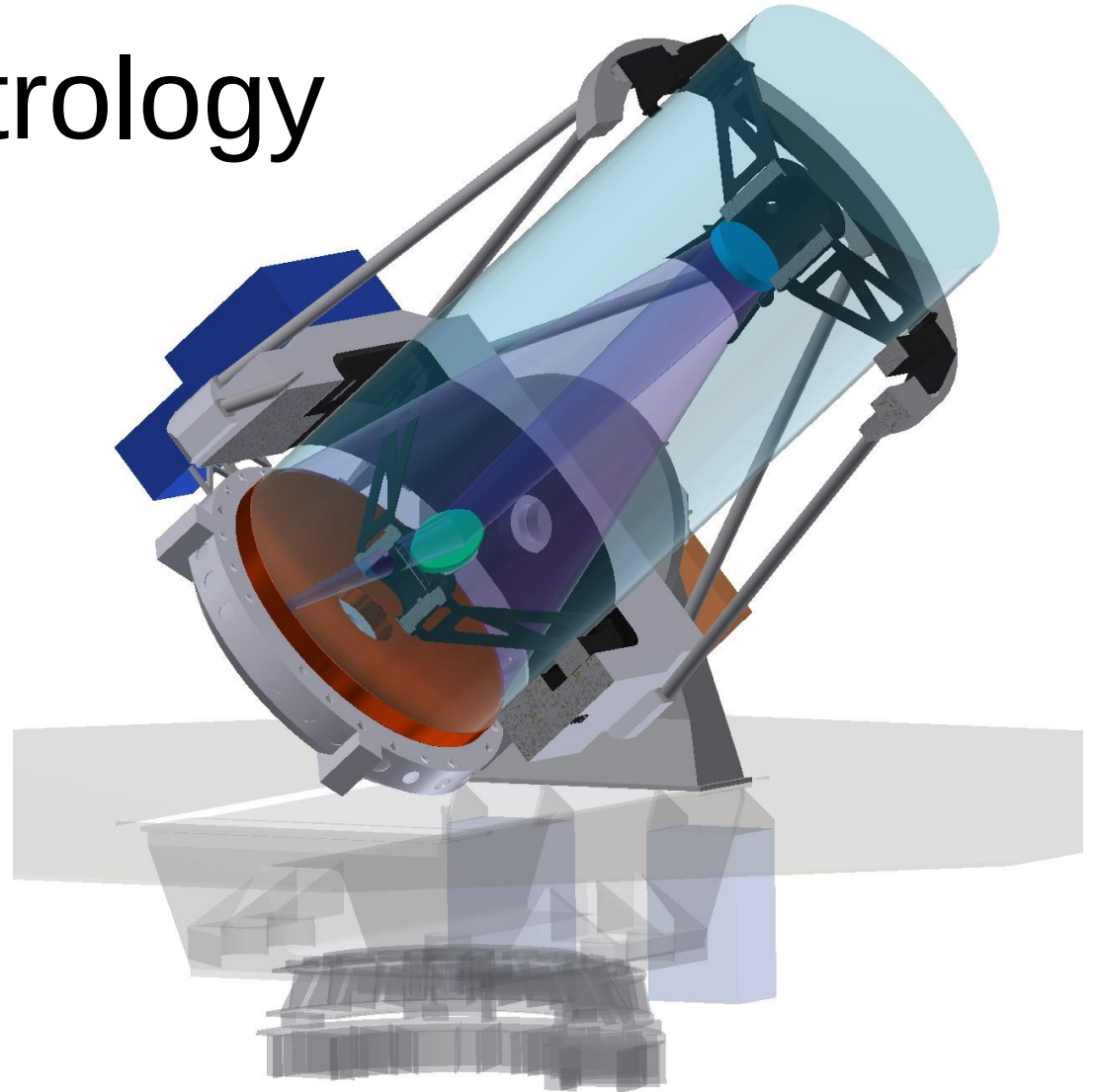


Optics and Metrology
at the

Telescopio
Nazionale
Galileo

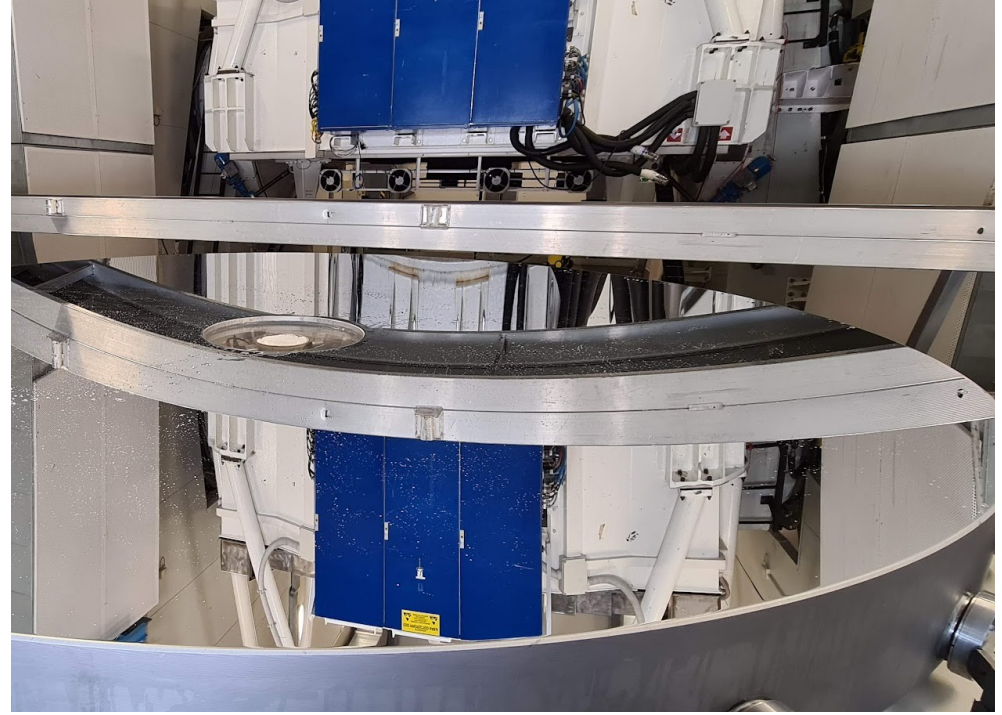
A. Ghedina



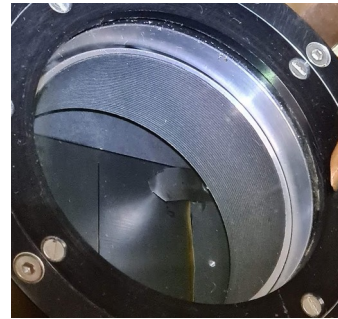
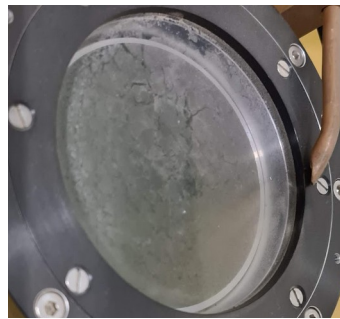
O&M @TNG

- Maintenance (Monitoring/cleaning)
- AIV of new instruments (tools and suggestions from a user PoV)
- New projects (Zemax+Inventor)

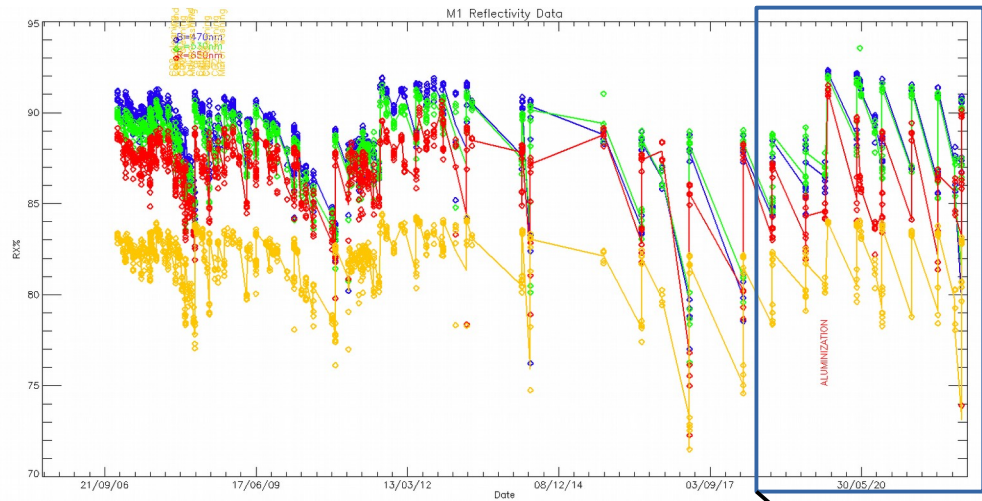
CLEANING



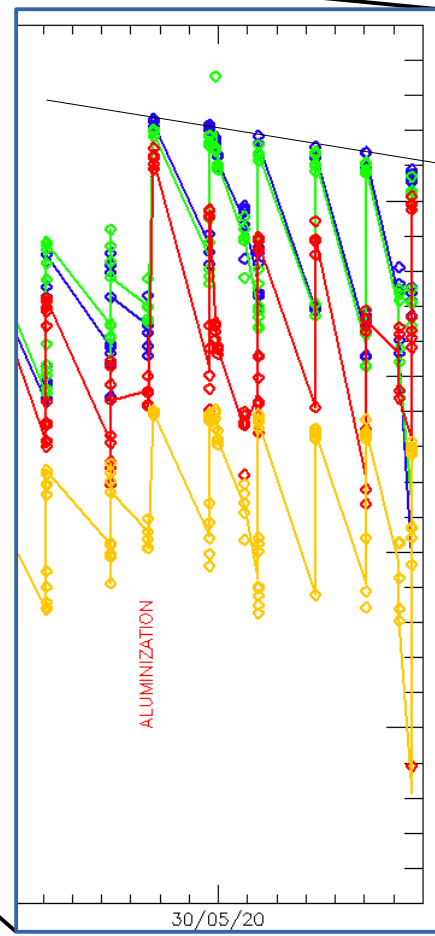
before



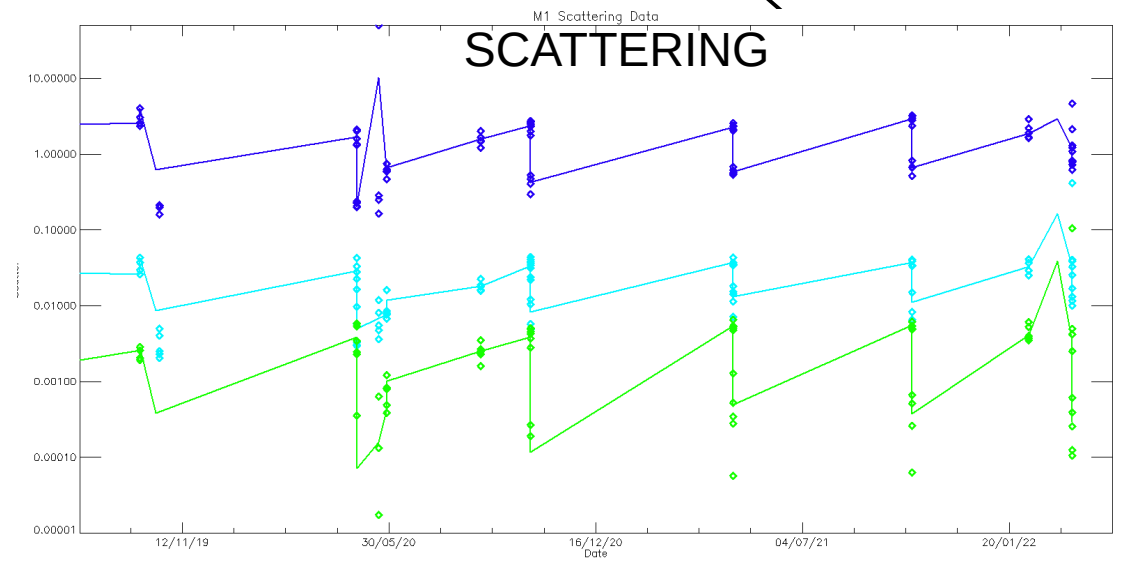
after



REFLECTIVITY

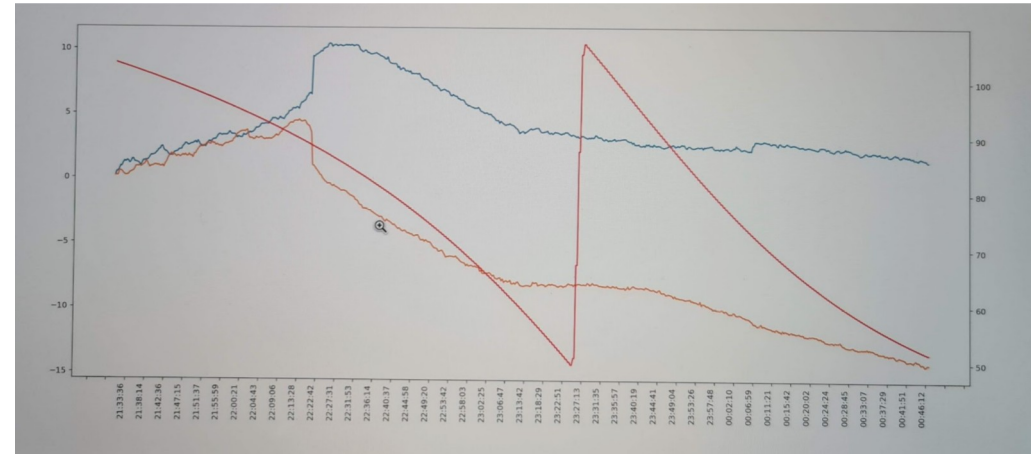
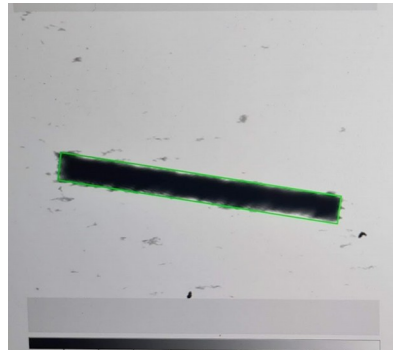
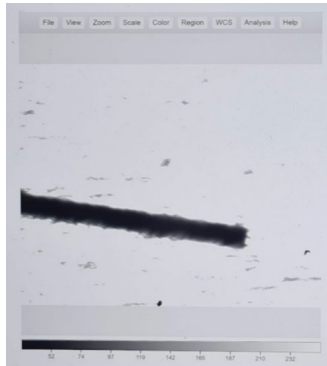


SCATTERING



Further maintenance → C.S.I.

- Slit movements, aberrations, objects out → download TCS telemetry (temp, angles, AG offsets...).



AIV of instruments

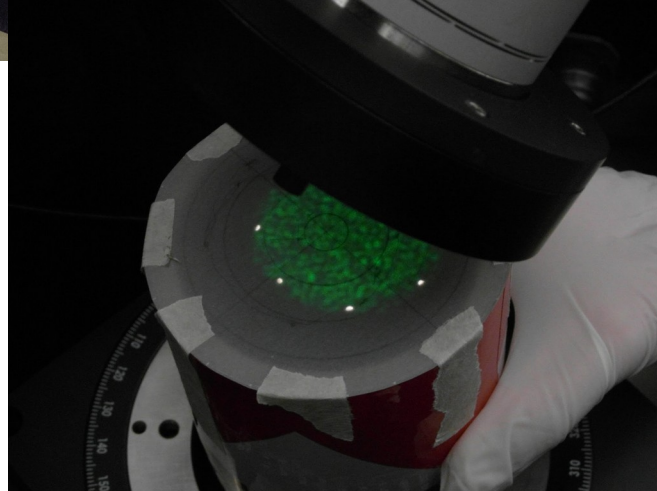
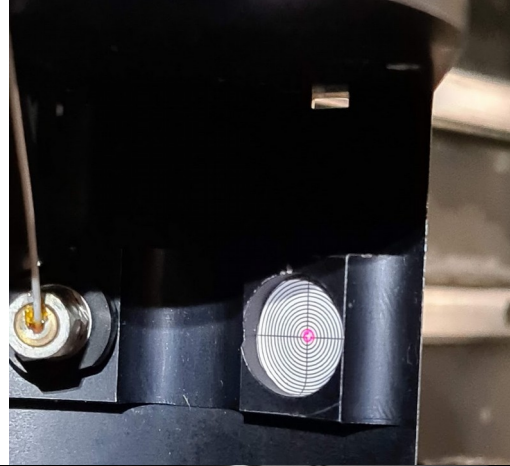
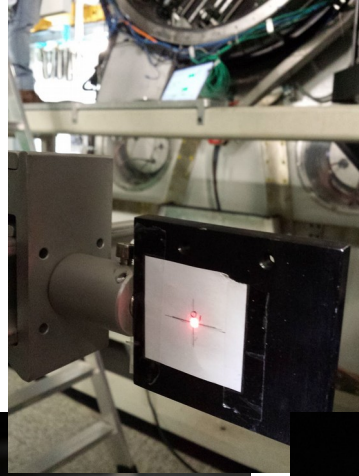
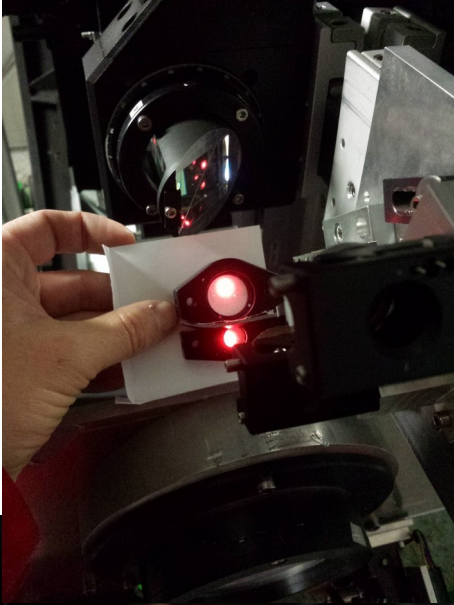
Apart from 1st inst.plan of +25 years ago, many instruments installed within the already working telescope optical system:

- HARPS-N, GIANO A, GIANO A2, GIANO B
- Giarps (dichroics)
- PI instruments: PAOLO, HANPO, SiFAP/SiFAP2/SiFAP4XP
- Touch & go: IQEYE, PAO, Cosmic Bell, Batman

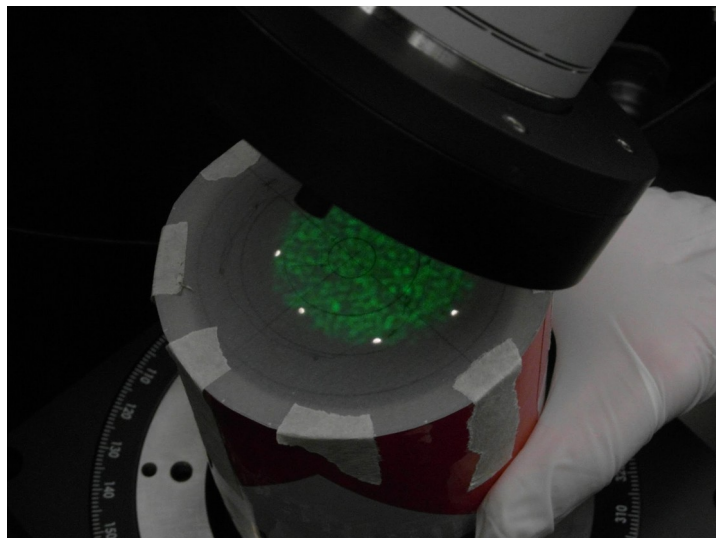
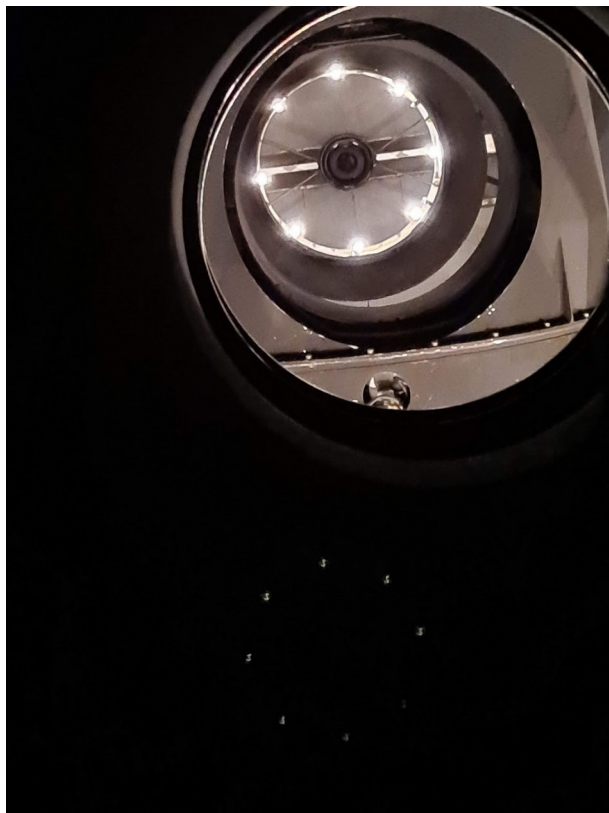
FOR ALL OF THEM:

- **Find+Define real positions of focus+chief ray+pupil WRT some mechanical surface**
Fit the pickup (mirror/lens/BS/dichroic) inside the already existing interface and then IN/OUT, no vignetting, etc.

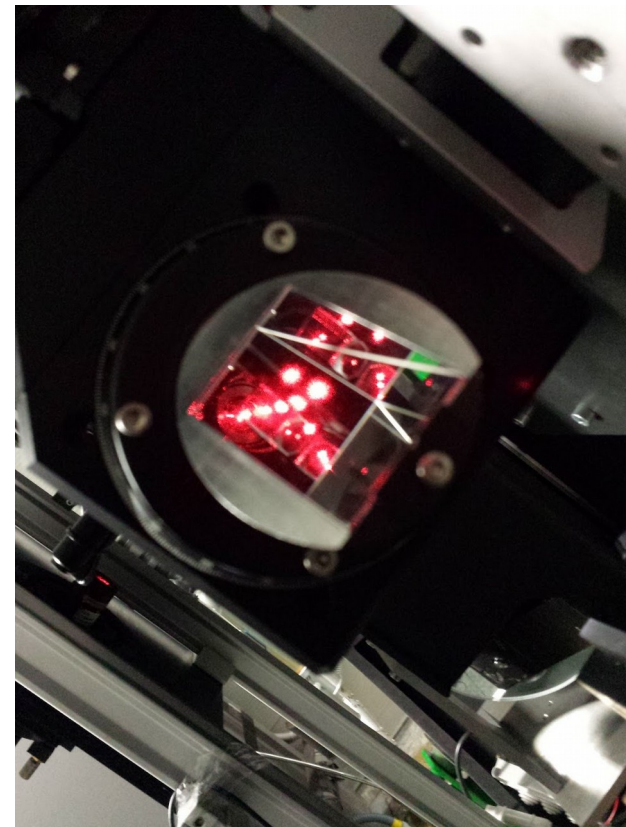
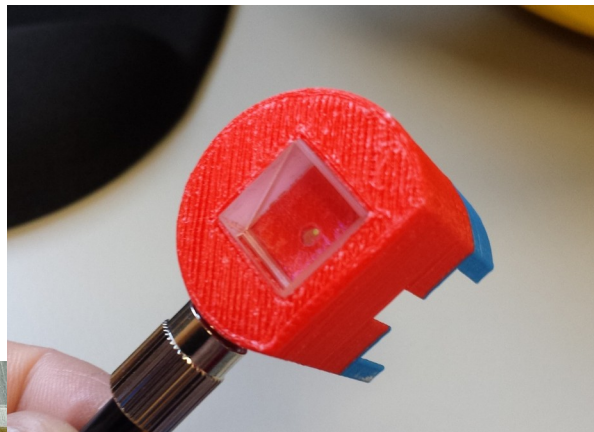
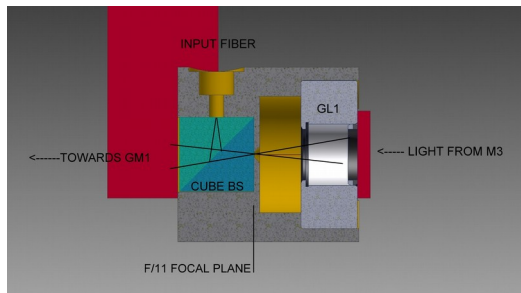
Analogical Metrology tool



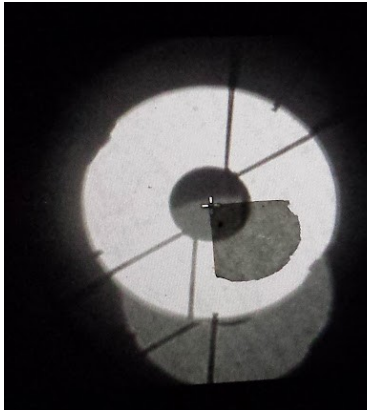
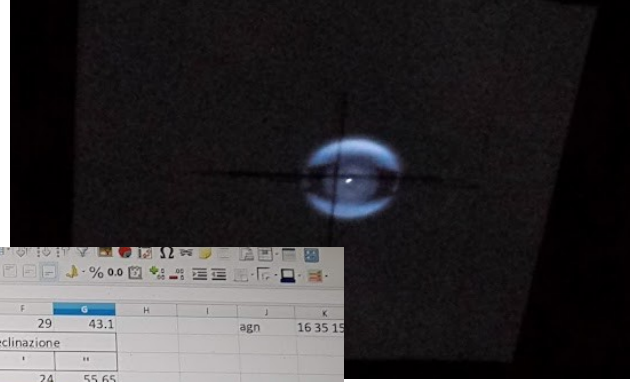
Xmas lights → pupil



Masks/Fibers/laser at focal plane (point sources)



Daylight pointing



A	B	C	D	E	F	G	H	I	J	K
7	21	29	45.04		21	29	43.1			
8									agn	16 35 18
9										
10		-4	29	6.5		-4	24	55.65		
11										
12										
13										
14										
15										
16										
17										
18										
19										

MUSPM_MH - Settings

Basic

Format: 2592 x 1944 | Mono | ROI

Auto exposure: Setup... | AEAG ROI

Exposure: 2.086 ms

Gain: 4.40 dB

Auto white balance | Manual WB

Performance

Temperature

Trigger, Device I/O

24.1°C 6% CLOSE

Stop Position - + T Status

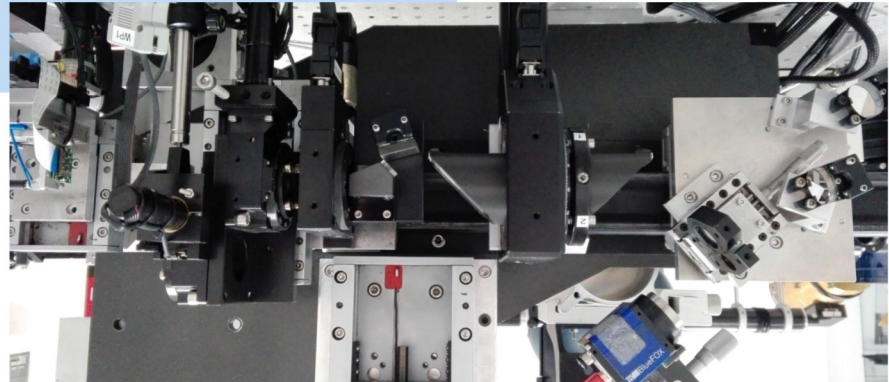
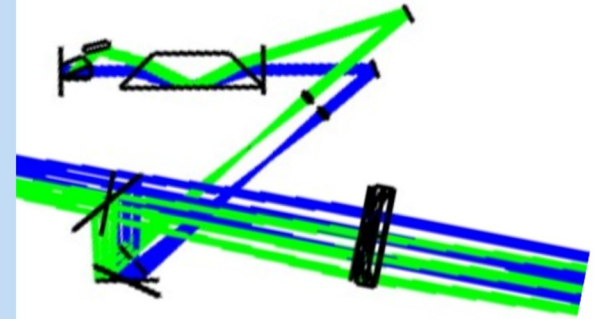
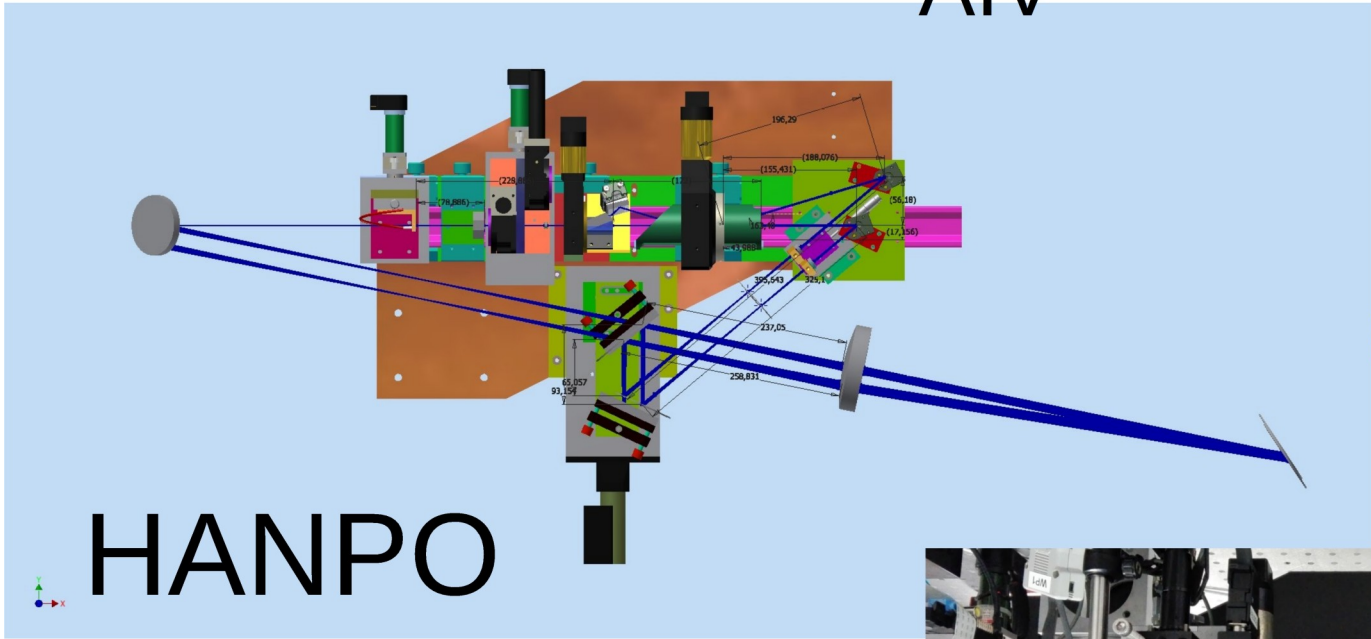
14.99° STAND BY

91.520mm STAND BY

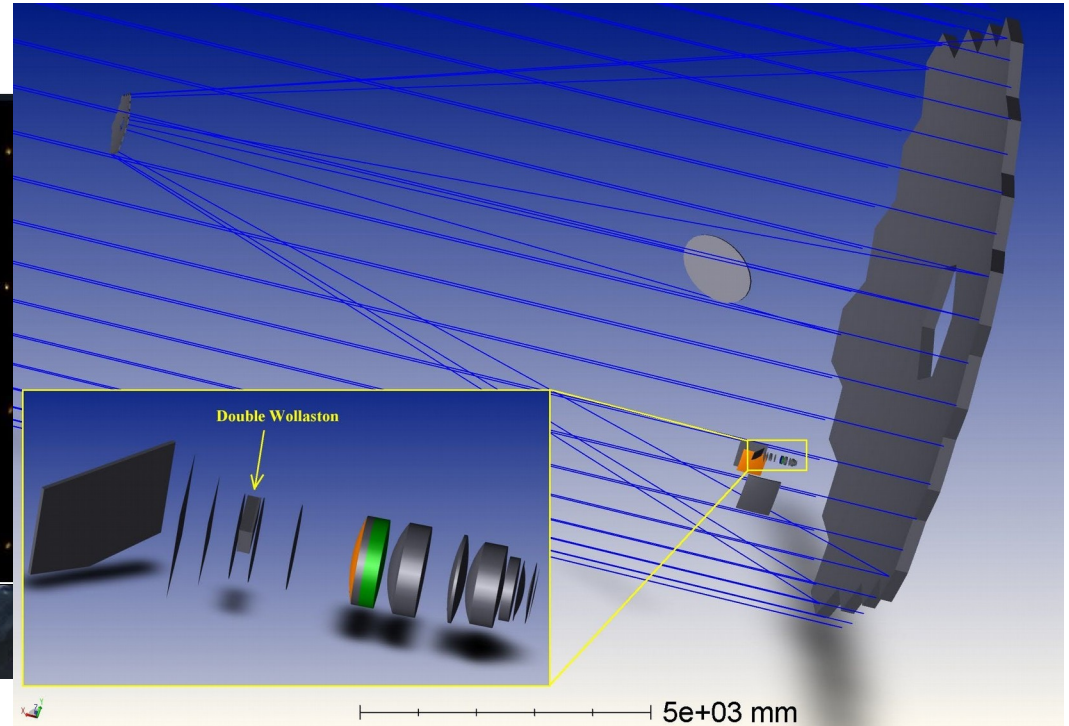
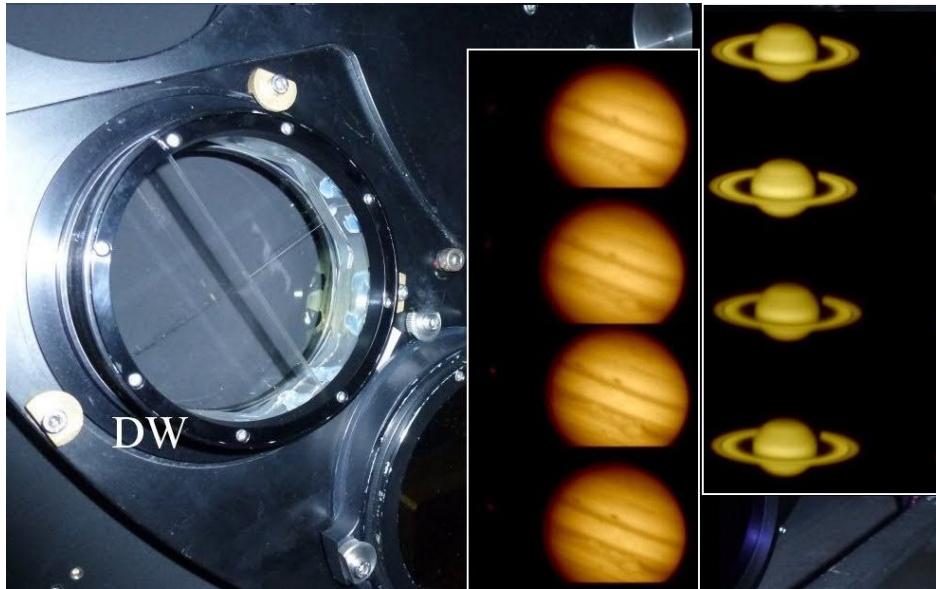
0 STAND BY

0 STAND BY

Full package: Design → 3D proto → CNC →
AIV

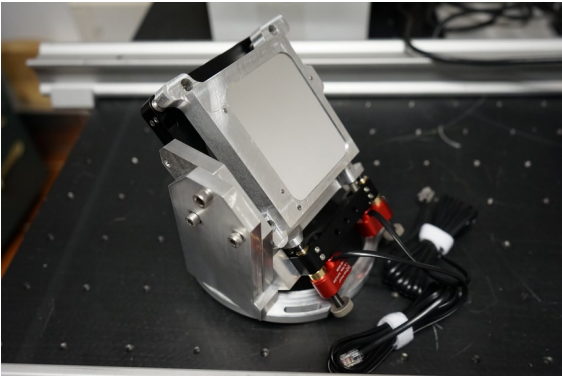
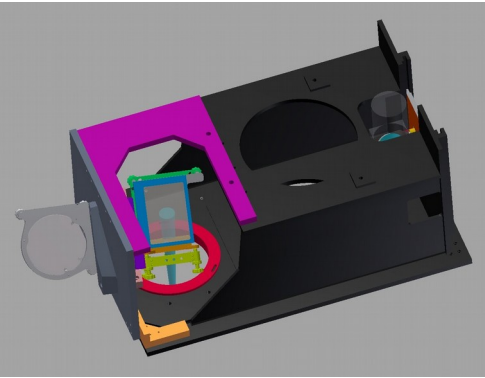


PAOLO: double wollaston

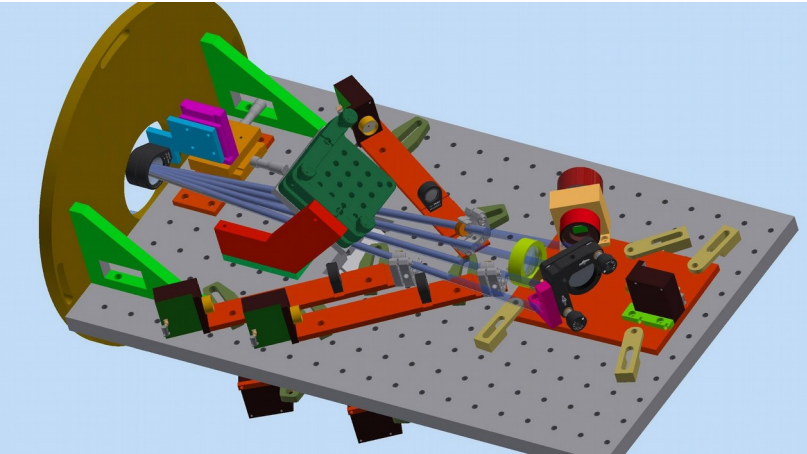
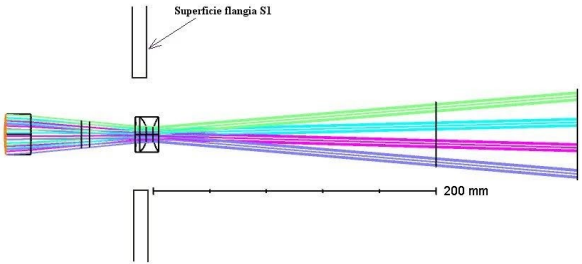


WDW for GTC

Collaborations with OA Arcetri, Univ. Catania, Padova, Brera, Roma

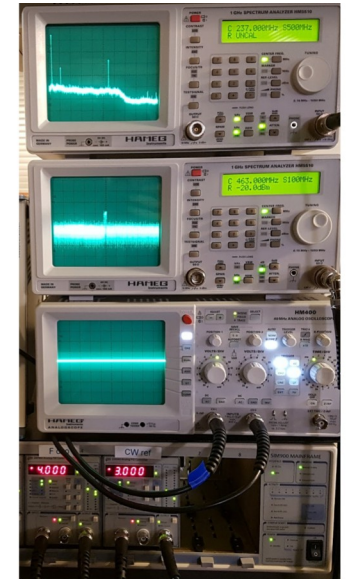
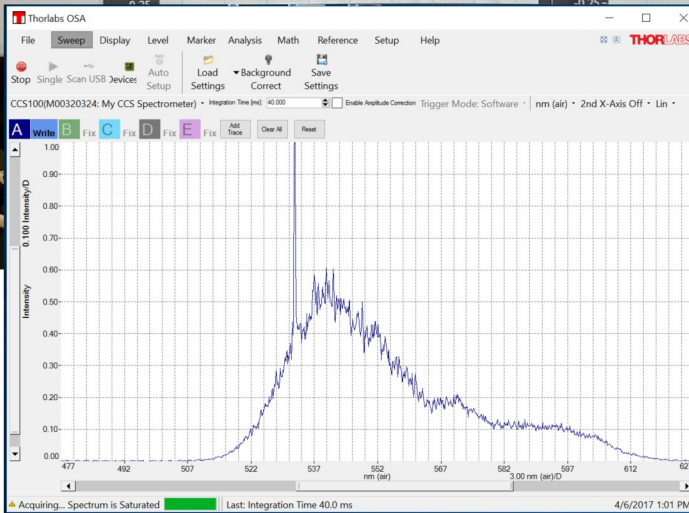
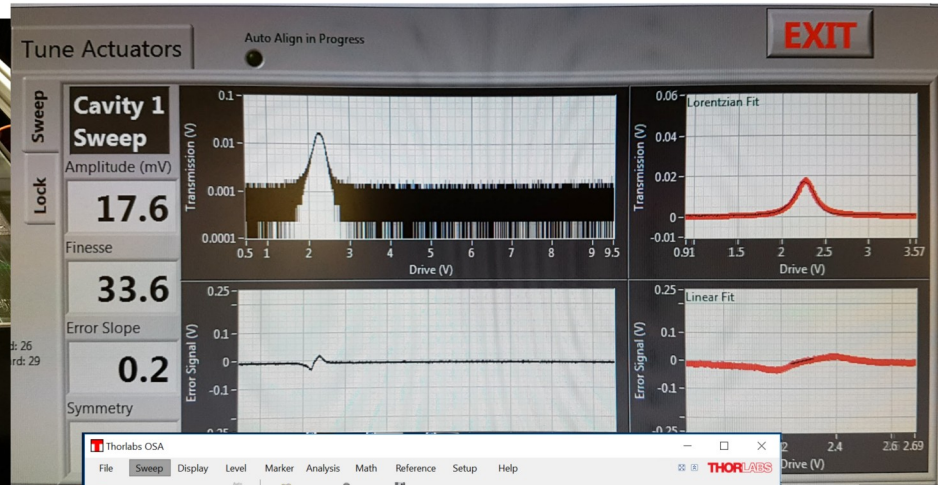
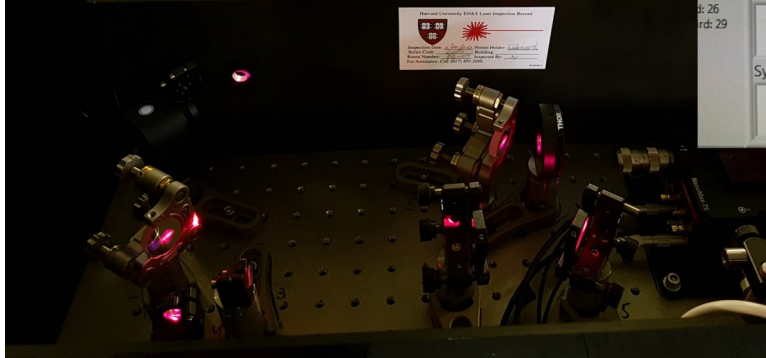
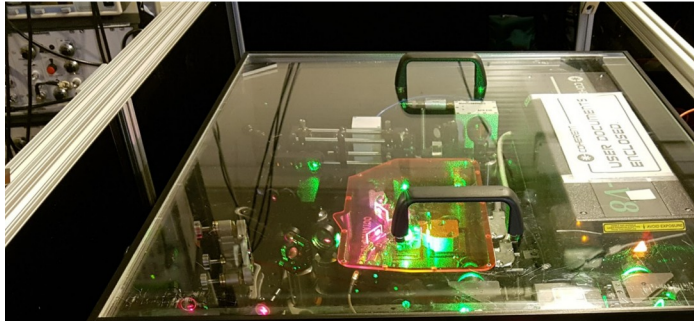


GIARPS DICHROICS



SiFAP4XP

Laser Frequency Comb



TNG expertise on optics and metrology

- Active/Adaptive optics (1st PWFS)
- Optics cleaning, monitoring and maintenance
- Design, assembly, alignments, laboratory tests, commissioning of optical systems
- LFC