



P Prime
F Focus
S Spectrograph

iPMU INSTITUTE FOR THE PHYSICS AND
MATHEMATICS OF THE UNIVERSE



PFS Spectrograph System 2011 – 2024

**JOHNS HOPKINS
UNIVERSITY**



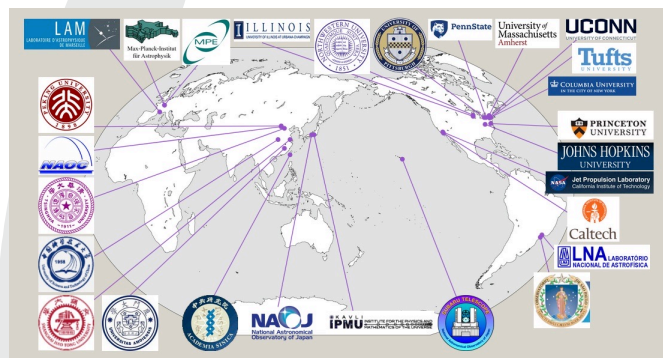
LNA LABORATÓRIO
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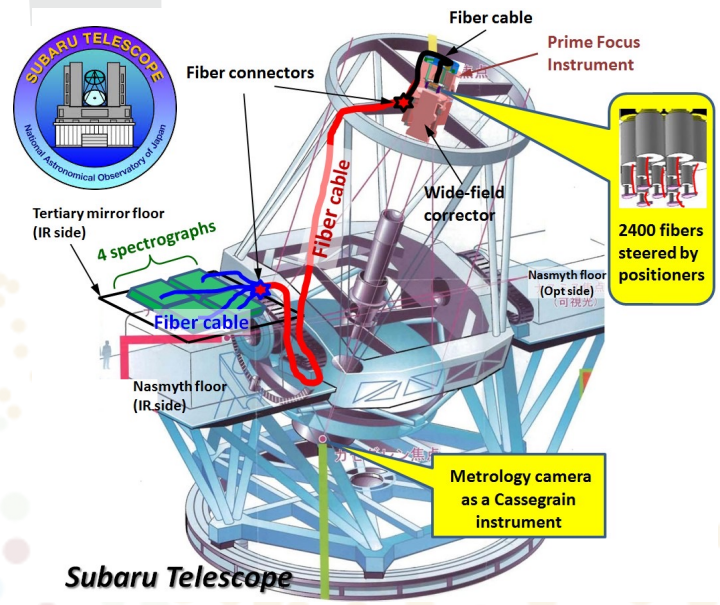


Subaru Prime Focus Spectrograph

A world-wide consortium, led by IPMU Tokyo and NAOJ to build the largest MOS (2400 fibers) on a 10-m class telescope in Hawai'i.
 Partners are contributing either cash or in-kind (FTEs) for a total estimated to 100M\$.
 IPMU-Tokyo initially brought 50M\$ to spend by 2015.

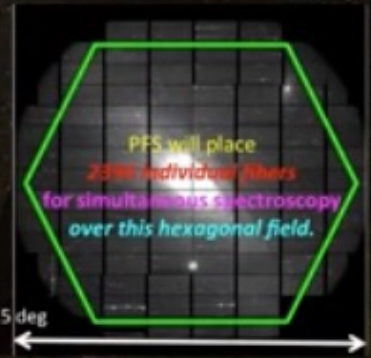


<https://pfs.ipmu.jp>



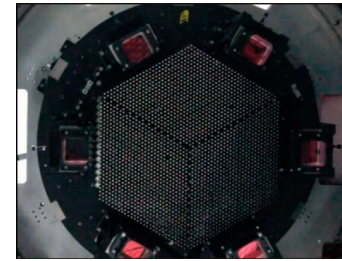
PFS - Fast facts

- **Prime Focus Spectrograph: Spectroscopic exploitation of the Subaru's prime focus (complementarily to HSC)**
 - Wide field: **~1.3 deg** diameter
 - High multiplicity: **2394 fibers**



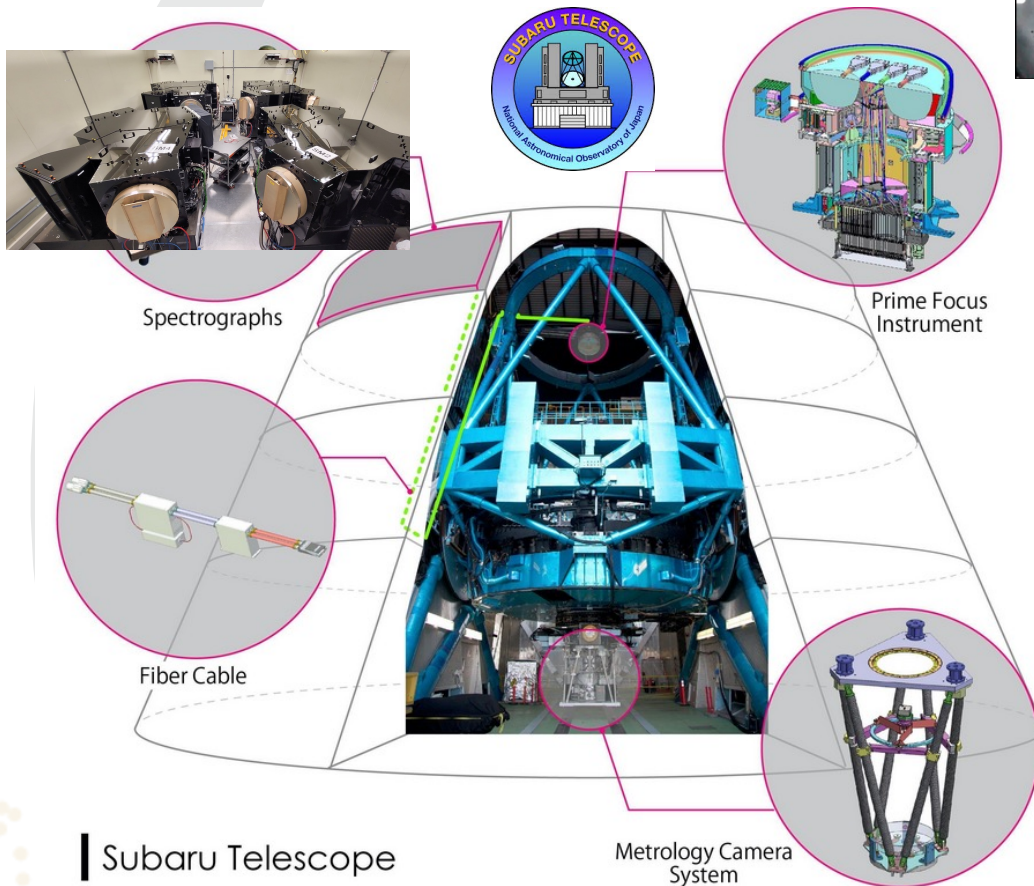
- VIS-NIR coverage: **380-1260nm simultaneously**
 - Low resolution mode: **~2.5 Å** resolution
 - Medium resolution mode (around 800nm): **~1.6 Å** resolution

Subaru PFS architecture



4 systems for PFS:

1. Prime Focus Instrument fiber positioner
2. Metrology Camera System at Cassegrain focus
3. Fiber Cable from positioner to spectrograph
4. Spectrograph System (SpS) 4 spectrograph modules in a large new clean room at Nasmyth floor



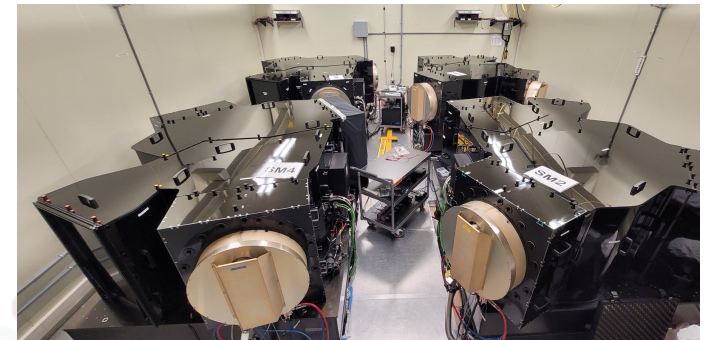
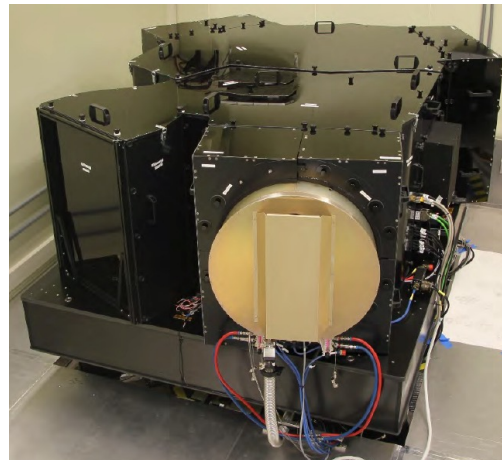
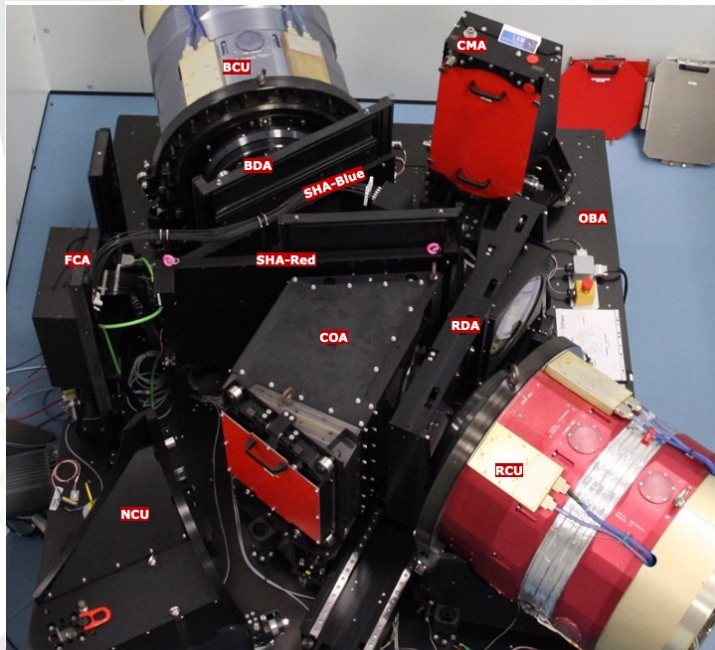
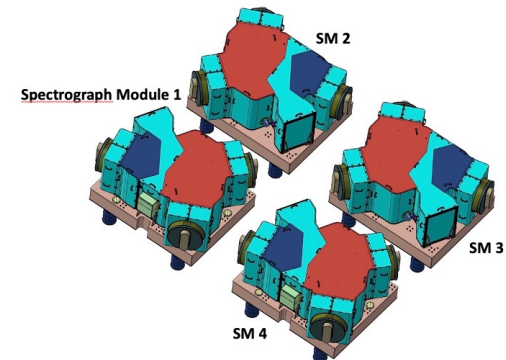
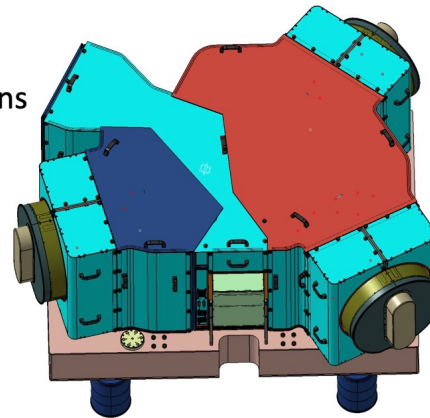
Spectrograph System (SpS)

IPMU, LNA-Brazil, JHU, Princeton, Subaru/NAOJ and LAM are all collaborating on the Spectrograph System with industry partners such as Winlight System in France.



2.7 tons

X 4 !



LAM's contributions to Spectrograph System (SpS)

Spectrograph system:

- Systems and optical engineering
- Systems management
- AIT/V of VIS cameras @cold
- AIT/V of spectrograph modules
- Technical interface with Winlight
- Dichroics with LMA (Lyon)
- SpS control software
- Entrance unit components (hexapods, shutters, sources, etc.)
- SpS transport and logistics
- AIT/V at Subaru telescope

- Spectrograph Optical design reference from S. Pascal et al. (LAM)
- 57 FTE for SpS LAM staff including 13 CDD paid by PFS funding
- 4 M€ to LAM through 6 collaboration contracts with MPA, NAOJ and IPMU

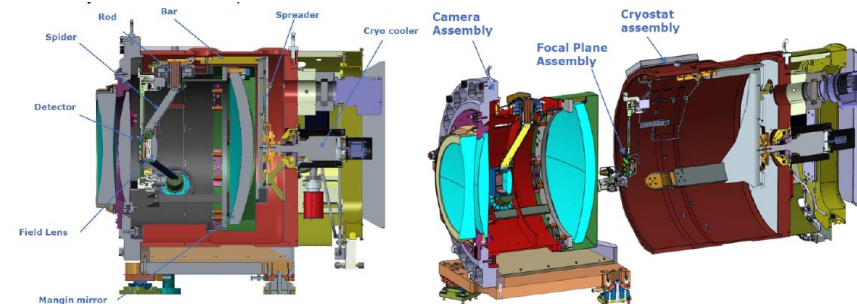
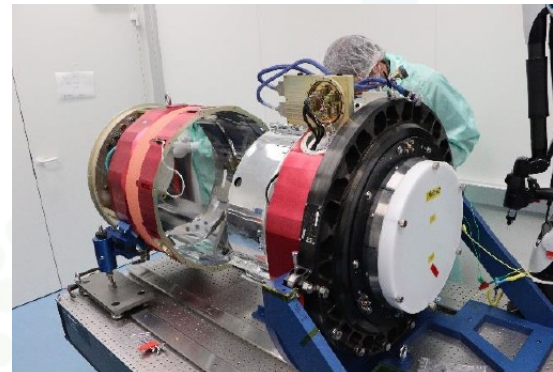
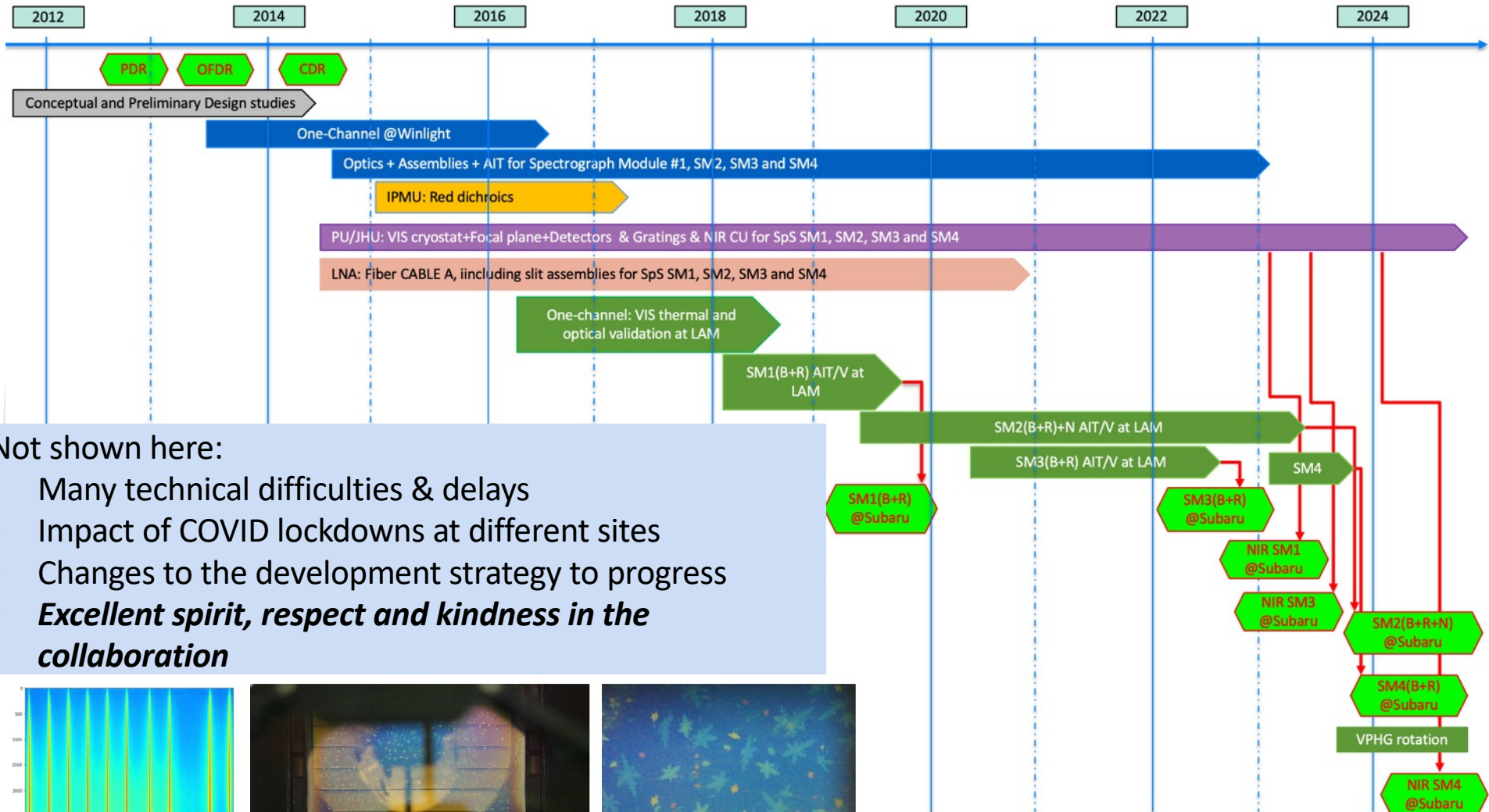


Figure 3 Visible Camera Unit design



It's a long road to Hawai'i... and a challenging project!



Not shown here:

- Many technical difficulties & delays
- Impact of COVID lockdowns at different sites
- Changes to the development strategy to progress
- **Excellent spirit, respect and kindness in the collaboration**

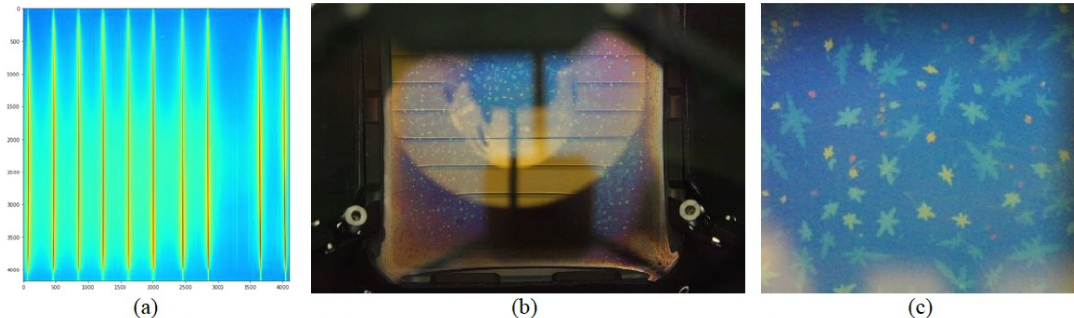
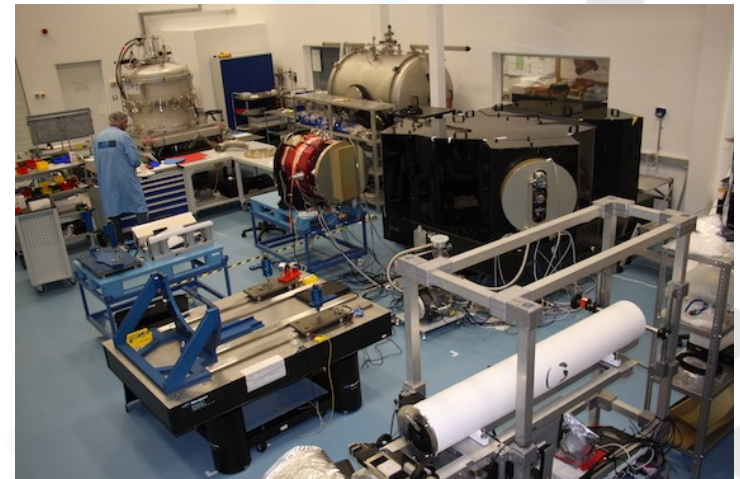
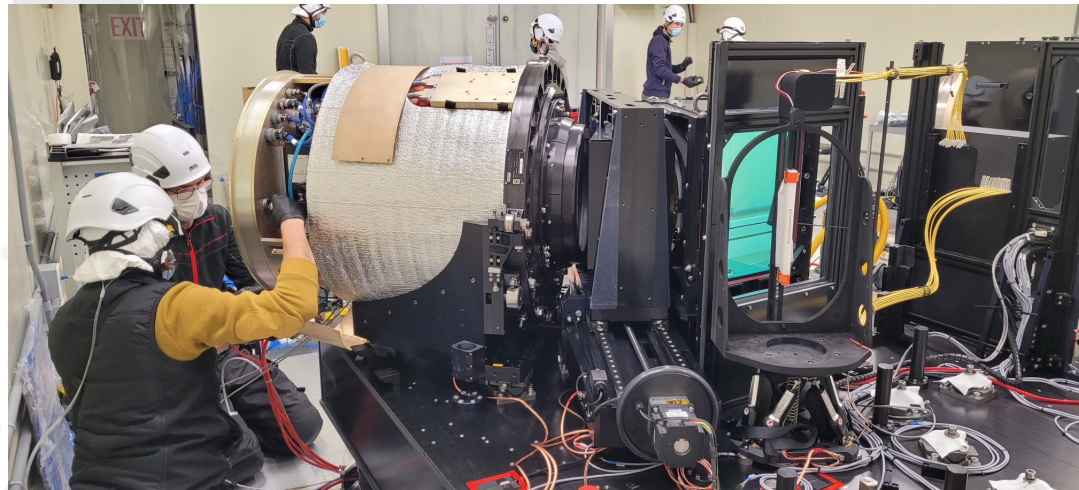
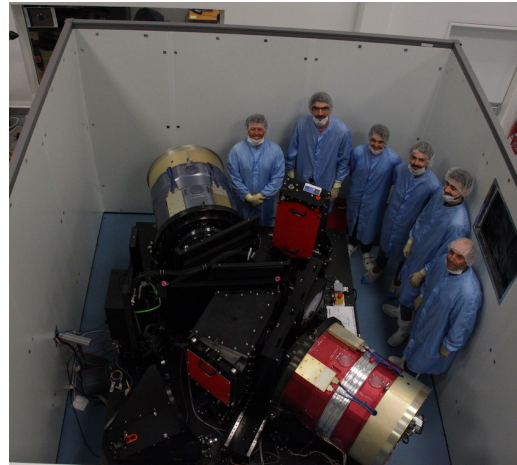
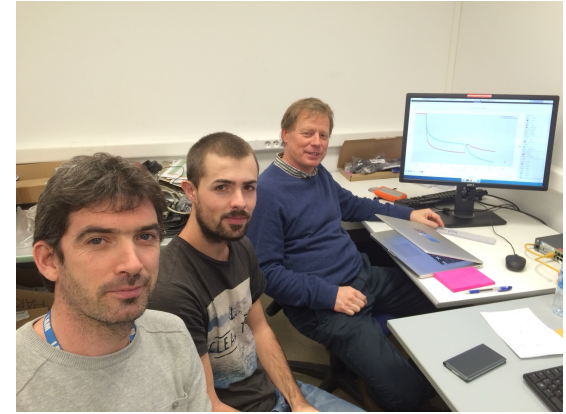


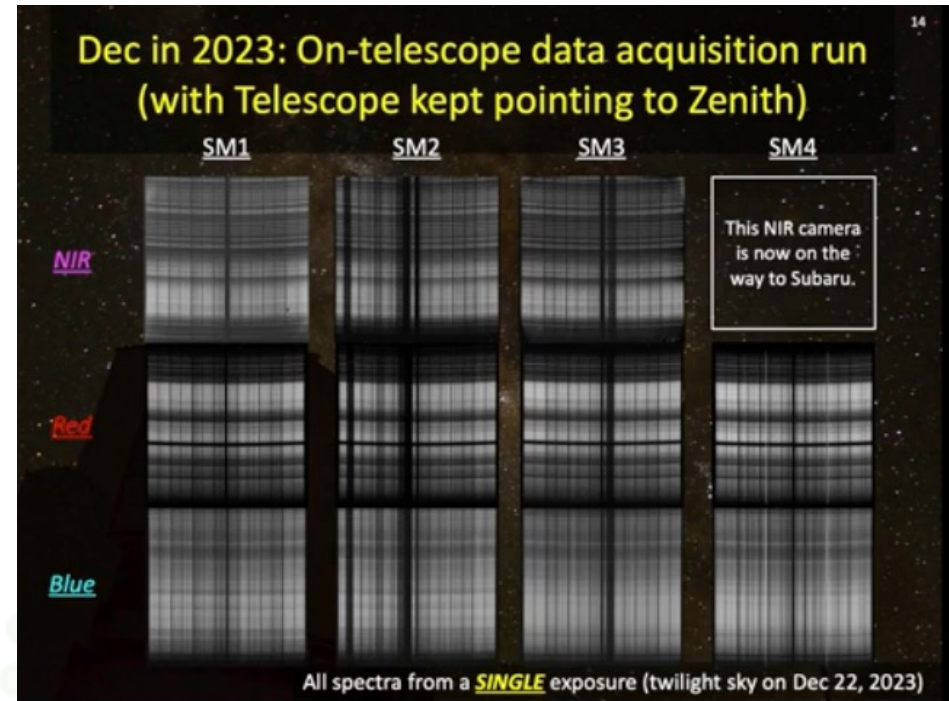
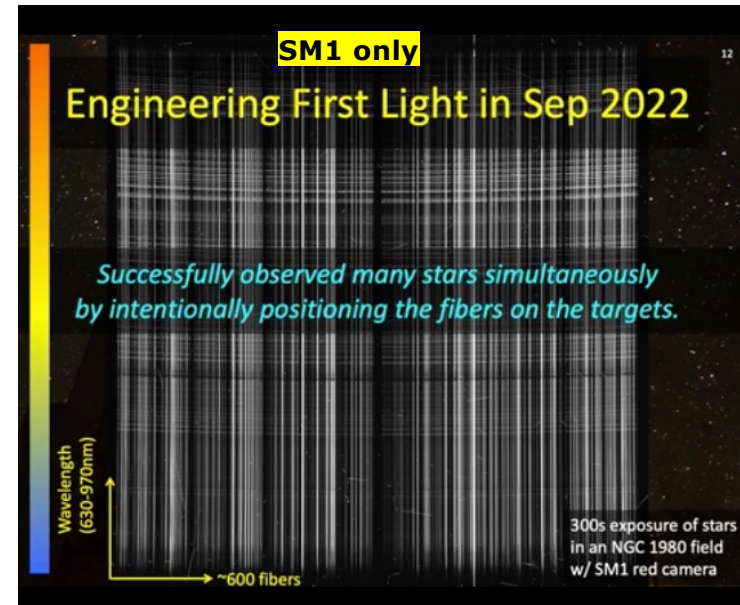
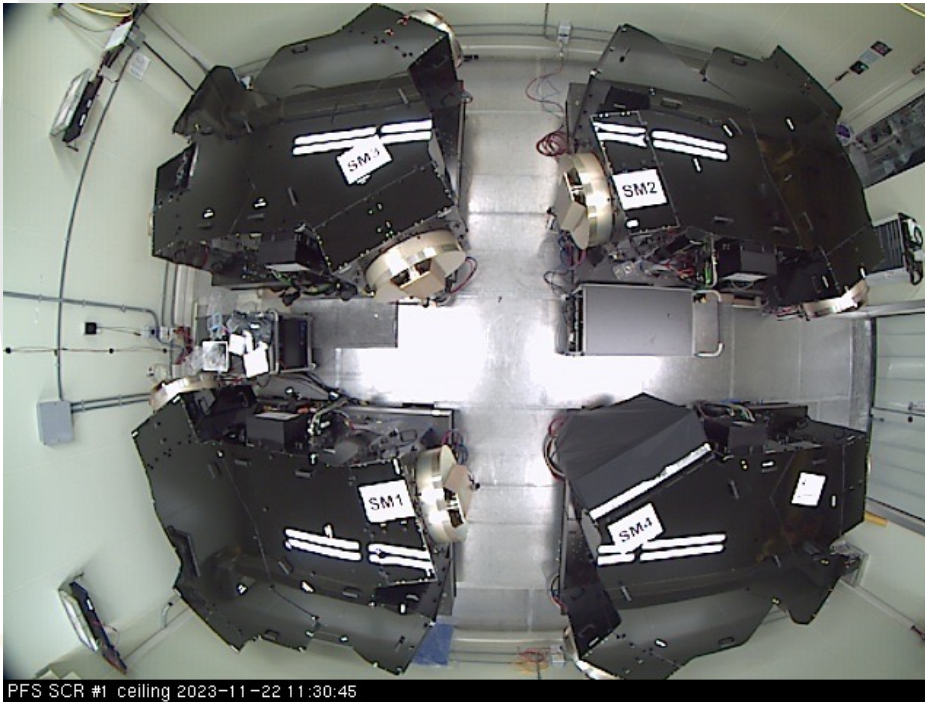
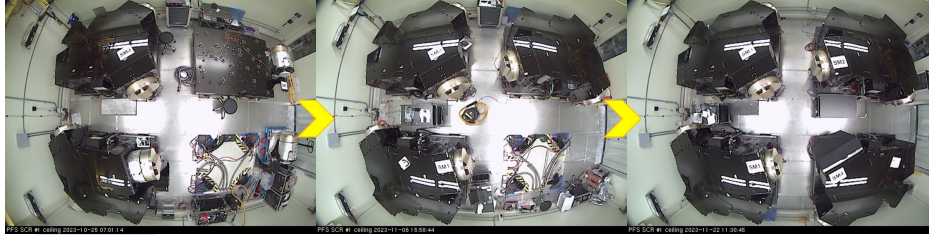
Figure 11. a: Halo observed around the continuum spectral trace in blue camera B3. b: Centre: Picture of the field lens indicating the presence of pollution. c: Zoom on the field lens revealing a beautiful crystalline pattern.



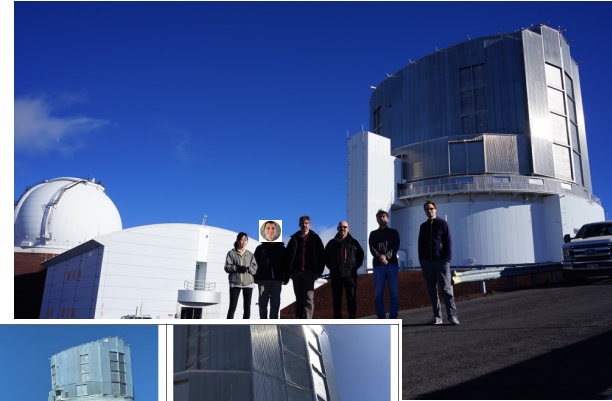
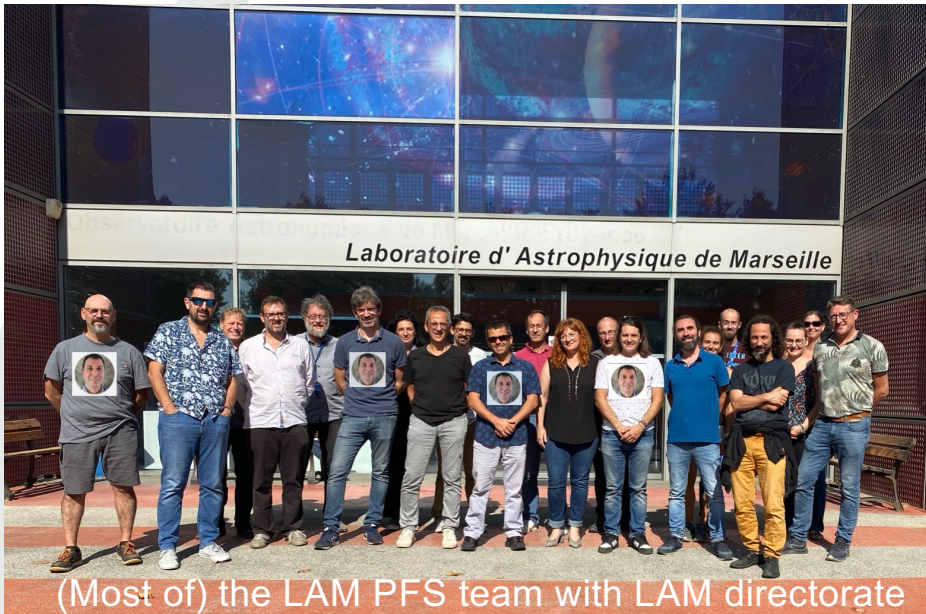
SM3 integration in Hawai`i

https://www.youtube.com/watch?v=M_bPVYzVB2U





Thank you everyone!!! 😊



x4

PFS hardware technical teams

