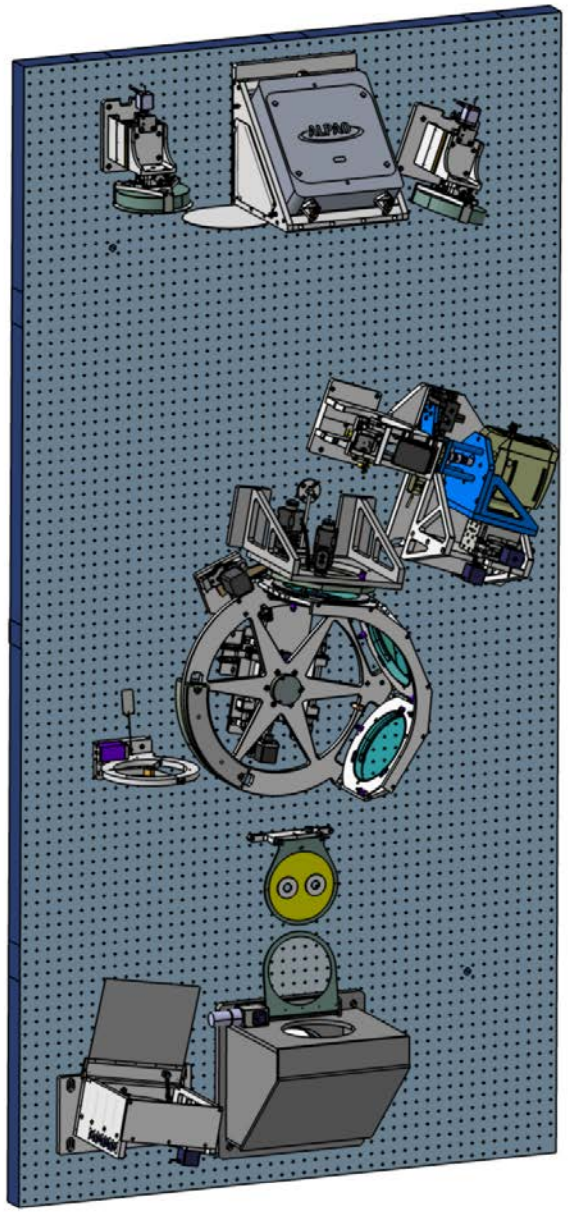
HW Improvements and Plans

Laszlo Sturmann

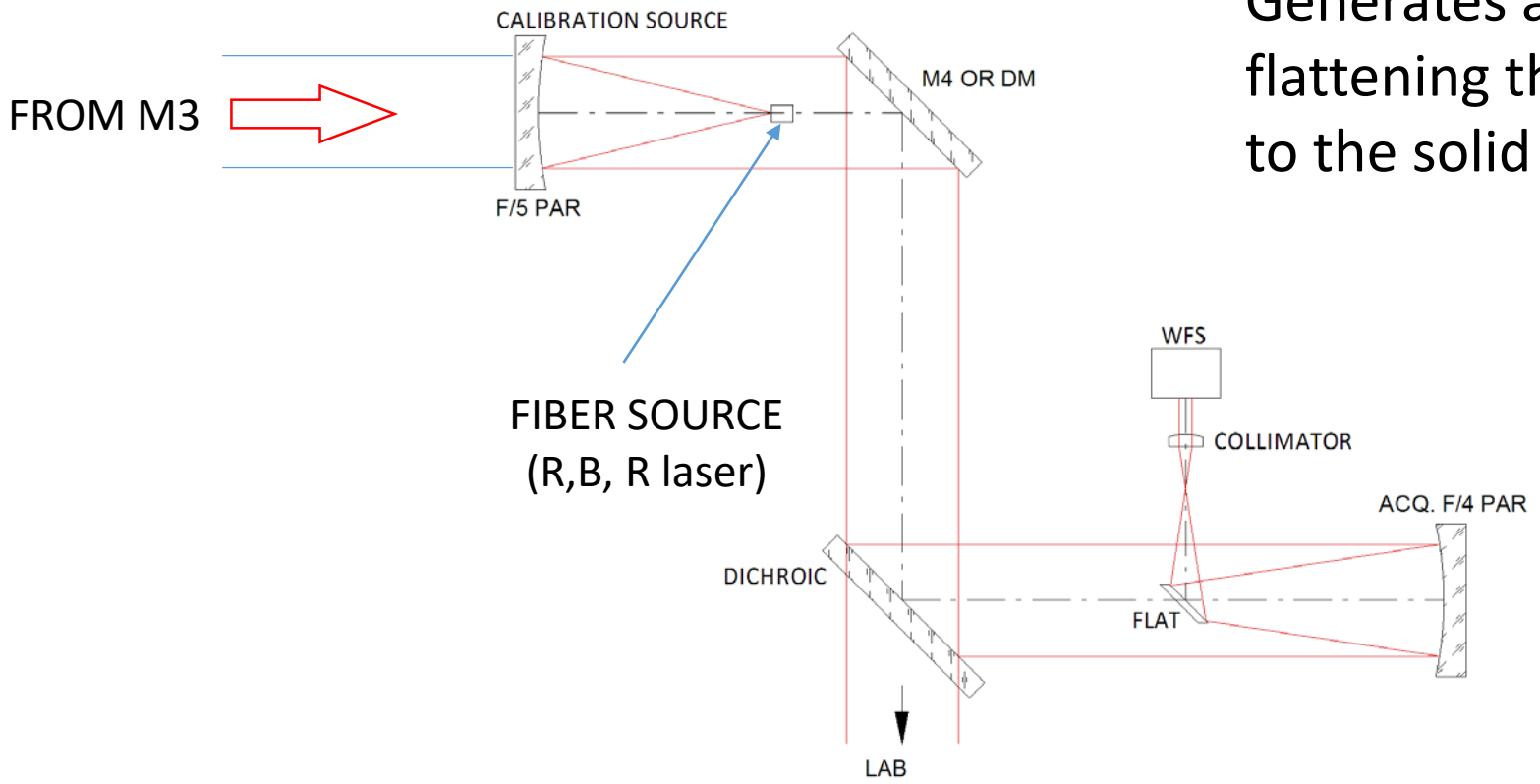
AO HW installation is almost complete

All but one new M4 mount are installed

DM calibration source is being installed

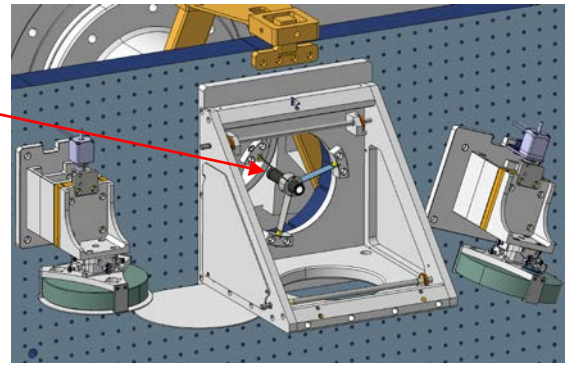


DM Calibration light source



Generates a collimated beam for flattening the DM by comparing it to the solid M4

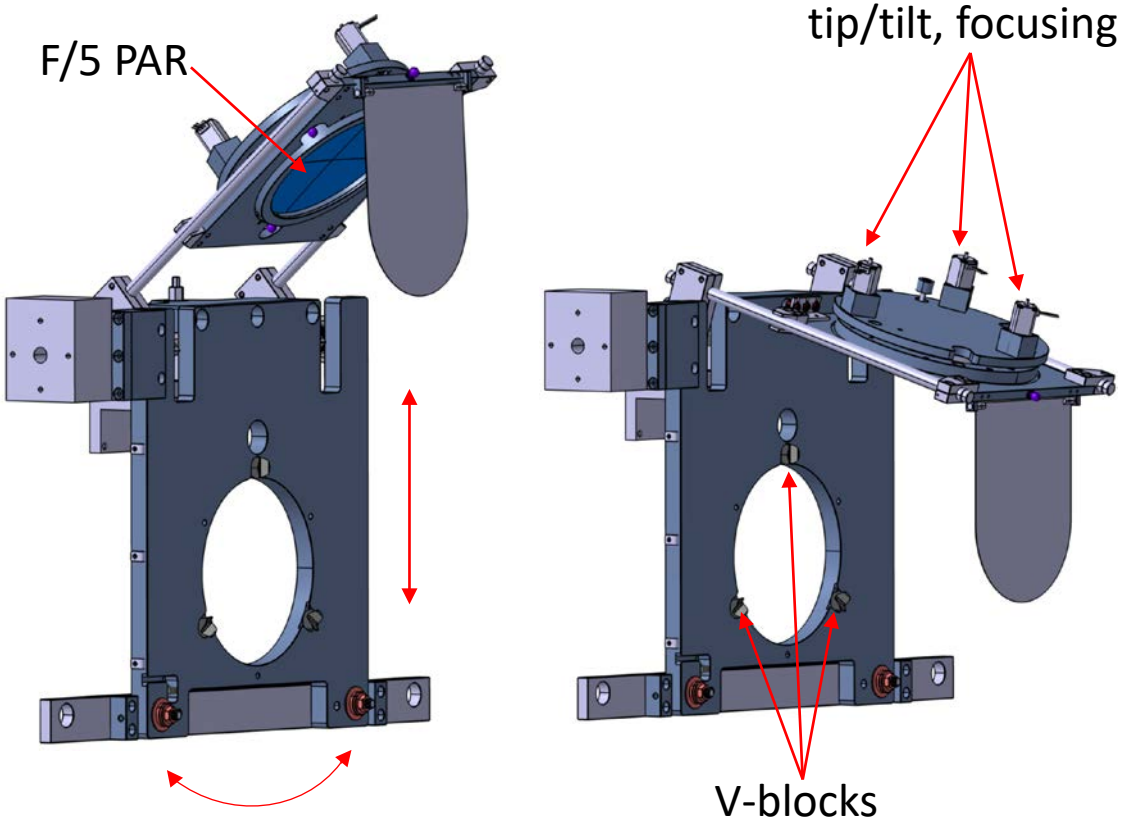
fiber mount in M4



5-DOF adjustment

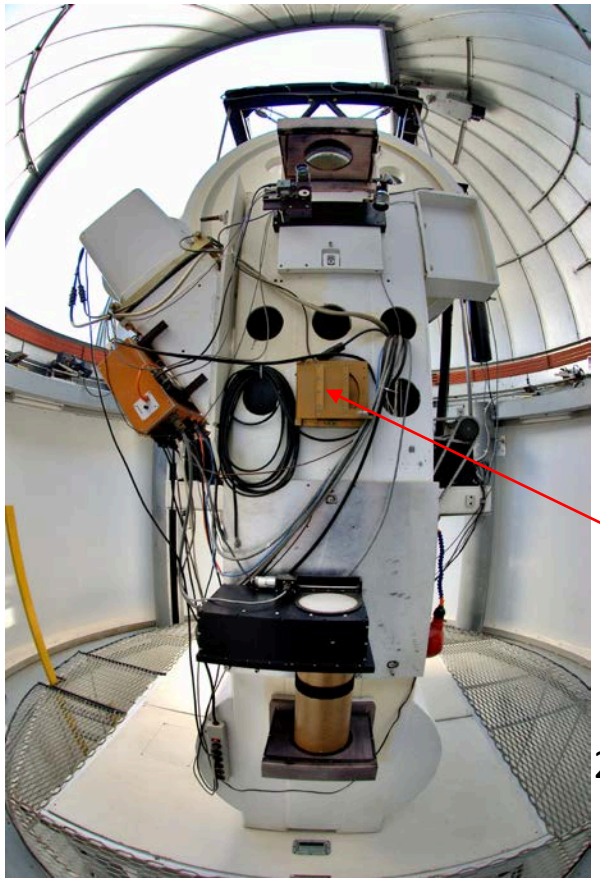
F/5 PAR

tip/tilt, focusing

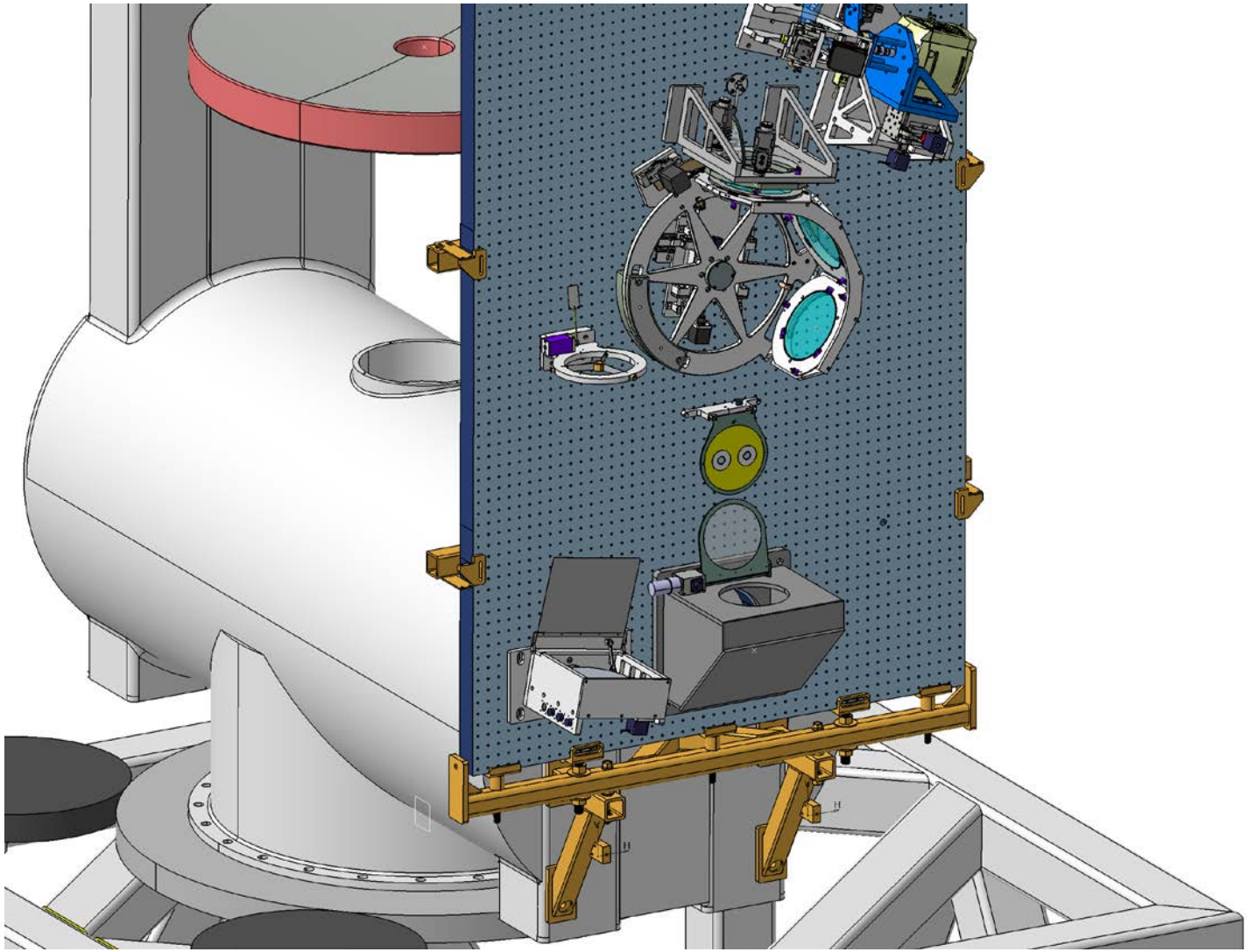


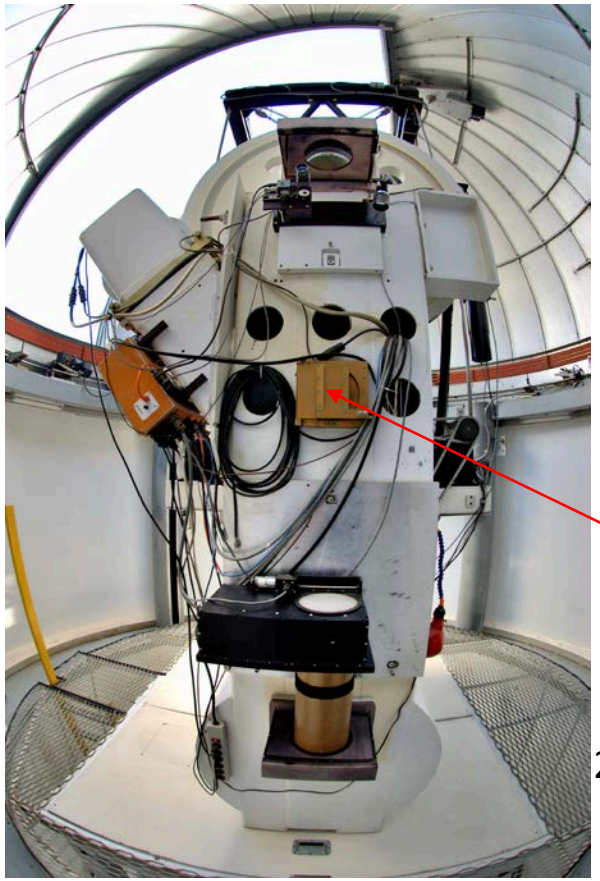
V-blocks

New TAS ⇨ TAS2

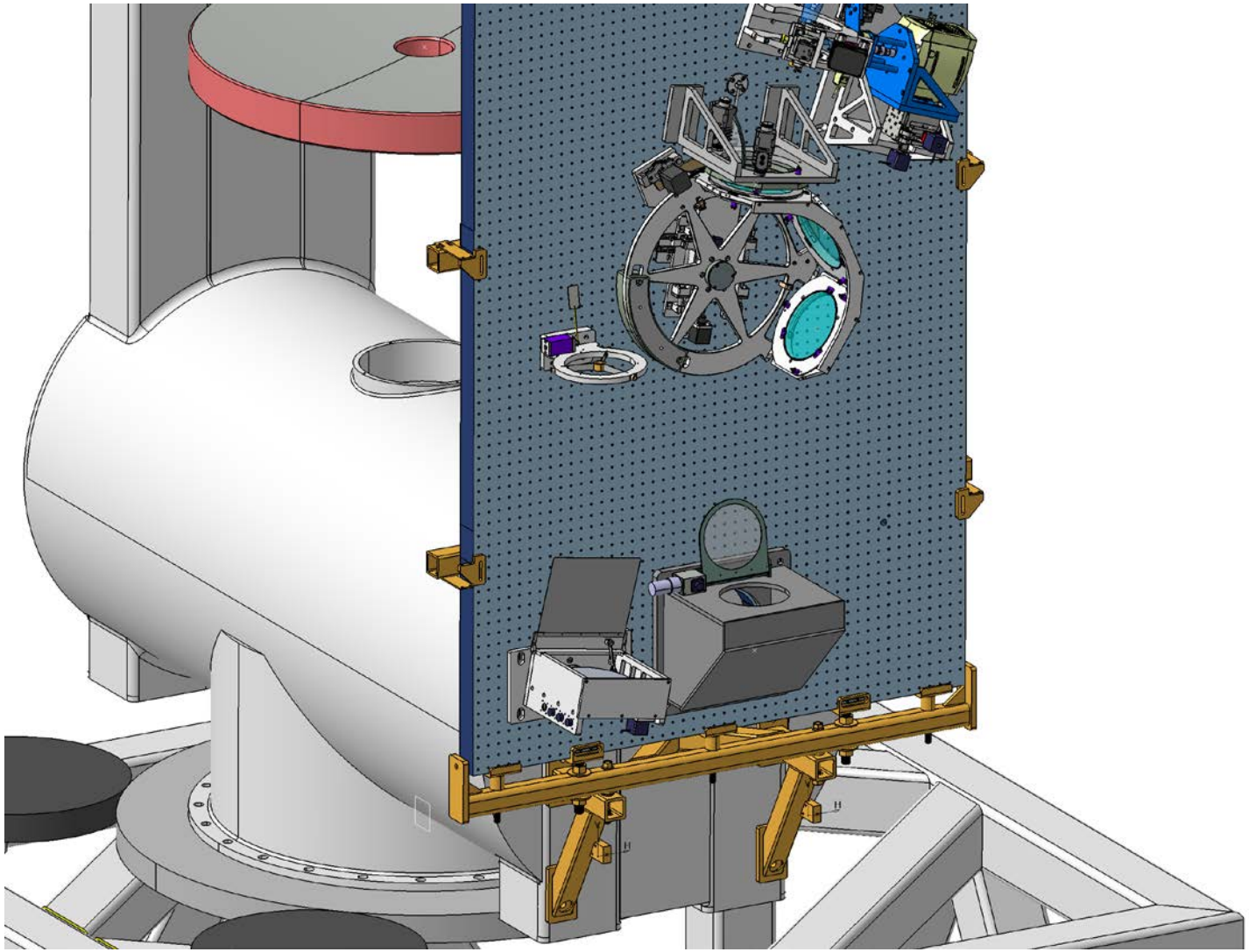


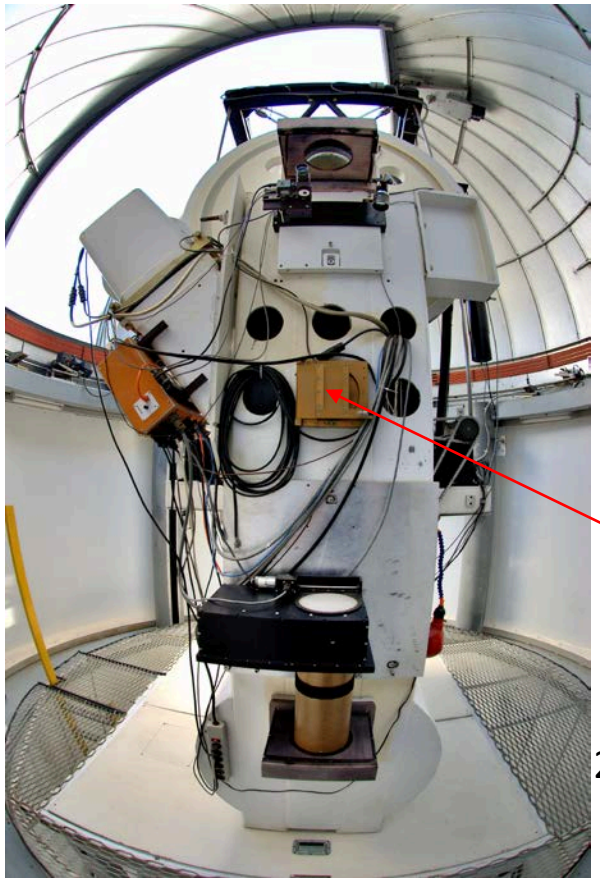
TAS
2008-2019



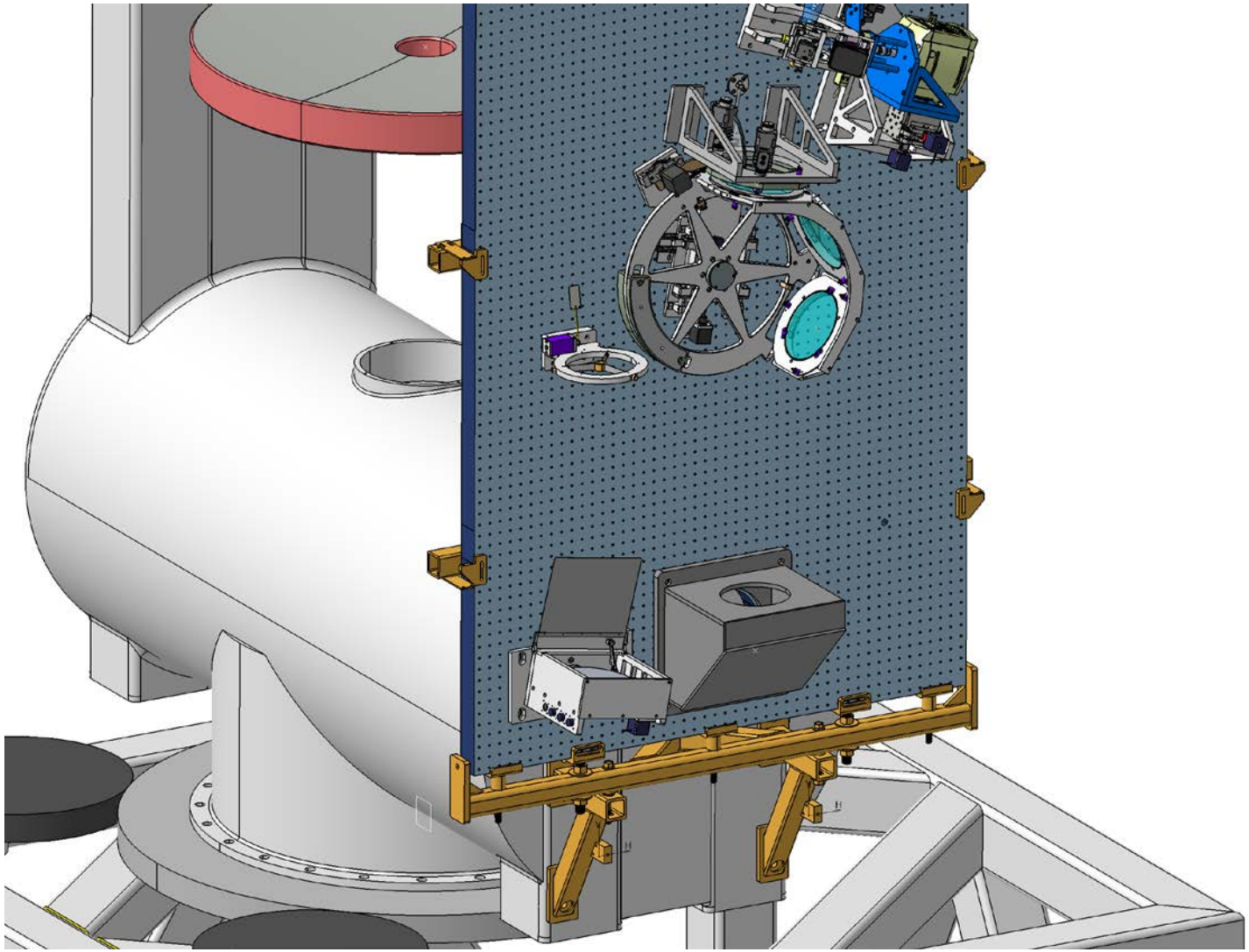


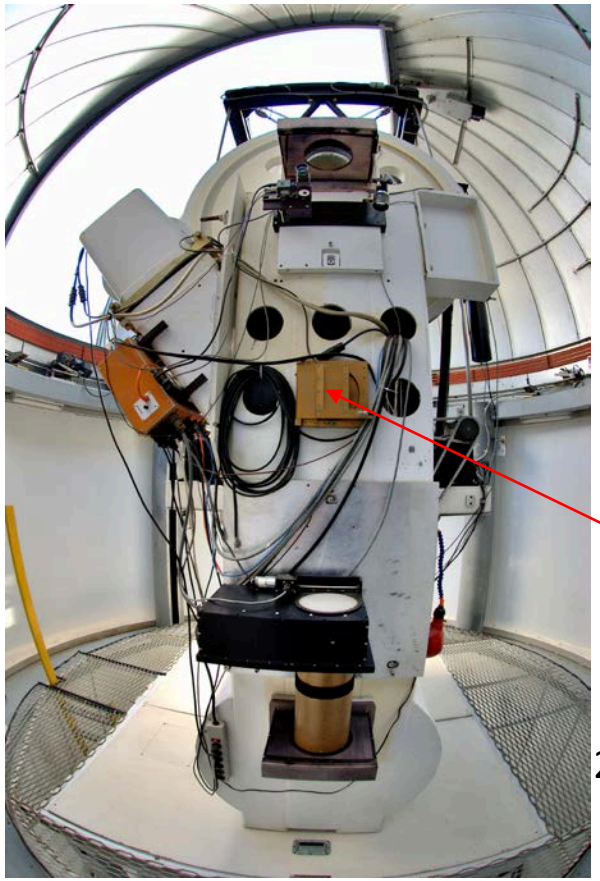
TAS
2008-2019



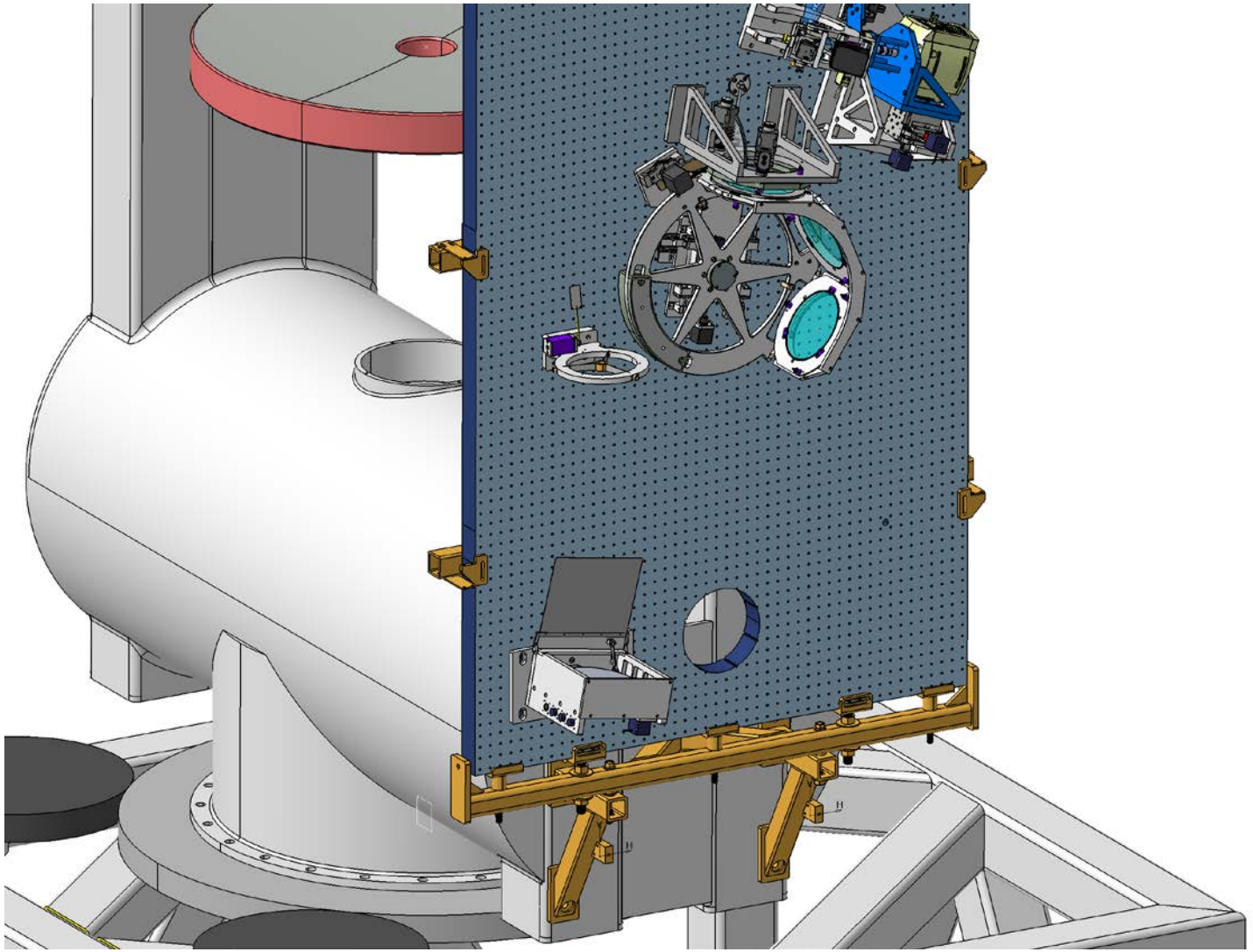


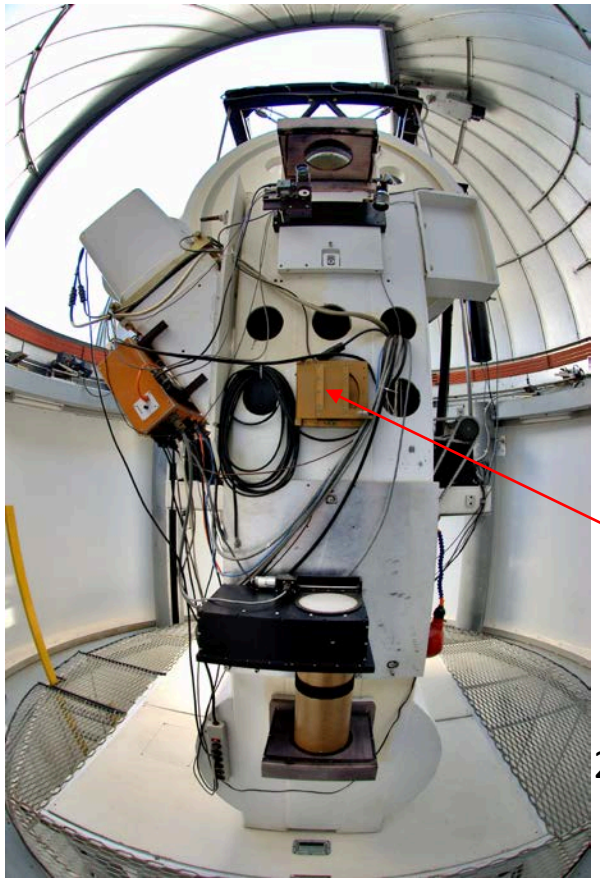
TAS
2008-2019



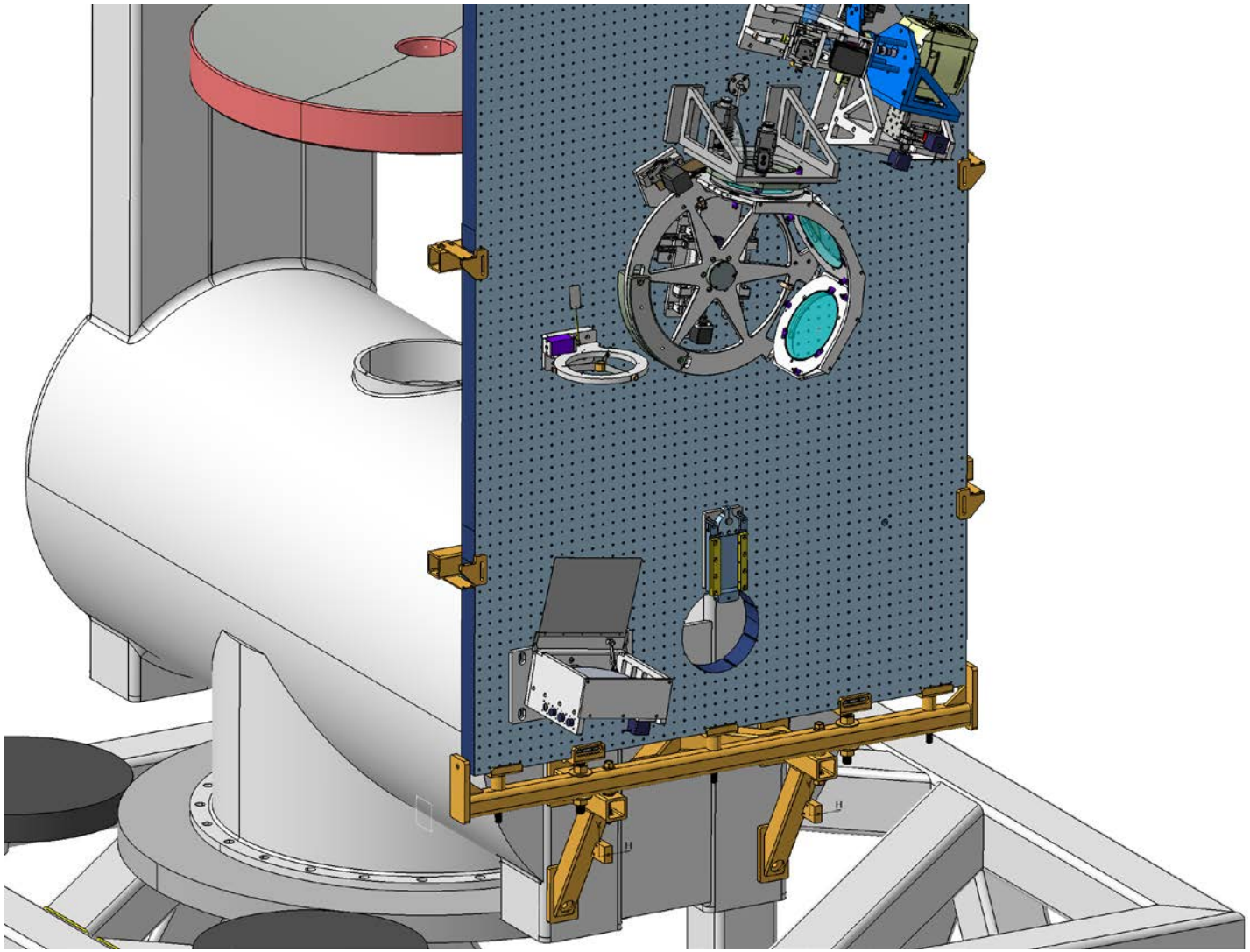


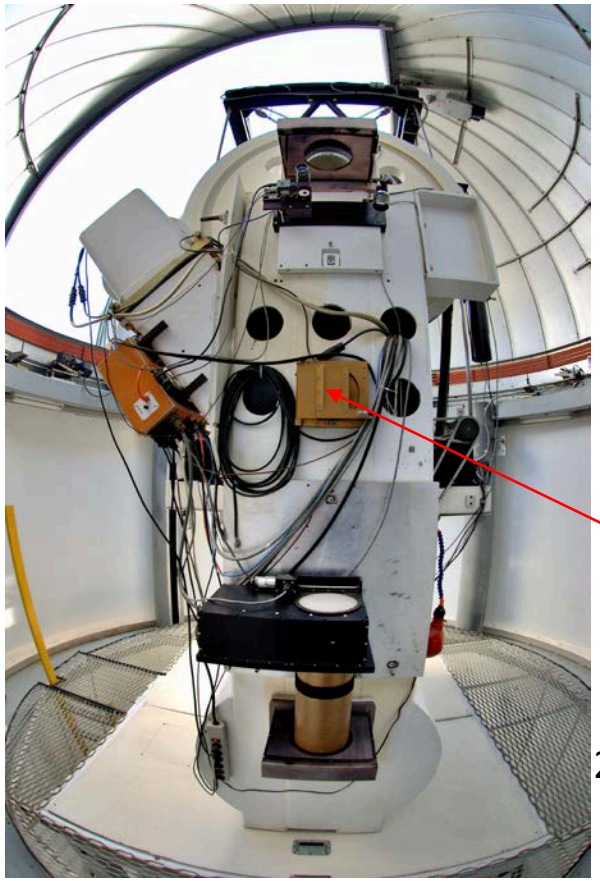
TAS
2008-2019



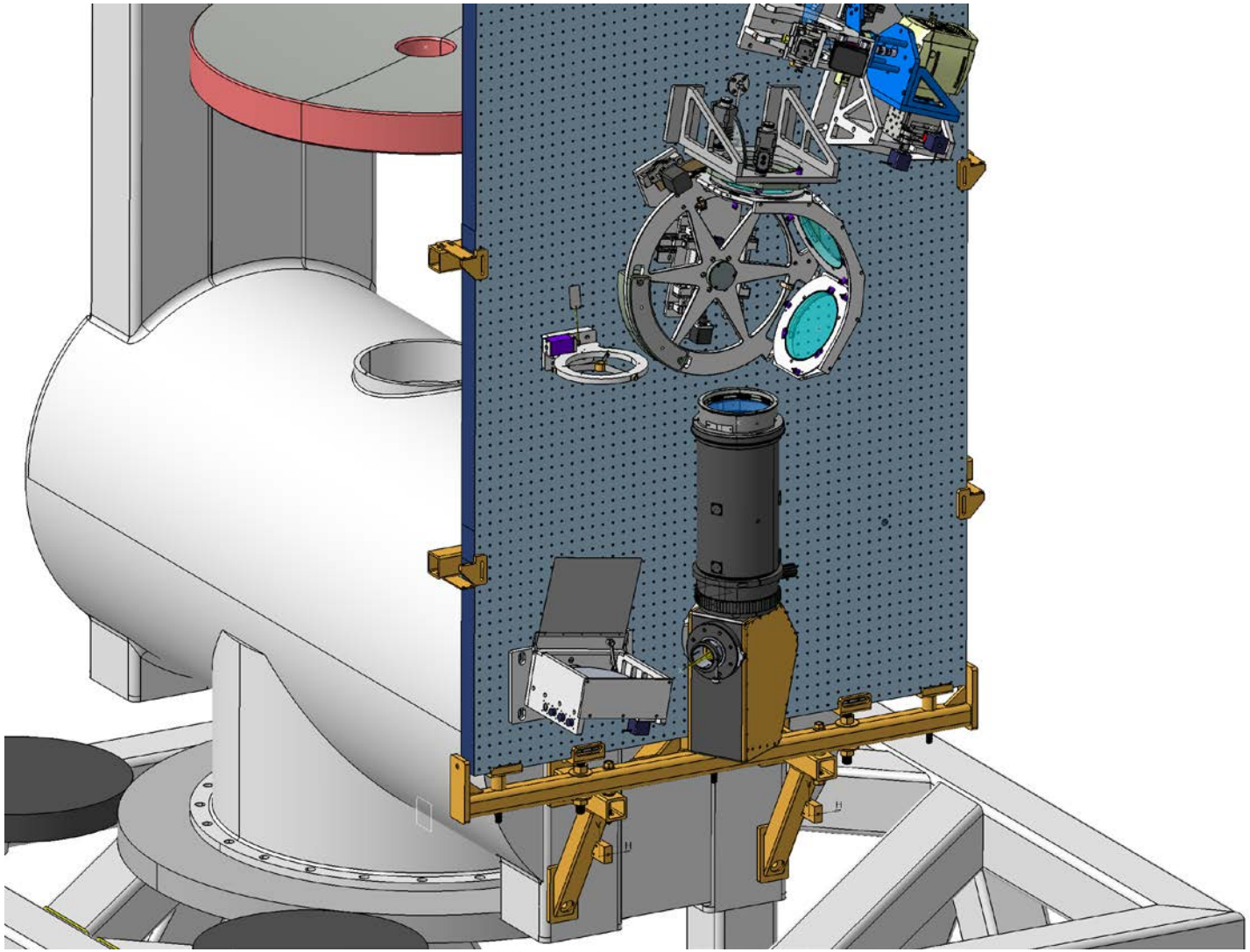


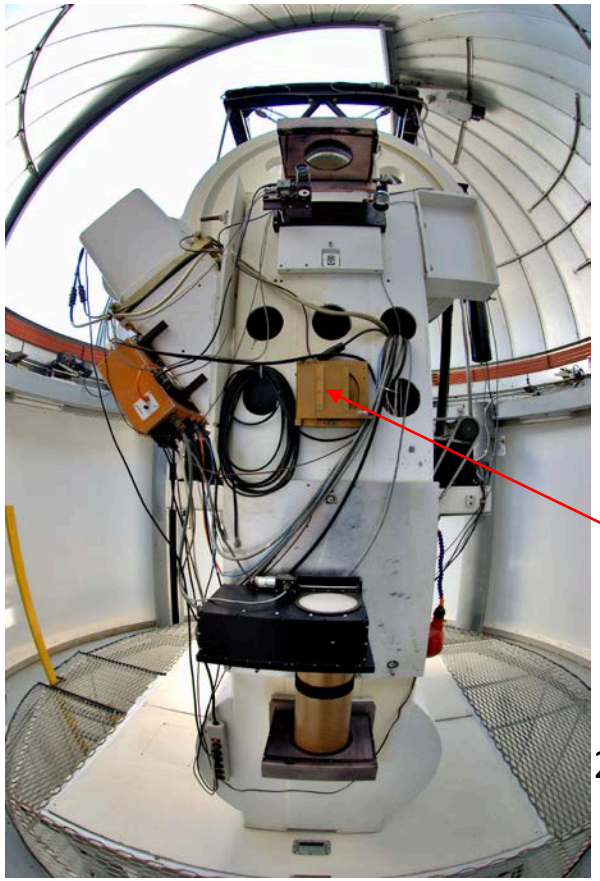
TAS
2008-2019



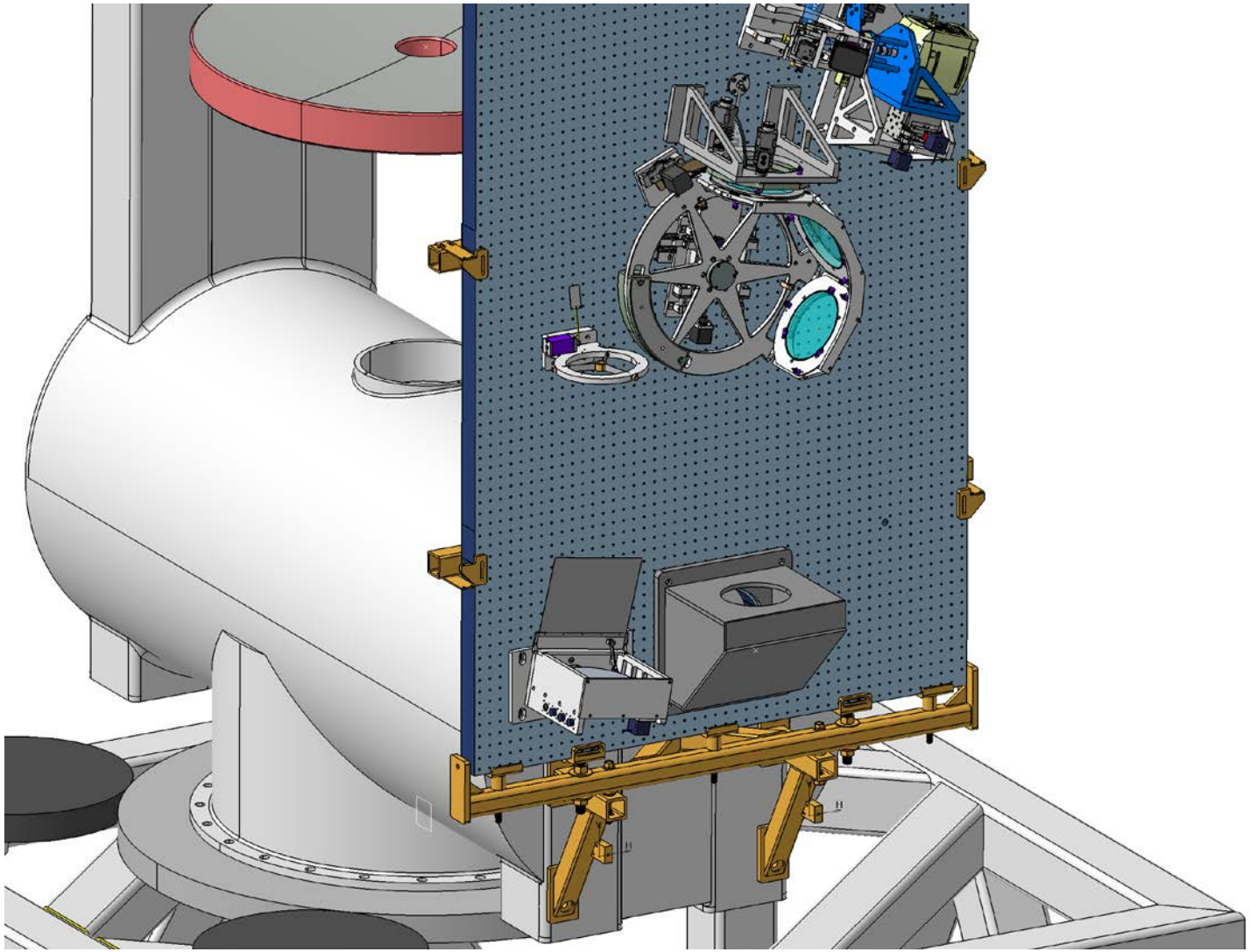


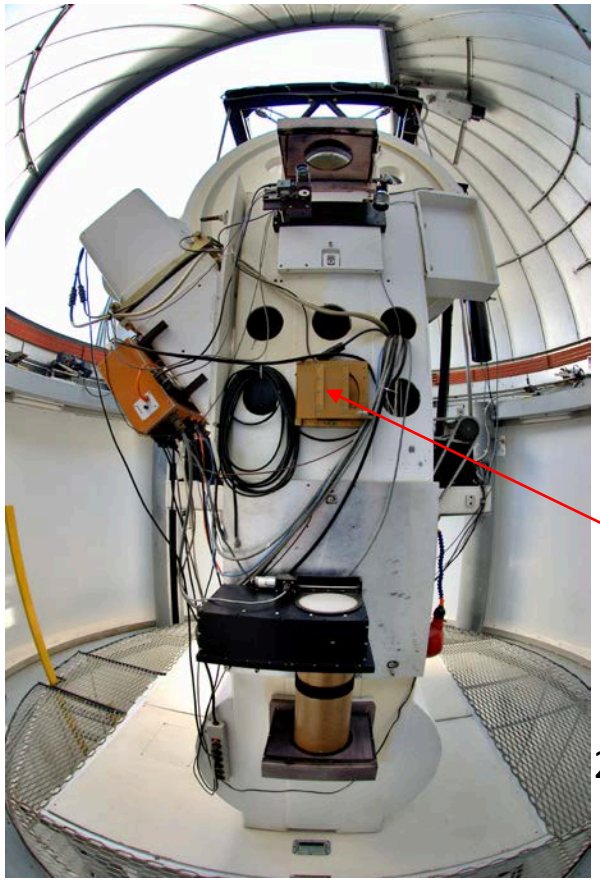
TAS
2008-2019



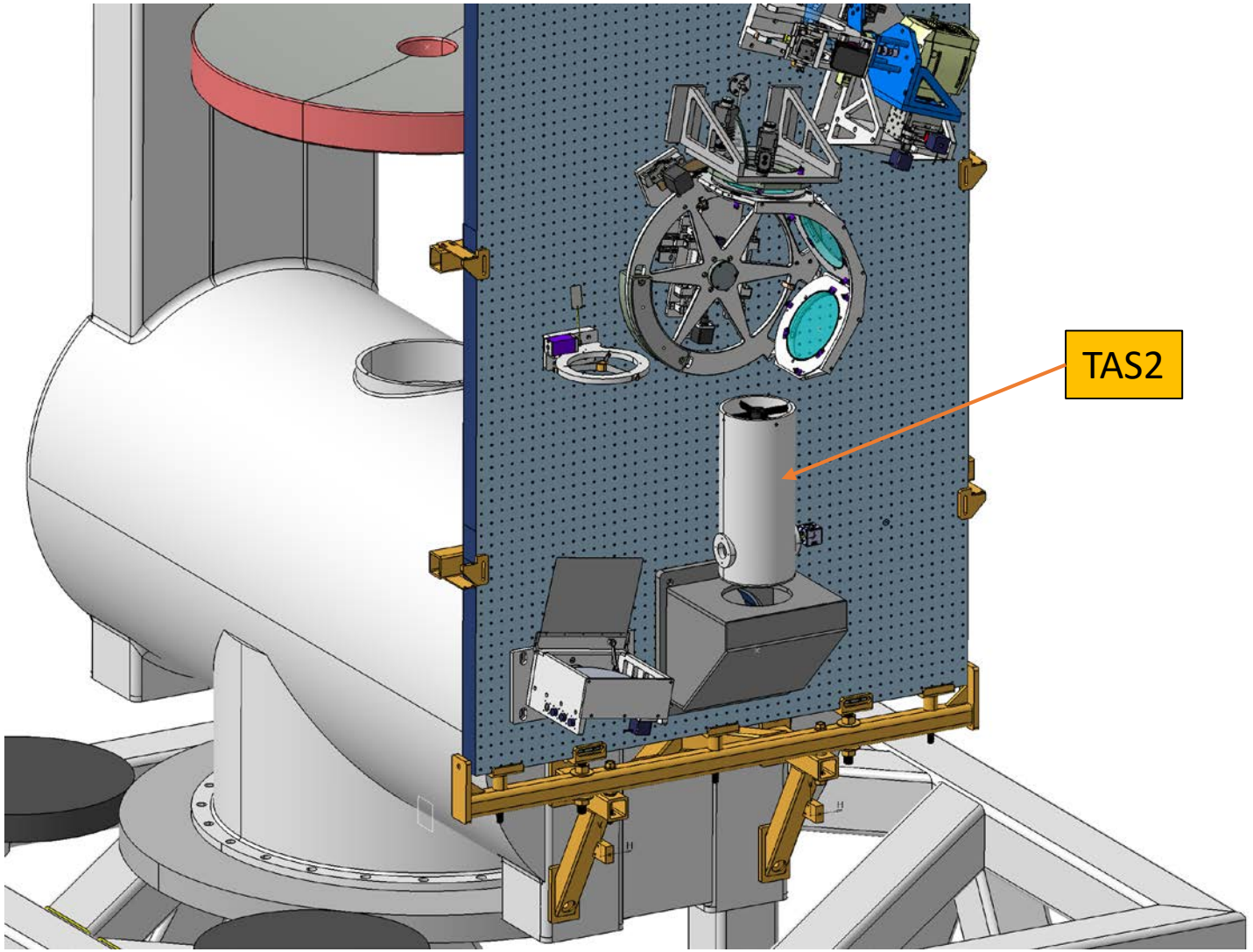


TAS
2008-2019

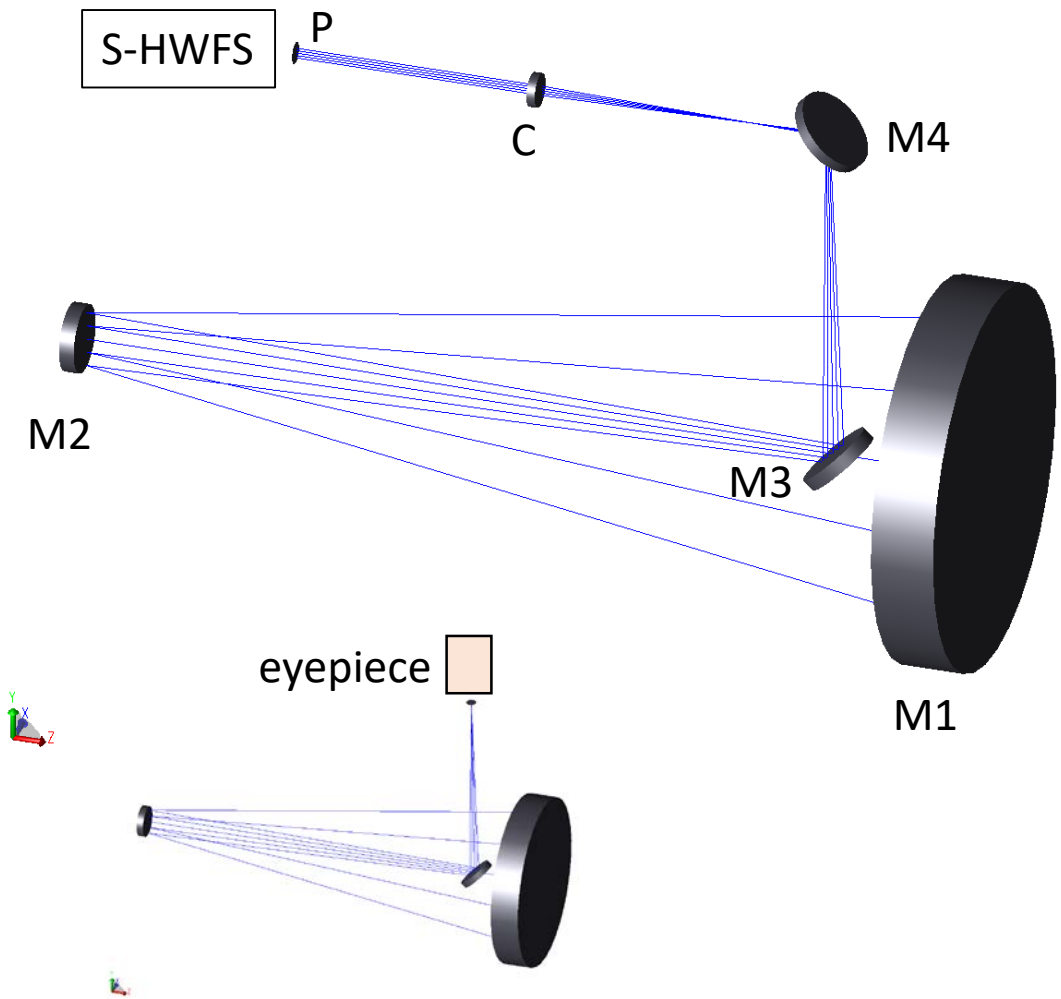




TAS
2008-2019



TAS2



athermal classical Cassegrain-Nasmyth

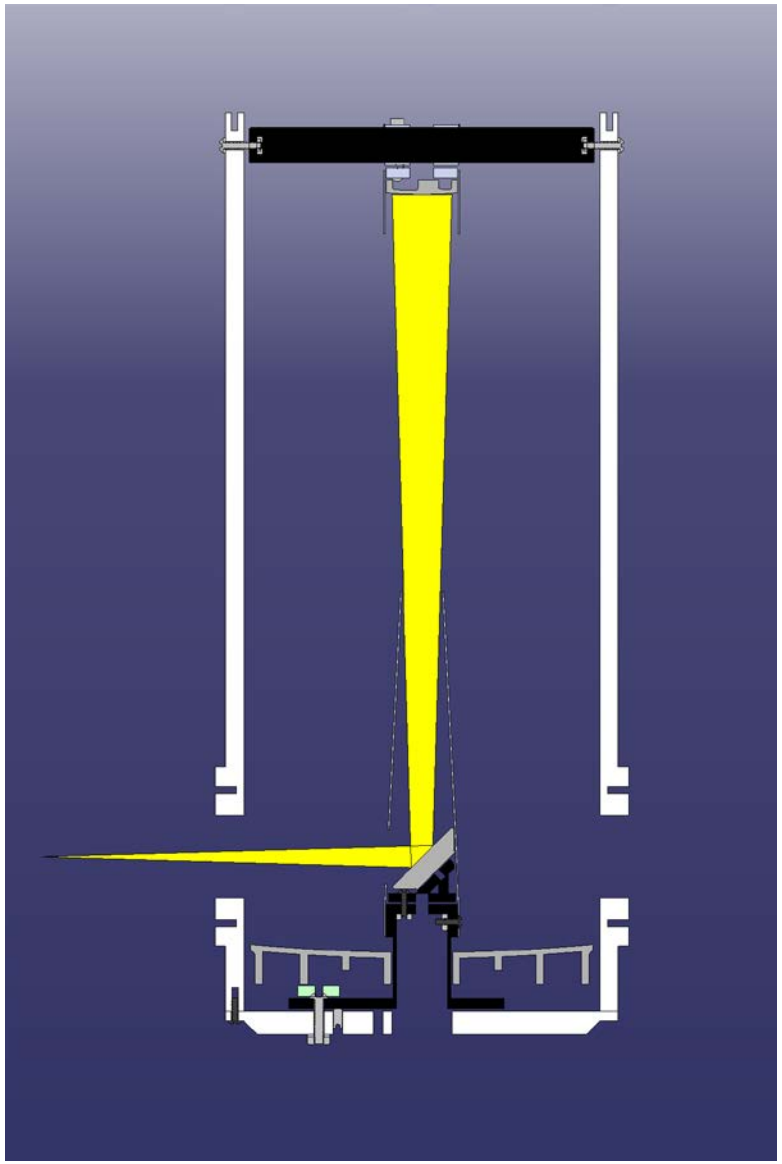
D1=140 mm,
D2 = 25 mm,
R1= -770 mm,
d12 = -318.12 mm,
R2 = -157.88 mm,
d23 = 278.12 mm,
D34 = 159.58 mm,
Conic constants (M1) = -1
(M2) = -1.822

Central obscuration 23%
Final F/Ratio = F/18

Image is diffraction limited within 13 mm and fully illuminated within 3.5 mm to the axis

Funded by Kyoto University
Built by Dream Telescopes, Inc.
Completion in May 2019


CARBON FIBER PARTS



Latest Iteration of the Telescope Alignment Procedure

Initial State: M1 installed, levelled, M2,M3,M4,M5,M6 removed

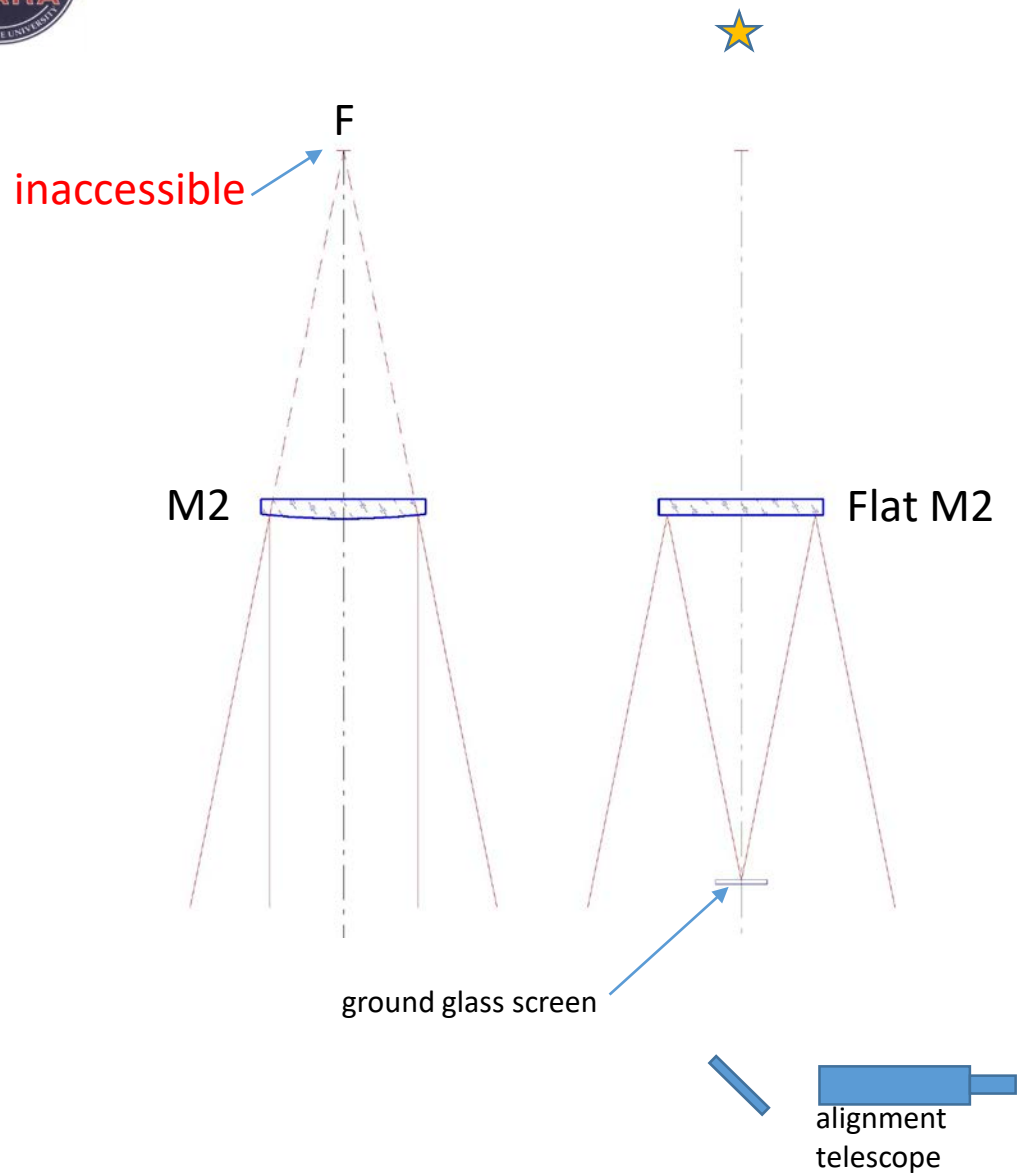
- Define a mechanical axis of the telescope by using an alignment telescope and targets at M1 and close to M2
- Check and adjust the spider arms of M2
- Make the finder parallel to this mechanical axis by using a star
- Install a flat in the place of M2 (new)
- Make the flat perpendicular to the line of sight of the alignment telescope
- Install a fine ground glass with a target on it in the reflected focal plane of M1
- Center the target in the alignment telescope
- Acquire a bright star by the finder telescope
- Tilt M1 until the image of the star falls on the target on the ground glass
- M1 is aligned to the mechanical axis
- Install M4
- Install a small flat on the elevation axis and an alignment telescope on the AO table
- Adjust the alignment telescope
- Translate the small flat until its center is stationary while the telescope is slewing in elevation
- Tilt the small flat until the image seen in it is stationary
- Iterate the last two steps, if needed
- Center the line of sight of the alignment telescope on the center of the small flat
- Adjust M4 along the elevation axis and along the AO table until its center is on the line of sight
- Adjust M4 up/down until its center seen in the small flat coincides with the center of the small flat
- Tilt M4 until the center of the small flat is on the line of sight

  M4 aligned
- Install M3
- Tilt and translate M3 until it is centered in the alignment telescope and the target at M2 as well as the image of the center of M3 in the flat at M2 are also centered (iteration)

  M3 aligned
- Install M2
- Acquire a star and center it in the finder
- Tilt M2 until the star is centered in the alignment telescope.

  Telescope aligned
- Focus TAS to infinity
- Acquire a star and center it in the finder
- Install TAS and center the star
- Focus the telescope
- Evaluate the wavefront
- Tilt M2 and repoint the telescope until coma is negligible
- Tilt M1 and recenter the star by tilting M2 until astigmatism is acceptable

Working toward automated telescope alignment



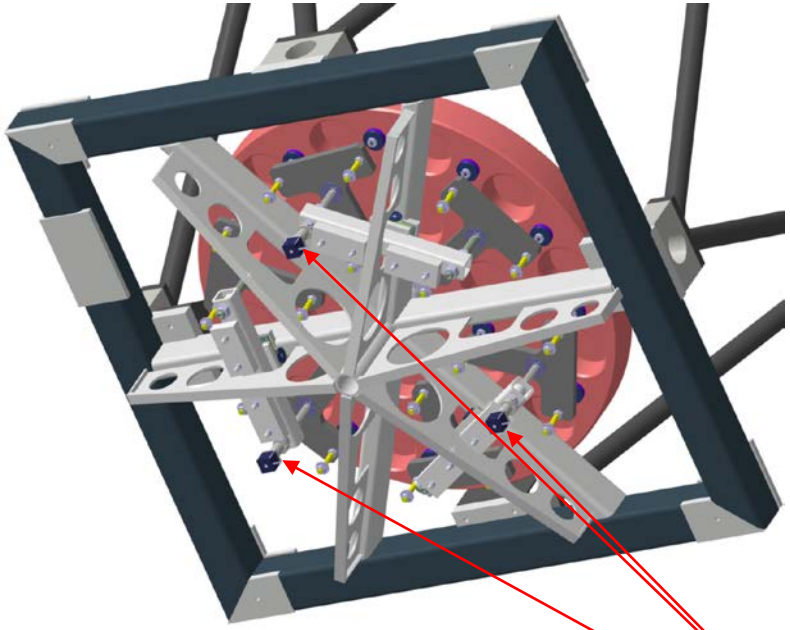
- coma is eliminated iteratively by tilting M2 and repointing the telescope to keep the output beam direction (fast convergence)
- astigmatism is minimized iteratively by tilting M1 then restoring the direction of the output beam by tilting M2 (slow convergence)

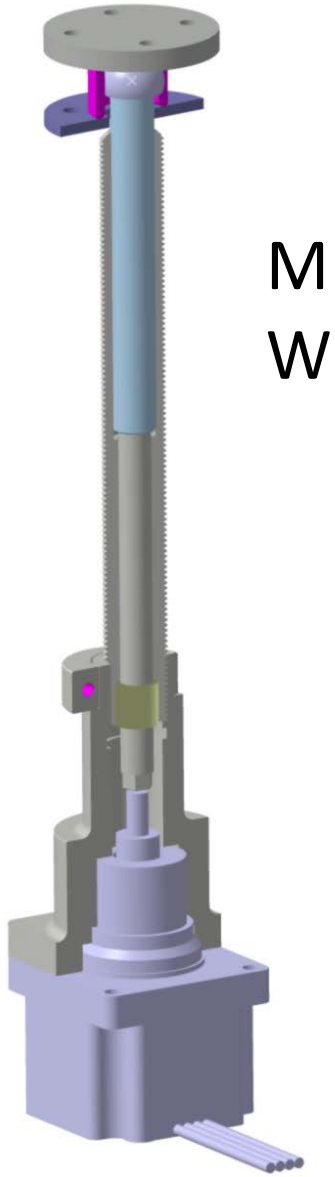
Flat M2

↓

Better initial M1 position

W1

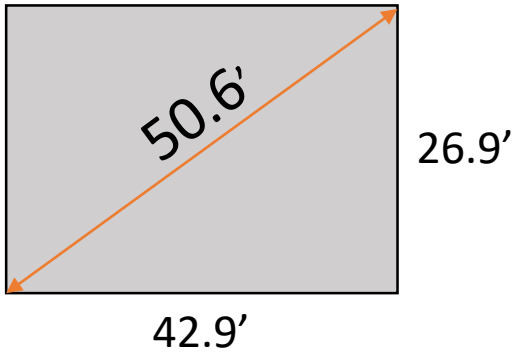




M1 actuators are ready to be installed,
W1 is equipped and operational

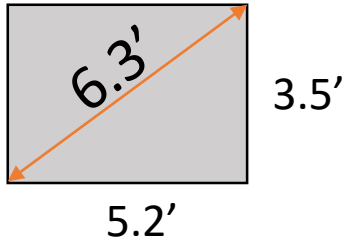
New finder and acquisition cameras on all six telescopes

Finder: ZWO ASI174MM-Cool



NO COOLING YET

Acquisition: ZWO ASI178MM-Cool



Funded by Kyoto University

New Classic/Climb Detector (may be)

FIRST LIGHT ADVANCED IMAGERY

C-RED One

Product Datasheet / January 2019

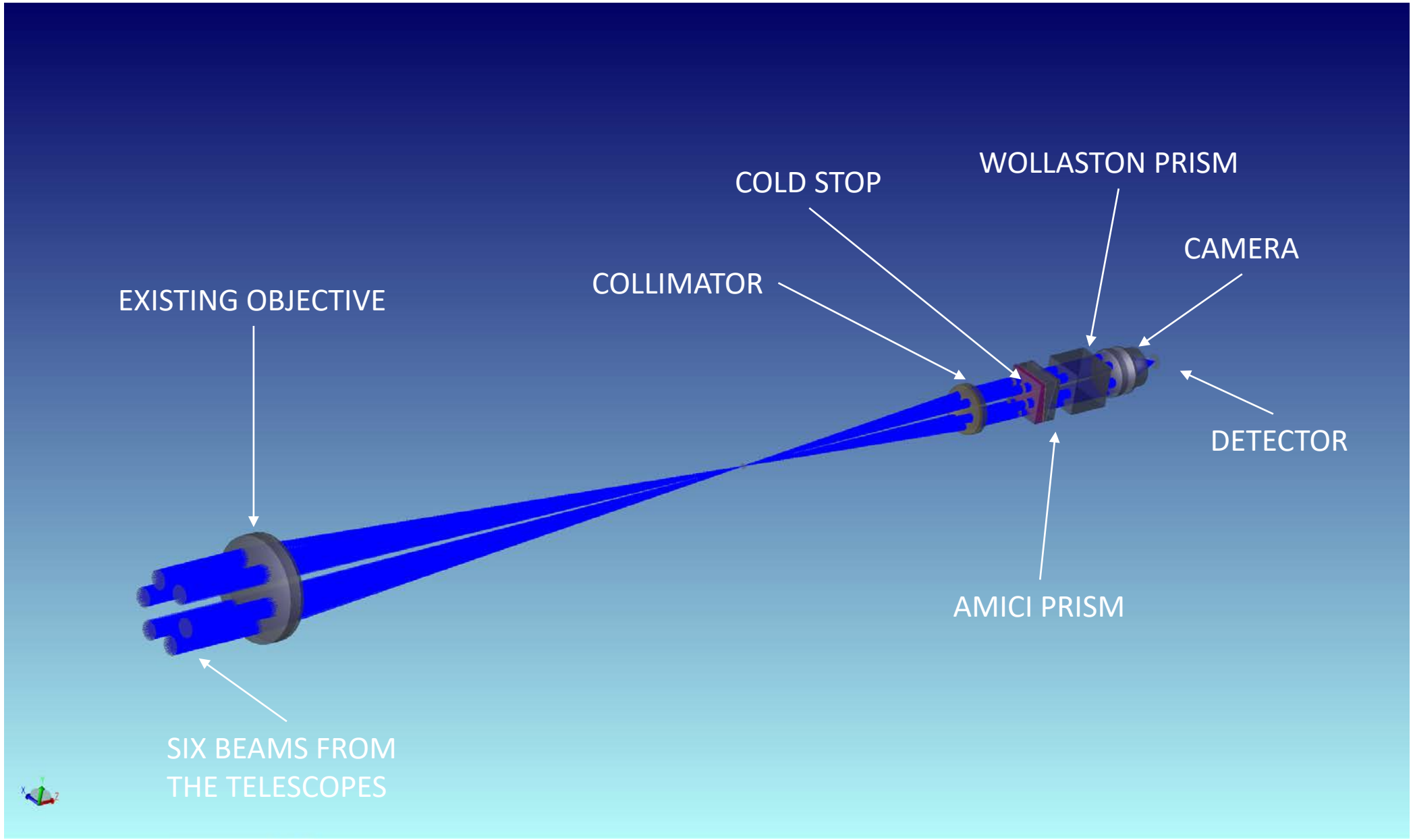
ULTRA LOW NOISE ULTRA HIGH SPEED SWIR CAMERA

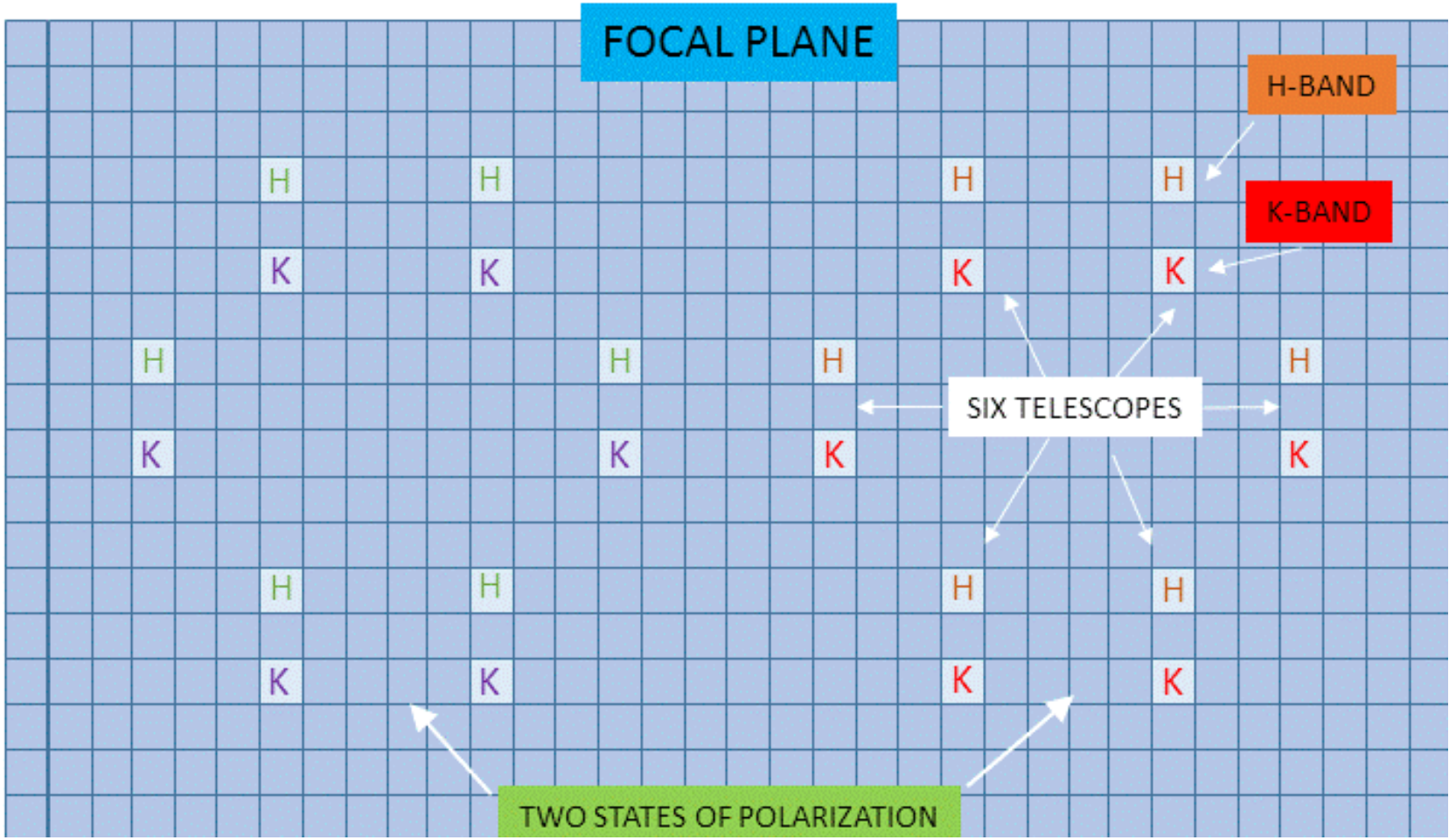
SCIENTIFIC CAMERA FOR INFRARED IMAGING

0.8 – 2.5 µm	FULL FRAME 3500 FPS	Subelectron RON	e-APD MCT, 320 x 256

MAIN FEATURES

- Deep cooled sensor @80K for ultra low dark operation
- Revolutionary e-APD MCT array
- 24 µm pixel pitch
- Multiple readout modes


WOLLASTON PRISM
COLD STOP
CAMERA
COLLIMATOR
EXISTING OBJECTIVE
DETECTOR
AMICI PRISM
SIX BEAMS FROM
THE TELESCOPES


FOCAL PLANE
H-BAND
K-BAND
SIX TELESCOPES
TWO STATES OF POLARIZATION

Thank you for your attention