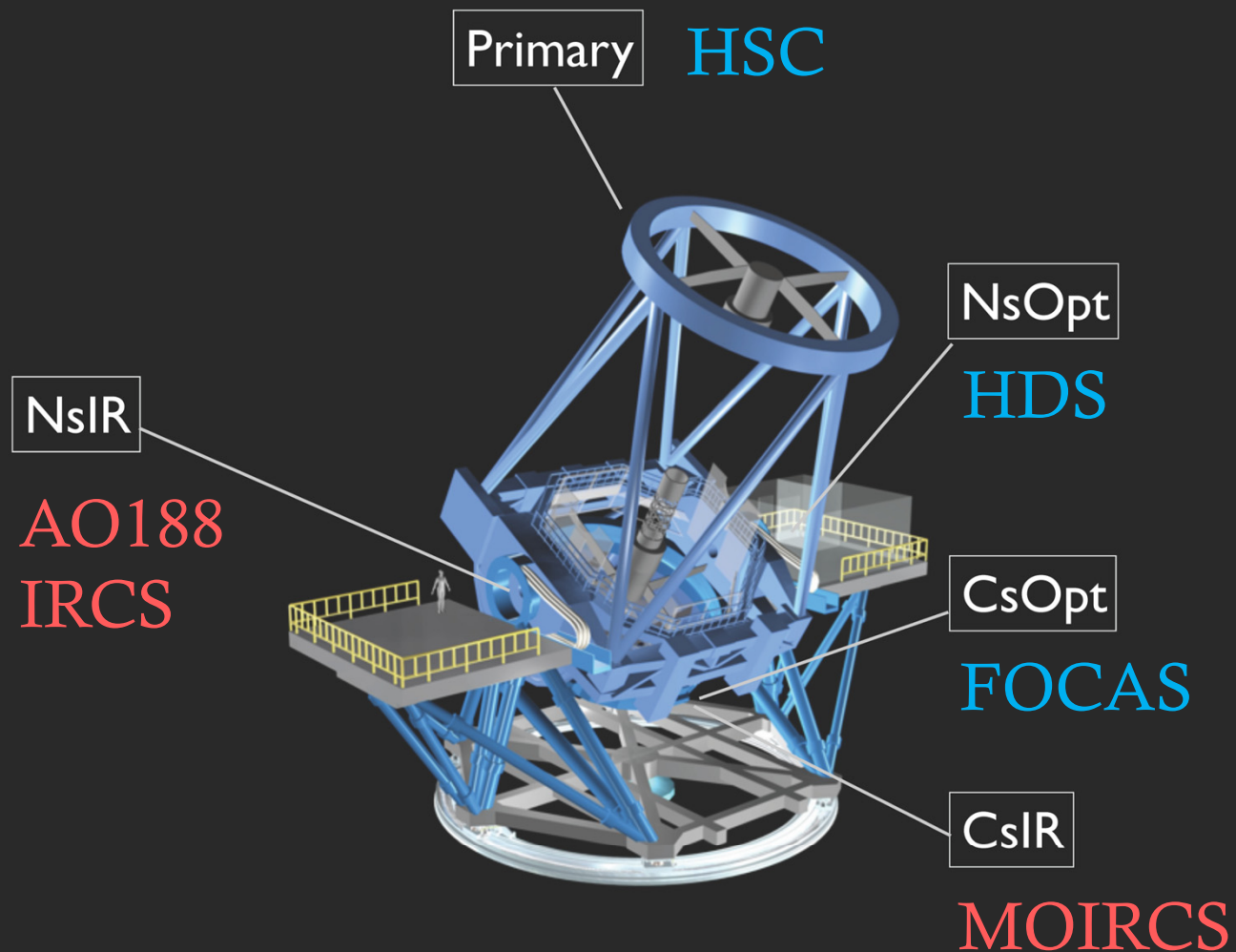


Status of Existing Facility Instruments

Takashi Hattori (Instrument Division, Subaru Telescope)

Facility Instruments



HSC

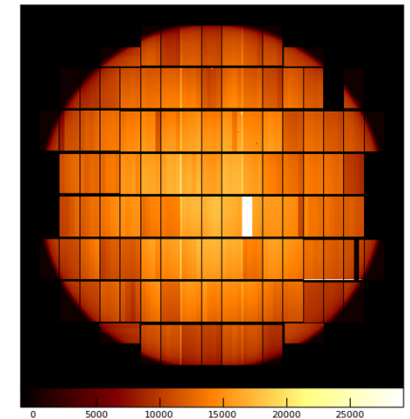
◇ CCD readout issues

◇ https://www.subarutelescope.org/Observing/Instruments/HSC/hsc_ccd_anomaly.html

◇ major issues (basically from the beginning of HSC operation)

Major issues

DET-ID	SDO-ID	Channel	Period (UT)	Case	Details
009	1_47	ch1 – 4	2014/04/03 – 2018/01/18	Saturation/anomaly patterns	Link
033	0_20	ch1 – 4	2013/10/29 –	Saturation/anomaly patterns	Link
094	0_43	ch2	2014/03/25 –	Poor linearity	Link
000	1_53	ch3	2014/06/24 –	No sensitivity	Link
043	1_09	ch4	2015/11/06 –	Light emission	Link



◇ some of the minor issues are new (2019-2021)

Minor issues

DET-ID	SDO-ID	Channel	Period (UT)	Case	Details
006	1_44	ch4	2014/03/25 –	A bright spot	Link
010	1_36	ch3	2014/03/25 –	A bright spot	Link
041	0_16	ch1	2021/10/01 – 2021/10/02	Light emission	Link
050	1_12	ch2 ch3	2019/05/28 – 2014/03/25 –	Light emission A bright spot	Link
062	0_07	ch4	2021/01/09 – 2021/01/18	Light emission	Link
074	1_24	ch2	2014/06/30 –	Light emission	Link
090	0_47	ch2	2021/06/10	Light emission	Link
100	0_31	ch1,2	2020/10/20 – 2020/10/23	Light emission/shadow	Link

HSC

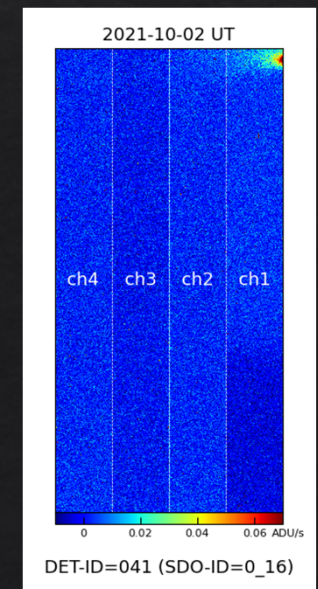
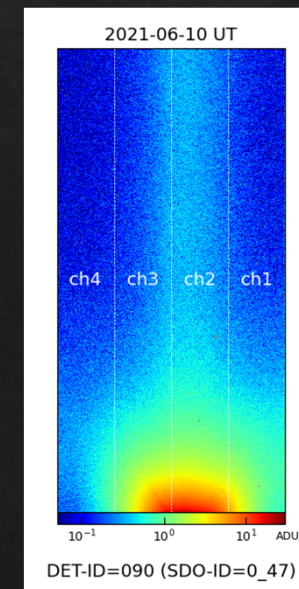
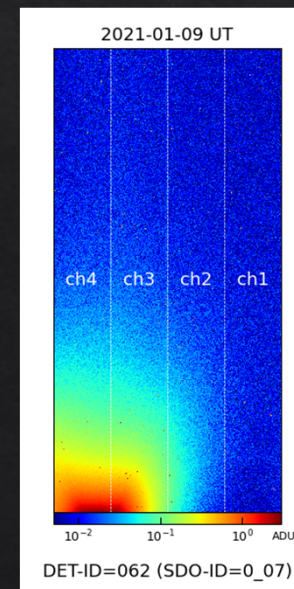
◇ CCD readout issues

◇ most of the new minor issues are **not persistent**

Minor issues

DET-ID	SDO-ID	Channel	Period (UT)	Case	Details
006	1_44	ch4	2014/03/25 –	A bright spot	Link
010	1_36	ch3	2014/03/25 –	A bright spot	Link
041	0_16	ch1	2021/10/01 – 2021/10/02	Light emission	Link
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062	0_07	ch4	2021/01/09 – 2021/01/18	Light emission	Link
074	1_24	ch2	2014/06/30 –	Light emission	Link
090	0_47	ch2	2021/06/10	Light emission	Link
100	0_31	ch1,2	2020/10/20 – 2020/10/23	Light emission/shadow	Link

◇ we are planning to test changing voltage settings to reduce these kinds of light emission

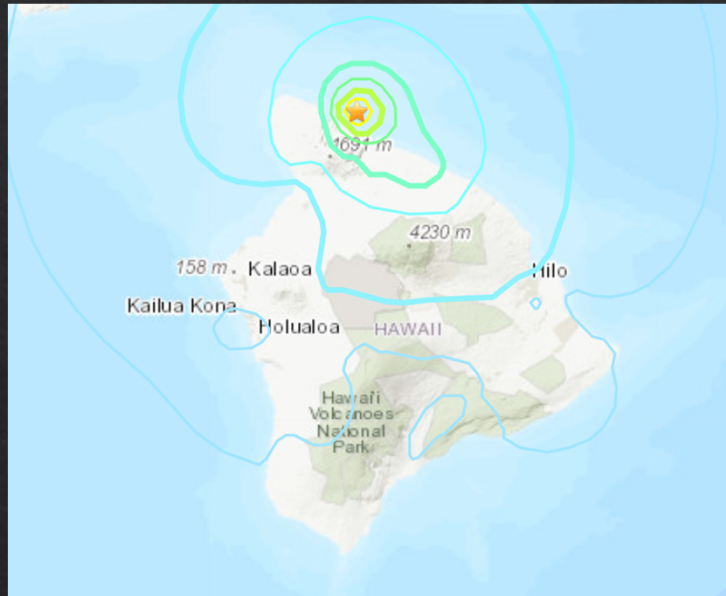


HSC

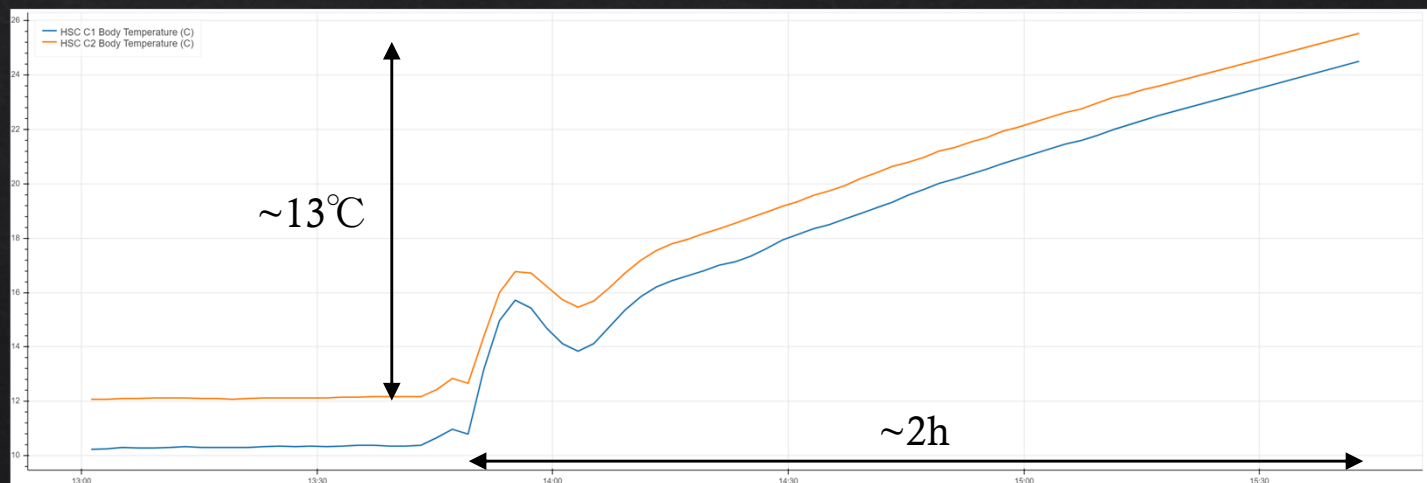
- ◇ Emergency shutdown after earthquake on 7/5/2021
 - ◇ 13:43 earthquake (mag. 5.16)
 - ◇ power outage at the summit facility
 - ◇ the facility chillers stopped cooling, resulting in warming-up of the coolant
 - ◇ HSC cooler body started warming up
from $\sim 12^{\circ}\text{C}$ to $\sim 25^{\circ}\text{C}$ at 15:43
 - ◇ 15:45 lost network connection to the summit facility
 - ◇ the batteries of UPS3 and UPS4, which support the network devices and computers, ran out
 - ◇ no remote monitoring or control on HSC instrument
 - ◇ $\sim 17:00$ TelDiv members arrived at the summit
 - ◇ $\sim 17:20$ shutdown the power supply for HSC
 - ◇ restarting HSC on the telescope is (basically) impossible
 - ◇ HSC observation on 7/5 to 7/9/2021 was cancelled

HSC

- ◆ Emergency shutdown after earthquake on 7/5/2021



shaking intensity map
<https://earthquake.usgs.gov/earthquakes/eventpage/hv72565662/executive>



HSC cooler body temperature

HSC

- ◆ User Filter policy update

- ◆ https://www.naoj.org/Observing/Instruments/HSC/20161016HSC_filter_policy_en.pdf

- ◆ Update of this policy is coming soon

- ◆ acceptance procedure

- ◆ Science objectives

- ◆ Relation with other existing/planned filters

- ◆ Filter performance

- ◆ Operation test in HSC (both in HSC Camera Unit and Filter Exchange Unit)

- ◆ before announcing the opening of the filter in CfP

- ◆ important to confirm that the filter-holder and filter-frame work fine

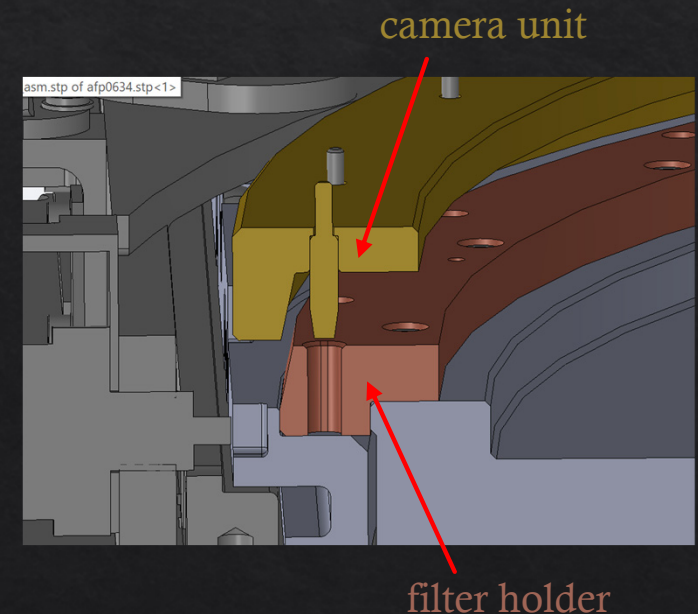
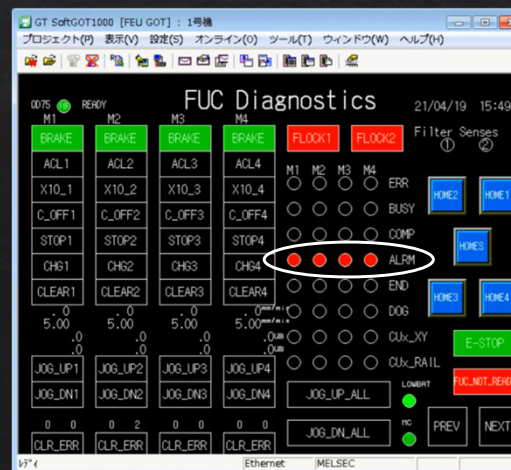
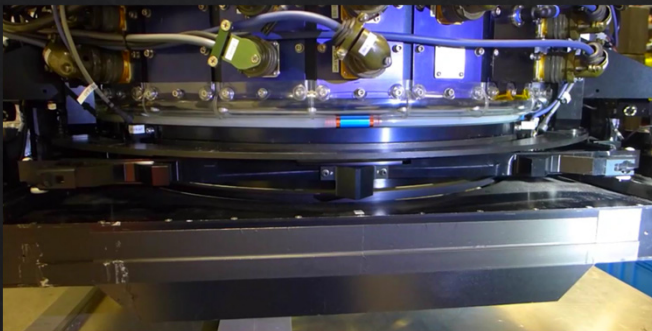
- ◆ NB506 case

HSC

- ◆ User Filter policy update

- ◆ NB506 case

- ◆ a user filter (PI: Dr. Masayuki Umemura)
 - ◆ overload alarms when attached to HSC camera unit
 - ◆ basically the first case after the commissioning of HSC
 - ◆ tapered coupling of the filter-holder may be larger than the specification



LGS/AO188

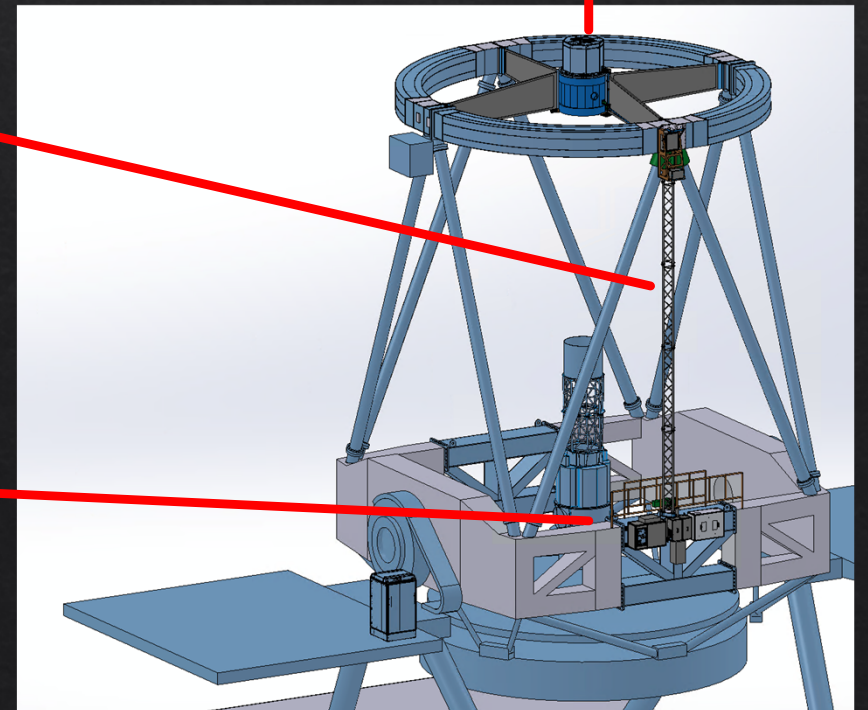
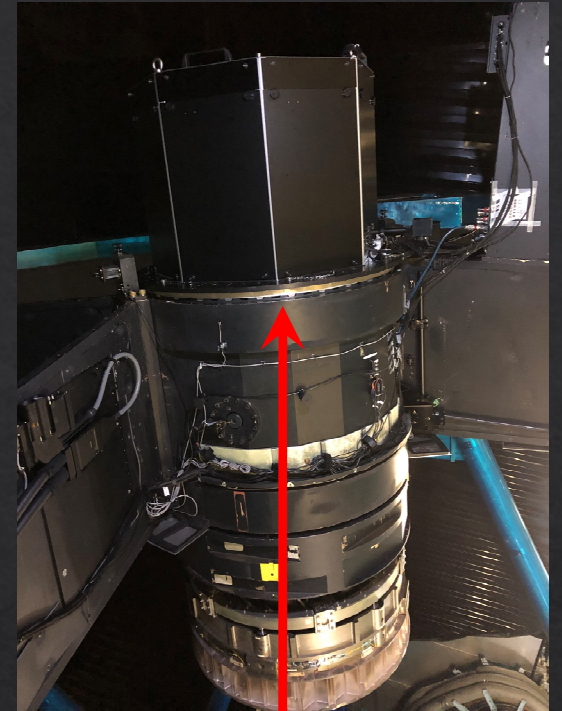
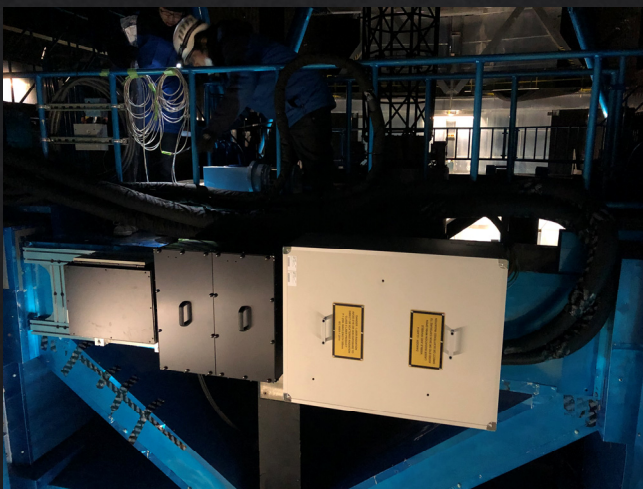
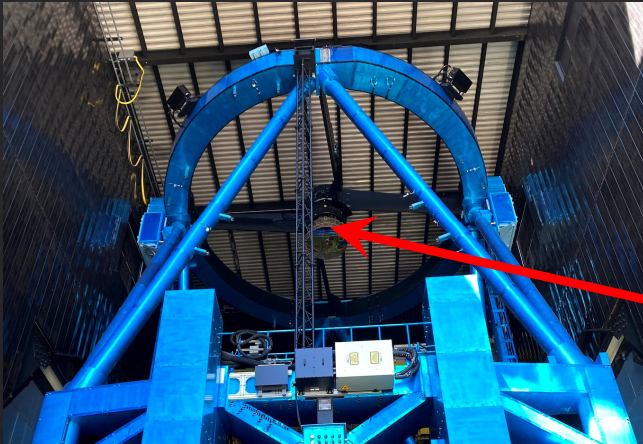
◆ Laser Guide Star Upgrade

- ◆ Installed **all of the laser components** to the telescope.
- ◆ **Optical alignment from the center section laser head to the launching telescope** has been completed.
- ◆ **Laser beam alignment control and stability** have been tested by moving the telescope Az/EL.
 - ◆ The beam alignment can be maintained within the accuracy of 0.2 arcsec.
- ◆ The laser **on-sky propagation has not been done yet.**
 - ◆ Waiting for approval from the Laser Clearing House at the US space command.

LGS/AO188

◆ Laser Guide Star Upgrade

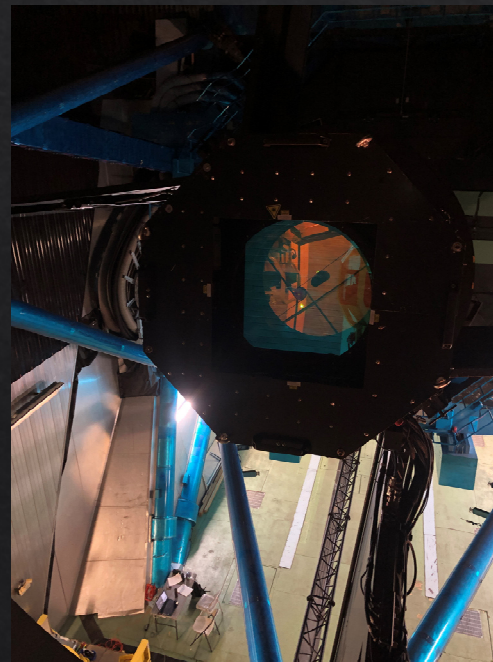
- ◆ Installed **all** of the laser components to the telescope.



LGS/AO188

◆ Laser Guide Star Upgrade

- ◆ Optical alignment from the center section laser head to the launching telescope has been completed.
- ◆ Laser beam alignment control and stability have been tested by moving the telescope.
 - ◆ The beam alignment can be maintained within the accuracy of 0.2 arcsec.



LGS/AO188

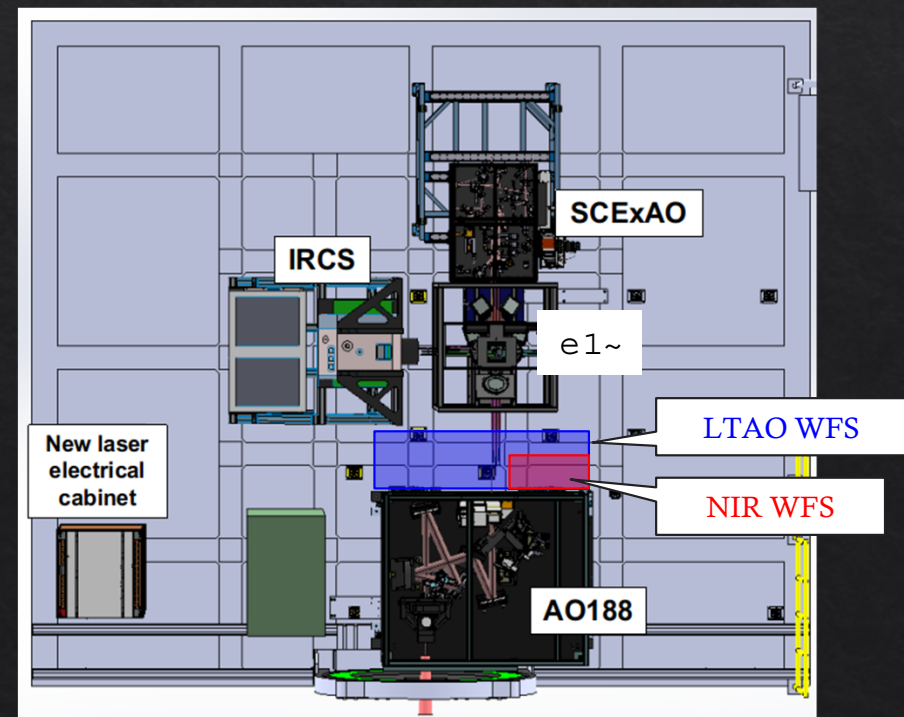
- ◇ Laser Guide Star Upgrade
 - ◇ The laser on-sky propagation has not been done yet.
 - ◇ Waiting for approval from the Laser Clearing House at the US space command.
 - ◇ Engineering runs in S21B
 - ◇ 12/15-12/20/2021 (3 nights)
 - ◇ 1/16-1/18/2022 (1.5 nights)
 - ◇ Hopefully announcing the new LGS in S22B call for proposal

LGS/AO188

- ◇ AO188 related upgrades
 - ◇ new Deformable Mirror
 - ◇ ALPAO DM3228 (64x64)
 - ◇ arriving at the end of January, engineering in S22A?
 - ◇ Near Infrared Pyramid WaveFront Sensor
 - ◇ tested in the lab, engineering in S22A
- ◇ Nasmyth Beam Switcher
 - ◇ final design was completed in this FY
 - ◇ manufacturing of the parts in ongoing
- ◇ ULTIMATE-START (PI device)
 - ◇ Grant-in-Aid project (PI:Dr. Akiyama)
 - ◇ Laser Tomographic AO with 4 LGS
 - ◇ test with prototype SH-WFS was done



ALPAO DM3228

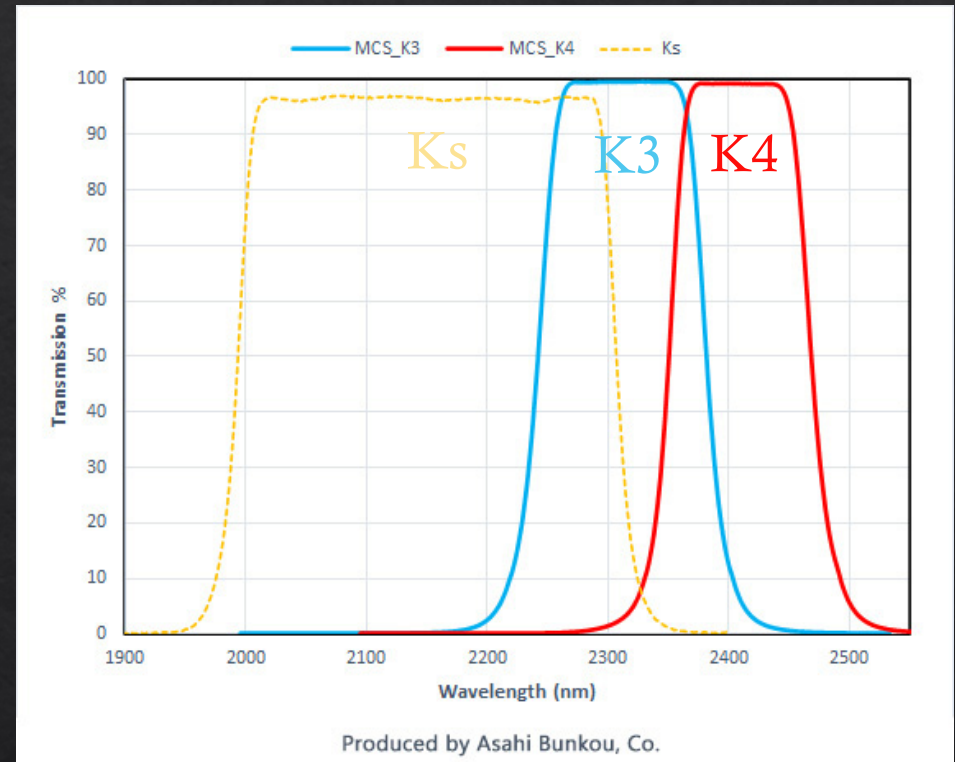


MOIRCS

- ◇ Hibernation from S21A to S22B
- ◇ Medium-band filters project
- ◇ K-band high-efficiency grism project

MOIRCS

- ◆ Medium-band Filters Project
 - ◆ K3 & K4 filters – fabricated by ULTIMATE-Subaru Project.
 - ◆ To be opened to public from S23A (shared-risk status).
 - ◆ Other MBs (similar to the SWIMS MB series) are also planned to make by MOIRCS user community.
- ◆ A NB-filter (“K-continuum”) will be decommissioned.



MOIRCS

- ◇ K-band high-efficiency grism project
PI: Dr. N. Ebizuka (Riken)
 - ◇ Medium-resolution ($R \sim 2700$)
Volume Binary grating
 - ◇ Replace of the current VPH-K grism
 - ◇ Currently test-piece fabrication
phase.
 - ◇ Actual VB grating fabrication to be
done hopefully in FY22.

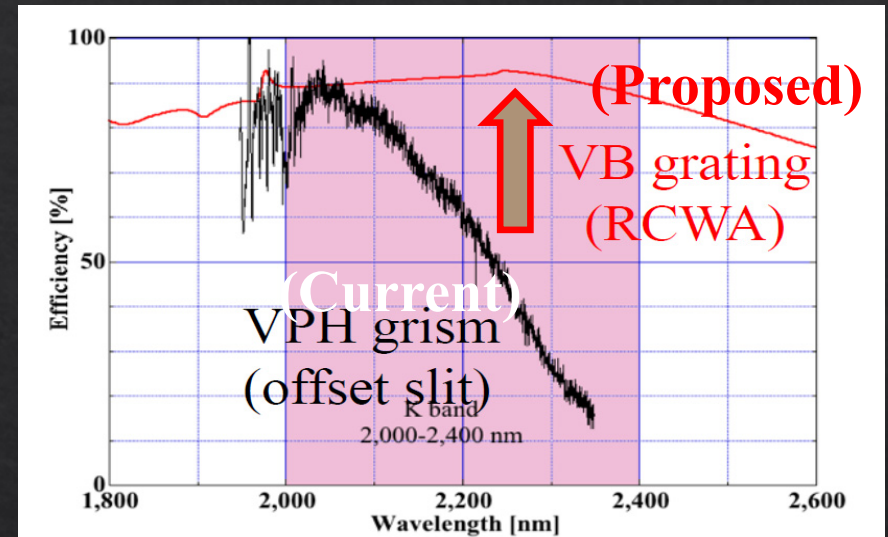
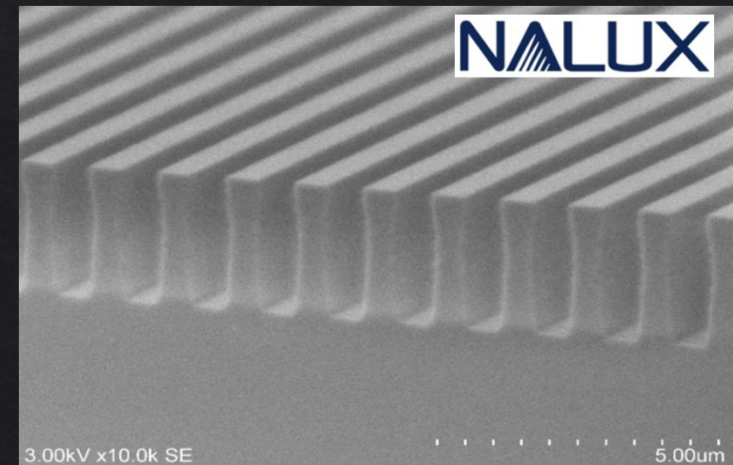


図 2 MOIRCS K band grism の回折効率。
AOI=27.8°, $\Lambda=2.36\mu\text{m}$, L&S=1:1, $t=4\mu\text{m}$ 。



Summary 2021

Prime Focus

HSC	CCD readout issues, emergency shutdown due to earthquake, user-filter policy update
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Nasmyth

AO188	LGS upgrade, various upgrades on NsIR
IRCS	No major issue/activity
HDS	No major issue/activity

Cassegrain

MOIRCS	Medium-band filters, K-band grism upgrade
FOCAS	No major issue/activity

