Subaru Telescope

Director's Report

Subaru UM 2015

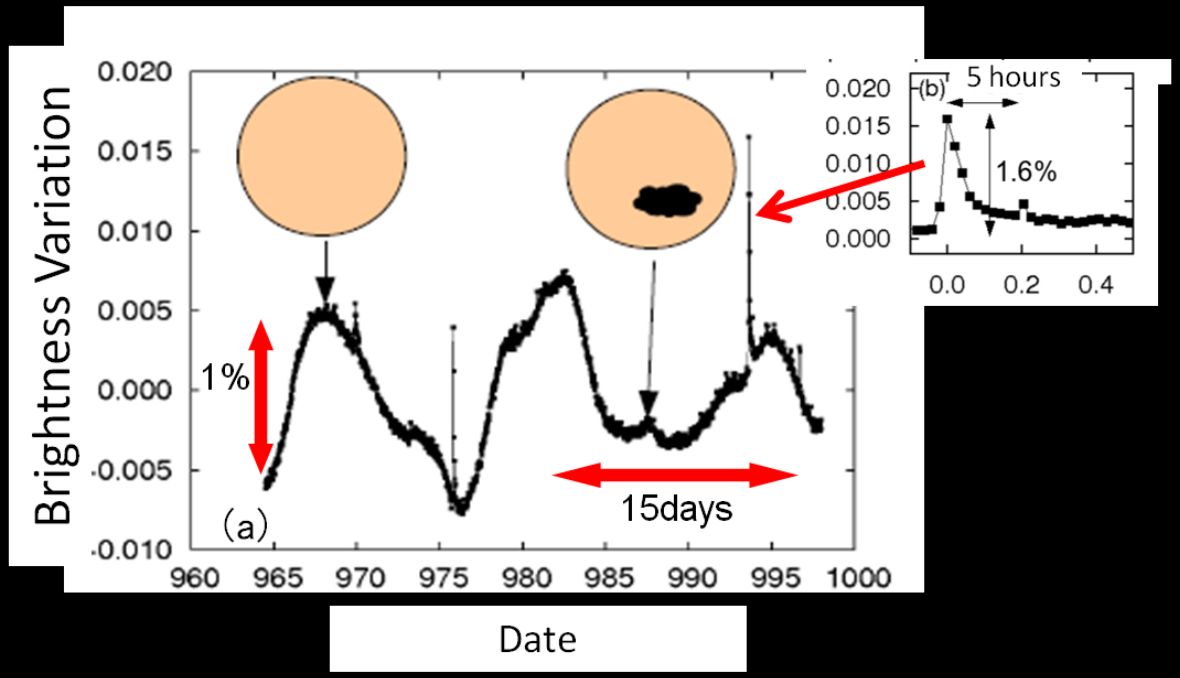
Nobuo ARIMOTO

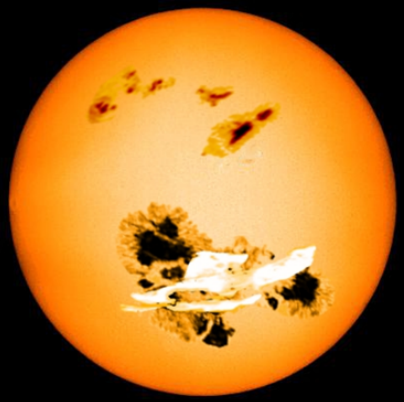
Subaru Telescope


TAURUS
ORION
ARIES
ECLIPTIC
JUNE
Aldebaran
Bellatrix
Pleiades
Alcyone
Atlas
Electra
Merope
Taygeta
Celino
Maia
Subaru Telescope
Science Topics

Subaru Telescope

Subaru Telescope Observes Superflare Stars with Large Starspot (Notsu et al. 2015)

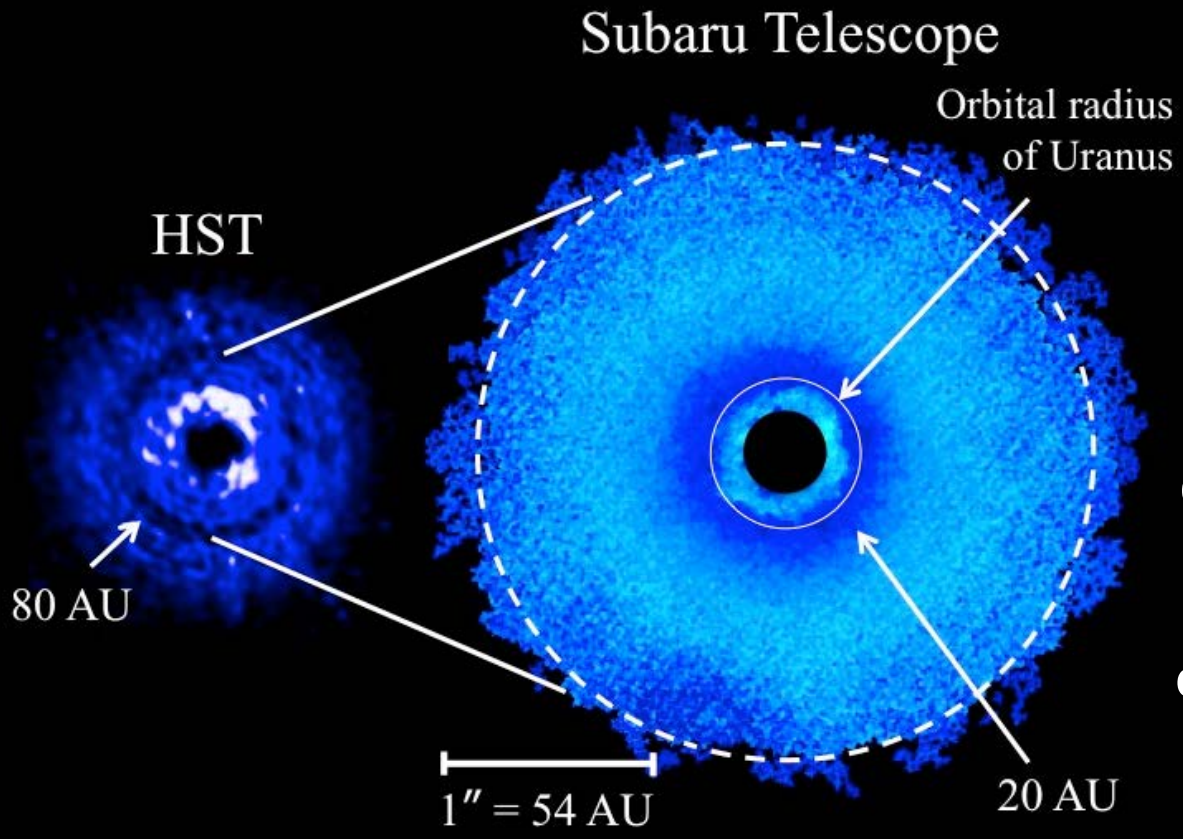




A team of astronomers has used the HDS to conduct spectroscopic observations of Sun-like "superflare" stars first observed and cataloged by the Kepler Space Telescope. The investigations focused on the detailed properties of these stars and confirmed that Sun-like stars with large starspots can experience superflares.

Subaru Telescope

Discovery of Multiple Ring-Like Gaps in a Protoplanetary Disk (Akiyama et al. 2015)

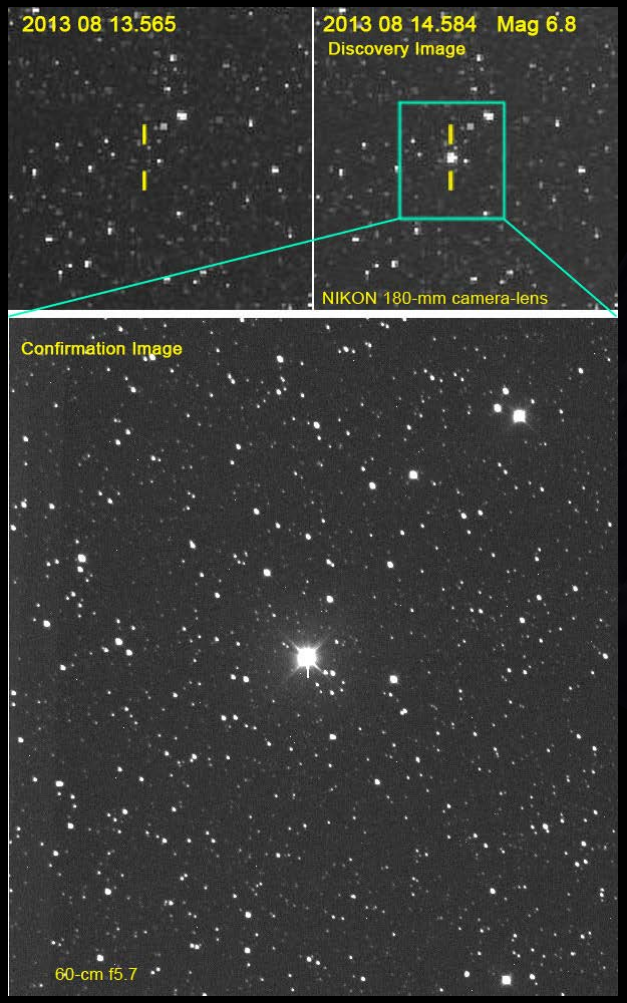


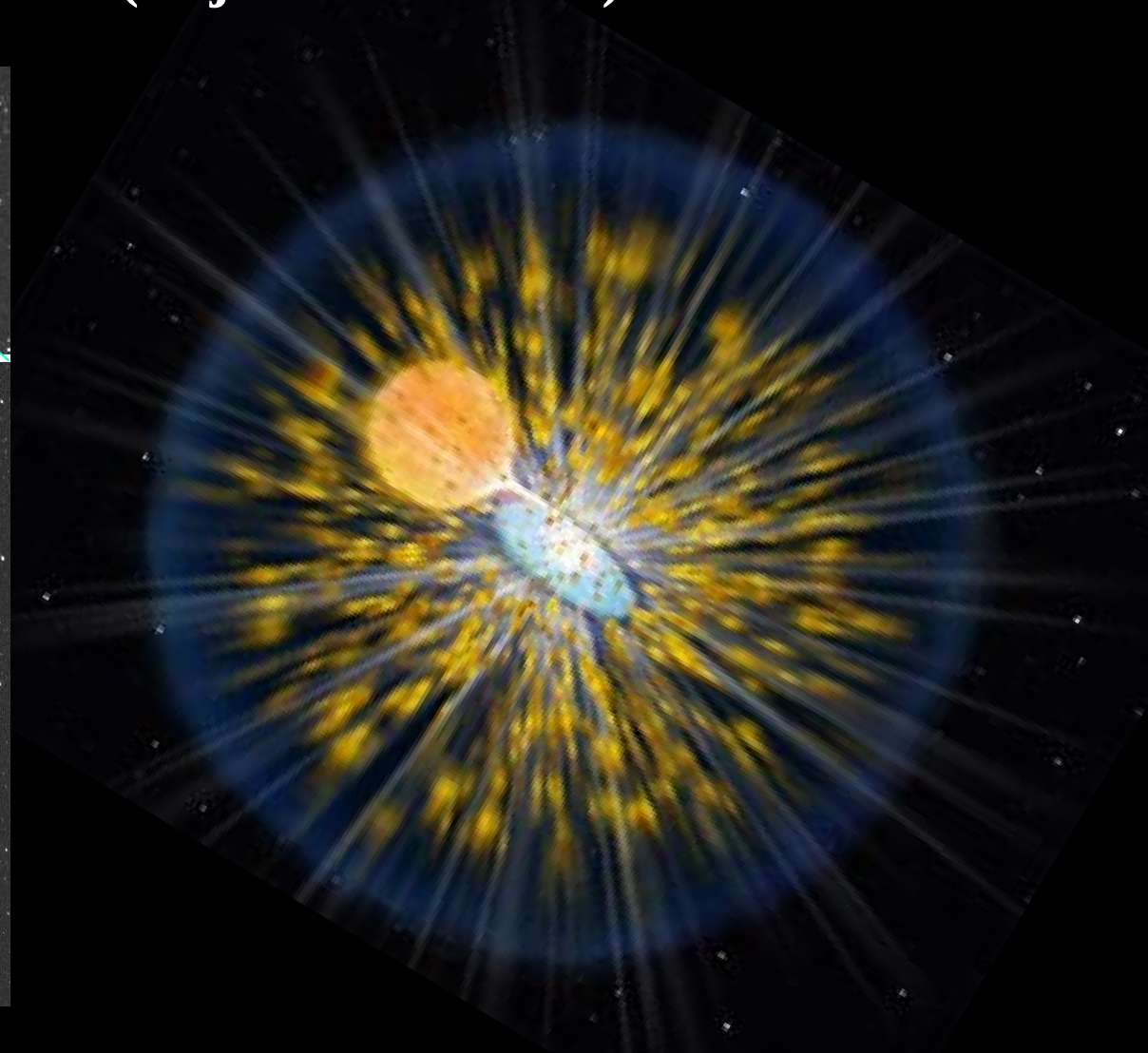
The ring-like gap was newly discovered at 20 AU from the central star.

The SEED has found a close-in ring-like gap in the protoplanetary disk of gas and dust around the nearby sun-like young star, TW Hydrae, suggesting the ongoing planet formation in the disk.

Subaru Telescope

Classical Nova Explosions are Major Lithium Factories in the Universe (Tajitsu et al. 2015)





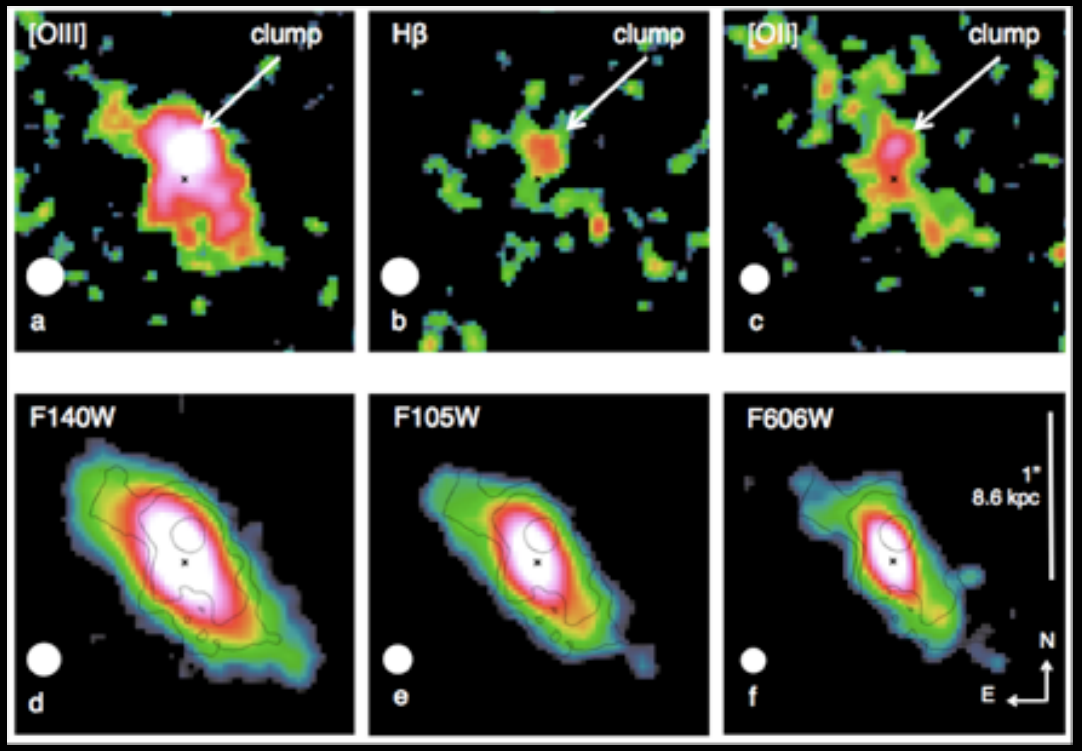
Subaru Telescope

The Ghostly Remnants of Galaxy Interactions Uncovered in a Nearby Galaxy Group M81

Okamoto et al. (2015)

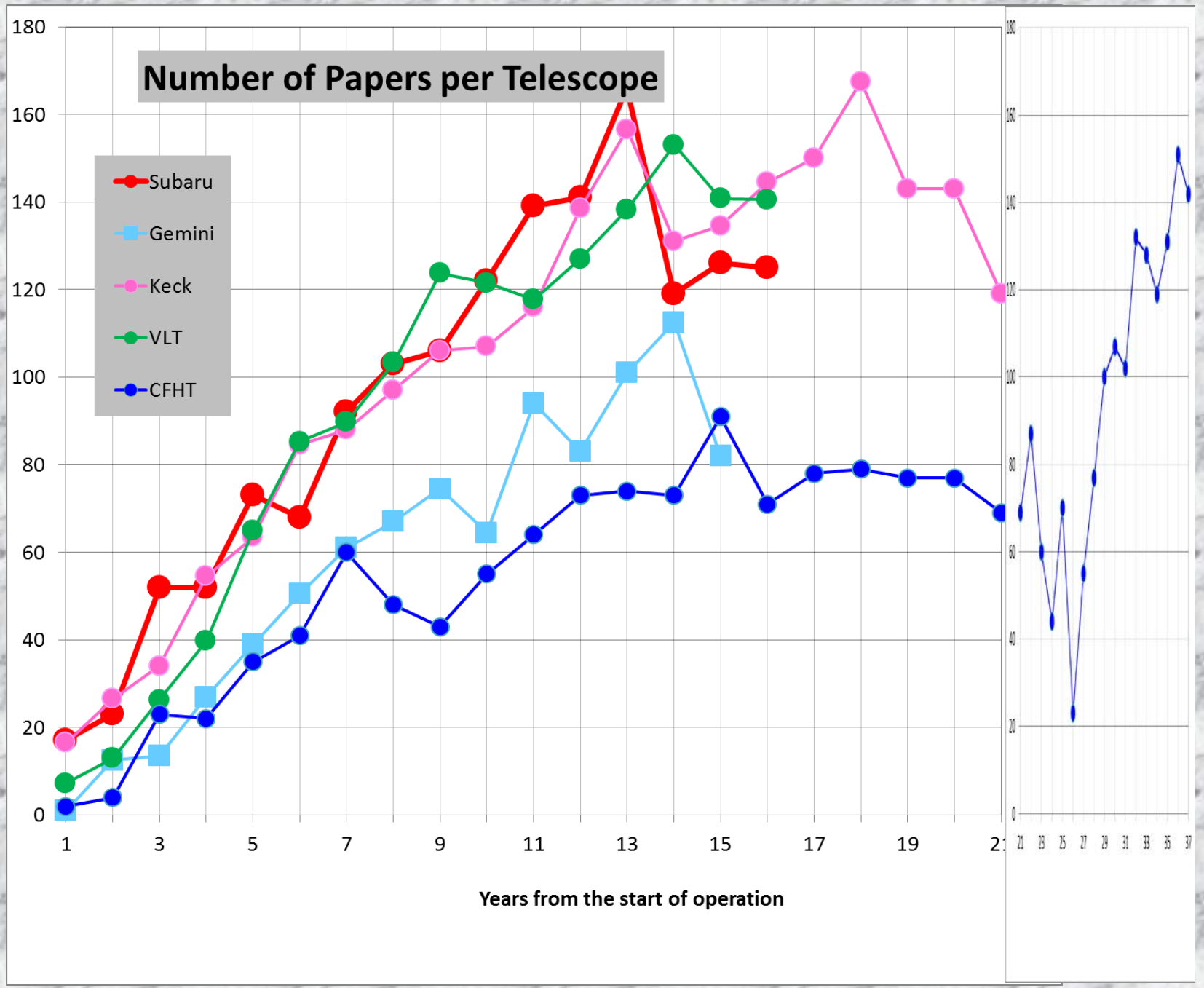
Subaru Telescope

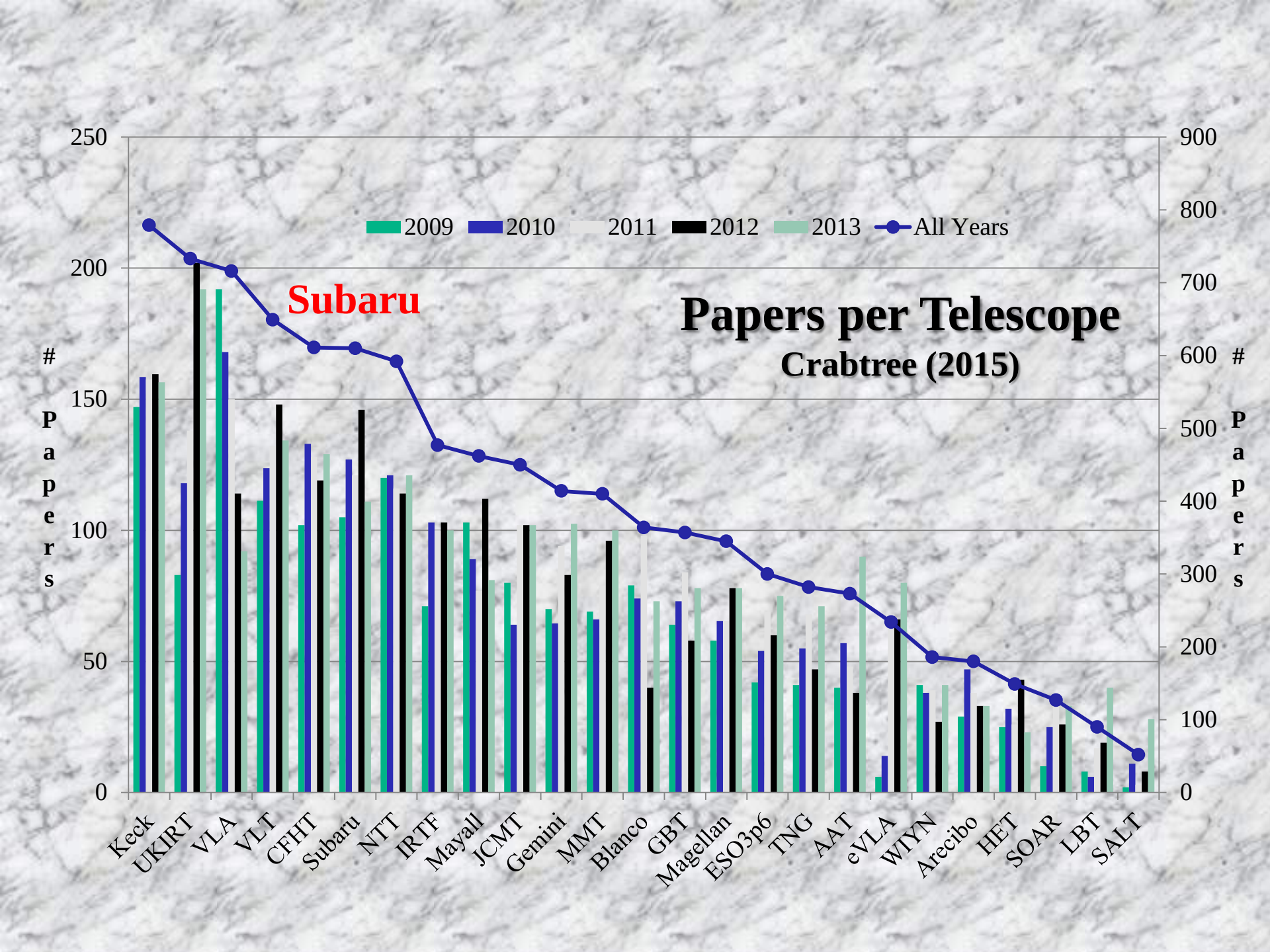
Discovery of an Extremely Young Stellar Clump in the Distant Universe (Zanella et al. 2015)

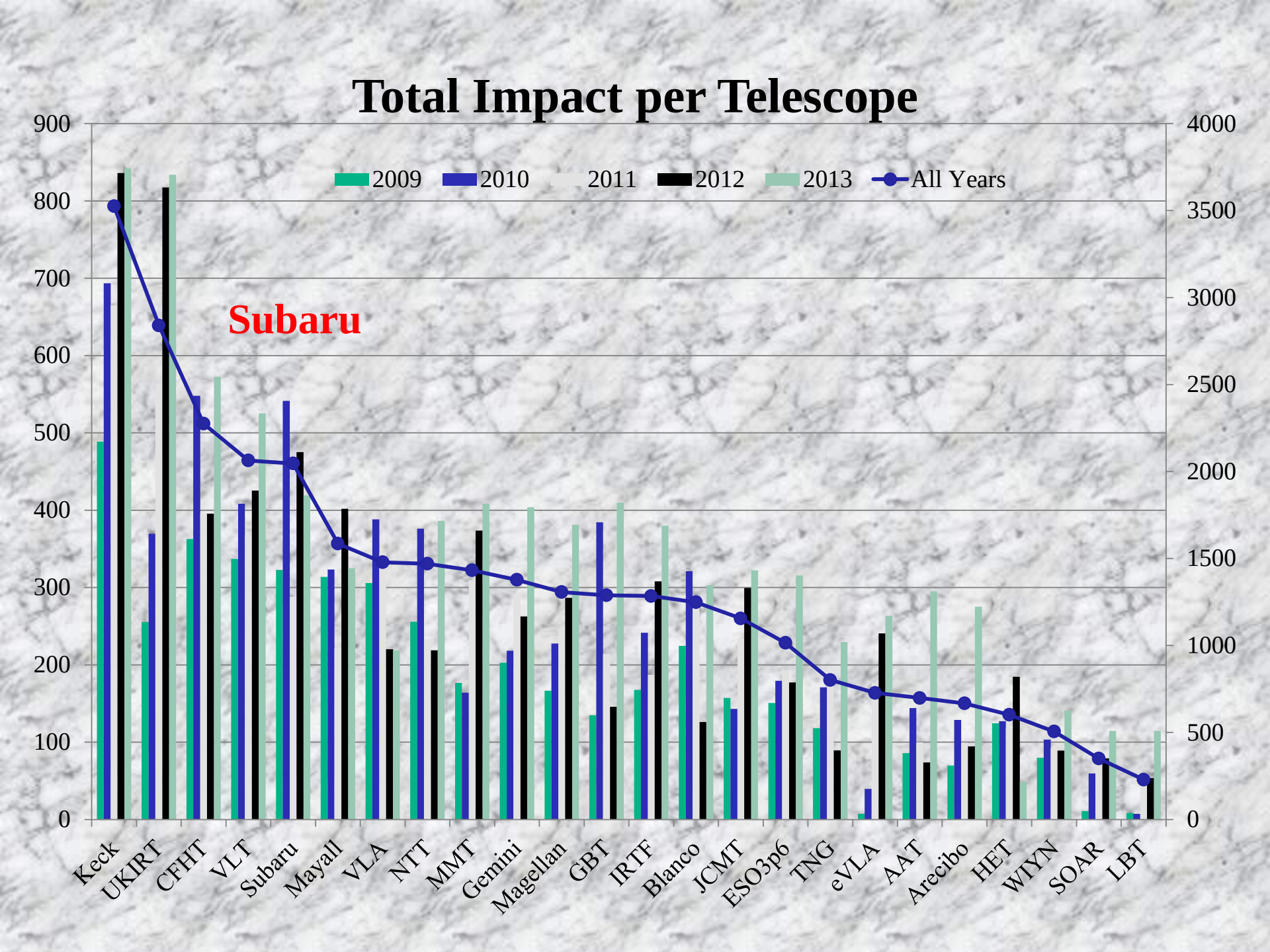


A group of French researchers from CEA-IRFU discovered the birth cry of a massive star-forming clump in the disk of a very distant galaxy. This giant clump is less than 10 million years old, and it is the very first time that such a young star-forming region is observed in the distant Universe.

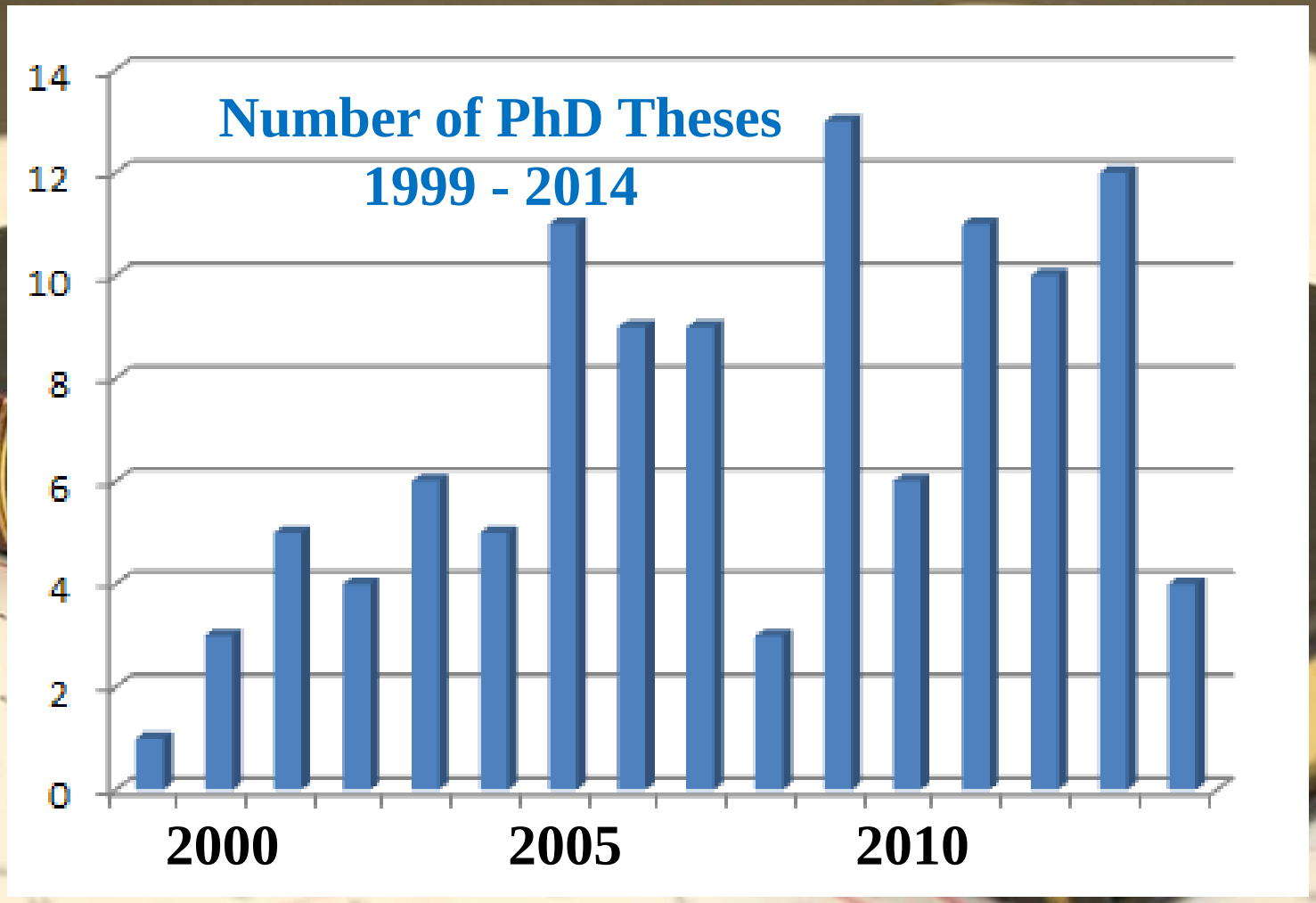
Publication and Impact Factor 2014-2015


Number of Papers per Telescope
Subaru
Gemini
Keck
VLT
CFHT
180
160
140
120
100
80
60
40
20
0
1
3
5
7
9
11
13
15
17
19
Years from the start of operation

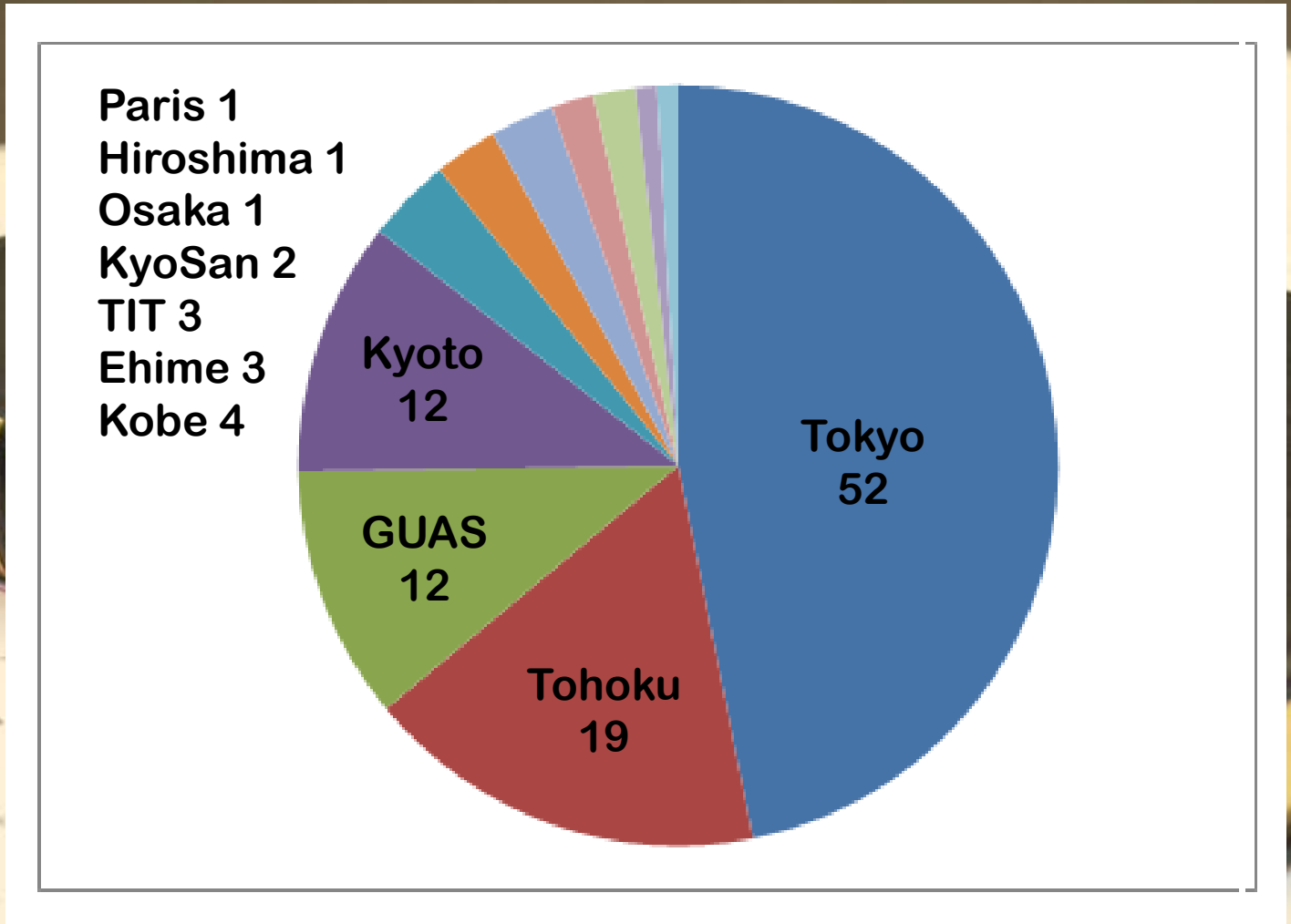

Papers per Telescope
Crabtree (2015)
Subaru
2009
2010
2011
2012
2013
All Years
Papers
Papers
250
200
150
100
50
0
900
800
700
600
500
400
300
200
100
0
Keck
UKIRT
VLA
VLT
CFHT
Subaru
NTT
IRTF
Mayall
JCMT
Gemini
MMT
Blanco
GBT
Magellan
ESO3p6
TNG
AAT
eVLA
WIYN
Arecibo
HET
SOAR
LBT
SALT


Total Impact per Telescope
2009
2010
2011
2012
2013
All Years
Subaru
900
800
700
600
500
400
300
200
100
0
4000
3500
3000
2500
2000
1500
1000
500
0
Keck
UKIRT
CFHT
VLT
Subaru
Mayall
VLA
NTT
MMT
Gemini
Magellan
GBT
IRTF
Blanco
JCMT
ESO3p6
TNG
eVLA
AAT
Arecibo
HET
WIYN
SOAR
LBT

PhD Theses (1999-2014)



PhD Theses (1999-2014)



Fundamental Questions of our Universe

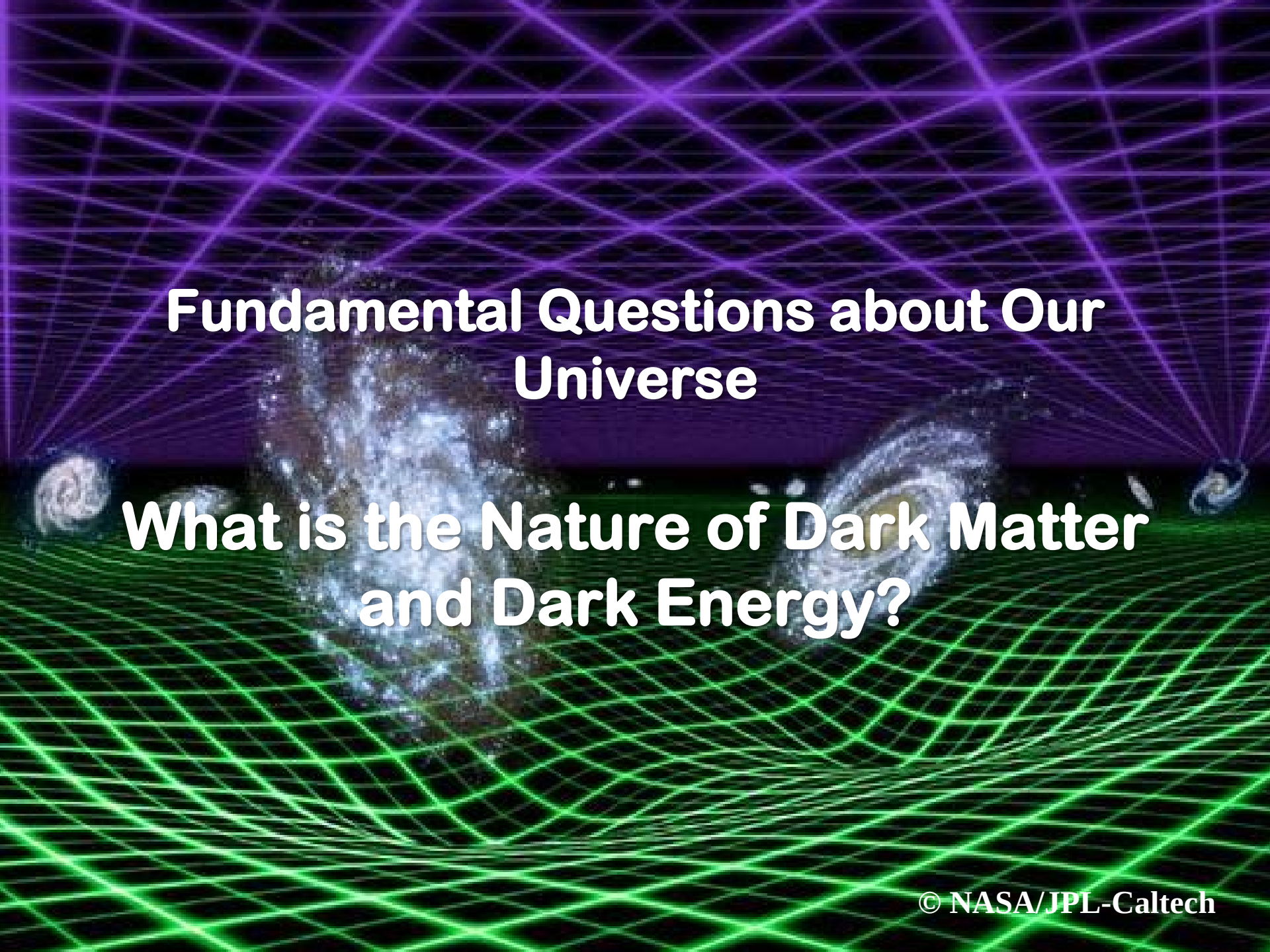
Fundamental Question of the Universe

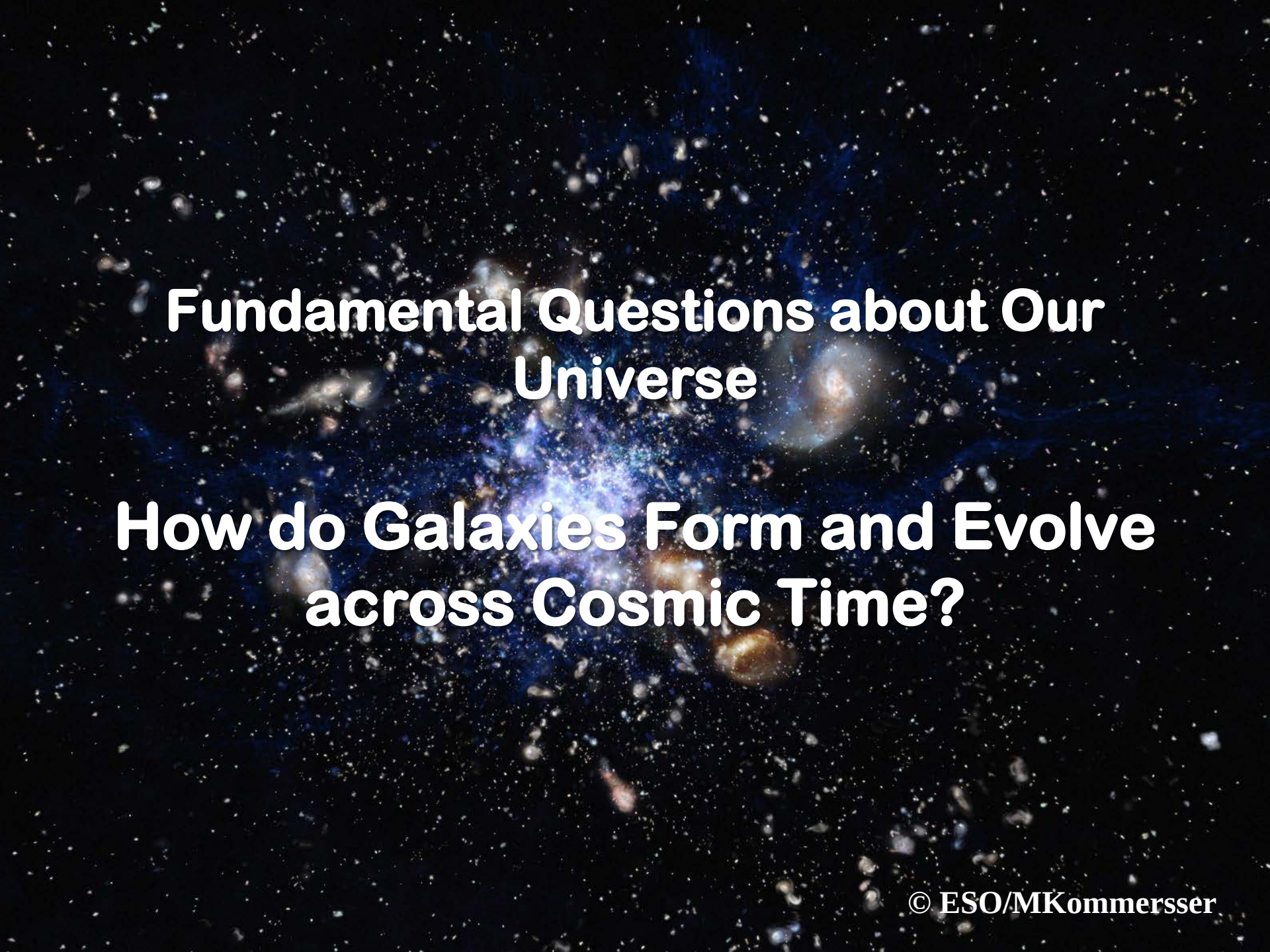
42

Hitchhiker's guide to the galaxy

Fundamental Questions about Our Universe

How did the first stars and galaxies transform the Universe?


Fundamental Questions about Our Universe
What is the Nature of Dark Matter and Dark Energy?
© NASA/JPL-Caltech


Fundamental Questions about Our Universe
How do Galaxies Form and Evolve across Cosmic Time?
© ESO/MKommersser


Fundamental Questions about Our Universe
How do Stars and Planets Form?
© ESO


Fundamental Questions about Our Universe
How Are Elements Produced by Stars and Recycled through Galaxies?
© NASA/HST

Fundamental Questions about Our Universe

What is the Nature of Matter and Gravity at Extreme Densities?

Major facilities required to answer the fundamental questions

	Subaru	TMT	ALMA	SKA	G-Grav	High-E
1) How did the first stars and galaxies transform the Universe?						
2) What is the nature of dark matter and dark energy?						
3) How do galaxies form and evolve across cosmic time?						
4) How do stars and planets form?						
5) How are elements reproduced and recycled through galaxies?						
6) What is the nature of matter and gravity at extreme densities?						

WFIRST, Euclid, TESS

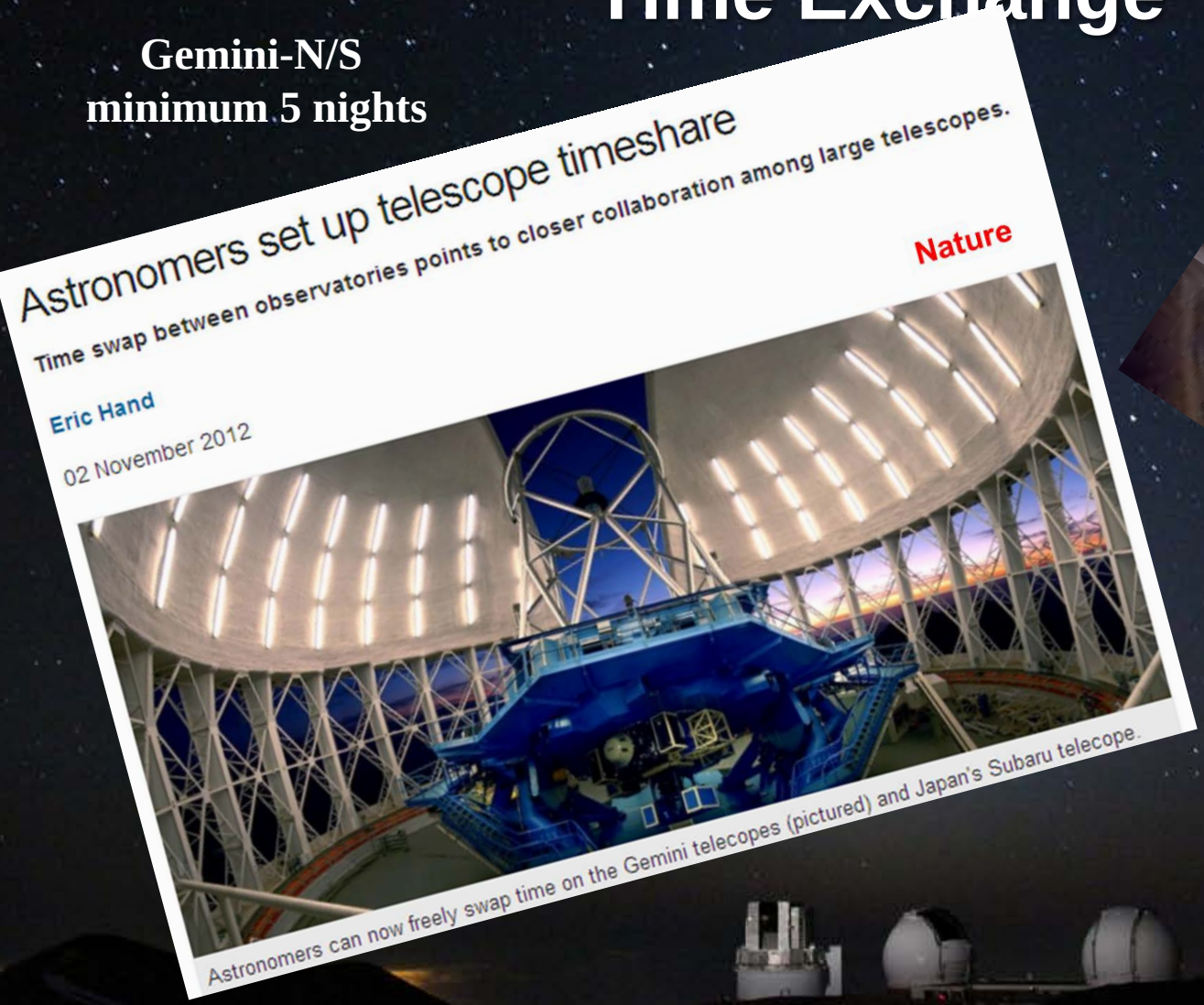
	Subaru	WFIRST	Euclid	TESS
1) How did the first stars and galaxies transform the Universe?				
2) What is the nature of dark matter and dark energy?				
3) How do galaxies form and evolve across cosmic time?				
4) How do stars and planets form?				
5) How are elements reproduced and recycled through galaxies?				
6) What is the nature of matter and gravity at extreme densities?				


Subaru Community's Access to TMT
40
nights
How do you use these nights?
Do you assign only a few hours to each PI?
Do you introduce TMT Strategic Program?

Timeline of Subaru

Keck/Gemini
Time Exchange

Gemini-N/S
minimum 5 nights



Astronomers set up telescope timeshare

Time swap between observatories points to closer collaboration among large telescopes.

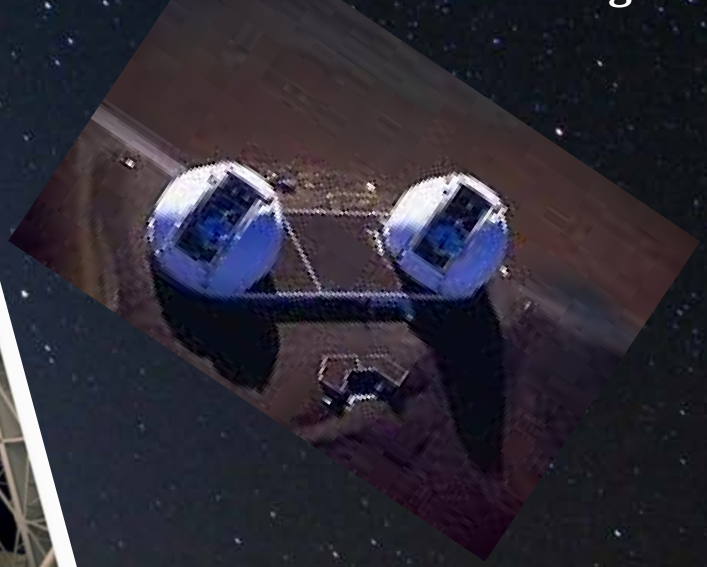
Nature

Eric Hand

02 November 2012

Astronomers can now freely swap time on the Gemini telecopes (pictured) and Japan's Subaru telecope.

Keck-I several nights
Keck-II several nights
LGS-AO maximum 2 nights



Time Exchange with Gemini

The amount of time available in the Subaru/Gemini time exchange will be determined semester by semester in discussions between the Subaru and Gemini Observatories.

Time Exchange with Gemini

Subaru users will be allowed to apply for time through Gemini's monthly Fast Turnaround scheme (URL). The scheduled time will be recorded throughout the semester and added to the time offered on Subaru to Gemini users in the subsequent semester(s).

Fast Turnaround

Subaru and Gemini will enable large/intensive programs from each other's community following their respective schemes and applying through their respective time allocation committees.

Large/Intensive

GEMINI OBSERVATORY
Exploring the Universe, Sharing its Wonders

Keck Strategic Meeting

2014/09/28-29@California

Subaru – Keck Synergy Meeting

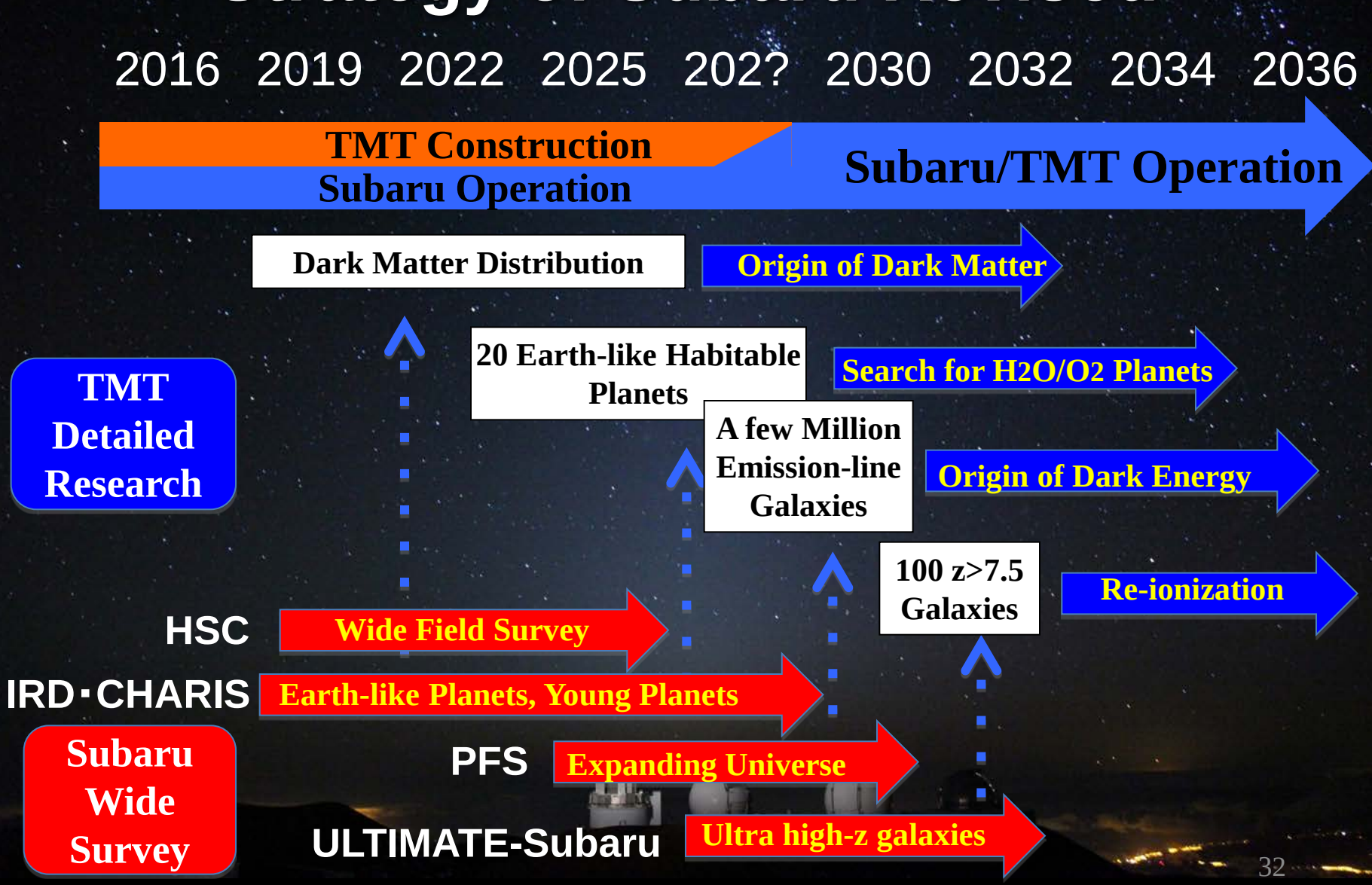
2015/01/16 @ NAOJ

- Increase time exchange nights
- Promote collaborative research projects by Subaru and Keck
- Develop instruments jointly
- Provide opportunities to deepen two communities' mutual understanding

Subaru-Keck Meeting

Sendai 9/1-9/2 2015

Strategy of Subaru Revised



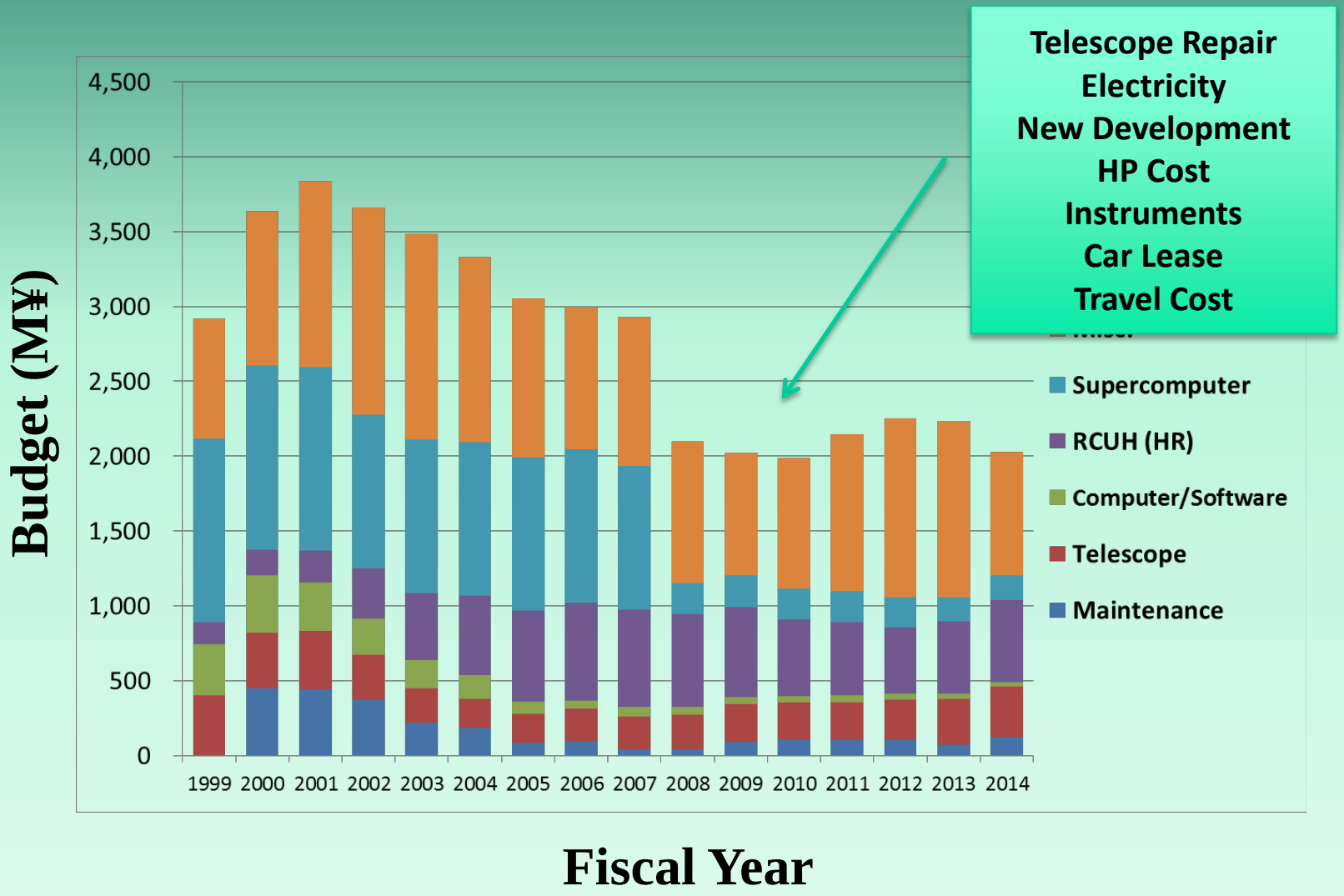
Subaru is not only for wide field astronomy

- Subaru needs to support researchers working on minor fields such as solar system, stars, interstellar dust, local group galaxies, galaxies at z<1, intra galactic medium, gamma ray bursters, and time domain targets, since some of them will grow quickly to the major science fields.

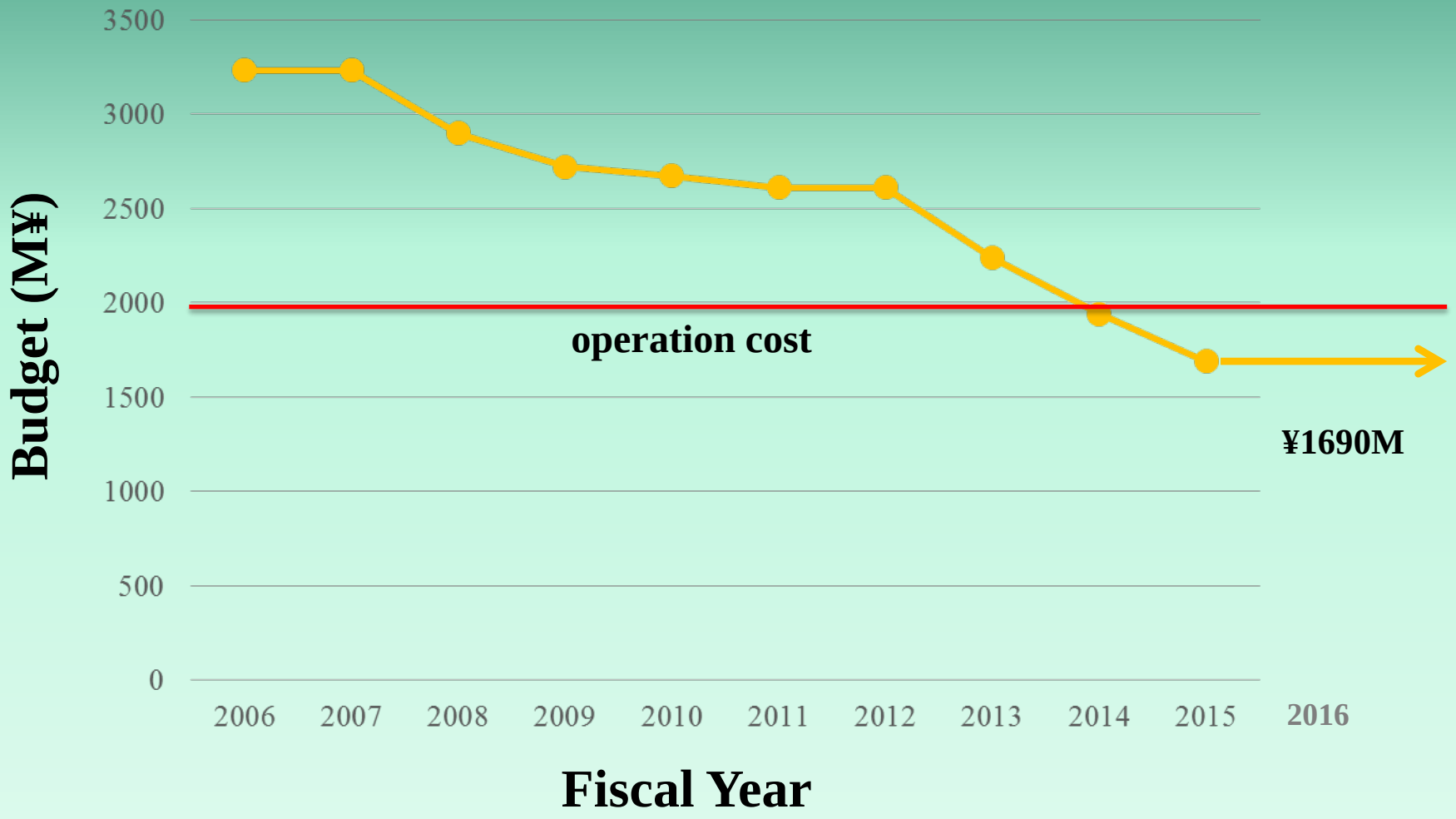

TAURUS
ORION
ARIES
ECLIPTIC
JUNE
MAY
Pleiades
Bellatrix
Budget 2016-2026


Dark Clouds Ahead

Subaru Telescope's Budget



Subaru Telescope's Budget
Allocated by the Japanese government



International Cooperation

Subaru Winter School in Korea

2014/02/25 – 2014/02/27 (KASI)

Fall Meeting

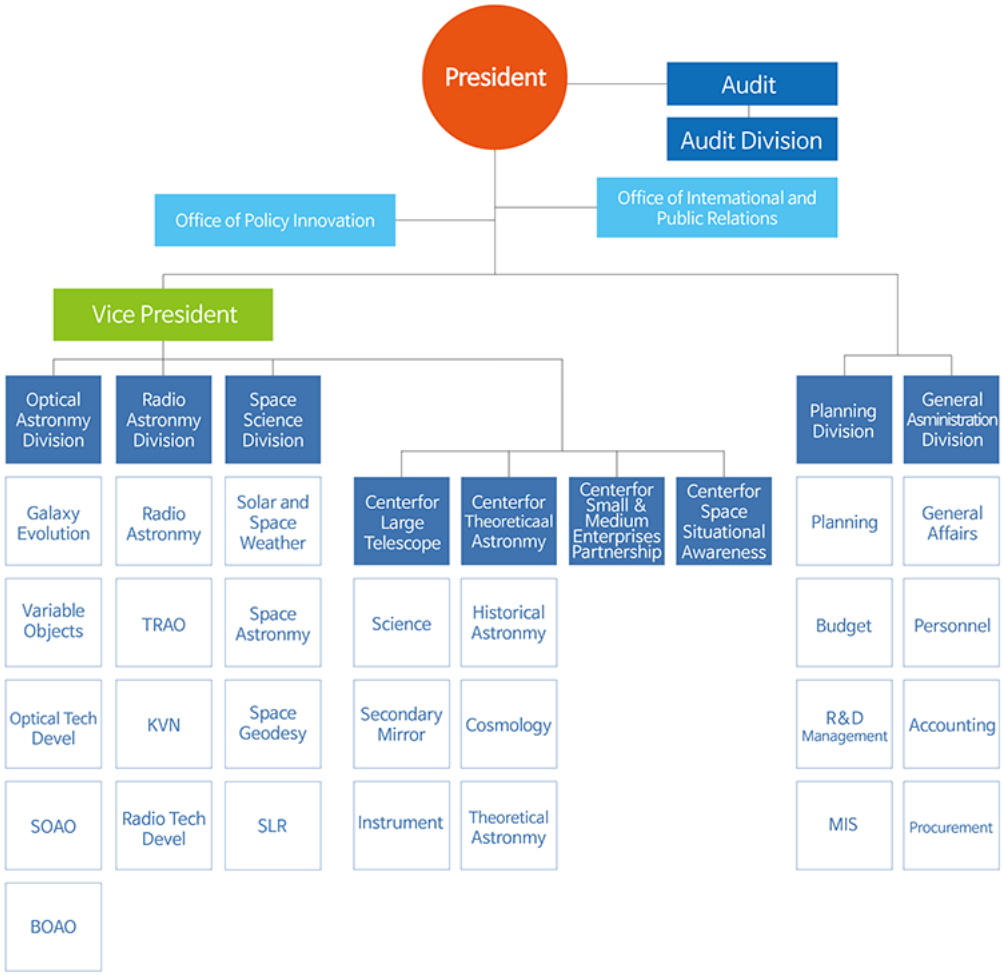
시간표	우주거대구조	성간물질	이론및고에너지천문학/고천
11:10~11:25	Yiseul Jeon	Bon-Chul Koo	Soonyoung Roh
11:25~11:40		Yong-Hyun Lee	
11:40~11:55	Yujin Yang	YoungJoo Yun	Hanbyul Jang
11:55~12:10	Yongmin Yoon	Jeong-Sun, Hwang	Gim Ji-Hyeon
12:10~12:25	LHuillier Benjamin	A-Ran Lyo	Guang-Yao Zhao
12:25~12:40	Sungwook E. Hong	Kyoung Hee Kim	Hong-Jin Yang
12:40~14:00	점심시간		
14:00~14:40	조청강연 - Nobuo Arimoto		

Daemyung Resort Viva

Korea Astronomy and Space Science Institute

president

Inwoo Han (한인우)

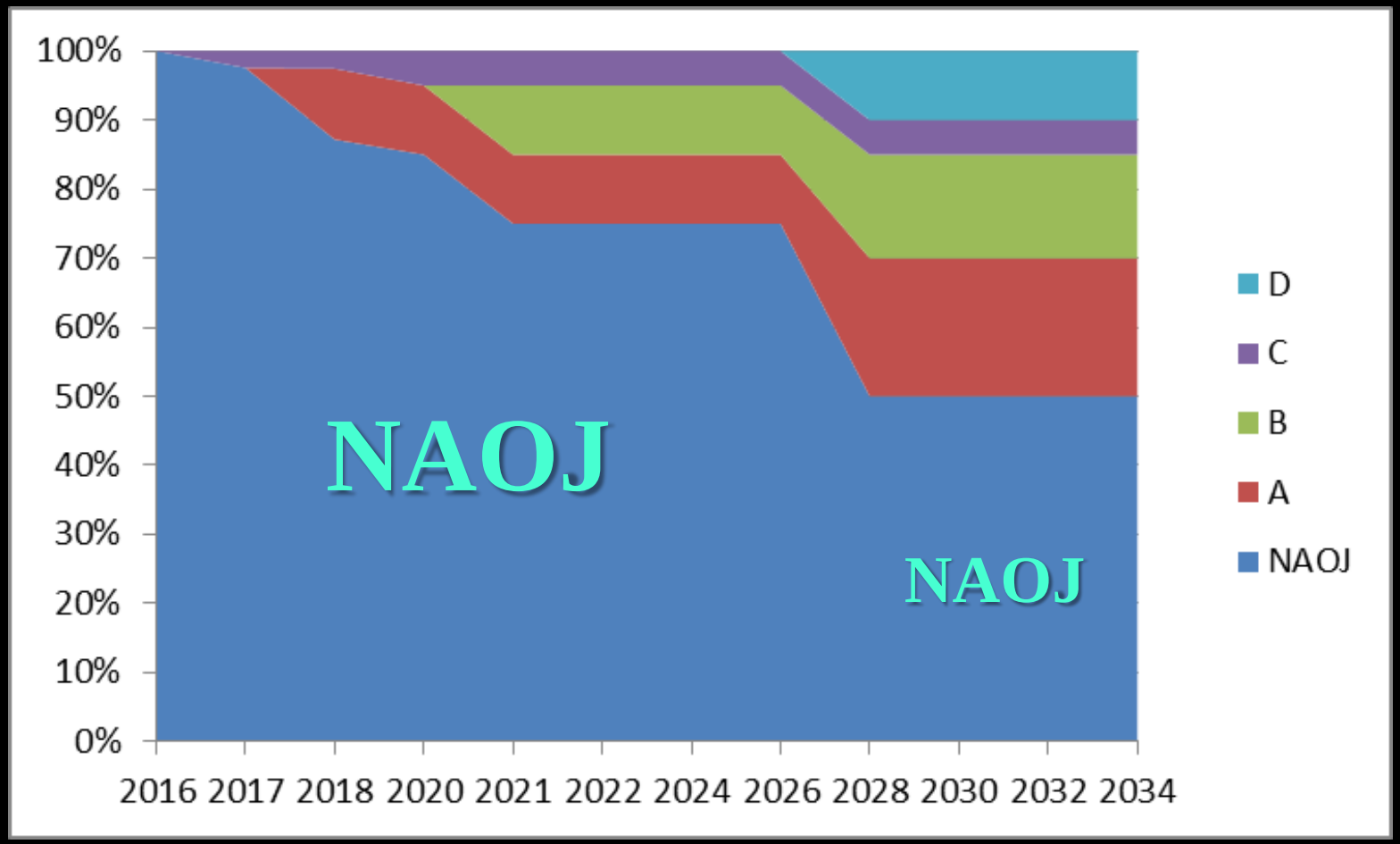


Narae Hwang (left)
Byeong-Gon Park (right)

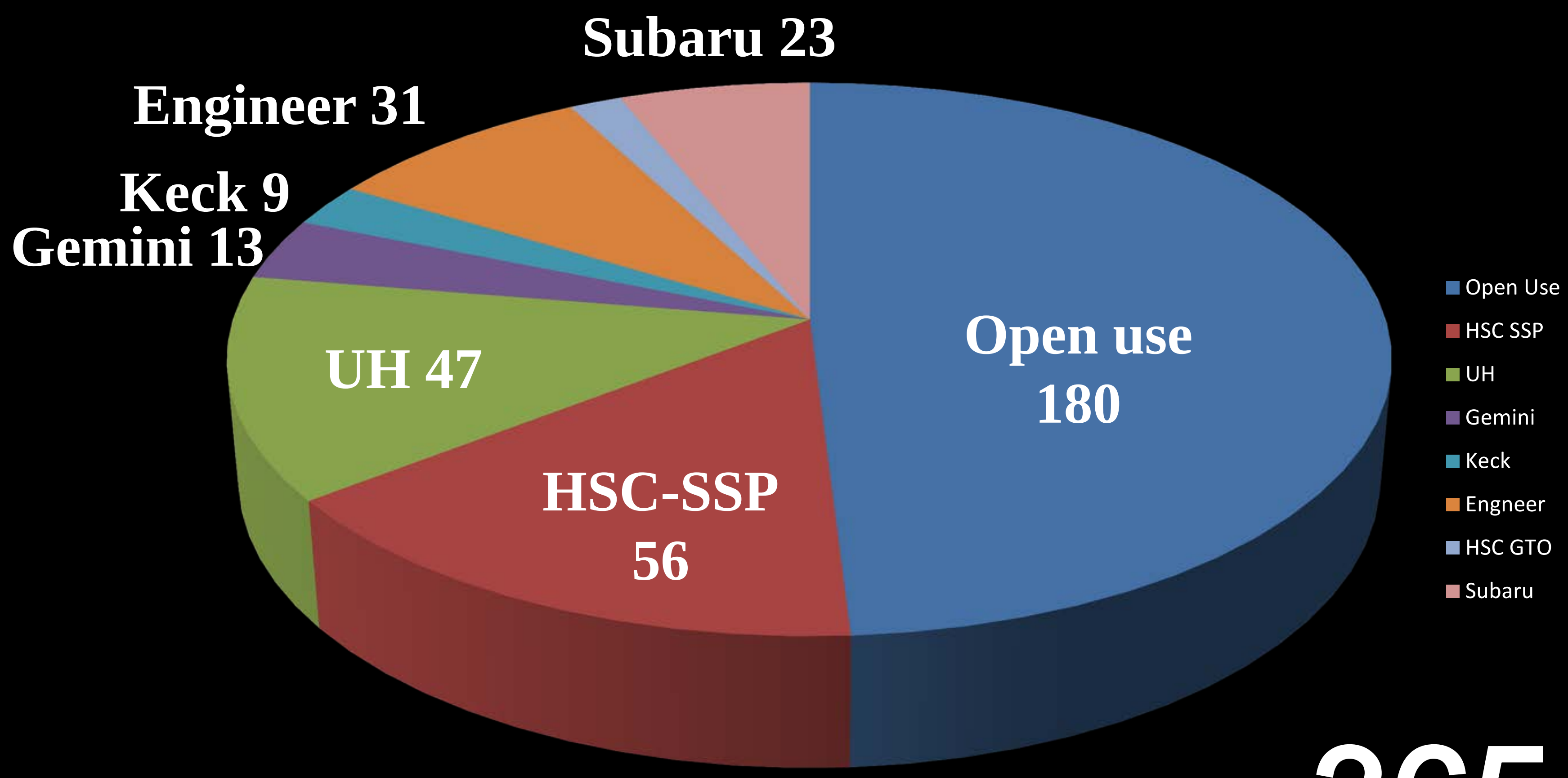
Kein Geld für Subaru über 202?

Ministerium für Bildung und Finanzministerium von der geheimen Vereinbarung

Subaru сотрудничества
스바루의 공동 운용
Subaru Co-operation



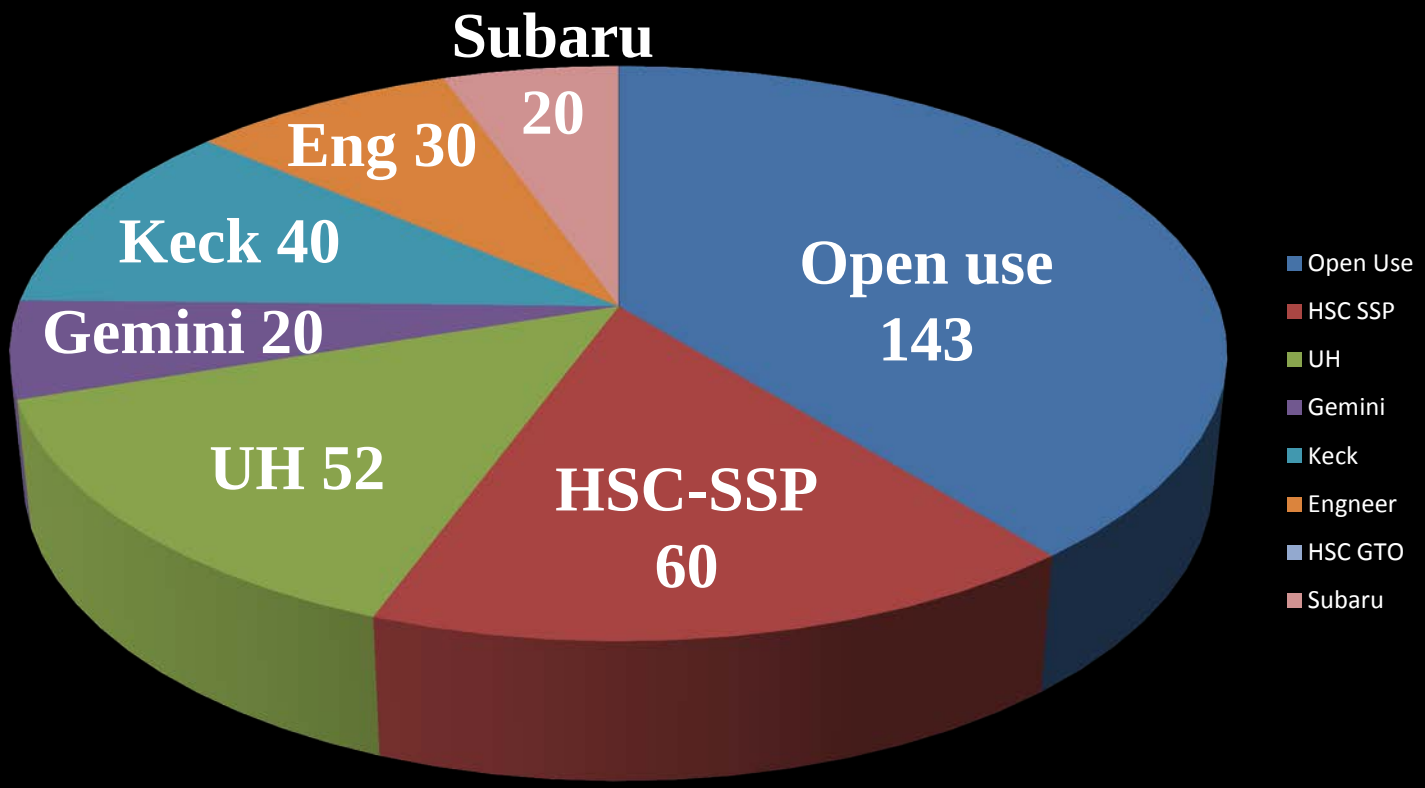
How are Subaru Nights Allocated?



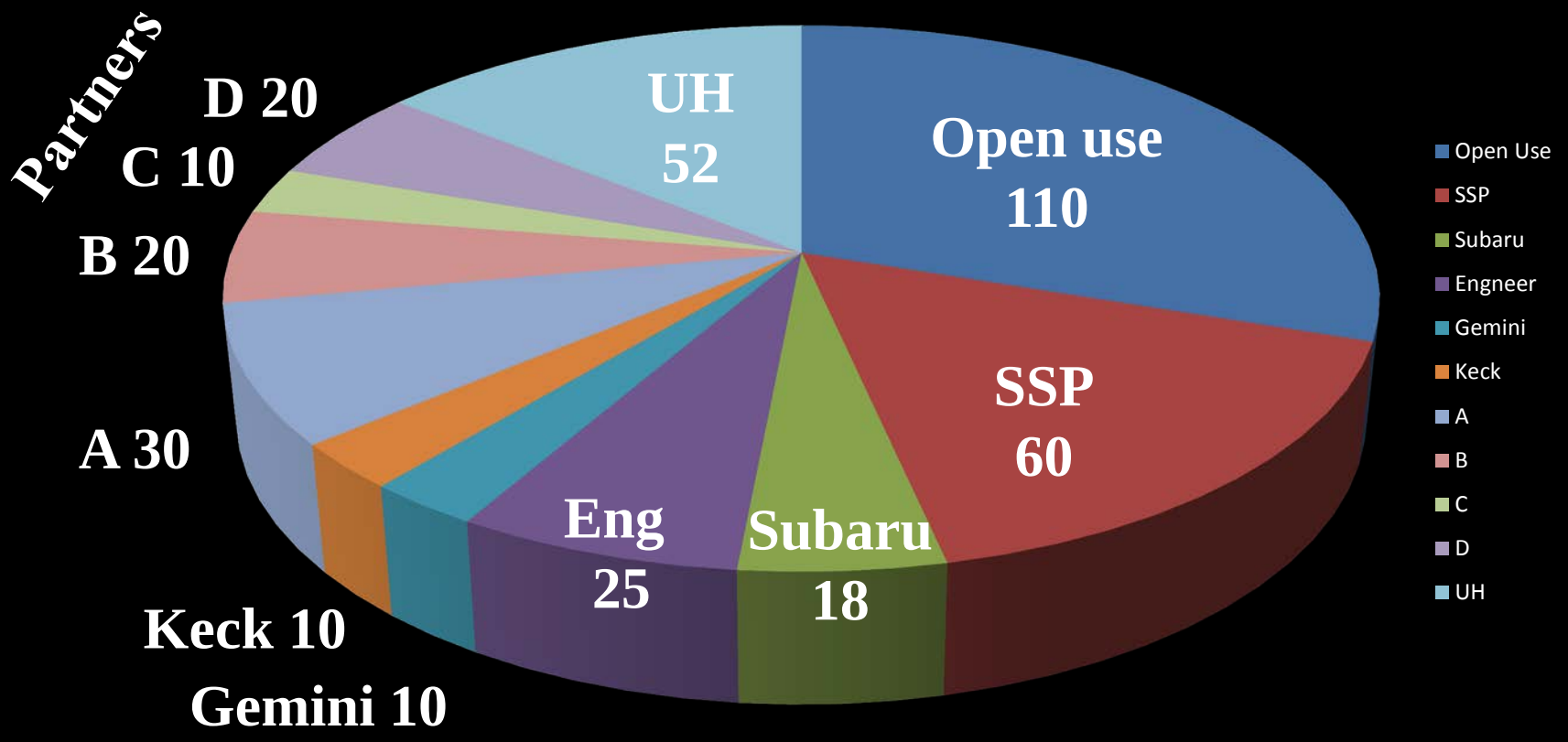
2015

365
nights

Case Study (I)
MK Collaboration



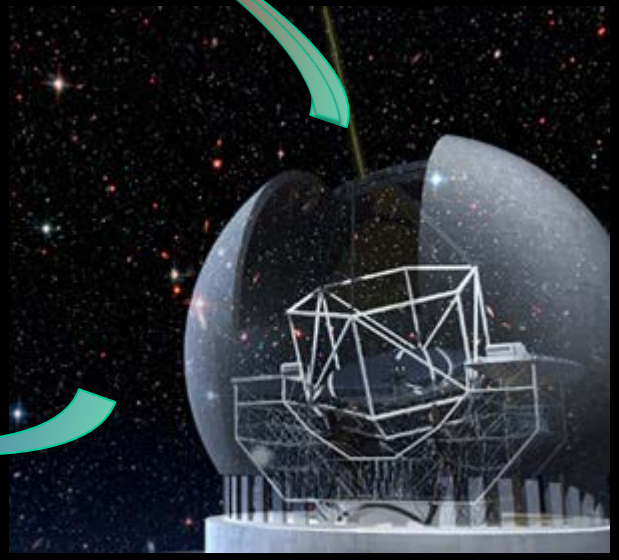
Case Study (II)
International Cooperation



NAOJ's Contribution

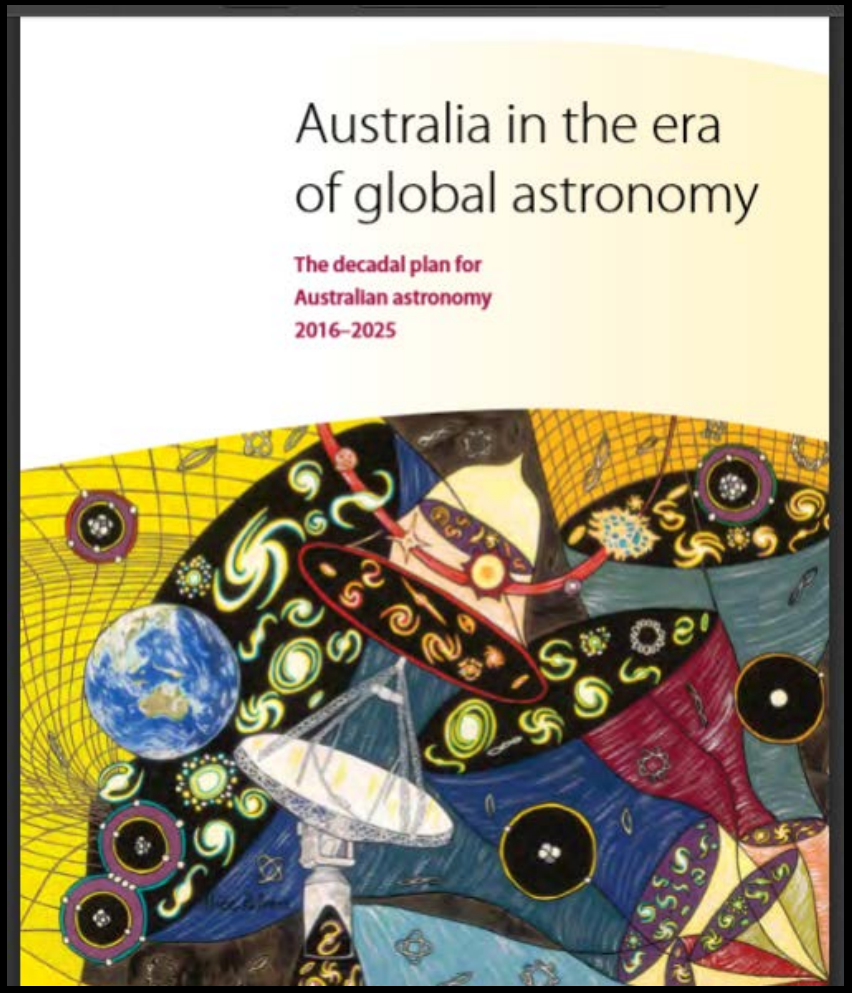
Subaru beyond 2028

TMT Operation Budget
NSF (Gemini & Subaru)



TMT Operation Budget
NAOJ (Subaru)

Decadal Plan for Australian Astronomy 2016 - 2025



Partnership equating to 30% of an 8-metre class optical/ infrared telescope

A simple cost-per-night purchase of telescope capability will not facilitate the opportunities for innovation and technology development that kept Australian astronomy at the international forefront.

Decision Making of Subaru

Subaru Director

SAC @ Odawara

NAOJ Director General

New Subaru DM

beyond 2018

SUBARU BOARD

Subaru Director

Collaboration with China

1st China-Subaru WS (Shanghai)

2014/11/29 – 2014/12/01

2nd China-Subaru Core Meeting (Kyoto)

2016/05/27 :

Subaru-LAMOST Intensive Program

S16A-S17B (20 nights)

(Page 1)

Semester
Proposal ID -
Received / /

for Telescope Time

5. Co-Investigators

Name	Institute
Misa Aoki	ICU
Nobuo Arimoto	NAOJ/Subaru
Norbert Christlieb	Univ. of Heidelberg
Satoshi Honda	Univ. of Hyogo
Miho Ishigaki	Kavli IPMU
Haining Li	NAOC
Tadafumi Matsuno	SOKENDAI
Takuma Suda	Univ. of Tokyo
Qianfan Xing	NAOC
Bharat Kumar Yerra	NAOC
Meng Zhai	NAOC
Shilin Zhang	NAOC
Gang Zhao	NAOC

2. Principal Investigator

Name: Aoki
Institute: National Astronomical Observatory of Japan
Mailing Address: 2-21-1, Osawa, Mitaka, Tokyo
E-mail Address: aoki.wako@nao.ac.jp

3. Scientific Category

- ☐ Solar System
- ☐ Normal Stars
- ☐ Extrasolar Planets
- ☐ Formation
- ★ Metal-Poor Stars
- ☐ Compact Objects and SNe
- ☐ Milky Way

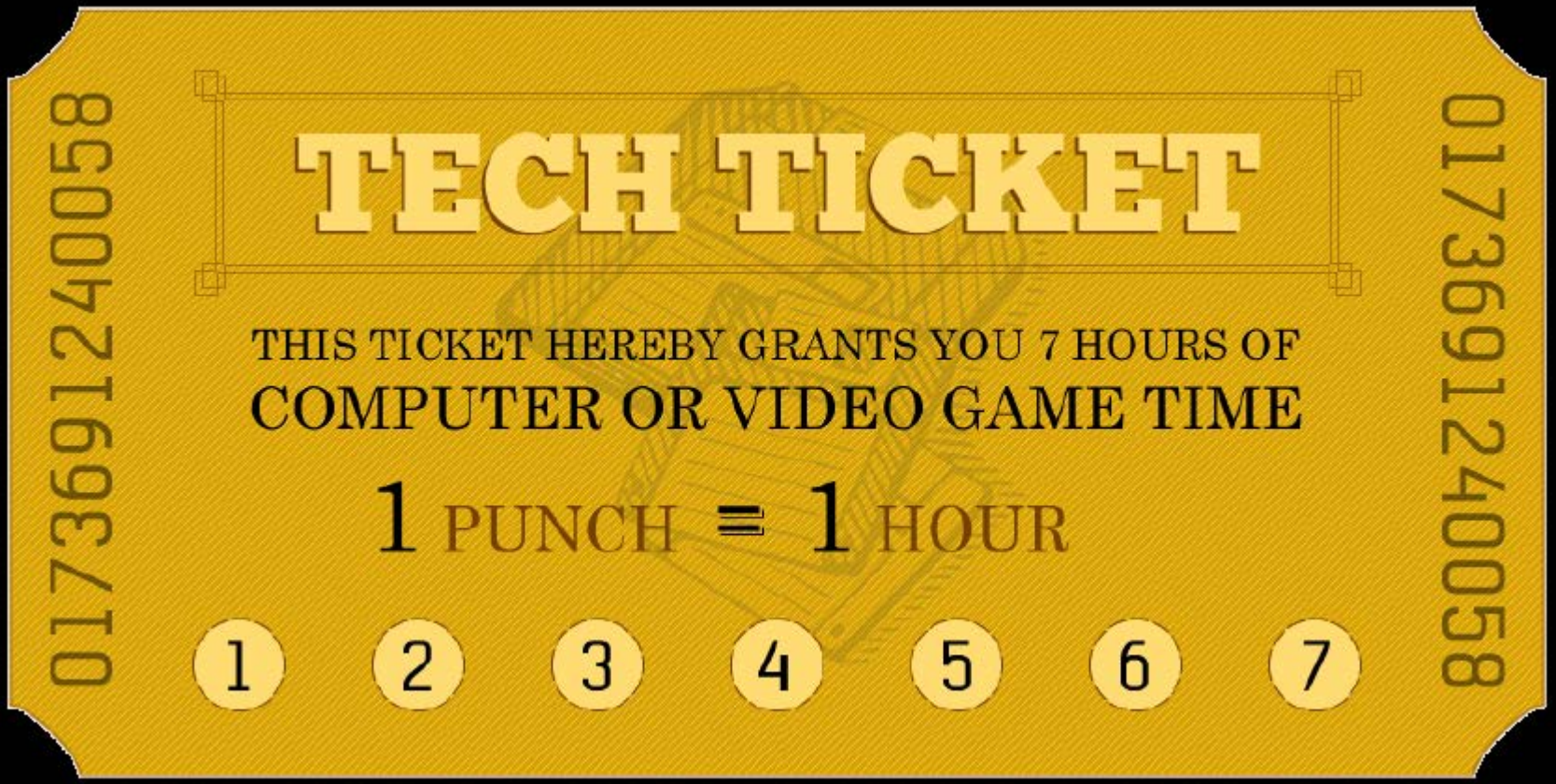
Chinese PFS Participation Consortium ($CP_{FS}PC$)

$5M Cash Contribution

- 11 senior scientists, namely Yipeng JING (representative), Xiaohu YANG, Jun ZHANG and Pengjie ZHANG from Shanghai Jiaotong University, Junxian WANG and Yongqun XUE from the University of Science and Technology of China, Cheng LI and Houjun MO from Tsinghua University, Taotao FANG from Xiamen University, and Gang ZHAO and Gongbo ZHAO from National Astronomical Observatories of China.
- Up to four junior participants (postdocs, graduate or undergraduate students) directly supervised by each senior scientist.

Chinese PFS Participation Consortium (CPPC)

Purchase of Subaru Time?



Purchase of Subaru Time?

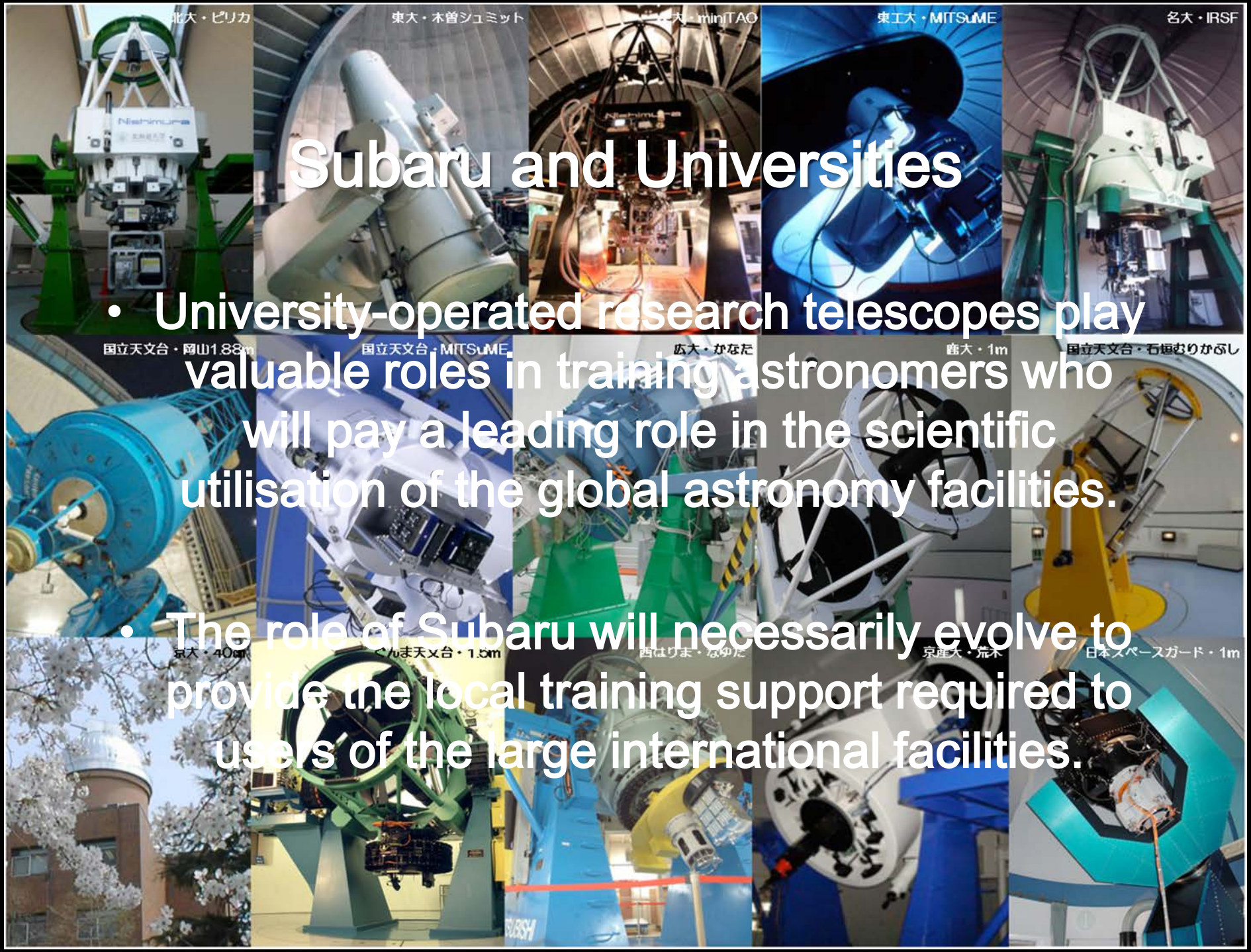
Japanese Astronomy must address the low level of Female Participation among its Workforce

$$\frac{22}{112}$$

Female PhD
1999-2014

Women Observing Stars, 1936

Female Samurai

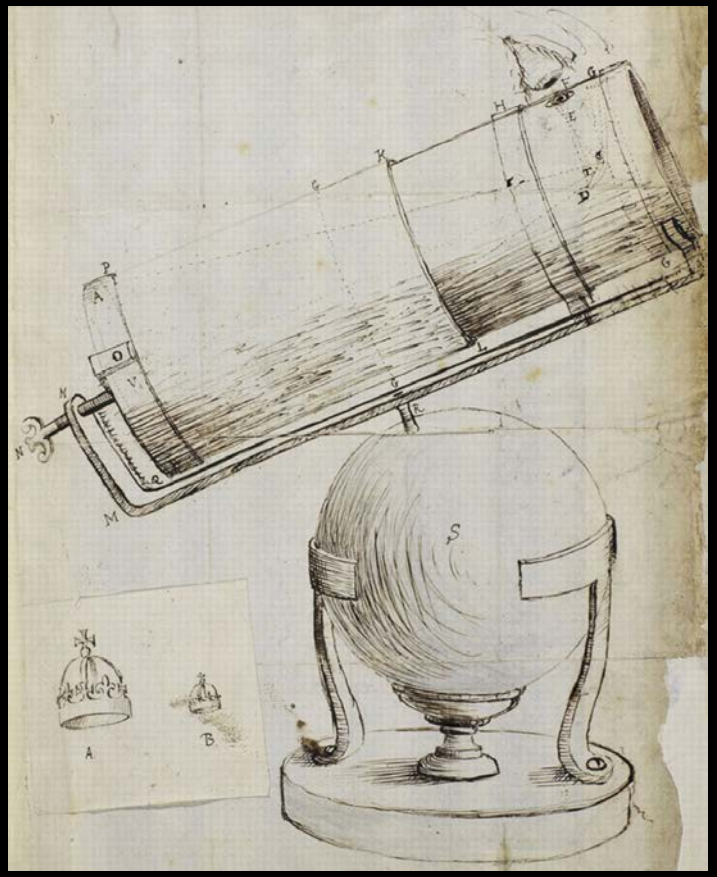


Subaru and Universities

- University-operated research telescopes play valuable roles in training astronomers who will pay a leading role in the scientific utilisation of the global astronomy facilities.

- The role of Subaru will necessarily evolve to provide the local training support required to users of the large international facilities.

Astronomy and Industries



Solutions include developing a commercial understanding within academia fostering the exchange of personnel and building long-term relationship between industry and academic partners.


TMT Protesters 2015
CONDITIONS
NOT MET
OUGHT OFF
I BET


HAWAIʻI
ALOHA ʻĀINA

Subaru Makali'i Seminar

Learn Hawaiian culture and history through a series of seminars.
All Subaru Telescope staff is invited.
Light refreshments will be served.

Dr. Larry Kimura
Associate Professor
College of Hawaiian Language at UHH

Topic:
Hawaiian Origins

Jan 12 (Tuesday) 5-6pm
Subaru Conference Room

Future Seminars:
- Hawaiian Immersion School Education
- Polynesian Wayfinding
- Hawaiian Perspective
- History of Immigrants: Cul

Subaru Makali'i Sem

Learn Hawaiian culture and history through a series o
All Subaru Telescope staff is invited.

(Executive Director, 'Imiloa Astronomy Center)

Ka'iu Kimura

story of 'Imiloa

5pm-6pm
nce Room

ssor at College of Hawaiian Language, UHH)
education (TBD)

e and Cuisine
tor of the Hawai'i Japanese Center)

The Maunakea Astronomy 'Ohana

Presents

ASTRODAY

at the Prince Kūhiō Plaza Mall

Saturday
May 2, 2015
10 am - 4 pm

CELEBRATING

The International Year of Light

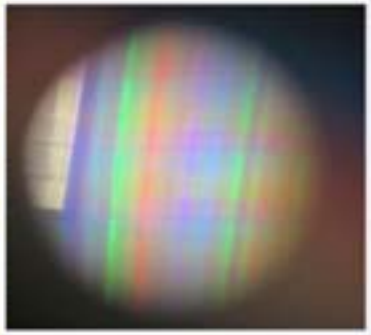
Bringing Astronomy to the People • www.mkaoc.org/programming/astroday

Subaru x AstroDay

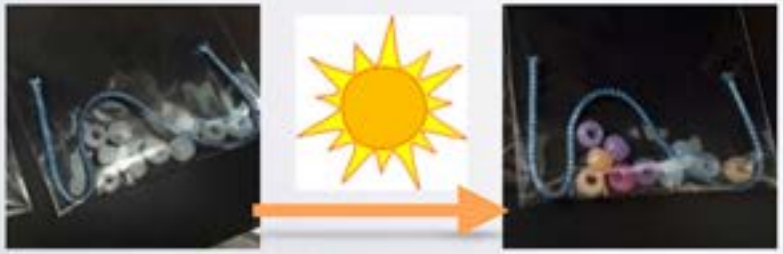
May 2 (Sat) 10am - 4pm, Prince Kuhio Plaza (Macy's)

Family & Kids friendly event. Lots of hands-on activities & souvenirs!

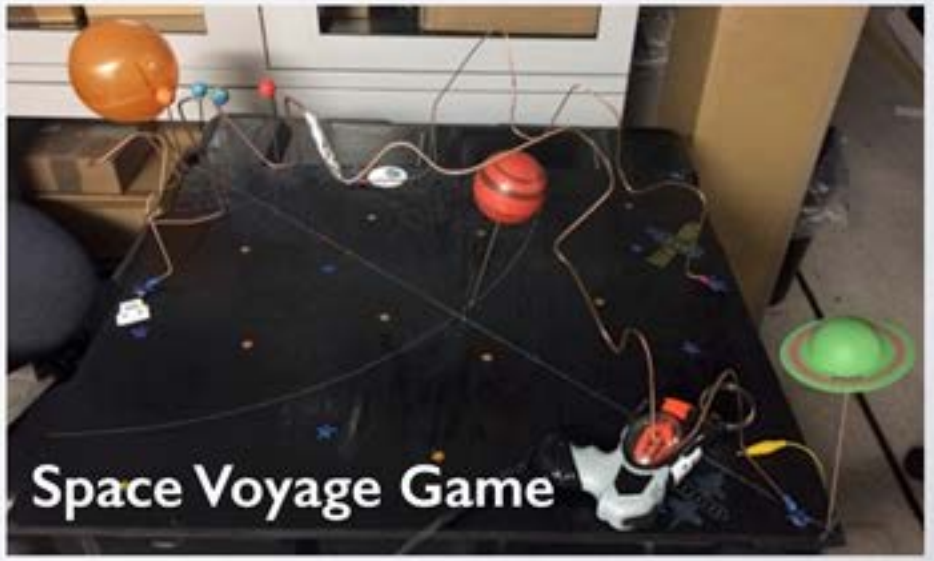
"Let's make a Rainbow!"
(spectrum card)



UV beads bracelet



Beads change colors under the Sun (ultraviolet light)



Journey through the Universe
Hilo, Hawai'i

DEPARTMENT
Hilo-Waiak

www.gemini.edu
For more in
Janice Harv
jharvey@ge

Astronomy Educators

in the classroom 2015!

Andy Adamson, Gemini Observ
Nobuo Arimoto, Subaru Telesco
Brad Bailey, NASA SSERVI
Daniel Berke, Joint Astronomy
Jennie Berghuis, Subaru Telesco
Dan Birchall, Subaru Telescope
Kelly Blumenthal, UH Institute f
Andre-Nicolas Chene, Gemini O
Kathy Cooksey, University of Ha
Sandra Dawson, Thirty Meter Te
Brian Day, NASA SSERVI
Daniel Devost, Canada-France-H
Aggelic Ebbers, Gemini Observa
Anna Ferre-Mateu, Subaru Teles
Scott Fisher, University of Orego
Roy Gal, UH Institute for Astron
Jeff Goldstein, NCESSE
Olivier Guyon, Subaru Telescope
John Hamilton, PISCES
Janice Harvey, Gemini Observat
Guenther Hasinger, UH Institute
Sagiko Hayashi, Subaru Telescop
Stephanie Henry, NASA Marsha
Michael Hoenig, Gemini Observ
Matthew Hosek, UH Institute for
Stewart Hunter, Mauna Kea Sup
Russell Kackley, Subaru Telesco
Yuko Kakazu, Subaru Telescope
Rob Kaho, PISCES
Markus Kissler-Patig, Gemini Ob
Bernhard Laurich, Hawai'i Comm
Mary Beth Laychak, Canada-Fra
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Callie Matulonis, James Clerk M
Peter Michaud, Gemini Observa
Joseph Minafra, NASA SSERVI
Brian Mitchell, NASA Marshall S
Harriet Parsons, Joint Astronom
Emily Peavy, University of Hawa
Andreea Petric, Gemini Observa
Christopher Phillips, Freelance
Bo Reipurth, UH Institute for As
Kathy Rolls, Gemini Observator
Rodrigo Roma, PISCES
Dennis Schatz, Pacific Science C
Sharon Schleigh, East Carolina U
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Breann Sitarski, University of Ca

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