'DISPERSION'         / Nominal dispersion at the center of the order
TBCOL12 =                   68 /
TFORM12 = 'F5.3    '           /
TUNIT12 = 'nm/pixel'           /
END

197    1    5  298.714 2048   52  300.812 4096   98  302.910 0.000 0.003
196    1   39  300.238 2048   86  302.347 4096  133  304.456 0.000 0.003
195    1   73  301.778 2048  120  303.897 4096  167  306.017 0.000 0.003
194    1  108  303.333 2048  155  305.464 4096  202  307.595 0.000 0.003
193    1  143  304.905 2048  190  307.047 4096  238  309.188 0.000 0.003
192    1  178  306.493 2048  226  308.646 4096  274  310.799 0.000 0.003
191    1  214  308.098 2048  262  310.262 4096  310  312.426 0.000 0.003
190    1  250  309.719 2048  298  311.895 4096  346  314.070 0.000 0.003
189    1  286  311.358 2048  335  313.545 4096  383  315.732 0.000 0.003
188    1  323  313.014 2048  372  315.213 4096  421  317.411 0.000 0.003
187    1  360  314.688 2048  409  316.898 4096  458  319.109 0.000 0.003
186    1  398  316.380 2048  447  318.602 4096  496  320.824 0.000 0.003
185    1  436  318.090 2048  485  320.324 4096  535  322.559 0.000 0.003
184    1  474  319.819 2048  524  322.065 4096  574  324.312 0.000 0.003
183    1  513  321.566 2048  563  323.825 4096  613  326.084 0.000 0.003
182    1  552  323.333 2048  603  325.604 4096  653  327.875 0.000 0.003
181    1  592  325.120 2048  643  327.403 4096  693  329.687 0.000 0.003
180    1  632  326.926 2048  683  329.222 4096  734  331.519 0.000 0.003
179    1  673  328.752 2048  724  331.061 4096  775  333.371 0.000 0.003
178    1  714  330.599 2048  765  332.921 4096  817  335.243 0.000 0.003
177    1  755  332.467 2048  807  334.802 4096  859  337.137 0.000 0.003
176    1  797  334.356 2048  849  336.705 4096  902  339.053 0.000 0.003
175    1  840  336.267 2048  892  338.629 4096  945  340.991 0.000 0.003
174    1  883  338.199 2048  935  340.575 4096  988  342.950 0.000 0.003
173    1  926  340.154 2048  979  342.543 4096 1032  344.933 0.000 0.003
172    1  970  342.132 2048 1024  344.535 4096 1077  346.938 0.000 0.003
171    1 1015  344.133 2048 1068  346.550 4096 1122  348.967 0.000 0.003
170    1 1060  346.157 2048 1114  348.588 4096 1168  351.020 0.000 0.003
169    1 1105  348.205 2048 1159  350.651 4096 1214  353.097 0.000 0.004
168    1 1151  350.278 2048 1206  352.738 4096 1261  355.198 0.000 0.004
167    1 1198  352.375 2048 1253  354.850 4096 1308  357.325 0.000 0.004
166    1 1245  354.498 2048 1300  356.988 4096 1356  359.478 0.000 0.004
165    1 1293  356.646 2048 1348  359.152 4096 1404  361.657 0.000 0.004
164    1 1341  358.821 2048 1397  361.341 4096 1453  363.862 0.000 0.004
163    1 1390  361.022 2048 1446  363.558 4096 1503  366.094 0.000 0.004
162    1 1439  363.251 2048 1496  365.802 4096 1553  368.354 0.000 0.004
161    1 1490  365.507 2048 1547  368.075 4096 1604  370.642 0.000 0.004
160    1 1540  367.792 2048 1598  370.375 4096 1655  372.958 0.000 0.004
159    1 1592  370.105 2048 1650  372.704 4096 1707  375.304 0.000 0.004
158    1 1644  372.447 2048 1702  375.063 4096 1760  377.679 0.000 0.004
157    1 1697  374.820 2048 1755  377.452 4096 1814  380.085 0.000 0.004
156    1 1750  377.222 2048 1809  379.872 4096 1868  382.521 0.000 0.004
155    1 1804  379.656 2048 1863  382.323 4096 1923  384.989 0.000 0.004
154    1 1859  382.121 2048 1919  384.805 4096 1978  387.489 0.000 0.004
153    1 1914  384.619 2048 1974  387.320 4096 2035  390.022 0.000 0.004
```

10.4.5 CISCO/OHS (2003/12/31)

● CISCO の Imaging mode

```
        1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678
--------------------------------------------------------------------------------------------------------------
SIMPLE  =                    T / SIMPLE must be 'T' for confirming FITS
BITPIX  =                   16 / # of bits storing pix values
NAXIS   =                    2 / # of axes in frame
```

```
NAXIS1  =                 1024 / # of pixels/row
NAXIS2  =                 1024 / # of rows (also # of scan lines)
EXTEND  =                    F / The existence of extension or not  (T or F)
DISPAXIS=                    2 / # of axis describing dispersion direction
OBSERVER= '"CISCO" '           / Name of observer
PROP-ID = 'o11121  '           / Proposal ID
FRAMEID = 'OHSA00132385'       / Image sequential number
EXP-ID  = 'OHSE00132384'       / ID of the exposure this data was taken
OBS-MOD = 'IMAG    '           / Observation Mode
DATA-TYP= 'OBJECT  '           / Type / Characteristics of  this data
DATASET = 'DS0000  '           / ID of an observation dataset
RA      = '02:48:01.620'       / HH:MM:SS.SSS RA pointing
DEC     = '-03:31:42.86'       / +/-DD:MM:SS.SS DEC pointing
EQUINOX =               2000.0 /
RADECSYS= 'FK5     '           /
RA2000  = '02:48:01.620'       / HH:MM:SS.SSS RA (J2000) pointing
DEC2000 = '-03:31:42.86'       / +/-DD:MM:SS.SS DEC (J2000) pointing
WCS-ORIG= 'SUBARU Toolkit'     /
CRPIX1  =                 512.0 /
CRPIX2  =                 512.0 /
CRVAL1  =          42.00675000 /
CRVAL2  =          -3.52857222 /
CDELT1  =           0.00003083 /
CDELT2  =           0.00003083 /
CTYPE1  = 'RA---TAN'           /
CTYPE2  = 'DEC--TAN'           /
CUNIT1  = 'degree  '           /
CUNIT2  = 'degree  '           /
LONGPOLE=            180.00000 /
PC001001=          -1.00000000 /
PC001002=          -0.00000000 /
PC002001=          -0.00000000 /
PC002002=           1.00000000 /
C2PIX1  =                 512.0 / Reference pixel in X
C2PIX2  =                 512.0 / Reference pixel in Y
C2VAL1  =          42.00675000 / Physical value of the reference pixel Y
C2VAL2  =        2130.00000000 / Physical value of the reference pixel X
C2ELT1  =           0.00003194 / Size projected into a detector pixel Y
C2ELT2  =           0.00000000 / Size projected into a detector pixel X
C2YPE1  = 'DEC--TAN'           / Pixel coordinate system
C2YPE2  = 'WAVELENGTH'         / Pixel coordinate system
C2NIT1  = 'degree  '           / Units used in both CRVAL2 and CDELT2
C2NIT2  = 'nm      '           / Units used in both CRVAL1 and CDELT1
P2001001=           1.00000000 / Pixel Coordinate translation matrix
P2001002=           0.00000000 / Pixel Coordinate translation matrix
P2002001=           0.00000000 / Pixel Coordinate translation matrix
P2002002=           1.00000000 / Pixel Coordinate translation matrix
SLIT    = 'NONE    '           / Identifier of the entrance slit used 'NONE' if
SLT-LEN =              115.229 / Length of the slit used  0.000 if Prism Sp
SLT-WID =              119.969 / Width of the slit used   0.000 if Prism Sp
SLT-PA  =               -360.0 / Slit Position Angle 0.0 if Prism Sp
SLTC-RA =          42.00675000 / RA of slit center (degree)
SLTC-DEC=          -3.52857222 / DEC of slit center (degree)
SLTCPIX1=                512.0 / Slit center projected on detector (pixel)
SLTCPIX2=                512.0 / Slit center projected on detector (pixel)
DISPERSR= 'NONE    '           / Name of disperser used
WAVELEN =           2130.00000 / Wavelength at detector center (nm)
WAV-MIN =           1960.00000 / Shortest wavelength focused on detector (nm)
WAV-MAX =           2300.00000 / Longest wavelength focused on detector (nm)
DATE-OBS= '2011-01-14'         / Observation start date  (yyyy-mm-dd)
UT      = '07:24:51.291'       / HH:MM:SS.S typical UTC at exposure
UT-STR  = '07:24:51.291'       / HH:MM:SS.S UTC at start
UT-END  = '07:25:09.064'       / HH:MM:SS.S UT at end
HST     = '21:24:51.2'         / HH:MM:SS.S Typical HST at exposure
LST     = '22:32:40.995'       / HH:MM:SS.S Typical LST at exposure
MJD     =       52926.30892278 / Modified Julian Day at typical time
TIMESYS = 'UTC     '           / Time system used in this header
EXPTIME =               15.000 / Total integration time (sec)
OBJECT  = 'Nandesuka'          / Target Description
AZIMUTH =                103.0 / Azimuth angle of telescope pointing
ALTITUDE=                 23.2 / Altitude angle of telescope pointing
TELFOCUS= 'Nasmyth-IR'         / Focus where a beam is reachable
FOC-POS = 'Nasmyth-IR'         / Focus where the instrument is attached
FOC-VAL =              -0.245 / Encoder value of the focus unit
M2-TIP  = 'OFF     '           / 2nd Mirror tip-tilt on/off
M2-TYPE = 'CS_IR   '           / Type of the Secondary Mirror (Opt/IR)
FILTER01= 'Kp      '           / Filter name/ID
FILTER02= 'NONE    '           / Filter name/ID
AIRMASS =              2.52900 / Averaged Air Mass
ZD      =                66.83 / Zenith Distance at typical time
INS-VER =                 2.00 / Version of the instrument
DETECTOR= 'HAWAII  '           / Name of the detector
DET-TMP =                 77.0 / Detector temperature
GAIN    =                 3.50 / AD conversion factor
```

```
DET-NSMP=                    1 / Number of multiple sample in each exposure
PRD-MIN1=                    0 / Start X position of partialy read out
PRD-MIN2=                    0 / Start position Y of partialy readout
PRD-RNG1=                 1024 / X Range of the partialy read out
PRD-RNG2=                 1024 / Y range of the partialy readout
BIN-FCT1=                    1 / Binning factor of X axis
BIN-FCT2=                    1 / Binning factor of Y axis
NAS-TAVE=                 0.00 / Average Value of Nasmyth Enclosure
INSTRUME= 'CISCO   '           / Name of Instrument
TELESCOP= 'SUBARU  '           / Telescope Name
OBSERVAT= 'NAOJ    '           / Observatory Name
OBS-ALOC= 'Observation'        / Allocation mode for Instrument
BLANK   =                32768 / Value used for NULL pixels
BSCALE  =                 1.00 / Real = fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =                 0.00 / Real = fits-value*BSCALE+BZERO
OHSSLIT =             HOME     / OHSSLIT Type
OHSSLOFF=                0.000 / OHSSLIT Offset (pix)
CD1_1   =          -0.00003083 /
CD1_2   =          -0.00000000 /
CD2_1   =          -0.00000000 /
CD2_2   =           0.00003083 /
END
```

● CISCO の Spectroscopy mode

```
         1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678
--------------------------------------------------------------------------------------------------------------
SIMPLE  =                    T / SIMPLE must be 'T' for confirming FITS
BITPIX  =                   16 / # of bits storing pix values
NAXIS   =                    2 / # of axes in frame
NAXIS1  =                 1024 / # of pixels/row
NAXIS2  =                 1024 / # of rows (also # of scan lines)
EXTEND  =                    F / The existence of extension or not  (T or F)
DISPAXIS=                    1 / # of axis describing dispersion direction
OBSERVER= 'CISCO     '         / Name of observer
PROP-ID = 'o11129  '           / Proposal ID
FRAMEID = 'OHSA00131227'       / Image sequential number
EXP-ID  = 'OHSE00131227'       / ID of the exposure this data was taken
OBS-MOD = 'SPEC    '           / Observation Mode
DATA-TYP= 'OBJECT  '           / Type / Characteristics of  this data
DATASET = 'DS0000  '           / ID of an observation dataset
RA      = '21:51:49.469'       / HH:MM:SS.SSS RA pointing
DEC     = '-11:19:47.04'       / +/-DD:MM:SS.SS DEC pointing
EQUINOX =               2000.0 /
RADECSYS= 'FK5     '           /
RA2000  = '21:51:49.469'       / HH:MM:SS.SSS RA (J2000) pointing
DEC2000 = '-11:19:47.04'       / +/-DD:MM:SS.SS DEC (J2000) pointing
WCS-ORIG= 'SUBARU Toolkit'     /
CRPIX1  =                512.0 /
CRPIX2  =                512.0 /
CRVAL1  =         327.95612083 /
CRVAL2  =         -11.32973333 /
CDELT1  =           0.00003083 /
CDELT2  =           0.00003083 /
CTYPE1  = 'RA---TAN'           /
CTYPE2  = 'DEC--TAN'           /
CUNIT1  = 'degree  '           /
CUNIT2  = 'degree  '           /
LONGPOLE=            180.00000 /
PC001001=           0.35999681 /
PC001002=           0.93295353 /
PC002001=           0.93295353 /
PC002002=          -0.35999681 /
C2PIX1  =                512.0 / Reference pixel in X
C2PIX2  =                512.0 / Reference pixel in Y
C2VAL1  =        1440.00000000 / Physical value of the reference pixel Y
C2VAL2  =         -11.32973333 / Physical value of the reference pixel X
C2ELT1  =           0.00000000 / Size projected into a detector pixel Y
C2ELT2  =           0.00003194 / Size projected into a detector pixel X
C2YPE1  = 'WAVELENGTH'         / Pixel coordinate system
C2YPE2  = 'DEC--TAN'           / Pixel coordinate system
C2NIT1  = 'nm      '           / Units used in both CRVAL2 and CDELT2
C2NIT2  = 'degree  '           / Units used in both CRVAL1 and CDELT1
P2001001=           1.00000000 / Pixel Coordinate translation matrix
P2001002=           0.00000000 / Pixel Coordinate translation matrix
P2002001=           0.00000000 / Pixel Coordinate translation matrix
P2002002=           1.00000000 / Pixel Coordinate translation matrix
SLIT    = 'Longslit'           / Identifier of the entrance slit used 'NONE' if
SLT-LEN =              115.229 / Length of the slit used  0.000 if Prism Sp
SLT-WID =                0.600 / Width of the slit used   0.000 if Prism Sp
```

```
SLT-PA  =                248.9 / Slit Position Angle 0.0 if Prism Sp
SLTC-RA =          327.95612083 / RA of slit center (degree)
SLTC-DEC=          -11.32973333 / DEC of slit center (degree)
SLTCPIX1=                 512.0 / Slit center projected on detector (pixel)
SLTCPIX2=                 512.0 / Slit center projected on detector (pixel)
DISPERSR= 'JHGr    '           / Name of disperser used
WAVELEN =           1440.00000 / Wavelength at detector center (nm)
WAV-MIN =           1050.00000 / Shortest wavelength focused on detector (nm)
WAV-MAX =           1810.00000 / Longest wavelength focused on detector (nm)
DATE-OBS= '2011-09-14'         / Observation start date  (yyyy-mm-dd)
UT      = '09:13:06.349'       / HH:MM:SS.S typical UTC at exposure
UT-STR  = '09:13:06.349'       / HH:MM:SS.S UTC at start
UT-END  = '09:16:29.120'       / HH:MM:SS.S UT at end
HST     = '23:13:06.3'         / HH:MM:SS.S Typical HST at exposure
LST     = '22:22:57.184'       / HH:MM:SS.S Typical LST at exposure
MJD     =       52896.38409717 / Modified Julian Day at typical time
TIMESYS = 'UTC     '           / Time system used in this header
EXPTIME =              200.000 / Total integration time (sec)
OBJECT  = 'Nandesuka'          / Target Description
AZIMUTH =                195.9 / Azimuth angle of telescope pointing
ALTITUDE=                 57.7 / Altitude angle of telescope pointing
TELFOCUS= 'Nasmyth-IR'         / Focus where a beam is reachable
FOC-POS = 'Nasmyth-IR'         / Focus where the instrument is attached
FOC-VAL =               -0.252 / Encoder value of the focus unit
M2-TIP  = 'OFF     '           / 2nd Mirror tip-tilt on/off
M2-TYPE = 'CS_IR   '           / Type of the Secondary Mirror (Opt/IR)
FILTER01= 'NONE    '           / Filter name/ID
FILTER02= 'JHGr    '           / Filter name/ID
AIRMASS =              1.18200 / Averaged Air Mass
ZD      =                32.26 / Zenith Distance at typical time
INS-VER =                 2.00 / Version of the instrument
DETECTOR= 'HAWAII  '           / Name of the detector
DET-TMP =                 77.3 / Detector temperature
GAIN    =                 3.50 / AD conversion factor
DET-NSMP=                    1 / Number of multiple sample in each exposure
PRD-MIN1=                    0 / Start X position of partialy read out
PRD-MIN2=                    0 / Start position Y of partialy readout
PRD-RNG1=                 1024 / X Range of the partialy read out
PRD-RNG2=                 1024 / Y range of the partialy readout
BIN-FCT1=                    1 / Binning factor of X axis
BIN-FCT2=                    1 / Binning factor of Y axis
NAS-TAVE=                 0.00 / Average Value of Nasmyth Enclosure
INSTRUME= 'CISCO   '           / Name of Instrument
TELESCOP= 'SUBARU  '           / Telescope Name
OBSERVAT= 'NAOJ    '           / Observatory Name
OBS-ALOC= 'Observation'        / Allocation mode for Instrument
BLANK   =                32768 / Value used for NULL pixels
BSCALE  =                 1.00 / Real = fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =                 0.00 / Real = fits-value*BSCALE+BZERO
OHSSLIT =             HOME     / OHSSLIT Type
OHSSLOFF=                0.000 / OHSSLIT Offset (pix)
CD1_1   =           0.00001110 /
CD1_2   =           0.00002877 /
CD2_1   =           0.00002877 /
CD2_2   =          -0.00001110 /
END
```

● OHS の Spectroscopy mode

```
        1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678
--------------------------------------------------------------------------------------------------------------
SIMPLE  =                    T / SIMPLE must be 'T' for confirming FITS
BITPIX  =                   16 / # of bits storing pix values
NAXIS   =                    2 / # of axes in frame
NAXIS1  =                 1024 / # of pixels/row
NAXIS2  =                 1024 / # of rows (also # of scan lines)
EXTEND  =                    F / The existence of extension or not  (T or F)
DISPAXIS=                    1 / # of axis describing dispersion direction
OBSERVER= 'OHS     '           / Name of observer
PROP-ID = 'o11111  '           / Proposal ID
FRAMEID = 'OHSA00134121'       / Image sequential number
EXP-ID  = 'OHSE00134120'       / ID of the exposure this data was taken
OBS-MOD = 'SPEC    '           / Observation Mode
DATA-TYP= 'STANDARD'           / Type / Characteristics of  this data
DATASET = 'DS0000  '           / ID of an observation dataset
RA      = '03:15:05.702'       / HH:MM:SS.SSS RA pointing
DEC     = '-05:28:21.23'       / +/-DD:MM:SS.SS DEC pointing
EQUINOX =               2000.0 /
RADECSYS= 'FK5     '           /
RA2000  = '03:15:05.702'       / HH:MM:SS.SSS RA (J2000) pointing
```

```
DEC2000 = '-05:28:21.23'       / +/-DD:MM:SS.SS DEC (J2000) pointing
WCS-ORIG= 'SUBARU Toolkit'     /
CRPIX1  =                512.0 /
CRPIX2  =                512.0 /
CRVAL1  =          48.77375833 /
CRVAL2  =          -5.47256389 /
CDELT1  =           0.00003083 /
CDELT2  =           0.00003083 /
CTYPE1  = 'RA---TAN'           /
CTYPE2  = 'DEC--TAN'           /
CUNIT1  = 'degree  '           /
CUNIT2  = 'degree  '           /
LONGPOLE=            180.00000 /
PC001001=          -1.00000000 /
PC001002=          -0.00000000 /
PC002001=           0.00000000 /
PC002002=           1.00000000 /
C2PIX1  =                512.0 / Reference pixel in X
C2PIX2  =                512.0 / Reference pixel in Y
C2VAL1  =        1440.00000000 / Physical value of the reference pixel Y
C2VAL2  =          -5.47256389 / Physical value of the reference pixel X
C2ELT1  =           0.00000000 / Size projected into a detector pixel Y
C2ELT2  =           0.00003194 / Size projected into a detector pixel X
C2YPE1  = 'WAVELENGTH'         / Pixel coordinate system
C2YPE2  = 'DEC--TAN'           / Pixel coordinate system
C2NIT1  = 'nm      '           / Units used in both CRVAL2 and CDELT2
C2NIT2  = 'degree  '           / Units used in both CRVAL1 and CDELT1
P2001001=           1.00000000 / Pixel Coordinate translation matrix
P2001002=           0.00000000 / Pixel Coordinate translation matrix
P2002001=           0.00000000 / Pixel Coordinate translation matrix
P2002002=           1.00000000 / Pixel Coordinate translation matrix
SLIT    = 'Longslit'           / Identifier of the entrance slit used 'NONE' if
SLT-LEN =               75.000 / Length of the slit used  0.000 if Prism Sp
SLT-WID =                2.000 / Width of the slit used   0.000 if Prism Sp
SLT-PA  =                  0.0 / Slit Position Angle 0.0 if Prism Sp
SLTC-RA =          48.77375833 / RA of slit center (degree)
SLTC-DEC=          -5.47256389 / DEC of slit center (degree)
SLTCPIX1=                512.0 / Slit center projected on detector (pixel)
SLTCPIX2=                512.0 / Slit center projected on detector (pixel)
DISPERSR= 'JHGr    '           / Name of disperser used
WAVELEN =           1440.00000 / Wavelength at detector center (nm)
WAV-MIN =           1050.00000 / Shortest wavelength focused on detector (nm)
WAV-MAX =           1810.00000 / Longest wavelength focused on detector (nm)
DATE-OBS= '2011-11-23'         / Observation start date  (yyyy-mm-dd)
UT      = '12:25:48.562'       / HH:MM:SS.S typical UTC at exposure
UT-STR  = '12:25:48.562'       / HH:MM:SS.S UTC at start
UT-END  = '12:26:01.329'       / HH:MM:SS.S UT at end
HST     = '02:25:48.5'         / HH:MM:SS.S Typical HST at exposure
LST     = '03:54:10.482'       / HH:MM:SS.S Typical LST at exposure
MJD     =       52931.51791897 / Modified Julian Day at typical time
TIMESYS = 'UTC     '           / Time system used in this header
EXPTIME =              10.000 / Total integration time (sec)
OBJECT  = 'Nandesuka'          / Target Description
AZIMUTH =               201.8 / Azimuth angle of telescope pointing
ALTITUDE=                63.0 / Altitude angle of telescope pointing
TELFOCUS= 'Nasmyth-IR'         / Focus where a beam is reachable
FOC-POS = 'Nasmyth-IR'         / Focus where the instrument is attached
FOC-VAL =              -0.349 / Encoder value of the focus unit
M2-TIP  = 'OFF     '           / 2nd Mirror tip-tilt on/off
M2-TYPE = 'CS_IR   '           / Type of the Secondary Mirror (Opt/IR)
FILTER01= 'NONE    '           / Filter name/ID
FILTER02= 'JHGr    '           / Filter name/ID
AIRMASS =            1.12300 / Averaged Air Mass
ZD      =               27.05 / Zenith Distance at typical time
INS-VER =                2.00 / Version of the instrument
DETECTOR= 'HAWAII  '           / Name of the detector
DET-TMP =               77.0 / Detector temperature
GAIN    =               3.50 / AD conversion factor
DET-NSMP=                  1 / Number of multiple sample in each exposure
PRD-MIN1=                  0 / Start X position of partialy read out
PRD-MIN2=                  0 / Start position Y of partialy readout
PRD-RNG1=               1024 / X Range of the partialy read out
PRD-RNG2=               1024 / Y range of the partialy readout
BIN-FCT1=                  1 / Binning factor of X axis
BIN-FCT2=                  1 / Binning factor of Y axis
NAS-TAVE=               0.00 / Average Value of Nasmyth Enclosure
INSTRUME= 'CISCO   '           / Name of Instrument
TELESCOP= 'SUBARU  '           / Telescope Name
OBSERVAT= 'NAOJ    '           / Observatory Name
OBS-ALOC= 'Observation'        / Allocation mode for Instrument
BLANK   =               32768 / Value used for NULL pixels
BSCALE  =                1.00 / Real = fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BZERO   =                0.00 / Real = fits-value*BSCALE+BZERO
```

```
OHSSLIT =              NORMAL   / OHSSLIT Type
OHSSLOFF=              -8.700 / OHSSLIT Offset (pix)
CD1_1   =          -0.00003083 /
CD1_2   =          -0.00000000 /
CD2_1   =           0.00000000 /
CD2_2   =           0.00003083 /
END
```

10.4.6 Suprime-Cam (2003/12/31)

```
         1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------------------
SIMPLE  =                    T / file does conform to FITS standard
BITPIX  =                   16 / number of bits per data pixel
NAXIS   =                    2 / number of data axes
NAXIS1  =                 2080 / length of data axis 1
NAXIS2  =                 4100 / length of data axis 2
EXTEND  =                    F / FITS dataset may contain extensions
BZERO   =              32768.0 / offset data range to that of unsigned short
BSCALE  =                  1.0 / default scaling factor
BUNIT   = 'ADU     '           / Unit of original pixel value
BLANK   =               -32768 / Value used for NULL pixels
DATE-OBS= '2011-11-03'         / Observation start date  (yyyy-mm-dd)
UT      = '15:18:05.753'       / HH:MM:SS.S typical UTC at the exposure (middle
UT-STR  = '15:18:05.753'       / HH:MM:SS.S UTC at the start exposure time
UT-END  = '15:21:05.010'       / HH:MM:SS.S UTC at the end of the exposure
HST     = '05:18:05.753'       / HH:MM:SS.S Typical HST at exposure
HST-STR = '05:18:05.753'       / HH:MM:SS.S HST at the beginning of exp.
HST-END = '05:21:05.010'       / HH:MM:SS.S HST at the end of exposure
LST     = '05:43:50.641'       / HH:MM:SS.SSS Typical LST at exposure
LST-STR = '05:43:50.641'       / HH:MM:SS.SSS LST at the beginning of exposure
LST-END = '05:46:50.389'       / HH:MM:SS.SSS LST at the end of exposure
MJD     =         52915.637562 / [d] Mod. Julian Date at typical time
TIMESYS = 'UTC     '           / Time System used in the header
MJD-STR =         52915.637562 / [d] Mod.Julian Date at the start of exposure
MJD-END =         52915.639637 / [d] Mod.Julian Date at the end of exposure
ZD-STR  =              56.493 / [degree] Zenith Distance at exposure start tim
ZD-END  =              57.152 / [degree] Zenith Distance at exposure end time
SECZ-STR=               1.811 / SEC(Zenith Distance) at exposure start time
SECZ-END=               1.844 / SEC(Zenith Distance) at exposure end time
AIRMASS =              1.8400 / Average airmass during exposure
AZIMUTH =             248.953 / [degree] Azimuth of tel-pointing. 0:N->90:E
ALTITUDE=              33.509 / [degree] Altitude ang. of telescope pointing
PROP-ID = 'o11111  '           / Proposal ID
OBSERVER= 'SuprimeCam'         / Names of the Observers
FRAMEID = 'SUPA00250799'       / Image sequential number
EXP-ID  = 'SUPE00250790'       / ID of exposure (shot) this data were taken
DATASET = 'DS000   '           / ID of dataset this data were taken
OBS-MOD = 'IMAG_N  '           / Observation Mode
OBS-ALOC= 'Observation'        / Allocation Mode
DATA-TYP= 'OBJECT  '           / Characteristics of this data
OBJECT  = 'Nandesuka         ' / Identification of object observed
RA      = '02:17:57.646'       / Right ascension of telescope pointing
DEC     = '-05:26:18.56'       / Declination of telescope pointing
RA2000  = '02:17:57.646'       / Right ascension of telescope pointing (J2000)
DEC2000 = '-05:26:18.56'       / Declination of telescope pointing (J2000)
OBSERVAT= 'NAOJ    '           / Observatory
TELESCOP= 'Subaru  '           / Telescope name
FOC-POS = 'Prime   '           / Position of the instrument focus unit
TELFOCUS= 'Prime   '           / The Focus where beam reaches
FOC-VAL =               7.800 / [mm] Encoder value of the focus unit
FILTER01= 'W-S-I+  '           / Filter name/ID
EXPTIME =             180.0 / [sec] Total integration time
INSTRUME= 'SuprimeCam'         / Name of instrument
DETECTOR= 'w7c3    '           / Name of the detector/CCD
DET-ID  =                    9 / ID of the detector used for this data
DET-A01 =               1.571 / [degree] Relative angle of the nn-th detector
DET-P101=              47.220 / [mm] Relative X-position of the nn-th detector
DET-P201=               0.705 / [mm] Relative Y-position of the nn-th detector
DET-TMP =              166.39 / [Kelvin] Detector temperature
DET-TMED=                0.00 / [Kelvin] Median of the detector temperature
DET-TMIN=                0.00 / [Kelvin] Minimum of the detector temperature
DET-TMAX=                0.00 / [Kelvin] Maximum of the detector temperature
GAIN    =               2.500 / AD conversion factor (electron/ADU)
EFP-MIN1=                  33 / Start position of effective frame in axis-1
EFP-RNG1=                2048 / Range of effective frame in axis-1
EFP-MIN2=                   1 / Start position of effective frame in axis-2
EFP-RNG2=                4100 / Range of effective frame in axis-2
PRD-MIN1=                   1 / Start X position of partialy read out
PRD-RNG1=                2080 / X range of the partialy readout
```

```
PRD-MIN2=                   1 / Start Y position of partialy read out
PRD-RNG2=                4100 / Y range of the partialy readout
BIN-FCT1=                   1 / Binning factor of axis 1
BIN-FCT2=                   1 / Binning factor of axis 2
DET-VER = 'spcam20010412'      / Version of the detector control command
INS-VER = 'Messia5/sup020829'  / Version of the instrument (hard/soft)
WEATHER = 'Fare                          ' / Weather condition
SEEING  =                0.00 / [arcsec] FWHM of the star at telescope focus
ADC-TYPE= 'IN      '           / ADC name if it is used. (BLUE, RED, NONE)
ADC-STR =              28.630 / [mm] ADC pos. at the start of exposur
ADC-END =              29.370 / [mm] ADC pos. at the end of exposure
INR-STR =             151.887 / [degree] Inst. rotator angle at start
INR-END =             152.186 / [degree] Inst. rotator angle at end
DOM-WND =                0.10 / [m/s] Wind speed in the dome/enclosure
OUT-WND =                6.50 / [m/s] Wind speed outside dome/enclosure
DOM-TMP =              276.85 / [Kelvin] Atm. temp. in the dome/enclosure
OUT-TMP =              276.55 / [Kelvin] Atm. temp. outside the dome/encl.
DOM-HUM =                19.7 / [%] Humidity in the dome
OUT-HUM =                20.5 / [%] Humidity outside the dome/encl.
DOM-PRS =              622.30 / [hPa] Atm. pressure in the dome
OUT-PRS =              622.30 / [hPa] Atm. press. outside the dome/encl.
EXP1TIME=               180.0 / [s] one exposure time
COADD   =                   1 / number of exposure
M2-POS1 =               0.095 / [mm] Stewart Platform x-value
M2-POS2 =              -0.533 / [mm] Stewart Platform x-value
M2-POS3 =               7.758 / [mm] Stewart Platform x-value
M2-ANG1 =              -0.000 / [arcmin] Stewart Platform x-rotation angle
M2-ANG2 =              -0.000 / [arcmin] Stewart Platform y-rotation angle
M2-ANG3 =               0.000 / [arcmin] Stewart Platform z-rotation angle
AUTOGUID= 'OFF     '           / Autoguid on/off
COMMENT  ------------------------------------------------------------
COMMENT  --------------- PARAMETERS FOR SUPRIME_CAM ------------------
COMMENT  ------------------------------------------------------------
S_UFNAME= 'object111_w7c3.fits' / User assigned file name
S_FRMPOS= '04O1    '           / Frame position (IIJJ)
S_BCTAVE=              999.999 / [ADU] Average count outside effective data
S_BCTSD =              999.999 / [ADU] S.D. of the count outside the eff. data
S_AG-OBJ= 'N/A     '           / Name of the guide-star
S_AG-RA = 'N/A     '           / R.A. of the guide-star
S_AG-DEC= 'N/A     '           / Dec. of the guide-star
S_AG-EQN=               2000.0 / [y] Equinox of the guide-star position
S_AG-X  =               160.01 / [mm] Position of the guiding probe (X)
S_AG-Y  =                -0.03 / [mm] Position of the guiding probe (Y)
S_AG-R  =               999.99 / [mm] Position of the guiding probe (R)
S_AG-TH =               999.99 / [degree] Position of the guiding probe (theta)
S_ETMED =               276.79 / [Kelvin] Averaged temp. in Camera enclosure
S_ETMAX =                 0.00 / [Kelvin] Maximum temp.  in Camera enclosure
S_ETMIN =                 0.00 / [Kelvin] Minimum temp.  in Camera enclosure
S_XFLIP =                    T / CCD readout is x-flipped when create image
S_YFLIP =                    T / CCD readout is y-flipped when create image
S_M2OFF1=                0.000 / [mm] Stewart Platform x-offset
S_M2OFF2=                0.000 / [mm] Stewart Platform y-offset
S_M2OFF3=                7.800 / [mm] Stewart Platform z-offset
S_DELTAZ=                0.000 / [mm] delta z for FocusTest
S_DELTAD=                 0.00 / [arcsec] delta Dec for FocusTest
S_SENT  =                    F / Already send to OBC
EQUINOX =               2000.0 / Standard FK5 (years)
CRVAL1  =          34.49019167 / Physical value of the reference pixel X
CRVAL2  =          -5.43848889 / Physical value of the reference pixel Y
CRPIX1  =              -3148.0 / Reference pixel in X (pixel)
CRPIX2  =                -47.0 / Reference pixel in Y (pixel)
CDELT1  =          -0.00005611 / X Scale projected on detector (#/pix)
CDELT2  =           0.00005611 / Y Scale projected on detector (#/pix)
PC001001=           1.00000000 / Pixel Coordinate translation matrix
PC001002=           0.00000000 / Pixel Coordinate translation matrix
PC002001=          -0.00000000 / Pixel Coordinate translation matrix
PC002002=           1.00000000 / Pixel Coordinate translation matrix
LONGPOLE=            180.00000 / The North Pole of standard system (deg)
CTYPE1  = 'RA---TAN'           / Pixel coordinate system
CTYPE2  = 'DEC--TAN'           / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree  '           / Units used in both CRVAL2 and CDELT2
WCS-ORIG= 'SUBARU Toolkit'     / Origin of the WCS value
RADECSYS= 'FK5     '           / The equatorial coordinate system
CD1_1   =          -0.00005611 / Pixel Coordinate translation matrix
CD1_2   =           0.00000000 / Pixel Coordinate translation matrix
CD2_1   =           0.00000000 / Pixel Coordinate translation matrix
CD2_2   =           0.00005611 / Pixel Coordinate translation matrix
END
```

10.4.7 MIRTOS (1998/09/03)

● MIRTOS の MIR mode および ASCII Table Extension

```
        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
SIMPLE  =                    T / Standard FITS format
BITPIX  =                   32 / Number of bits storing pix values
NAXIS   =                    3 / Number of axis in frame
NAXIS1  =                  336 / Number of pixels/row
NAXIS2  =                  240 / Number of rows
NAXIS3  =                   10 / Number of frames
EXTEND  =                    T / ASCII Table for Z-frame description
COMMENT Sample Primary header for MIRTOS written by Tomono on 1998/9/2
COMMENT Updated: string format %-30s => %-8.30s, M_BEAM, M_OBSID
OBSERVER= 'D.Tomono, Y.Doi, T.Nishimura' / Name of observers
PROP-ID = 'P1998-0430-1'       / Proposal ID
DATASET = 'Used for DASH'      / What is this? Ref. George
INSTRUME= 'MIRTOS  '           / Name of instrument
INS-VER = '1.1 980701'         / Version of the instrument
FRAMEID = 'MIRA000000001'      / FITS File sequential number
EXP-ID  = 'MIRM000000001'
OBS-MOD = 'imaging '           / Observation Mode
DATA-TYP= 'object  '           / object/flat/pupil/pupil_flat/dark
OBSERVAT= 'NAOJ    '
TELESCOP= 'Subaru  '
CRPIX1  =                160.0 / Reference pixel in X (pixel)
CRPIX2  =                120.0 / Reference pixel in Y (pixel)
CRVAL1  =         189.00529167 / Physical value of the reference pixel X
CRVAL2  =         -39.86927778 / Physical value of the reference pixel Y
CDELT1  =        0.0000186328 / X Scale projected on detector(#/pix)
CDELT2  =        0.0000186328 / Y scale projected on detector(#/pix)
CTYPE1  = 'RA--TAN '           / Pixel coordinate system
CTYPE2  = 'DEC--TAN'           / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree  '           / Units used in both CRVAL2 and CDELT2
TIMESYS = 'UTC     '           / Time System used in the header. UTC fix.
RADECSYS= 'FK5     '           / The equatorial coordinate system
PROJP1  =                  0.0 / Projection type of the first axis
PROJP2  =                  0.0 / Projection type of the second axis
LONGPOLE=            180.00000 / The North Pole of standard system (deg)
PC001001=           1.00000000 / Pixel Coordinate translation matrix
PC001002=           0.00000000 / Pixel Coordinate translation matrix
PC002001=           0.00000000 / Pixel Coordinate translation matrix
PC002002=           1.00000000 / Pixel Coordinate translation matrix
BSCALE  =                    1 / Real=fits-value*BSCALE+BZERO
BZERO   =                    0 / Real=fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BLANK   =                32768 / Value used for NULL pixels
DATE-OBS= '1998-04-30'         / yyyy-mm-dd UTC obs start date
UT      = '09:12:00.0'         / HH:MM:SS.S UTC at typical time(=start)
HST     = '23:12:00.0'         / HH:MM:SS.S HST at typical time(=start)
LST     = '12:34:56.7'         / HH:MM:SS.S LST at typical time(=start)
MJD     =       12345.67890000 / Modified Julian Day at typical time(=start)
EXPTIME =               0.0800 / Total integration time per frame(sec)
OBJECT  = 'HR 4796 '           / Target Description
RA      = '12:36:01.270'       / HH:MM:SS.SSS RA (J2000) pointing
RA2000  = '12:36:01.270'       / HH:MM:SS.SSS RA (J2000) pointing
DEC     = '-39:52:09.40'       / +/-DD:MM:SS.SS DEC (J2000) pointing
DEC2000 = '-39:52:09.40'       / +/-DD:MM:SS.SS DEC (J2000) pointing
EQUINOX =              2000.0
AZIMUTH =             12.34000 / Azimuth of telescope pointing (degree)
ALTITUDE=             12.34000 / Altitude of telescope pointing(degree)
FOC-POS = 'CASSEGRAIN'         / Focus where the instrument is attached
FOC-LEN =           100000.000 / Focal length of the telescope (mm)
FOC-VAL =                2.531 / Encoder value of the focus unit (mm)
M2-TYPE = 'IR      '           / Type of the secondary mirror (Opt/IR)
M2-TIP  = 'off     '           / Tip/Tilt of the Secondary Mirror (on/off)
APERTURE= '21x16   '           / Field stop ID
INR-STR =               12.345 / Instrument Rotator angle at Start (deg)
INR-END =               12.345 / Instrument Rotator angle at End (deg)
AIRMASS =              4.67918 / Averaged Air Mass
ZD      =               77.660 / Zenith Distance at typical time
SECZ    =                4.679 / SEC(Zenith Distance) at typical time
M_WINDOW= 'ZnSe    '           / MIRTOS dewar entrance window
M_M1MOT1=                  224 / Beam Stearing Mirror Direction (count)
M_M1MOT2=                  339 / Beam Stearing Mirror Direction (count)
M_M2MOT1=                  224 / Beam Splitter Direction (count)
M_M2MOT2=                  339 / Beam Splitter Direction (count)
FILTER01= 'Through '           / Filter name/ID
FILTER02= 'Q       '           / Filter name/ID
FILTER03= '30mm-phi'           / Lyot Stop name/ID
```

```
DETECTOR= 'Ratheon Si:As IBC 320x240' / Name of the detector/CCD
DET-ID  =                    1 / ID of the detector used for this data
DETPXSZ1=                0.050 / Detector pixel size in axis1 (mm)
DETPXSZ2=                0.050 / Detector pixel size in axis2 (mm)
DET-A00 =                0.100 / Relative angle of nn-th detector (deg)
DET-TMP =                 6.01 / Detector temperature (K)
GAIN    =               330.90 / AD conversion factor (electron/ADU)
PRD-MIN1=                    1 / Start X pos. of partially read out (pix)
PRD-MIN2=                    1 / Start Y pos. of partially read out (pix)
PRD-RNG1=                  320 / X Range of partially read out (pix)
PRD-RNG2=                  240 / Y Range of partially read out (pix)
BIN-FCT1=                    1 / Binning factor of X axis (pixel)
BIN-FCT2=                    1 / Binning factor of Y axis (pixel)
COMMENT === Beam: U(chop+,nod+) u(-,+) D(+,-) d(-,-) X(other) C(Cont)
M_BEAM  =                    1 / Number of Beam Description Keywords M_BEAMn
M_BEAM1 = 'UuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUu'
COMMENT === Beams are also described in ASCII Table Extension
WEATHER = 'Sunny   '           / Weather condition
SEEING  =                 0.45 / Long integ PSF FWHM (arcsec)
DOM-WND =                 4.61 / Wind speed in the dome (m/s)
OUT-WND =                 7.79 / Wind speed outside (m/s)
DOM-TMP =                273.5 / Temperature measured in the dome (K)
OUT-TMP =                273.7 / Temperature measured outside dome (K)
DOM-HUM =                0.050 / Humidity measured in the dome
OUT-HUM =                0.060 / Humidity measured outside the dome
DOM-PRS =               670.00 / Atmospheric pressure in the Dome (hpa)
OUT-PRS =               670.00 / Atmospheric pressure outside dome (hPa)
COMMENT
COMMENT (: Subaru Device Dependent Header for MIRTOS :)
COMMENT
COMMENT === ID
M_CHID  = 'MIR     '           / ID of camera channel of MIRTOS
M_OBSID = '19980430-0001'      / ID of set of chop/nod observation
M_TWID  = '19980430-0010'      / ID of two-wavelength simultaneous file
M_FLATID= 'NA      '           / ID of the most recent flat field file
M_DARKID= 'NA      '           / ID of the most recent dark exposure file
M_DET01 =             12.30000 / Rel X pos of NIR from MIR on sky (pixel)
M_DET02 =             45.60000 / Rel Y pos of NIR from MIR on sky (pixel)
COMMENT === Chopping and Nodding
M_CHOPTM=                 0.20 / Chopping period (sec)
M_CHOPTH=                90.00 / Chopping throw (arcsec)
M_CHOPPA=                 0.00 / Chopping P.A. origin:source/pointing (deg)
M_NODTM =                 10.0 / Nodding period (sec)
M_NODTH =                90.00 / Nodding throw (arcsec)
M_NODPA =                90.00 / Nodding P.A. origin:source/pointing (deg)
COMMENT === M_RF are Reference Square Corners in Pix, -1:NA 0:No ref in image
M_RFX1PP=                   -1 / Corner 1 X for Chop+ Nod+
M_RFY1PP=                   -1 / Corner 1 Y for Chop+ Nod+
M_RFX2PP=                   -1 / Corner 2 X for Chop+ Nod+
M_RFY2PP=                   -1 / Corner 2 Y for Chop+ Nod+
M_RFX1MP=                   -1 / Corner 1 X for Chop- Nod+
M_RFY1MP=                   -1 / Corner 1 Y for Chop- Nod+
M_RFX2MP=                   -1 / Corner 2 X for Chop- Nod+
M_RFY2MP=                   -1 / Corner 2 Y for Chop- Nod+
M_RFX1PM=                   -1 / Corner 1 X for Chop+ Nod-
M_RFY1PM=                   -1 / Corner 1 Y for Chop+ Nod-
M_RFX2PM=                   -1 / Corner 2 X for Chop+ Nod-
M_RFY2PM=                   -1 / Corner 2 Y for Chop+ Nod-
M_RFX1MM=                   -1 / Corner 1 X for Chop- Nod-
M_RFY1MM=                   -1 / Corner 1 Y for Chop- Nod-
M_RFX2MM=                   -1 / Corner 2 X for Chop- Nod-
M_RFY2MM=                   -1 / Corner 2 Y for Chop- Nod-
COMMENT === Temperature
M_O-TMP =                 35.6 / Temperature of Optics (K)
M_A-TMP1=                300.1 / Temperature of Ambient thermometer (K)
M_A-TMP2=                350.3 / Temperature of Ambient thermometer (K)
M_A-TMP3=                280.4 / Temperature of Ambient thermometer (K)
M_A-TMP4=                300.1 / Temperature of Ambient thermometer (K)
COMMENT === Clock
M_CLKFL = '/common/clock/980828/twsaa2_mir' / Clock file name
M_CLKMR = 'chop02nod10_1'      / Clock pattern marco name
M_CLKMC = 'This is only preliminary' / Comment on clock pattern macro
M_PIXTIM=                  5.0 / Clock duration for a pixel (us)
M_FRTIME=                 32.3 / Time to sweep one frame (ms)
COMMENT === FMC
M_JPORT =                    0 / Jump port value at the time of getting data
M_REFSUB=                    T / Subtraction of reference column T:done
M_ARRANG= 'Raw980828'          / Data sequence FITS/Raw-hardware version
M_BANK  = 'A       '           / Bank name where the data was stored
COMMENT == BlackBody
M_BBPOS =                    F / Black Body Position T:In F:Out
M_BBTMP =                270.0 / Temperature of Black Body (K)
END
```

```
XTENSION= 'TABLE   '           / ASCII Table Extension
BITPIX  =                    8 / Number of bits storing pix values
NAXIS   =                    2 / Number of axis in frame
NAXIS1  =                   17 / Number of characters in a row
NAXIS2  =                   10 / Number of rows = number of frames
PCOUNT  =                    0 / No random parameters
GCOUNT  =                    1 / Only one group
TFIELDS =                    4 / Number of fields in a row
EXTNAME = 'Frames  '           / Name

TTYPE1  = 'Chop    '           / Chop beam: +/-
TBCOL1  =                    1 / start column of this field
TFORM1  = 'A1      '           / 1 character

TTYPE2  = 'Nod     '           / Nod beam: +/-
TBCOL2  =                    2 / start column of this field
TFORM2  = 'A1      '           / 1 character

TTYPE3  = 'NumReads'           / Number of read outs for a pixel
TBCOL3  =                    3 / start column of this field
TFORM3  = 'I6      '           / 6 digit integer
TUNIT3  = 'Samples '           / units: ADC Samplings for a pixel

TTYPE4  = 'WaitTime'           / Wait time for secondary stabilization
TBCOL4  =                    9 / start column of this field
TFORM4  = 'F10.4   '           / 9 digit floating down to 1us + space
TUNIT4  = 'ms      '           / units: milli-second

TTYPE5  = 'NDRate  '           / Integration Duty Cycle x/243 only MIR
TBCOL5  =                   19 / start column of this field
TFORM5  = 'I4      '           / 3 digit integer + space
TUNIT5  = 'rows    '           / units: milli-second

TTYPE6  = 'CentroiX'           / Centroid X Position of Reference Source
TBCOL6  =                   23 / start column of this field
TFORM6  = 'F7.1    '           / 6 digit floating down to .1 pix + space
TUNIT6  = 'pix     '           / units: pix -1:NA

TTYPE7  = 'CentroiY'           / Centroid Y Position of Reference Source
TBCOL7  =                   30 / start column of this field
TFORM7  = 'F7.1    '           / 6 digit floating down to .1 pix + space
TUNIT7  = 'pix     '           / units: pix -1:NA

TTYPE8  = 'PeakX   '           / Peak X Position of Reference Source
TBCOL8  =                   37 / start column of this field
TFORM8  = 'F7.1    '           / 6 digit floating down to .1 pix + space
TUNIT8  = 'pix     '           / units: pix -1:NA

TTYPE9  = 'PeakY   '           / Peak Y Position of Reference Source
TBCOL9  =                   44 / start column of this field
TFORM9  = 'F7.1    '           / 6 digit floating down to .1 pix + space
TUNIT9  = 'pix     '           / units: pix -1:NA

COMMENT Sample ASCII Extension header for MIRTOS written by Tomono on 1998/9/2
COMMENT Storage of Centroid/peak position needs to be thought again
END
```

● MIRTOS の NIR mode および ASCII Table Extension

```
         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
--------------------------------------------------------------------------------
SIMPLE  =                    T / Standard FITS format
BITPIX  =                   32 / Number of bits storing pix values
NAXIS   =                    3 / Number of axis in frame
NAXIS1  =                  256 / Number of pixels/row
NAXIS2  =                  256 / Number of rows
NAXIS3  =                   10 / Number of frames
EXTEND  =                    T / ASCII Table for Z-frame description
COMMENT Sample Primary header for MIRTOS written by Tomono on 1998/9/2
COMMENT Updated: string format %-30s => %-8.30s, M_BEAM, M_OBSID
OBSERVER= 'D.Tomono, Y.Doi, T.Nishimura' / Name of observers
PROP-ID = 'P1998-0430-1'       / Proposal ID
DATASET = 'Used for DASH'      / What is this? Ref. George
INSTRUME= 'MIRTOS  '           / Name of instrument
INS-VER = '1.1 980701'         / Version of the instrument
FRAMEID = 'MIRA000000002'      / FITS File sequential number
EXP-ID  = 'MIRN000000001'
OBS-MOD = 'imaging '           / Observation Mode
DATA-TYP= 'object  '           / object/flat/pupil/pupil_flat/dark
OBSERVAT= 'NAOJ    '
TELESCOP= 'Subaru  '
```

```
CRPIX1  =                128.0 / Reference pixel in X (pixel)
CRPIX2  =                128.0 / Reference pixel in Y (pixel)
CRVAL1  =         189.00529167 / Physical value of the reference pixel X
CRVAL2  =         -39.86927778 / Physical value of the reference pixel Y
CDELT1  =         0.0000076860 / X Scale projected on detector(#/pix)
CDELT2  =         0.0000076860 / Y scale projected on detector(#/pix)
CTYPE1  = 'RA--TAN '           / Pixel coordinate system
CTYPE2  = 'DEC--TAN'           / Pixel coordinate system
CUNIT1  = 'degree  '           / Units used in both CRVAL1 and CDELT1
CUNIT2  = 'degree  '           / Units used in both CRVAL2 and CDELT2
TIMESYS = 'UTC     '           / Time System used in the header. UTC fix.
RADECSYS= 'FK5     '           / The equatorial coordinate system
PROJP1  =                  0.0 / Projection type of the first axis
PROJP2  =                  0.0 / Projection type of the second axis
LONGPOLE=            180.00000 / The North Pole of standard system (deg)
PC001001=           1.00000000 / Pixel Coordinate translation matrix
PC001002=           0.00000000 / Pixel Coordinate translation matrix
PC002001=           0.00000000 / Pixel Coordinate translation matrix
PC002002=           1.00000000 / Pixel Coordinate translation matrix
BSCALE  =                    1 / Real=fits-value*BSCALE+BZERO
BZERO   =                    0 / Real=fits-value*BSCALE+BZERO
BUNIT   = 'ADU     '           / Unit of original pixel values
BLANK   =                32768 / Value used for NULL pixels
DATE-OBS= '1998-04-30'         / yyyy-mm-dd UTC obs start date
UT      = '09:12:00.0'         / HH:MM:SS.S UTC at typical time(=start)
HST     = '23:12:00.0'         / HH:MM:SS.S HST at typical time(=start)
LST     = '12:34:56.7'         / HH:MM:SS.S LST at typical time(=start)
MJD     =       12345.67890000 / Modified Julian Day at typical time(=start)
EXPTIME =               0.0800 / Total integration time per frame(sec)
OBJECT  = 'HR 4796 '           / Target Description
RA      = '12:36:01.270'       / HH:MM:SS.SSS RA (J2000) pointing
RA2000  = '12:36:01.270'       / HH:MM:SS.SSS RA (J2000) pointing
DEC     = '-39:52:09.40'       / +/-DD:MM:SS.SS DEC (J2000) pointing
DEC2000 = '-39:52:09.40'       / +/-DD:MM:SS.SS DEC (J2000) pointing
EQUINOX =               2000.0
AZIMUTH =             12.34000 / Azimuth of telescope pointing (degree)
ALTITUDE=             12.34000 / Altitude of telescope pointing(degree)
FOC-POS = 'CASSEGRAIN'         / Focus where the instrument is attached
FOC-LEN =           100000.000 / Focal length of the telescope (mm)
FOC-VAL =                2.531 / Encoder value of the focus unit (mm)
M2-TYPE = 'IR      '           / Type of the secondary mirror (Opt/IR)
M2-TIP  = 'off     '           / Tip/Tilt of the Secondary Mirror (on/off)
APERTURE= '21x16   '           / Field stop ID
INR-STR =               12.345 / Instrument Rotator angle at Start (deg)
INR-END =               12.345 / Instrument Rotator angle at End (deg)
AIRMASS =              4.67918 / Averaged Air Mass
ZD      =               77.660 / Zenith Distance at typical time
SECZ    =                4.679 / SEC(Zenith Distance) at typical time
M_WINDOW= 'ZnSe    '           / MIRTOS dewar entrance window
M_M1MOT1=                  224 / Beam Stearing Mirror Direction (count)
M_M1MOT2=                  339 / Beam Stearing Mirror Direction (count)
M_M2MOT1=                  224 / Beam Splitter Direction (count)
M_M2MOT2=                  339 / Beam Splitter Direction (count)
FILTER01= 'K       '           / Filter name/ID
FILTER03= '13mm-phi'           / Lyot Stop name/ID
DETECTOR= 'Ratheon InSb 256x256' / Name of the detector/CCD
DET-ID  =                    1 / ID of the detector used for this data
DETPXSZ1=                0.030 / Detector pixel size in axis1 (mm)
DETPXSZ2=                0.030 / Detector pixel size in axis2 (mm)
DET-A00 =               -0.100 / Relative angle of nn-th detector (deg)
DET-TMP =                30.12 / Detector temperature (K)
GAIN    =               123.40 / AD conversion factor (electron/ADU)
PRD-MIN1=                    1 / Start X pos. of partially read out (pix)
PRD-MIN2=                    1 / Start Y pos. of partially read out (pix)
PRD-RNG1=                  256 / X Range of partially read out (pix)
PRD-RNG2=                  256 / Y Range of partially read out (pix)
BIN-FCT1=                    1 / Binning factor of X axis (pixel)
BIN-FCT2=                    1 / Binning factor of Y axis (pixel)
COMMENT === Beam: U(chop+,nod+) u(-,+) D(+,-) d(-,-) X(other) C(Cont)
M_BEAM  =                    1 / Number of Beam Description Keywords M_BEAMn
M_BEAM1 = 'UuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUuUu'
COMMENT === Beams are also described in ASCII Table Extension
WEATHER = 'Sunny   '           / Weather condition
SEEING  =                 0.45 / Long integ PSF FWHM (arcsec)
DOM-WND =                 4.61 / Wind speed in the dome (m/s)
OUT-WND =                 7.79 / Wind speed outside (m/s)
DOM-TMP =                273.5 / Temperature measured in the dome (K)
OUT-TMP =                273.7 / Temperature measured outside dome (K)
DOM-HUM =                0.050 / Humidity measured in the dome
OUT-HUM =                0.060 / Humidity measured outside the dome
DOM-PRS =               670.00 / Atmospheric pressure in the Dome (hpa)
OUT-PRS =               670.00 / Atmospheric pressure outside dome (hPa)
COMMENT
COMMENT (: Subaru Device Dependent Header for MIRTOS :)
```

```
COMMENT
COMMENT === ID
M_CHID  = 'NIR     '           / ID of camera channel of MIRTOS
M_OBSID = '19980430-0001'      / ID of set of chop/nod observation
M_TWID  = '19980430-0010'      / ID of two-wavelength simultaneous file
M_FLATID= 'NA      '           / ID of the most recent flat field file
M_DARKID= 'NA      '           / ID of the most recent dark exposure file
M_DET01 =             12.30000 / Rel X pos of NIR from MIR on sky (pixel)
M_DET02 =             45.60000 / Rel Y pos of NIR from MIR on sky (pixel)
COMMENT === Chopping and Nodding
M_CHOPTM=                 0.20 / Chopping period (sec)
M_CHOPTH=                90.00 / Chopping throw (arcsec)
M_CHOPPA=                 0.00 / Chopping P.A. origin:source/pointing (deg)
M_NODTM =                 10.0 / Nodding period (sec)
M_NODTH =                90.00 / Nodding throw (arcsec)
M_NODPA =                90.00 / Nodding P.A. origin:source/pointing (deg)
COMMENT === M_RF are Reference Square Corners in Pix, -1:NA 0:No ref in image
M_RFX1PP=                   -1 / Corner 1 X for Chop+ Nod+
M_RFY1PP=                   -1 / Corner 1 Y for Chop+ Nod+
M_RFX2PP=                   -1 / Corner 2 X for Chop+ Nod+
M_RFY2PP=                   -1 / Corner 2 Y for Chop+ Nod+
M_RFX1MP=                   -1 / Corner 1 X for Chop- Nod+
M_RFY1MP=                   -1 / Corner 1 Y for Chop- Nod+
M_RFX2MP=                   -1 / Corner 2 X for Chop- Nod+
M_RFY2MP=                   -1 / Corner 2 Y for Chop- Nod+
M_RFX1PM=                   -1 / Corner 1 X for Chop+ Nod-
M_RFY1PM=                   -1 / Corner 1 Y for Chop+ Nod-
M_RFX2PM=                   -1 / Corner 2 X for Chop+ Nod-
M_RFY2PM=                   -1 / Corner 2 Y for Chop+ Nod-
M_RFX1MM=                   -1 / Corner 1 X for Chop- Nod-
M_RFY1MM=                   -1 / Corner 1 Y for Chop- Nod-
M_RFX2MM=                   -1 / Corner 2 X for Chop- Nod-
M_RFY2MM=                   -1 / Corner 2 Y for Chop- Nod-
COMMENT === Temperature
M_O-TMP =                 56.7 / Temperature of Optics (K)
M_A-TMP1=                300.1 / Temperature of Ambient thermometer (K)
M_A-TMP2=                350.3 / Temperature of Ambient thermometer (K)
M_A-TMP3=                280.4 / Temperature of Ambient thermometer (K)
M_A-TMP4=                300.1 / Temperature of Ambient thermometer (K)
COMMENT === Clock
M_CLKFL = '/common/clock/980828/twsaa2_mir' / Clock file name
M_CLKMR = 'chop02nod10_1'      / Clock pattern marco name
M_CLKMC = 'This is only preliminary' / Comment on clock pattern macro
M_PIXTIM=                  6.1 / Clock duration for a pixel (us)
M_FRTIME=                 32.3 / Time to sweep one frame (ms)
COMMENT === FMC
M_JPORT =                    0 / Jump port value at the time of getting data
M_ARRANG= 'Raw980828'          / Data sequence FITS/Raw-hardware version
M_BANK  = 'A       '           / Bank name where the data was stored
COMMENT == BlackBody
M_BBPOS =                    F / Black Body Position T:In F:Out
M_BBTMP =                270.0 / Temperature of Black Body (K)
END

XTENSION= 'TABLE   '           / ASCII Table Extension
BITPIX  =                    8 / Number of bits storing pix values
NAXIS   =                    2 / Number of axis in frame
NAXIS1  =                   17 / Number of characters in a row
NAXIS2  =                   10 / Number of rows = number of frames
PCOUNT  =                    0 / No random parameters
GCOUNT  =                    1 / Only one group
TFIELDS =                    4 / Number of fields in a row
EXTNAME = 'Frames  '           / Name

TTYPE1  = 'Chop    '           / Chop beam: +/-
TBCOL1  =                    1 / start column of this field
TFORM1  = 'A1      '           / 1 character

TTYPE2  = 'Nod     '           / Nod beam: +/-
TBCOL2  =                    2 / start column of this field
TFORM2  = 'A1      '           / 1 character

TTYPE3  = 'NumReads'           / Number of read outs for a pixel
TBCOL3  =                    3 / start column of this field
TFORM3  = 'I6      '           / 6 digit integer
TUNIT3  = 'Samples '           / units: ADC Samplings for a pixel

TTYPE4  = 'WaitTime'           / Wait time for secondary stabilization
TBCOL4  =                    9 / start column of this field
TFORM4  = 'F10.4   '           / 9 digit floating down to 1us + space
TUNIT4  = 'ms      '           / units: milli-second

TTYPE5  = 'MIR_ND  '           / Integration Duty Cycle x/243 only MIR
TBCOL5  =                   19 / start column of this field
```

```
TFORM5  = 'I4      '           / 3 digit integer + space
TUNIT5  = 'rows    '           / units: milli-second

TTYPE6  = 'CentroiX'           / Centroid X Position of Reference Source
TBCOL6  =                   23 / start column of this field
TFORM6  = 'F7.1    '           / 6 digit floating down to .1 pix + space
TUNIT6  = 'pix     '           / units: pix -1:NA

TTYPE7  = 'CentroiY'           / Centroid Y Position of Reference Source
TBCOL7  =                   30 / start column of this field
TFORM7  = 'F7.1    '           / 6 digit floating down to .1 pix + space
TUNIT7  = 'pix     '           / units: pix -1:NA

TTYPE8  = 'PeakX   '           / Peak X Position of Reference Source
TBCOL8  =                   37 / start column of this field
TFORM8  = 'F7.1    '           / 6 digit floating down to .1 pix + space
TUNIT8  = 'pix     '           / units: pix -1:NA

TTYPE9  = 'PeakY   '           / Peak Y Position of Reference Source
TBCOL9  =                   44 / start column of this field
TFORM9  = 'F7.1    '           / 6 digit floating down to .1 pix + space
TUNIT9  = 'pix     '           / units: pix -1:NA

COMMENT Sample ASCII Extension header for MIRTOS written by Tomono on 1998/9/2
COMMENT Storage of Centroid/peak position needs to be thought again
END
```

10.4.8 IRCS (1999/03/02)

● IRCS の Imaging mode

```
         1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678
--------------------------------------------------------------------------------------------------------------
SIMPLE  =                    T / DATA IS IN FITS FORMAT
BITPIX  =                   32 / 32 BIT SIGNED TWOS COMPLEMENT INTEGER
NAXIS   =                    2 / NUMBER OF AXES
NAXIS1  =                 1024 / PIXELS ON 1st MOST VARYING AXIS
NAXIS2  =                 1024 / PIXELS ON 2nd MOST VARYING AXIS
FRAME-ID=                      / Frame Id
I_ARCH  =                    0 / ARCHIVED? 0:No 1:Yes
I_HDRVER=                 1.23 / IRCS HEADER VERSION
OBSERVER= 'IRCS                                                 ,
INSTRUME= 'IRCS              ' /
TELESCOP= 'SUBARU            ' /
OBS-ALOC= 'Observation       ' / Observation or Standby
OBSERVAT= 'NAOJ              ' /
OBJECT  = 'Nandesuka '         /
DATA-TYP= 'FLAT                                                 ,
OBS-MOD = 'IMAGING           ' / Observation Mode
DETECTOR= 'Aladdin3 SCA-415478' / Name of detector
I_FNAME = 'IRCA00107722                                         ,
TIMESYS = 'UTC               ' / Time system used in this header
DATE-OBS= '2011-11-13        ' / UT date of Observation (yyyy-mm-dd)
EXP1TIME=                0.5000 / Integration time in seconds
EXPTIME =                0.5000 / Integration time in seconds
COADDS  =                    1 / Number of Coadds
DET_NSMP=                    1 / Number of Non-Destructive Reads
NDR     =                    1 / Number of Non-Destructive Reads
UT-STR  = '16:30:49.92       ' / Start Exposure at UTC (HH:MM:SS.SS)
UT      = '16:30:49.46       ' / Typical UTC at exposure (HH:MM:SS.SS)
UT-END  = '16:30:50.83       ' / End Exposure at UTC (HH:MM:SS.SS)
HST     = '06:30:49.92       ' / Start exposure at HST (HH:MM:SS.SS)
DET-TMP =                27.50 / Detector Temperature
BIN-FCT1=                    1 / Binning factor of the X axis
BIN-FCT2=                    1 / Binning factor of the Y axis
BLANK   =                32768 /  Value used for null pixels
BUNIT   =                  ADU / Unit of original pixel values
BSCALE  =                 1.00 / Real = fits-value*BSCALE+BZERO
BZERO   =                 0.00 / Real = fits-value*BSCALE+BZERO
I_NSQ   =                    1 / Number of the frame in the sequence
I_NSQMAX=                    1 / Maximum number of the sequence
SLIT    = 'MIRROR            ' / Entrance slit identifier
PROP-ID = 'o11215            ' / Proposal ID
DATASET = 'NOP               ' / Id of Observation Dataset
DET-ID  =                    1 / Detector Id. (1:CAMERA, 2:SPECTROGRAPH)
EQUINOX = '2000.000          ' / Standard FK5 (years)
UT1-UTC =               -0.375 / Difference between UT1 and UTC
MJD     =       52956.68805556 / Modified Julian Day at typical time
LST     = '09:37:54.68       ' / Typical local sidereal time during exposure
```

```
WCS-ORIG=                       / Origin of World Coordinate System
RA      = '09:38:22.044      ' / HH:MM:SS.SSS RA pointing
DEC     = '+19:50:39.53      ' / +/-DD:MM:SS.SS DEC pointing
RA2000  = '09:38:22.042      ' / HH:MM:SS.SSS RA (J2000) pointing
DEC2000 = '+19:50:39.53      ' / +/-DD:MM:SS.SS DEC (J2000) pointing
AZIMUTH =             90.00021 / Azimuth angle of telescope pointing
ALTITUDE=             89.96030 / Altitude angle of telescope pointing
ZD      =              0.03970 / Zenith Distance at typical time
LONGPOLE=                180.0 / The North Pole of the standard system
RADECSYS= 'FK5               ' / Equatorial coordinate system
CRPIX1  =                512.5 / Reference pixel in X (pixel)
CRPIX2  =                512.5 / Reference pixel in Y (pixel)
CRVAL1  =         144.59184265 / RA  (dg) of CRPIX1 reference pixel X
CRVAL2  =          19.84431458 / DEC (dg) of CRPIX2 reference pixel Y
CDELT1  =           0.00000623 / X Scale projected on detector (dg/pixel)
CDELT2  =           0.00000623 / Y Scale projected on detector (dg/pixel)
FOC-POS = 'CASSEGRAIN        ' / Focus where instrument is attached
TELFOCUS= 'CASSEGRAIN        ' / Focus where a beam is reachable
CS-TAVE =                       / Cassegrain Enclosure Average Temperature
FOC-VAL =                0.834 / Encoder value of the focus unit
AIRMASS =                1.000 / Averaged Air Mass
INSROT  =                0.000 / Instrument rotator angle
INST-PA =                6.060 / Instrument rotator position angle
AUTOGUID= 'OFF               ' / Autoguiding on/off
PROJP1  =                  0.0 / Projection Type of the first axis
PROJP2  =                  0.0 / Projection Type of the second axis
A_STATE =                ALIVE /
A_APDAV =                  0.0 /
A_LOOP  =                  OFF /
A_DMGAIN=              0.02000 /
A_TTGAIN=              0.00005 /
A_DMCMTX=         C_MTX_DM.cfg /
A_TTCMTX=         C_MTX_TT.cfg /
A_VMVOLT=                  0.1 /
A_VMFREQ=               2060.0 /
A_M1POS =                  OUT /
A_M1STAT=                UNDEF /
A_M1PULS=                    0 /
A_ISTAT =                UNDEF /
A_IPULS =                18000 /
A_RSTAT =                UNDEF /
A_TSTAT =                UNDEF /
A_FSTAT =                UNDEF /
A_CSTAT =                UNDEF /
A_RPULS =                 8267 /
A_TPULS =               166792 /
A_FPULS =                 1750 /
A_CPULS =                19781 /
A_IDXOFF=                    0 /
A_IDYOFF=                    0 /
A_IDX0  =                    0 /
A_IDY0  =                    0 /
PC001001=             0.993729 / Coordinate translation matrix
PC001002=            -0.111816 / Coordinate translation matrix
PC002001=             0.111816 / Coordinate translation matrix
PC002002=             0.993729 / Coordinate translation matrix
CTYPE1  = 'RA---TAN          ' / Pixel Coordinate System
CTYPE2  = 'DEC--TAN          ' / Pixel Coordinate System
CUNIT1  = 'degree            ' / CRVAL1 units
CUNIT2  = 'degree            ' / CRVAL2 units
FILTER01= 'OPEN:1            ' / First filter element
FILTER02= 'OPEN:1            ' / Second filter element
FILTER03= 'H2(2-1)           ' / Third filter element
I_MCW1NM= 'OPEN:1            ' / Camera Wheel 1 element name
I_MCW1PK=                    1 / Camera Wheel 1 puka
I_CW1HV =                 3084 / Camera Wheel 1 Hall Value
I_CW1MP =                 3050 / Camera Wheel 1 motor position
I_MCW2NM= 'OPEN:1            ' / Camera Wheel 2 element name
I_CW2PK =                    1 / Camera Wheel 2 puka
I_CW2HV =                 2722 / Camera Wheel 2 Hall Value
I_CW2MP =                 3100 / Camera Wheel 2 motor position
I_MCW3NM= 'H2(2-1)           ' / Camera Wheel 3 element name
I_CW3PK =                    8 / Camera Wheel 3 puka
I_CW3HV =                 3054 / Camera Wheel 3 Hall Value
I_CW3MP =                61000 / Camera Wheel 3 motor position
I_MFOCMC=                 2500 / Focus Stage microns
I_MFOCHV=                 3165 / Focus Stage hall value
I_MFOCMP=                 8590 / Focus Stage motor position
I_MDFMST= '23MAS             ' / Dual Flipmirror State
I_MFM1ST= 'OUT               ' / Flipmirror 1 State IN/OUT
I_MFM1HV=                  750 / Flipmirror 1 Hall Value
I_MFM1MP=                 -500 / FlipMirror 1 motor position
I_MFM2ST= 'OUT               ' / Flipmirror 2 state IN/OUT
I_MFM2HV=                    0 / Flipmirror 2 Hall Value
```

```
I_MFM2MP=                  500 / FlipMirror 1 motor position
I_SLWNM = 'MIRROR            ' / SlitWheel element name
I_SLWPK =                    1 / Slitwheel puka
I_SLWHV =                 3130 / Slitwheel Hall Value
I_SLWMP =                 4700 / SlitWheel motor position
I_SPWNM =                      / Spectrograph Wheel element name
I_SPWPK =                    5 / Spectrograph Filter Wheel Puka
I_SPWHV =                    0 / Spectrograph Filter Wheel Hall Value
I_SPWMP =                    0 / Spectrograph Filter Wheel Motor Position
I_MECHAS=                    0 / Echelle Arcsec
I_MECHHV=                 2048 / Echelle Hall value
I_MECHMP=                    0 / Echelle Motor Position
I_MXDSAS=                    0 / Cross Disperser Arcsec
I_MXDSHV=                 2051 / Cross Disperser Hall value
I_MXDSMP=                    0 / Cross Disperser motor position
I_CKMODE= 'ARC_D             ' / Detector clock mode
I_GRNS  =                40000 / Detector global reset pulsewidth (ns)
I_BGRFL =                    T / Backgroud Resets flag T:Yes F:No
I_BGRRT =                  900 / Detector backgroud resets rate (ms)
I_BGRDL =                   10 / Detector backgroud reset delay (ms)
I_BGRPW =                40000 / Backgroud Resets pulsewidth (nanoseconds)
I_SLWCNT=                   16 / Number of detector Slow Counts
I_VGGCL =                -3.05 / Detector VGGCL volts
I_VDET  =                -3.25 / Detector VDET (volts)
I_VDDUC =                -3.75 / Detector VDDUC (volts)
I_VBIAS =                 0.50 / Detector Bias= I_VDET - I_VDDUC (volts)
GAIN    =                  5.6 / AD conversion factor (electron/ADU)
I_PGAIN =                9.000 / Gain of Redline Preamp Boards
I_NSUBAR=                    1 / Number of Sub Arrays
I_SAR1CX=                  512 / Subarray 1 center x pixel coord
I_SAR1CY=                  514 / Subarray 1 center y pixel coord
I_SAR1WD=                  512 / Subarray 1 width
I_SAR1HT=                  514 / Subarray 1 height
I_NDRASZ=           0.00000000 / Nod R.A. size (arc seconds)
I_NDDCSZ=           0.00000000 / Nod DEC size (arc seconds)
I_DTHSZ =           0.00000000 / Dither step size (arc seconds)
I_DTHPAT=                 NONE / Dither pattern shape
I_DTHNUM=                    0 / N positions in dither
I_DTHPOS=                      / Dither position number
I_ROTAO =         185.66000000 / Array Rotation AO M1 IN
I_ROTNAO=          -0.36000000 / Array Rotation AO M1 OUT
EXTEND  =                    F / Extension exists or not (T or F)
END
```

● IRCS の Grism Spectroscopy モード

```
        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
--------------------------------------------------------------------------------
SIMPLE  =                    T / DATA IS IN FITS FORMAT
BITPIX  =                   32 / 32 BIT SIGNED TWOS COMPLEMENT INTEGER
NAXIS   =                    2 / NUMBER OF AXES
NAXIS1  =                 1024 / PIXELS ON 1st MOST VARYING AXIS
NAXIS2  =                 1024 / PIXELS ON 2nd MOST VARYING AXIS
FRAME-ID=                      / Frame Id
I_ARCH  =                    0 / ARCHIVED? 0:No 1:Yes
I_HDRVER=                 1.23 / IRCS HEADER VERSION
OBSERVER= 'IRCS                                                 ,
INSTRUME= 'IRCS              ' /
TELESCOP= 'SUBARU            ' /
OBS-ALOC= 'Observation       ' / Observation or Standby
OBSERVAT= 'NAOJ              ' /
OBJECT  = 'GRISM_JH_ON       ' /
DATA-TYP= 'FLAT                                                 ,
OBS-MOD = 'GRISM             ' / Observation Mode
DETECTOR= 'Aladdin3 SCA-415478' / Name of detector
I_FNAME = 'IRCA00107604                                         ,
TIMESYS = 'UTC               ' / Time system used in this header
DATE-OBS= '2011-12-15        ' / UT date of Observation (yyyy-mm-dd)
EXP1TIME=               0.5000 / Integration time in seconds
EXPTIME =               0.5000 / Integration time in seconds
COADDS  =                    1 / Number of Coadds
DET_NSMP=                    1 / Number of Non-Destructive Reads
NDR     =                    1 / Number of Non-Destructive Reads
UT-STR  = '16:10:30.47       ' / Start Exposure at UTC (HH:MM:SS.SS)
UT      = '16:10:30.23       ' / Typical UTC at exposure (HH:MM:SS.SS)
UT-END  = '16:10:31.39       ' / End Exposure at UTC (HH:MM:SS.SS)
HST     = '06:10:30.47       ' / Start exposure at HST (HH:MM:SS.SS)
DET-TMP =                27.50 / Detector Temperature
BIN-FCT1=                    1 / Binning factor of the X axis
BIN-FCT2=                    1 / Binning factor of the Y axis
BLANK   =                32768 /  Value used for null pixels
```

```
BUNIT   =                  ADU / Unit of original pixel values
BSCALE  =                 1.00 / Real = fits-value*BSCALE+BZERO
BZERO   =                 0.00 / Real = fits-value*BSCALE+BZERO
I_NSQ   =                    1 / Number of the frame in the sequence
I_NSQMAX=                    1 / Maximum number of the sequence
SLIT    = 'Reflective 3      ' / Entrance slit identifier
PROP-ID = 'o11111            ' / Proposal ID
DATASET = 'NOP               ' / Id of Observation Dataset
DET-ID  =                    1 / Detector Id. (1:CAMERA, 2:SPECTROGRAPH)
EQUINOX = '2000.000          ' / Standard FK5 (years)
UT1-UTC =              -0.375 / Difference between UT1 and UTC
MJD     =       52956.67394676 / Modified Julian Day at typical time
LST     = '09:17:32.34       ' / Typical local sidereal time during exposure
WCS-ORIG=                     / Origin of World Coordinate System
RA      = '09:17:58.962      ' / HH:MM:SS.SSS RA pointing
DEC     = '+19:50:35.21      ' / +/-DD:MM:SS.SS DEC pointing
RA2000  = '09:17:58.964      ' / HH:MM:SS.SSS RA (J2000) pointing
DEC2000 = '+19:50:35.21      ' / +/-DD:MM:SS.SS DEC (J2000) pointing
AZIMUTH =             90.00021 / Azimuth angle of telescope pointing
ALTITUDE=             89.96033 / Altitude angle of telescope pointing
ZD      =              0.03967 / Zenith Distance at typical time
LONGPOLE=                180.0 / The North Pole of the standard system
RADECSYS= 'FK5               ' / Equatorial coordinate system
CRPIX1  =                512.5 / Reference pixel in X (pixel)
CRPIX2  =                512.5 / Reference pixel in Y (pixel)
CRVAL1  =         139.49568176 / RA  (dg) of CRPIX1 reference pixel X
CRVAL2  =          19.84311485 / DEC (dg) of CRPIX2 reference pixel Y
CDELT1  =           0.00001618 / X Scale projected on detector (dg/pixel)
CDELT2  =           0.00001618 / Y Scale projected on detector (dg/pixel)
FOC-POS = 'CASSEGRAIN        ' / Focus where instrument is attached
TELFOCUS= 'CASSEGRAIN        ' / Focus where a beam is reachable
CS-TAVE =                     / Cassegrain Enclosure Average Temperature
FOC-VAL =                0.834 / Encoder value of the focus unit
AIRMASS =                1.000 / Averaged Air Mass
INSROT  =                0.000 / Instrument rotator angle
INST-PA =                6.060 / Instrument rotator position angle
AUTOGUID= 'OFF               ' / Autoguiding on/off
PROJP1  =                  0.0 / Projection Type of the first axis
PROJP2  =                  0.0 / Projection Type of the second axis
A_STATE =                ALIVE /
A_APDAV =                  0.0 /
A_LOOP  =                  OFF /
A_DMGAIN=              0.02000 /
A_TTGAIN=              0.00005 /
A_DMCMTX=         C_MTX_DM.cfg /
A_TTCMTX=         C_MTX_TT.cfg /
A_VMVOLT=                  0.1 /
A_VMFREQ=               2060.0 /
A_M1POS =                   IN /
A_M1STAT=                UNDEF /
A_M1PULS=                23100 /
A_ISTAT =                UNDEF /
A_IPULS =                18000 /
A_RSTAT =                UNDEF /
A_TSTAT =                UNDEF /
A_FSTAT =                UNDEF /
A_CSTAT =                UNDEF /
A_RPULS =                 8267 /
A_TPULS =               166792 /
A_FPULS =                 1750 /
A_CPULS =                19781 /
A_IDXOFF=                    0 /
A_IDYOFF=                    0 /
A_IDX0  =                    0 /
A_IDY0  =                    0 /
PC001001=             0.993729 / Coordinate translation matrix
PC001002=            -0.111816 / Coordinate translation matrix
PC002001=             0.111816 / Coordinate translation matrix
PC002002=             0.993729 / Coordinate translation matrix
CTYPE1  = 'RA---TAN          ' / Pixel Coordinate System
CTYPE2  = 'LINEAR            ' / Pixel Coordinate System
CUNIT1  = 'degree            ' / CRVAL1 units
CUNIT2  = 'microns           ' / CRVAL2 units
FILTER01= 'Grism JH          ' / First filter element
FILTER02= 'JH58Low(G)        ' / Second filter element
FILTER03= 'OPEN:1            ' / Third filter element
WAVELEN =               0.0000 / Wavelength at detector center (microns)
SLTCPIX1=          0.00000000 / Slit detector center (pixel)
SLTCPIX2=          0.00000000 / Slit detector center (pixel)
SLT-LEN =         20.60000000 / Slit length (arcsec)
SLT-WID =          0.30900001 / Slit width  (arcsec)
SLT-PA  =         90.00000000 / Slit Position Angle
SLTC-RA =          0.00000000 / RA  of slit center (degree)
SLTC-DEC=          0.00000000 / DEC of slit center (degree)
```

```
DISPERSR= 'GRISM             ' / Disperser name
DISPAXIS=                    2 / Number of dispersing axes
I_MCW1NM= 'Grism JH          ' / Camera Wheel 1 element name
I_MCW1PK=                    2 / Camera Wheel 1 puka
I_CW1HV =                 3117 / Camera Wheel 1 Hall Value
I_CW1MP =                11050 / Camera Wheel 1 motor position
I_MCW2NM= 'JH58Low(G)        ' / Camera Wheel 2 element name
I_CW2PK =                    2 / Camera Wheel 2 puka
I_CW2HV =                 2690 / Camera Wheel 2 Hall Value
I_CW2MP =                11100 / Camera Wheel 2 motor position
I_MCW3NM= 'OPEN:1            ' / Camera Wheel 3 element name
I_CW3PK =                    1 / Camera Wheel 3 puka
I_CW3HV =                 2968 / Camera Wheel 3 Hall Value
I_CW3MP =                 5000 / Camera Wheel 3 motor position
I_MFOCMC=                  875 / Focus Stage microns
I_MFOCHV=                 2158 / Focus Stage hall value
I_MFOCMP=                 3007 / Focus Stage motor position
I_MDFMST= '58MAS             ' / Dual Flipmirror State
I_MFM1ST= 'IN                ' / Flipmirror 1 State IN/OUT
I_MFM1HV=                 3281 / Flipmirror 1 Hall Value
I_MFM1MP=                    0 / FlipMirror 1 motor position
I_MFM2ST= 'IN                ' / Flipmirror 2 state IN/OUT
I_MFM2HV=                 4095 / Flipmirror 2 Hall Value
I_MFM2MP=                    0 / FlipMirror 1 motor position
I_SLWNM = 'Reflective 3      ' / SlitWheel element name
I_SLWPK =                   13 / Slitwheel puka
I_SLWHV =                 3140 / Slitwheel Hall Value
I_SLWMP =               100700 / SlitWheel motor position
I_SPWNM =                      / Spectrograph Wheel element name
I_SPWPK =                    5 / Spectrograph Filter Wheel Puka
I_SPWHV =                 4095 / Spectrograph Filter Wheel Hall Value
I_SPWMP =                    1 / Spectrograph Filter Wheel Motor Position
I_MECHAS=                    0 / Echelle Arcsec
I_MECHHV=                 2048 / Echelle Hall value
I_MECHMP=                    0 / Echelle Motor Position
I_MXDSAS=                    0 / Cross Disperser Arcsec
I_MXDSHV=                 2051 / Cross Disperser Hall value
I_MXDSMP=                    0 / Cross Disperser motor position
I_CKMODE= 'ARC_D             ' / Detector clock mode
I_GRNS  =                40000 / Detector global reset pulsewidth (ns)
I_BGRFL =                    T / Backgroud Resets flag T:Yes F:No
I_BGRRT =                  900 / Detector backgroud resets rate (ms)
I_BGRDL =                   10 / Detector backgroud reset delay (ms)
I_BGRPW =                40000 / Backgroud Resets pulsewidth (nanoseconds)
I_SLWCNT=                   16 / Number of detector Slow Counts
I_VGGCL =                -3.05 / Detector VGGCL volts
I_VDET  =                -3.25 / Detector VDET (volts)
I_VDDUC =                -3.75 / Detector VDDUC (volts)
I_VBIAS =                 0.50 / Detector Bias= I_VDET - I_VDDUC (volts)
GAIN    =                  5.6 / AD conversion factor (electron/ADU)
I_PGAIN =                9.000 / Gain of Redline Preamp Boards
I_NSUBAR=                    1 / Number of Sub Arrays
I_SAR1CX=                  512 / Subarray 1 center x pixel coord
I_SAR1CY=                  514 / Subarray 1 center y pixel coord
I_SAR1WD=                  512 / Subarray 1 width
I_SAR1HT=                  514 / Subarray 1 height
I_NDRASZ=           0.00000000 / Nod R.A. size (arc seconds)
I_NDDCSZ=           0.00000000 / Nod DEC size (arc seconds)
I_DTHSZ =           0.00000000 / Dither step size (arc seconds)
I_DTHPAT=                 NONE / Dither pattern shape
I_DTHNUM=                    0 / N positions in dither
I_DTHPOS=                      / Dither position number
I_ROTAO =         185.66000000 / Array Rotation AO M1 IN
I_ROTNAO=          -0.36000000 / Array Rotation AO M1 OUT
EXTEND  =                    F / Extension exists or not (T or F)
END
```

● IRCS の Echelle モード

```
        1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678
--------------------------------------------------------------------------------------------------------------
SIMPLE  =                    T / DATA IS IN FITS FORMAT
BITPIX  =                   32 / 32 BIT SIGNED TWOS COMPLEMENT INTEGER
NAXIS   =                    2 / NUMBER OF AXES
NAXIS1  =                 1024 / PIXELS ON 1st MOST VARYING AXIS
NAXIS2  =                 1024 / PIXELS ON 2nd MOST VARYING AXIS
FRAME-ID=                      / Frame Id
I_ARCH  =                    0 / ARCHIVED? 0:No 1:Yes
I_HDRVER=                 1.23 / IRCS HEADER VERSION
OBSERVER= 'IRCS                                    '
INSTRUME= 'IRCS              ' /
```

```
TELESCOP= 'SUBARU            ' /
OBS-ALOC= 'Observation       ' / Observation or Standby
OBSERVAT= 'NAOJ              ' /
OBJECT  = 'ECHELLE_K12CO_OFF_1' /
DATA-TYP= 'FLAT                                                 '
OBS-MOD = 'ECHELLE           ' / Observation Mode
DETECTOR= 'Aladdin2 SCA-42821' / Name of detector
I_FNAME = 'IRCA00107193                                         '
TIMESYS = 'UTC               ' / Time system used in this header
DATE-OBS= '2011-10-13        ' / UT date of Observation (yyyy-mm-dd)
EXP1TIME=               0.5000 / Integration time in seconds
EXPTIME =               0.5000 / Integration time in seconds
COADDS  =                    1 / Number of Coadds
DET_NSMP=                    1 / Number of Non-Destructive Reads
NDR     =                    1 / Number of Non-Destructive Reads
UT-STR  = '09:14:18.05       ' / Start Exposure at UTC (HH:MM:SS.SS)
UT      = '09:14:18.02       ' / Typical UTC at exposure (HH:MM:SS.SS)
UT-END  = '09:14:18.96       ' / End Exposure at UTC (HH:MM:SS.SS)
HST     = '23:14:18.05       ' / Start exposure at HST (HH:MM:SS.SS)
DET-TMP =                27.50 / Detector Temperature
BIN-FCT1=                    1 / Binning factor of the X axis
BIN-FCT2=                    1 / Binning factor of the Y axis
BLANK   =                32768 /  Value used for null pixels
BUNIT   =                  ADU / Unit of original pixel values
BSCALE  =                 1.00 / Real = fits-value*BSCALE+BZERO
BZERO   =                 0.00 / Real = fits-value*BSCALE+BZERO
I_NSQ   =                    1 / Number of the frame in the sequence
I_NSQMAX=                    1 / Maximum number of the sequence
SLIT    = '0.155x5.79 H      ' / Entrance slit identifier
PROP-ID = 'o11111            ' / Proposal ID
DATASET = 'NOP               ' / Id of Observation Dataset
DET-ID  =                    2 / Detector Id. (1:CAMERA, 2:SPECTROGRAPH)
EQUINOX = '2000.000          ' / Standard FK5 (years)
UT1-UTC =               -0.372 / Difference between UT1 and UTC
MJD     =       52946.38491898 / Modified Julian Day at typical time
LST     = '01:40:46.42       ' / Typical local sidereal time during exposure
WCS-ORIG=                     / Origin of World Coordinate System
RA      = '01:54:23.971      ' / HH:MM:SS.SSS RA pointing
DEC     = '+63:40:15.08      ' / +/-DD:MM:SS.SS DEC pointing
RA2000  = '01:54:23.971      ' / HH:MM:SS.SSS RA (J2000) pointing
DEC2000 = '+63:40:15.08      ' / +/-DD:MM:SS.SS DEC (J2000) pointing
AZIMUTH =              2.14829 / Azimuth angle of telescope pointing
ALTITUDE=             46.07823 / Altitude angle of telescope pointing
ZD      =             43.92175 / Zenith Distance at typical time
LONGPOLE=                180.0 / The North Pole of the standard system
RADECSYS= 'FK5               ' / Equatorial coordinate system
CRPIX1  =                512.5 / Reference pixel in X (pixel)
CRPIX2  =                512.5 / Reference pixel in Y (pixel)
CRVAL1  =          28.59987831 / RA  (dg) of CRPIX1 reference pixel X
CRVAL2  =          63.67085648 / DEC (dg) of CRPIX2 reference pixel Y
CDELT1  =           0.00003194 / X Scale projected on detector (dg/pixel)
CDELT2  =           0.00003194 / Y Scale projected on detector (dg/pixel)
FOC-POS = 'CASSEGRAIN        ' / Focus where instrument is attached
TELFOCUS= 'CASSEGRAIN        ' / Focus where a beam is reachable
CS-TAVE =                     / Cassegrain Enclosure Average Temperature
FOC-VAL =                0.767 / Encoder value of the focus unit
AIRMASS =                1.387 / Averaged Air Mass
INSROT  =             -169.505 / Instrument rotator angle
INST-PA =                5.930 / Instrument rotator position angle
AUTOGUID= 'OFF               ' / Autoguiding on/off
PROJP1  =                  0.0 / Projection Type of the first axis
PROJP2  =                  0.0 / Projection Type of the second axis
A_STATE =                ALIVE /
A_APDAV =                105.0 /
A_LOOP  =                  OFF /
A_DMGAIN=              0.05000 /
A_TTGAIN=              0.00005 /
A_DMCMTX=         C_MTX_DM.cfg /
A_TTCMTX=         C_MTX_TT.cfg /
A_VMVOLT=                  3.0 /
A_VMFREQ=               2060.0 /
A_M1POS =                   IN /
A_M1STAT=               UNDEF /
A_M1PULS=               23100 /
A_ISTAT =               UNDEF /
A_IPULS =               16000 /
A_RSTAT =               UNDEF /
A_TSTAT =               UNDEF /
A_FSTAT =               UNDEF /
A_CSTAT =               UNDEF /
A_RPULS =                5073 /
A_TPULS =               83016 /
A_FPULS =                1400 /
A_CPULS =               19782 /
```

```
A_IDXOFF=                    0 /
A_IDYOFF=                    0 /
A_IDX0  =                    0 /
A_IDY0  =                    0 /
PC001001=            -0.994649 / Coordinate translation matrix
PC001002=             0.103313 / Coordinate translation matrix
PC002001=             0.103313 / Coordinate translation matrix
PC002002=             0.994649 / Coordinate translation matrix
CTYPE1  = 'LINEAR            ' / Pixel Coordinate System
CTYPE2  = 'RA--TAN           ' / Pixel Coordinate System
CUNIT1  = 'degree            ' / CRVAL1 units
CUNIT2  = 'degree            ' / CRVAL2 units
CRVAL1  =          28.59987831 / Physical value of reference pixel X
CRVAL2  =          63.67085648 / Physical value of reference pixel Y
PROJP1  =                  0.0 / Projection Type of the first axis
PROJP2  =                  0.0 / Projection Type of the second axis
FILTER01= 'K                 ' / First filter element
PROJP2  =                  0.0 / Projection Type of the secondaxis
WAVELEN =               0.0000 / Wavelength at detector center (microns)
SLTCPIX1=           0.00000000 / Slit detector center (pixel)
SLTCPIX2=           0.00000000 / Slit detector center (pixel)
SLT-LEN =           5.78859988 / Slit length (arcsec)
SLT-WID =           0.15450001 / Slit width  (arcsec)
SLT-PA  =           0.00000000 / Slit Position Angle
SLTC-RA =           0.00000000 / RA  of slit center (degree)
SLTC-DEC=           0.00000000 / DEC of slit center (degree)
DISPERSR= 'ECHELLE           ' / Disperser name
DISPAXIS=                    1 / Number of dispersing axes
I_MCW1NM= 'OPEN:1            ' / Camera Wheel 1 element name
I_MCW1PK=                    1 / Camera Wheel 1 puka
I_CW1HV =                 3071 / Camera Wheel 1 Hall Value
I_CW1MP =                 3050 / Camera Wheel 1 motor position
I_MCW2NM= 'K                 ' / Camera Wheel 2 element name
I_CW2PK =                    7 / Camera Wheel 2 puka
I_CW2HV =                 2855 / Camera Wheel 2 Hall Value
I_CW2MP =                51100 / Camera Wheel 2 motor position
I_MCW3NM= 'ND(CaF2 1/4)      ' / Camera Wheel 3 element name
I_CW3PK =                    2 / Camera Wheel 3 puka
I_CW3HV =                 2997 / Camera Wheel 3 Hall Value
I_CW3MP =                13000 / Camera Wheel 3 motor position
I_MFOCMC=                 1000 / Focus Stage microns
I_MFOCHV=                 2195 / Focus Stage hall value
I_MFOCMP=                 3436 / Focus Stage motor position
I_MDFMST= '58MAS             ' / Dual Flipmirror State
I_MFM1ST= 'IN                ' / Flipmirror 1 State IN/OUT
I_MFM1HV=                 3280 / Flipmirror 1 Hall Value
I_MFM1MP=                    0 / FlipMirror 1 motor position
I_MFM2ST= 'IN                ' / Flipmirror 2 state IN/OUT
I_MFM2HV=                 4095 / Flipmirror 2 Hall Value
I_MFM2MP=                    0 / FlipMirror 1 motor position
I_SLWNM = '0.155x5.79 H      ' / SlitWheel element name
I_SLWPK =                    3 / Slitwheel puka
I_SLWHV =                 2975 / Slitwheel Hall Value
I_SLWMP =                20700 / SlitWheel motor position
I_SPWNM = 'K                 ' / Spectrograph Wheel element name
I_SPWPK =                    6 / Spectrograph Filter Wheel Puka
I_SPWHV =                 2982 / Spectrograph Filter Wheel Hall Value
I_SPWMP =                21000 / Spectrograph Filter Wheel Motor Position
I_MECHAS=                 6450 / Echelle Arcsec
I_MECHHV=                 3089 / Echelle Hall value
I_MECHMP=                14333 / Echelle Motor Position
I_MXDSAS=                  500 / Cross Disperser Arcsec
I_MXDSHV=                 1929 / Cross Disperser Hall value
I_MXDSMP=                -1110 / Cross Disperser motor position
I_CKMODE= 'ARC_D             ' / Detector clock mode
I_GRNS  =                40000 / Detector global reset pulsewidth (ns)
I_BGRFL =                    T / Backgroud Resets flag T:Yes F:No
I_BGRRT =                  900 / Detector backgroud resets rate (ms)
I_BGRDL =                   10 / Detector backgroud reset delay (ms)
I_BGRPW =                40000 / Backgroud Resets pulsewidth (nanoseconds)
I_SLWCNT=                   16 / Number of detector Slow Counts
I_VGGCL =                -3.25 / Detector VGGCL volts
I_VDET  =                -3.45 / Detector VDET (volts)
I_VDDUC =                -3.75 / Detector VDDUC (volts)
I_VBIAS =                 0.30 / Detector Bias= I_VDET - I_VDDUC (volts)
GAIN    =                  3.8 / AD conversion factor (electron/ADU)
I_PGAIN =               18.289 / Gain of Redline Preamp Boards
I_NSUBAR=                    1 / Number of Sub Arrays
I_SAR1CX=                    0 / Subarray 1 center x pixel coord
I_SAR1CY=                    0 / Subarray 1 center y pixel coord
I_SAR1WD=                    0 / Subarray 1 width
I_SAR1HT=                    0 / Subarray 1 height
I_NDRASZ=           0.00000000 / Nod R.A. size (arc seconds)
I_NDDCSZ=           0.00000000 / Nod DEC size (arc seconds)
```

```
I_DTHSZ =           0.00000000 / Dither step size (arc seconds)
I_DTHPAT=                 NONE / Dither pattern shape
I_DTHNUM=                    0 / N positions in dither
I_DTHPOS=                      / Dither position number
I_ROTAO =         185.66000000 / Array Rotation AO M1 IN
I_ROTNAO=          -0.36000000 / Array Rotation AO M1 OUT
EXTEND  =                    F / Extension exists or not (T or F)
END
```

● IRCS の SlitViewing モード

```
         1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678
--------------------------------------------------------------------------------------------------------------
SIMPLE  =                    T / DATA IS IN FITS FORMAT
BITPIX  =                   32 / 32 BIT SIGNED TWOS COMPLEMENT INTEGER
NAXIS   =                    2 / NUMBER OF AXES
NAXIS1  =                 1024 / PIXELS ON 1st MOST VARYING AXIS
NAXIS2  =                 1024 / PIXELS ON 2nd MOST VARYING AXIS
FRAME-ID=                      / Frame Id
I_ARCH  =                    0 / ARCHIVED? 0:No 1:Yes
I_HDRVER=                 1.23 / IRCS HEADER VERSION
OBSERVER= 'IRCS                                          '
INSTRUME= 'IRCS              ' /
TELESCOP= 'SUBARU            ' /
OBS-ALOC= 'Observation       ' / Observation or Standby
OBSERVAT= 'NAOJ              ' /
OBJECT  = 'Nandesuka         ' /
DATA-TYP= 'SLITVIEW                                      '
OBS-MOD = 'SLITVIEW          ' / Observation Mode
DETECTOR= 'Aladdin3 SCA-415478' / Name of detector
I_FNAME = 'IRCA00107155                                  '
TIMESYS = 'UTC               ' / Time system used in this header
DATE-OBS= '2011-10-11        ' / UT date of Observation (yyyy-mm-dd)
EXP1TIME=               5.0000 / Integration time in seconds
EXPTIME =               5.0000 / Integration time in seconds
COADDS  =                    1 / Number of Coadds
DET_NSMP=                   12 / Number of Non-Destructive Reads
NDR     =                   12 / Number of Non-Destructive Reads
UT-STR  = '09:08:04.99       ' / Start Exposure at UTC (HH:MM:SS.SS)
UT      = '09:08:09.49       ' / Typical UTC at exposure (HH:MM:SS.SS)
UT-END  = '09:08:14.91       ' / End Exposure at UTC (HH:MM:SS.SS)
HST     = '23:08:04.99       ' / Start exposure at HST (HH:MM:SS.SS)
DET-TMP =                27.50 / Detector Temperature
BIN-FCT1=                    1 / Binning factor of the X axis
BIN-FCT2=                    1 / Binning factor of the Y axis
BLANK   =                32768 /  Value used for null pixels
BUNIT   =                  ADU / Unit of original pixel values
BSCALE  =                 1.00 / Real = fits-value*BSCALE+BZERO
BZERO   =                 0.00 / Real = fits-value*BSCALE+BZERO
I_NSQ   =                    1 / Number of the frame in the sequence
I_NSQMAX=                    1 / Maximum number of the sequence
SLIT    = '0.155x5.79 H      ' / Entrance slit identifier
PROP-ID = 'o11111            ' / Proposal ID
DATASET = 'NOP               ' / Id of Observation Dataset
DET-ID  =                    1 / Detector Id. (1:CAMERA, 2:SPECTROGRAPH)
EQUINOX = '2000.000          ' / Standard FK5 (years)
UT1-UTC =             -0.372 / Difference between UT1 and UTC
MJD     =       52946.38059028 / Modified Julian Day at typical time
LST     = '01:34:31.39       ' / Typical local sidereal time during exposure
WCS-ORIG=                      / Origin of World Coordinate System
RA      = '01:54:23.971      ' / HH:MM:SS.SSS RA pointing
DEC     = '+63:40:15.07      ' / +/-DD:MM:SS.SS DEC pointing
RA2000  = '01:54:23.971      ' / HH:MM:SS.SSS RA (J2000) pointing
DEC2000 = '+63:40:15.07      ' / +/-DD:MM:SS.SS DEC (J2000) pointing
AZIMUTH =              3.13914 / Azimuth angle of telescope pointing
ALTITUDE=             46.01056 / Altitude angle of telescope pointing
ZD      =             43.98944 / Zenith Distance at typical time
LONGPOLE=                180.0 / The North Pole of the standard system
RADECSYS= 'FK5               ' / Equatorial coordinate system
CRPIX1  =                512.5 / Reference pixel in X (pixel)
CRPIX2  =                512.5 / Reference pixel in Y (pixel)
CRVAL1  =          28.59987831 / RA  (dg) of CRPIX1 reference pixel X
CRVAL2  =          63.67085266 / DEC (dg) of CRPIX2 reference pixel Y
CDELT1  =           0.00001618 / X Scale projected on detector (dg/pixel)
CDELT2  =           0.00001618 / Y Scale projected on detector (dg/pixel)
FOC-POS = 'CASSEGRAIN        ' / Focus where instrument is attached
TELFOCUS= 'CASSEGRAIN        ' / Focus where a beam is reachable
CS-TAVE =                      / Cassegrain Enclosure Average Temperature
FOC-VAL =                0.767 / Encoder value of the focus unit
AIRMASS =                1.389 / Averaged Air Mass
INSROT  =             -167.393 / Instrument rotator angle
```

```
INST-PA =               5.930 / Instrument rotator position angle
AUTOGUID= 'OFF              ' / Autoguiding on/off
PROJP1  =                 0.0 / Projection Type of the first axis
PROJP2  =                 0.0 / Projection Type of the second axis
A_STATE =               ALIVE /
A_APDAV =            252919.7 /
A_LOOP  =                FULL /
A_DMGAIN=             0.05000 /
A_TTGAIN=             0.00005 /
A_DMCMTX=        C_MTX_DM.cfg /
A_TTCMTX=        C_MTX_TT.cfg /
A_VMVOLT=                3.0 /
A_VMFREQ=              2060.0 /
A_M1POS =                  IN /
A_M1STAT=               UNDEF /
A_M1PULS=               23100 /
A_ISTAT =               UNDEF /
A_IPULS =               16000 /
A_RSTAT =               UNDEF /
A_TSTAT =               UNDEF /
A_FSTAT =               UNDEF /
A_CSTAT =               UNDEF /
A_RPULS =                4395 /
A_TPULS =               82556 /
A_FPULS =                1400 /
A_CPULS =               19782 /
A_IDXOFF=                   0 /
A_IDYOFF=                   0 /
A_IDX0  =                   0 /
A_IDY0  =                   0 /
PC001001=            -0.999989 / Coordinate translation matrix
PC001002=             0.004712 / Coordinate translation matrix
PC002001=            -0.004712 / Coordinate translation matrix
PC002002=            -0.999989 / Coordinate translation matrix
CTYPE1  = 'RA---TAN         ' / Pixel Coordinate System
CTYPE2  = 'DEC--TAN         ' / Pixel Coordinate System
CUNIT1  = 'degree           ' / CRVAL1 units
CUNIT2  = 'degree           ' / CRVAL2 units
FILTER01= 'OPEN:1           ' / First filter element
FILTER02= 'K                ' / Second filter element
FILTER03= 'ND(CaF2 1/4)     ' / Third filter element
DISPERSR= 'ECHELLE          ' / Disperser name
DISPAXIS=                   1 / Number of dispersing axes
I_MCW1NM= 'OPEN:1           ' / Camera Wheel 1 element name
I_MCW1PK=                   1 / Camera Wheel 1 puka
I_CW1HV =                3071 / Camera Wheel 1 Hall Value
I_CW1MP =                3050 / Camera Wheel 1 motor position
I_MCW2NM= 'K                ' / Camera Wheel 2 element name
I_CW2PK =                   7 / Camera Wheel 2 puka
I_CW2HV =                2855 / Camera Wheel 2 Hall Value
I_CW2MP =               51100 / Camera Wheel 2 motor position
I_MCW3NM= 'ND(CaF2 1/4)     ' / Camera Wheel 3 element name
I_CW3PK =                   2 / Camera Wheel 3 puka
I_CW3HV =                2997 / Camera Wheel 3 Hall Value
I_CW3MP =               13000 / Camera Wheel 3 motor position
I_MFOCMC=                1000 / Focus Stage microns
I_MFOCHV=                2195 / Focus Stage hall value
I_MFOCMP=                3436 / Focus Stage motor position
I_MDFMST= '58MAS            ' / Dual Flipmirror State
I_MFM1ST= 'IN               ' / Flipmirror 1 State IN/OUT
I_MFM1HV=                3280 / Flipmirror 1 Hall Value
I_MFM1MP=                   0 / FlipMirror 1 motor position
I_MFM2ST= 'IN               ' / Flipmirror 2 state IN/OUT
I_MFM2HV=                4095 / Flipmirror 2 Hall Value
I_MFM2MP=                   0 / FlipMirror 1 motor position
I_SLWNM = '0.155x5.79 H     ' / SlitWheel element name
I_SLWPK =                   3 / Slitwheel puka
I_SLWHV =                2975 / Slitwheel Hall Value
I_SLWMP =               20700 / SlitWheel motor position
I_SPWNM = 'K                ' / Spectrograph Wheel element name
I_SPWPK =                   6 / Spectrograph Filter Wheel Puka
I_SPWHV =                2982 / Spectrograph Filter Wheel Hall Value
I_SPWMP =               21000 / Spectrograph Filter Wheel Motor Position
I_MECHAS=                6450 / Echelle Arcsec
I_MECHHV=                3089 / Echelle Hall value
I_MECHMP=               14333 / Echelle Motor Position
I_MXDSAS=                 500 / Cross Disperser Arcsec
I_MXDSHV=                1929 / Cross Disperser Hall value
I_MXDSMP=               -1110 / Cross Disperser motor position
I_CKMODE= 'ARC_D            ' / Detector clock mode
I_GRNS  =               40000 / Detector global reset pulsewidth (ns)
I_BGRFL =                   T / Backgroud Resets flag T:Yes F:No
I_BGRRT =                 900 / Detector backgroud resets rate (ms)
I_BGRDL =                  10 / Detector backgroud reset delay (ms)
```

```
I_BGRPW =                40000 / Backgroud Resets pulsewidth (nanoseconds)
I_SLWCNT=                   16 / Number of detector Slow Counts
I_VGGCL =                -3.05 / Detector VGGCL volts
I_VDET  =                -3.25 / Detector VDET (volts)
I_VDDUC =                -3.75 / Detector VDDUC (volts)
I_VBIAS =                 0.50 / Detector Bias= I_VDET - I_VDDUC (volts)
GAIN    =                  5.6 / AD conversion factor (electron/ADU)
I_PGAIN =                9.000 / Gain of Redline Preamp Boards
I_NSUBAR=                    1 / Number of Sub Arrays
I_SAR1CX=                  512 / Subarray 1 center x pixel coord
I_SAR1CY=                  514 / Subarray 1 center y pixel coord
I_SAR1WD=                  512 / Subarray 1 width
I_SAR1HT=                  514 / Subarray 1 height
I_NDRASZ=           0.00000000 / Nod R.A. size (arc seconds)
I_NDDCSZ=           0.00000000 / Nod DEC size (arc seconds)
I_DTHSZ =           2.80000000 / Dither step size (arc seconds)
I_DTHPAT=                 ABBA / Dither pattern shape
I_DTHNUM=                    4 / N positions in dither
I_DTHPOS=               CENTER / Dither position number
I_ROTAO =         185.66000000 / Array Rotation AO M1 IN
I_ROTNAO=          -0.36000000 / Array Rotation AO M1 OUT
EXTEND  =                    F / Extension exists or not (T or F)
END
```

10.4.9 CAC (1999/03/02)

```
         1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678
--------------------------------------------------------------------------------------------------------------
SIMPLE  =                    T /  固定
BITPIX  =                  -32 /  固定
NAXIS   =                    2 /  固定                                                  %2d
NAXIS1  =                 1024 /   V-LAN 画像ヘッダ                                    %4d
NAXIS2  =                 1024 /   V-LAN 画像ヘッダ                                    %4d
BSCALE  =                  1.0 /  固定                                               %3.1f
BZERO   =                  0.0 /  固定                                               %3.1f
BUNIT   = 'CCD COUNT IN ADU'   /  固定                                                %16s
BLANK   =               -32767 /  固定                                                %8s
CRPIX1  =                512.0 /   V-LAN 画像ヘッダ                                  %5.1f
CRPIX2  =                512.0 /   V-LAN 画像ヘッダ                                  %5.1f
CRVAL1  =            41.509915 /                                                     %10.6f
CRVAL2  =            41.509915 /                                                     %10.6f
CTYPE1  = 'RA---TAN'           /  固定                                                %8s
CTYPE2  = 'DEC--TAN'           /  固定                                                %8s
CDELT1  =          -0.00047247 /  計算式                                             %13.8f
CDELT2  =           0.00047257 /  計算式                                             %13.8f
CUNIT1  = 'degree  '           /  →固定                                               %6s
CUNIT2  = 'degree  '           /  →固定                                               %6s
BIN-FCT1=                    1 /   V-LAN 画像ヘッダ                                    %2d
BIN-FCT2=                    1 /   V-LAN 画像ヘッダ                                    %2d
PRD-MIN1=                    1 /   V-LAN 画像ヘッダより、読出開始Ｘ位置 (%d)            %4d
PRD-MIN2=                    1 /   V-LAN 画像ヘッダより、読出開始Ｙ位置 (%d)            %4d
PRD-RNG1=                  100 /   V-LAN 画像ヘッダより、読出Ｘ範囲 (%d)               %4d
PRD-RNG2=                  100 /   V-LAN 画像ヘッダより、読出Ｙ範囲 (%d)               %4d
RA      = '02:46:02.379'       /   Status : FITS.SBR.RA                               %12s
DEC     = '+41:30:35.69'       /   Status : FITS.SBR.DEC                              %12s
EQUINOX =               1998.7 /   Status : FITS.SBR.EQUINOX                         %6.1f
RA2000  = '02:46:02.379'       /   Status : FITS.SBR.RA                               %12s
DEC2000 = '+41:30:35.69'       /   Status : FITS.SBR.DEC                              %12s
RADECSYS= 'FK5     '           /  固定
PC001001=                  1.0 /  ツールキットのロジックを使用                      %13.8f
PC001002=                  0.0 /  ツールキットのロジックを使用                      %13.8f
PC002001=                  0.0 /  ツールキットのロジックを使用                      %13.8f
PC002002=                  1.0 /  ツールキットのロジックを使用                      %13.8f
LONGPOLE=                180.0 /  固定                                             %5.1f
WCS-ORIG= 'SUBARU Toolkit'     /  固定
ALTITUDE=              23.4567 /   Status : FITS.SBR.ALTITUDE                        %8.5f
AZIMUTH =             187.6543 /   Status : FITS.SBR.AZIMUTH                         %9.5f
TIMESYS = 'UTC     '           /  固定
DATE-OBS= '1998-12-31'         /  ツールキット関数の UTC-Date                         %10s
UT      = '00:00:00.000'       /  ツールキット関数の UTC                              %12s
MJD     =       40587.00000000 /  ツールキット関数の MJD                            %15.8f
HST     = '00:00:00.000'       /  プログラム内獲得                                    %12s
LST     = '00:00:00.000'       /  ツールキット関数の LST                              %12s
EXPTIME =               10.000 /   V-LAN 画像ヘッダ                                  %8.3f
AIRMASS =             1.00000 /   Status : FITS.SBR.AIRMASS                          %8.5f
ZD      =              56.700 /   Status : FITS.SBR.ZA                               %6.3f
DOM-PRS =              600.00 /   Status : FITS.SBR.DOM-PRS(%7.2f)hpa                %7.2f
OBSERVER= 'George  '           /   Status : FITS.VGW.OBSERVER                         %30s
PROP-ID = 'o98001  '           /   FITS.VGW.PROP-ID                                   %6s
```

```
OBSERVAT= 'NAOJ    '           /  固定
TELESCOP= 'Subaru  '           /   Status : FITS.SBR.TELESCOP
TELFOCUS= 'CASSEGRAIN'         /   Status : FITS.SBR.TELFOCUS                    %12s
FOC-POS = 'CASSEGRAIN'         /   V-LAN 画像ヘッダ                              %12s
FOC-VAL =                1.000 /   Status : FITS.SBR.FOC-VAL                    %7.3f
M2-POS1 =                1.000 /   Status : ?????(%8.3f)mm                      %8.3f
M2-POS2 =                1.000 /   Status : ?????(%8.3f)mm                      %8.3f
M2-ANG1 =               30.000 /   Status : TSCL.TX(%8.5f)arcmin                %8.5f
M2-ANG2 =               30.000 /   Status : TSCL.TY(%8.5f)arcmin                %8.5f
AG-PRB1 =          -123.45678 /   Status : TSCV.AGr Probe-r(%10.5f)mm           %10.5f
AG-PRB2 =          -100.45678 /   Status : TSCV.AGTheta Probe-Theta(%10.5f)deg  %10.5f
INSROT  =            +123.456 /   Status : FITS.SBR.INSROT(%+8.3f)degree       %8.3f
ADC-TYPE= 'RED     '           /   Status : FITS.SBR.ADC-TYPE(%30s)              %30s
ADC     =              130.123 /   Status : FITS.SBR.ADC(%7.3f)                 %7.3f
FRAMEID = 'CACA00000001'       /   OBS からのコマンド                            %12s
EXP-ID  = 'CACA00000001'       /   FRAMEID と同様の値                            %12s
OBS-ALOC= 'Observation'        /   Status : FITS.VGW.OBS-ALOC                    %12s
OBS-MOD = 'IMAGING '           /  固定                                           %7s
INSTRUME= 'CAC     '           /   Cassegrain Alignment Camera                   %3s
OBJECT  = 'First Light Target' /   Object Name                                   %20s
DATA-TYP= 'OBJECT  '           /  画像により OBJECT/DARK/FLAT/SKY/BIAS           %6s
DATASET = 'CACD0000001'        /                                                 %6s
DETECTOR= 'SI003A-1B'          /                                                 %30s
GAIN    =                 1.00 /                                               %5.2f
DET-TMP =                131.0 /   Status : FITS.VGW.DET-TMP-AG                 %6.1f
FILTER01= 'None    '           / None, ND0.5, ND1.0, ND1.5, ND2.0, ND3.0        %6s
FILTER02= 'U       '           / None, U, B, V, R, I                            %4s
EXTEND  =                    F /  固定
END
```

10.5 *FITS* ヘッダ情報の STARS データベースへの登録形式

以下は観測データが山麓に転送され、 STARS (すばる望遠鏡データアーカイブシステム) にアーカイビングされる際に、そのヘッダ情報がデータベースにどのような形式で登録されるかを示したものである。

[***FITS*** フォーマットと **STARS** データベース内フォーマットの対応表]

(2003 年 12 月 31 日版)

この対応表のねらいは、すばる *FITS* 辞書のフォーマットと、STARS データベース内のフォーマットの違いを明確にし、桁数でどのような値をデフォルト、もしくは OBS との通信エラー時などにキーワード値としてほうり込んでおくべきかを明示することにある。*FITS* 辞書の場合と違い、STARS のフォーマットはなるべくデータベースの容量を削減するべく、このような方式を取らざるを得ないのが現状である。

本表は、*FITS* 辞書の項目からキーワード名 (KeyWord)、カテゴリ (Category)、重要度 (Importance)、フォートラン型フォーマット (FormatF) を抽出し、さらに各観測装置ごとのフォーマットを装置名の下に書き記したものである。

なお、この表は「WEB 版すばる *FITS* 辞書」のページ (7.4.4 節参照) からも参照できる。

(注: 紙面の都合でオリジナル版から一部のカラム名を略してある。Importance → Importanc, SupCam → SupCa, COMICS → COMIC, MIRTOS → MIRTO である。また一部隣接する内容間に空白が取れず見にくい部分のあることをお断りしておく。)

[*FITS* フォーマットと STARS データベース内フォーマット対応表 (1/5)]

KeyWord	Category	Importanc	FormatF	SupCa	FOCAS	HDS	IRCS	OHS	COMIC	CIAO	MIRTO	CAC
ADC	Telescope	Optional	F20.3	-	A80	A80	-	-	-	-	-	A80
ADC-END	Telescope	Optional	F20.3	F7.3	-	F7.2	-	-	-	-	-	-
ADC-STR	Telescope	Optional	F20.3	F7.3	-	F7.2	-	-	-	-	-	-
ADC-TYPE	Telescope	Optional	A20	A80	-	A80	-	-	-	-	-	A80

[*FITS* フォーマットと STARS データベース内フォーマット対応表 (2/5)]

KeyWord	Category	Importanc	FormatF	SupCa	FOCAS	HDS	IRCS	OHS	COMIC	CIAO	MIRTO	CAC
AG-PRB1	Telescope	Optional	F20.3	-	-	-	-	-	-	-	-	F10.5
AG-PRB2	Telescope	Optional	F20.3	-	-	-	-	-	-	-	-	F10.5
AIRM-END	Time	Optional	F20.3	F6.4	F5.2	F6.4	-	-	-	-	-	-
AIRM-STR	Time	Optional	F20.3	F6.4	F5.2	F6.4	-	-	-	-	-	-
AIRMASS	Time	Common	F20.3	F6.4	F5.2	F6.4	F9.5	F9.5	F9.5	F9.5	F9.5	F8.5
ALT-END	Telescope	Optional	F20.5	-	-	F9.5	-	-	-	-	-	-
ALT-STR	Telescope	Optional	F20.5	-	-	F9.5	-	-	-	-	-	-
ALTITUDE	Telescope	Optional	F20.5	F7.3	F8.5	F9.5	F5.1	F5.1	F8.5	-	F9.5	F8.5
APERTURE	Spectroscopy	Optional	A30	-	-	-	-	-	-	-	A80	-
APT-SIZE	Spectroscopy	Optional	F20.3	-	-	-	-	-	-	-	-	-
APTC-DEC	Spectroscopy	Optional	F20.5	-	-	-	-	-	-	-	-	-
APTC-RA	Spectroscopy	Optional	F20.5	-	-	-	-	-	-	-	-	-
APTCPIX1	Spectroscopy	Optional	F20.1	-	-	-	-	-	-	-	-	-
APTCPIX2	Spectroscopy	Optional	F20.1	-	-	-	-	-	-	-	-	-
AUTOGUID	Instrument	Optional	A8	-	-	-	-	-	A80	A80	-	-
AZ-END	Telescope	Optional	F20.5	-	-	F9.5	-	-	-	-	-	-
AZ-STR	Telescope	Optional	F20.5	-	-	F9.5	-	-	-	-	-	-
AZIMUTH	Telescope	Optional	F20.5	F7.3	F10.5	F9.5	F5.1	F5.1	F9.5	F9.5	F10.5	F9.5
BIN-FCT1	Instrument	Common	I20	I2	I4	I2	I2	I2	I2	I2	I2	I2
BIN-FCT2	Instrument	Common	I20	I2	I4	I2	I2	I2	I2	I2	I2	I2
BITPIX	FITS	Common	I20	-	-	-	-	-	-	-	-	-
BLANK	File	Common	I20	-	-	-	-	-	-	-	-	-
BSCALE	File	Common	F20.8	-	-	-	-	-	-	-	-	-
BUNIT	File	Common	A10	-	-	-	-	-	-	-	-	-
BZERO	File	Common	F20.8	-	-	-	-	-	-	-	-	-
C2ELT1	WCS	Optional	F20.8	-F13.10	F13.8	-	F13.8	-	-	-	-	-
C2ELT2	WCS	Optional	F20.8	-F13.10	F13.8	-	F13.8	-	-	-	-	-
C2NIT1	WCS	Optional	A8	-	A80	A80	-	A80	-	-	-	-
C2NIT2	WCS	Optional	A8	-	A80	A80	-	A80	-	-	-	-
C2PIX1	WCS	Optional	F20.1	-	F7.1	F6.1	-	F6.1	-	-	-	-
C2PIX2	WCS	Optional	F20.1	-	F7.1	F6.1	-	F6.1	-	-	-	-
C2VAL1	WCS	Optional	F20.8	-	F9.3	F13.8	-	F13.8	-	-	-	-
C2VAL2	WCS	Optional	F20.8	-	F9.4	F13.8	-	F13.8	-	-	-	-
C2YPE1	WCS	Optional	A8	-	A80	A80	-	A80	-	-	-	-
C2YPE2	WCS	Optional	A8	-	A80	A80	-	A80	-	-	-	-
CDj_i	WCS	Optional	F20.8	-	-	-	-	F15.8	-	-	-	-
CDELT1	File	Common	F20.8	F16.13	F13.10	F13.8	F13.8	F13.8	F13.8	F13.8	F12.10	F13.8
CDELT2	File	Common	F20.8	F16.13	F13.10	F13.8	F13.8	F13.8	F13.8	F13.8	F12.10	F13.8
COADD	Instrument	Optional	I20	-	-	-	I4	-	-	I2	-	-
COMMENT	Comment	Optional	A79	-	-	-	-	-	-	-	-	-
CRPIX1	File	Common	F20.1	F8.1	F7.1	F6.1	F6.1	F6.1	F6.1	F6.1	F6.1	F5.1
CRPIX2	File	Common	F20.1	F8.1	F7.1	F6.1	F6.1	F6.1	F6.1	F6.1	F6.1	F5.1
CRVAL1	File	Common	F20.8	F11.7	F9.3	F13.8	F13.8	F13.8	F13.8	F13.8	F13.8	F10.6
CRVAL2	File	Common	F20.8	F11.7	F9.4	F13.8	F13.8	F13.8	F13.8	F13.8	F13.8	F10.6
CTYPE1	File	Common	A10	A80	A80	A80	A80	A80	A80	A80	A80	A80
CTYPE2	File	Common	A10	A80	A80	A80	A80	A80	A80	A80	A80	A80
CUNIT1	File	Common	A10	A80	A80	A80	A80	A80	A80	A80	A80	-
CUNIT2	File	Common	A10	A80	A80	A80	A80	A80	A80	A80	A80	-
DATA-TYP	Object	Common	A30	A80	A80	A80	A80	A80	A80	A80	A80	A80
DATASET	Object	Object	A20	A80	A80	A80	A80	A80	A80	A80	A80	A80
DATE-OBS	Time	Common	A10	A80	A80	A80	A80	A80	A80	A80	A80	A80
DEC	Object	Common	A12	A80	A80	A80	A80	A80	A80	A80	A80	A80
DEC2000	Object	Common	A12	A80	A80	A80	A80	A80	A80	A80	A80	A80
DET-Ann	Instrument	Optional	F20.3	F7.3	F6.3	F7.3	-	-	-	-	F6.3	-
DET-ID	Instrument	Optional	I20	I2	I1	I1	-	-	I1	-	I1	-
DET-NSMP	Instrument	Optional	I20	-	-	-	-	I2	-	I2	-	-
DET-P1nn	Instrument	Optional	F20.3	F7.3	F6.1	-	-	-	-	-	-	-
DET-P2nn	Instrument	Optional	F20.3	F7.3	F6.1	-	-	-	-	-	-	-
DET-RST	Instrument	Optional	I20	-	-	-	-	-	-	I2	-	-
DET-SMPL	Instrument	Optional	A20	-	-	-	-	-	-	A80	-	-
DET-TAVE	Instrument	Optional	F20.2	-	-	F6.2	-	-	-	-	-	-
DET-TMAX	Instrument	Optional	F20.2	F6.2	F6.2	F6.2	-	-	-	-	-	-
DET-TMED	Instrument	Optional	F20.2	F6.2	F6.2	-	-	-	-	-	-	-

[*FITS* フォーマットと STARS データベース内フォーマット対応表 (3/5)]

KeyWord	Category	Importanc	FormatF	SupCa	FOCAS	HDS	IRCS	OHS	COMIC	CIAO	MIRTO	CAC
DET-TMIN	Instrument	Optional	F20.2	F6.2	F6.2	F6.2	-	-	-	-	-	-
DET-TMP	Instrument	Common	F20.2	F6.2	F6.2	F6.2	F5.1	F5.1	F6.2	F5.1	F5.2	F6.1
DET-TSD	Instrument	Optional	F20.2	-	-	F5.3	-	-	-	F6.2	-	-
DETECTOR	Instrument	Common	A20	A80	A80	A80	A80	A80	A80	A80	A80	A80
DETPXSZ1	Instrument	Optional	F20.4	-	-	F6.4	-	-	F6.4	-	F5.3	-
DETPXSZ2	Instrument	Optional	F20.4	-	-	F6.4	-	-	F6.4	-	F5.3	-
DISPAXIS	Spectroscopy	Spectroscopy	I20	-	I1	-	I1	I1	I1	I1	-	-
DISPERSR	Spectroscopy	Spectroscopy	A20	-	A80	A80	A80	A80	A80	-	-	-
DOM-HUM	Environment	Optional	F20.1	F5.1	F6.2	F5.1	-	-	F5.1	F5.1	F7.3	-
DOM-PEND	Environment	Optional	F20.2	-	-	F6.1	-	-	-	-	-	-
DOM-PRS	Environment	Optional	F20.2	F7.2	-	F6.1	-	-	F7.2	F7.2	F7.2	F7.2
DOM-PSTR	Environment	Optional	F20.2	-	-	F6.1	-	-	-	-	-	-
DOM-TMP	Environment	Optional	F20.2	F6.2	F6.2	F6.2	-	-	F6.2	F6.2	F6.2	-
DOM-WND	Environment	Optional	F20.2	F5.2	F5.2	F4.1	-	-	F5.2	F5.2	F7.2	-
EFP-MIN1	Instrument	Optional	I20	I5	I5	I5	-	-	-	-	-	-
EFP-MIN2	Instrument	Optional	I20	I5	I5	I5	-	-	-	-	-	-
EFP-RNG1	Instrument	Optional	I20	I5	I5	I5	-	-	-	-	-	-
EFP-RNG2	Instrument	Optional	I20	I5	I5	I5	-	-	-	-	-	-
END	FITS	Common	-	-	-	-	-	-	-	-	-	-
EQUINOX	Object	Common	F20.1	F6.1	F6.1	F6.1	F6.1	F6.1	F6.1	F6.1	F6.1	F6.1
EXP-ID	Instrument	Common	A12	A80	A80	A80	A80	A80	A80	A80	A80	-
EXP1TIME	Time	Optional	F20.3	-	-	-	-	-	-	F8.1	-	-
EXPTIME	Time	Common	F20.2	F7.1	F8.2	F8.1	F8.1	F8.1	F7.3	F7.1	F9.4	F8.3
EXTEND	FITS	Common	BOOLEAN	-	-	-	-	-	-	-	-	-
FILTERnn	Instrument	Optional	A30	A80	A80	A80	A80	A80	A80	A80	A80	A80
FLT-Ann	Instrument	Optional	F20.2	-	F5.2	-	-	-	-	-	-	-
FOC-LEN	Origin	Optional	F20.3	-	-	F8.1	-	-	F10.3	-	F10.3	-
FOC-POS	Origin	Common	A12	A80	A80	A80	A80	A80	A80	A80	A80	A80
FOC-VAL	Origin	Common	F20.3	F10.3	F6.3	F10.3	F10.3	F10.3	F10.3	F10.3	F6.3	F7.3
FRAMEID	Instrument	Common	A12	A16	A16	A16	A16	A16	A16	A16	A16	A16
GAIN	Instrument	Common	F20.3	F6.3	F6.2	F5.2	F5.2	F5.2	F5.2	F5.2	F6.2	F5.2
HISTORY	Comment	Optional	A60	-	-	-	-	-	-	-	-	-
HST	Time	Common	A12	A80	A80	A80	A80	A80	A80	A80	A80	A80
HST-END	Time	Optional	A12	A80	A80	A80	-	-	-	-	-	-
HST-STR	Time	Optional	A12	A80	A80	A80	-	-	-	-	-	-
IMGROT	Telescope	Optional	F20.3	-	-	A80	-	-	-	-	-	-
IMR-END	Telescope	Optional	F20.3	-	-	F7.2	-	-	-	-	-	-
IMR-STR	Telescope	Optional	F20.3	-	-	F7.2	-	-	-	-	-	-
IMR-TYPE	Telescope	Optional	A20	-	-	A80	-	-	-	-	-	-
INR-END	Telescope	Optional	F20.3	F8.3	-	-	-	-	-	-	F8.3	-
INR-STR	Telescope	Optional	F20.3	F8.3	-	-	-	-	-	-	F8.3	-
INS-VER	Instrument	Optional	A30	A80	A80	A80	A80	A80	A80	A80	A80	-
INSROT	Telescope	Optional	F20.3	-	-	-	-	-	F8.3	F7.3	-	F8.3
INSTRUME	Instrument	Common	A20	-	-	-	-	A80	-	-	-	-
LONGPOLE	WCS	Imaging	F20.1	F6.1	F9.5	F6.1	F6.1	F6.1	F6.1	F6.1	F9.5	F5.1
LST	Time	Common	A12	A80	A80	A80	A80	A80	A80	A80	A80	A80
LST-END	Time	Optional	A12	A80	A80	A80	-	-	-	-	-	-
LST-STR	Time	Optional	A12	A80	A80	A80	-	-	-	-	-	-
M2-ANG1	Telescope	Optional	F20.3	F12.6	-	-	-	-	-	-	-	F8.5
M2-ANG2	Telescope	Optional	F20.3	F12.6	-	-	-	-	-	-	-	F8.5
M2-ANG3	Telescope	Optional	F20.3	F12.6	-	-	-	-	-	-	-	-
M2-POS1	Telescope	Optional	F20.3	F11.4	-	-	-	-	-	-	-	F8.3
M2-POS2	Telescope	Optional	F20.3	F11.4	-	-	-	-	-	-	-	F8.3
M2-POS3	Telescope	Optional	F20.3	F11.4	-	-	-	-	-	-	-	-
M2-TIP	Telescope	Optional	A8	-	-	-	-	A80	A80	A80	A80	-
M2-TYPE	Telescope	Optional	A8	-	-	-	-	A80	A80	-	A80	-
MJD	Time	Common	F20.8	F12.6	F14.8	F15.8	F20.8	F20.8	F14.8	F20.8	F14.8	F15.8
MJD-END	Time	Optional	F20.8	F12.6	F14.8	F15.8	-	-	-	-	-	-
MJD-STR	Time	Optional	F20.8	F12.6	F14.8	F15.8	-	-	-	-	-	-
N2XIS	WCS	Optional	I20	-	-	I1	-	-	-	-	-	-
N2XIS1	WCS	Optional	I20	-	-	I5	-	-	-	-	-	-
N2XIS2	WCS	Optional	I20	-	-	I5	-	-	-	-	-	-
NAS-TAVE	Environment	Optional	F20.2	-	-	F6.2	-	F6.2	-	-	-	-

[*FITS* フォーマットと STARS データベース内フォーマット対応表 (4/5)]

KeyWord	Category	Importanc	FormatF	SupCa	FOCAS	HDS	IRCS	OHS	COMIC	CIAO	MIRTO	CAC
NAS-TMAX	Environment	Optional	F20.2	-	-	F6.2	-	-	-	-	-	-
NAS-TMIN	Environment	Optional	F20.2	-	-	F6.2	-	-	-	-	-	-
NAS-TSD	Environment	Optional	F20.1	-	-	F5.3	-	-	-	-	-	-
NAXIS	FITS	Common	I20	I1	I1	I1	I1	I1	I1	I1	I1	I2
NAXIS1	FITS	Common	I20	I5	I4	I5	I5	I5	I5	I5	I3	I4
NAXIS2	FITS	Common	I20	I5	I4	I5	I5	I5	I5	I5	I3	I4
NAXIS3	FITS	Optional	I20	-	-	-	-	-	I4	-	I3	-
OBJECT	Object	Common	A30	A80	A80	A80	A80	A80	A80	A80	A80	A80
OBS-ALOC	Telescope	Common	A12	A80	A80	A80	A80	A80	A80	-	-	A80
OBS-MOD	Instrument	Common	A30	A80	A80	A80	A80	A80	A80	A80	A80	A80
OBSERVAT	Origin	Common	A20	-	-	-	-	-	-	-	-	-
OBSERVER	Origin	Common	A50	A80	A80	A80	A80	A80	A80	A80	A80	A80
OUT-HUM	Environment	Optional	F20.1	F5.1	F6.2	F5.1	-	-	F5.1	F5.1	F7.3	-
OUT-PRS	Environment	Optional	F20.2	F7.2	-	-	-	-	F7.2	F7.2	F7.2	-
OUT-TMP	Environment	Optional	F20.2	F6.2	F6.2	F6.2	-	-	F6.2	F6.2	F6.2	-
OUT-WND	Environment	Optional	F20.2	F5.2	F5.2	F4.1	-	-	F5.2	F5.2	F7.2	-
P2OJP1	WCS	Optional	F20.1	-	-	F5.1	-	-	-	-	-	-
P2OJP2	WCS	Optional	F20.1	-	-	F5.1	-	-	-	-	-	-
P2iiijjj	WCS	Optional	F20.8	-	-	F12.8	-	F12.8	-	-	-	-
PCiiijjj	WCS	Imaging	F20.8	F12.8	F9.6	F12.8	F12.8	F12.8	F12.8	F12.8	F12.8	F13.8
POL-ANGn	Polarimetry	Optional	F20.2	-	-	-	-	-	-	F6.2	-	-
POLARIZn	Polarimetry	Polarimetry	A30	-	-	-	-	-	-	A80	-	-
PRD-MIN1	Instrument	Optional	I20	I5	I4	I4	I4	I4	I3	I5	I4	I4
PRD-MIN2	Instrument	Optional	I20	I5	I4	I4	I4	I4	I3	I5	I4	I4
RRD-RNG1	Instrument	Optional	I20	I5	I4	I4	I4	I4	I3	I5	I4	I4
PRD-RNG2	Instrument	Optional	I20	I5	I4	I4	I4	I4	I3	I5	I4	I4
PROJP1	WCS	Optional	F20.1	F5.1	-	F5.1	F5.1	F5.1	F5.1	F5.1	F5.1	-
PROJP2	WCS	Optional	F20.1	F5.1	-	F5.1	F5.1	F5.1	F5.1	F5.1	F5.1	-
PROP-ID	Origin	Common	A8	A8	A8	A8	A8	A8	A8	A8	A8	A8
RA	Object	Common	A12	A80	A80	A80	A80	A80	A80	A80	A80	A80
RA2000	Object	Common	A12	A80	A80	A80	A80	A80	A80	A80	A80	A80
RADECSYS	Object	Common	A8	-	-	-	-	-	-	-	-	-
RET-ANGn	Polarimetry	Polarimetry	F20.2	-	F8.4	-	-	-	-	F6.2	-	-
RETPLATn	Polarimetry	Polarimetry	A30	-	A80	-	-	-	-	A80	-	-
SECZ	Time	Optional	F20.3	-	F6.3	F6.4	-	-	F6.3	-	F6.3	-
SECZ-END	Time	Optional	F20.3	F6.3	F6.3	F6.4	-	-	-	-	-	-
SECZ-STR	Time	Optional	F20.3	F6.3	F6.3	F6.4	-	-	-	-	-	-
SEEING	Environment	Optional	F20.2	F5.2	F5.2	-	-	-	F5.2	F4.2	F5.2	-
SIMPLE	FITS	Common	BOOLEAN	-	-	-	-	-	-	-	-	-
SLIT	Spectroscopy	Spectroscopy	A20	-	A80	A80	A80	A80	A80	A80	-	-
SLT-LEN	Spectroscopy	Spectroscopy	F20.3	-	F6.3	F6.3	F7.3	F7.3	F7.3	F7.3	-	-
SLT-OBJP	Spectroscopy	Optional	F20.3	-	-	F6.2	-	-	-	-	-	-
SLT-PA	Spectroscopy	Spectroscopy	F20.1	-	F6.2	F6.2	F5.1	F5.1	F5.1	F5.1	-	-
SLT-PEND	Spectroscopy	Optional	F20.1	-	-	F6.2	-	-	-	-	-	-
SLT-PSTR	Spectroscopy	Optional	F20.1	-	-	F6.2	-	-	-	-	-	-
SLT-WID	Spectroscopy	Spectroscopy	F20.3	-	F6.3	F6.3	F6.3	F6.3	F6.3	F6.3	-	-
SLTC-DEC	Spectroscopy	Optional	F20.5	-	-	-	F12.8	F12.8	-	F9.5	-	-
SLTC-RA	Spectroscopy	Optional	F20.5	-	-	-	F12.8	F12.8	-	F9.5	-	-
SLTCPIX1	Spectroscopy	Spectroscopy	F20.1	-	F7.2	F7.2	F7.1	F7.1	F6.1	F6.1	-	-
SLTCPIX2	Spectroscopy	Spectroscopy	F20.1	-	F7.2	F7.2	F7.1	F7.1	F6.1	F6.1	-	-
SV-PRB	Telescope	Optional	F20.3	-	-	-	-	-	-	-	-	-
TELESCOP	Origin	Common	A30	-	-	-	-	-	-	-	-	-
TELFOCUS	Telescope	Common	A30	A80	A80	A80	A80	A80	A80	-	-	A80
TIMESYS	Time	Common	A8	-	-	-	-	-	-	-	-	-
TRAN-END	Environment	Optional	F20.3	-	-	-	-	-	-	-	-	-
TRAN-STR	Environment	Optional	F20.3	-	-	-	-	-	-	-	-	-
TRANSP	Environment	Optional	F20.3	-	-	-	-	-	-	-	-	-
UT	Time	Common	A12	A80	A80	A80	A80	A80	A80	A80	A80	A80
UT-END	Time	Optional	A12	A80	A80	A80	A80	A80	-	A80	-	-
UT-STR	Time	Optional	A12	A80	A80	A80	A80	A80	-	A80	-	-
UT1-UTC	Time	Optional	F20.5	-	-	-	-	-	-	-	-	-
WAV-MAX	Spectroscopy	Spectroscopy	F20.4	-	F6.2	F7.2	F10.5	F10.5	F10.4	F6.2	-	-
WAV-MIN	Spectroscopy	Spectroscopy	F20.4	-	F6.2	F7.2	F10.5	F10.5	F10.4	F6.2	-	-

[*FITS* フォーマットと STARS データベース内フォーマット対応表 (5/5)]

KeyWord	Category	Importanc	FormatF	SupCa	FOCAS	HDS	IRCS	OHS	COMIC	CIAO	MIRTO	CAC
WAVELEN	Spectroscopy	Spectroscopy	F20.4	-	F6.2	F7.2	F10.5	F10.5	F10.4	F6.2	-	-
WCS-ORIG	WCS	Imaging	A20	A80	-	-	-	A80	-	-	-	-
WEATHER	Environment	Optional	A30	A80	A80	-	-	-	A80	A80	A80	-
ZD	Time	Optional	F20.5	F6.3	F5.2	-	F5.2	F5.2	F8.5	F5.2	F6.3	F6.3
ZD-END	Time	Optional	F20.5	F6.3	F5.2	-	-	-	-	F5.2	-	-
ZD-STR	Time	Optional	F20.5	F6.3	F5.2	-	-	-	-	F5.2	-	-

10.6 すばる *FITS* データの構造とキーワードとの関係

以下の図は、すばるの可視光観測装置の *FITS* データの構造に関して、それらを記述する *FITS* キーワードとの対応関係を示すものである。

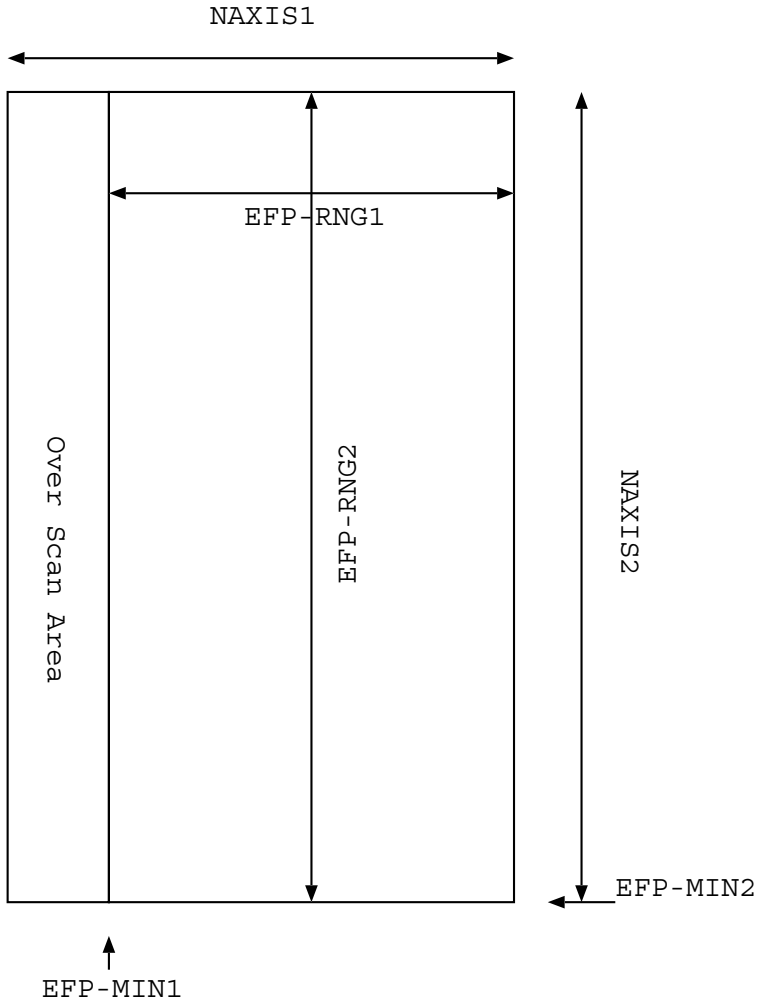

図 4: すばる *FITS* データのフォーマットとそれらを記述するキーワード値との関係