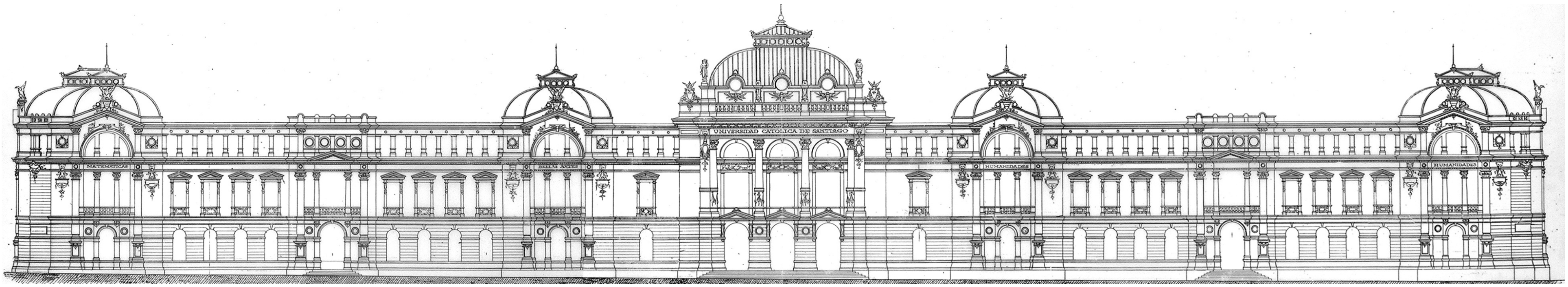


The Adventure of building Astronomical Instruments at the AIUC

Leonardo Vanzi
Center of Astro Engineering
Pontificia Universidad Catolica de Chile

Adventure

→ It must be exciting

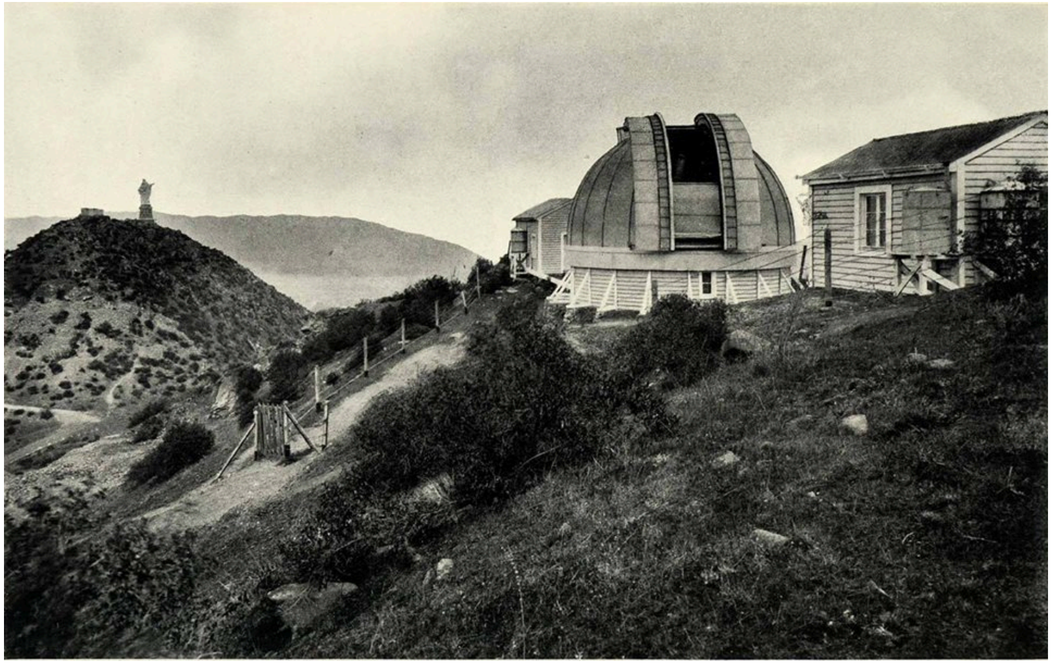
→ It must be difficult or nearly impossible

→ It must be unusual, ideally something never done before

→ It must be risky, there must be a real chance to hurt yourself

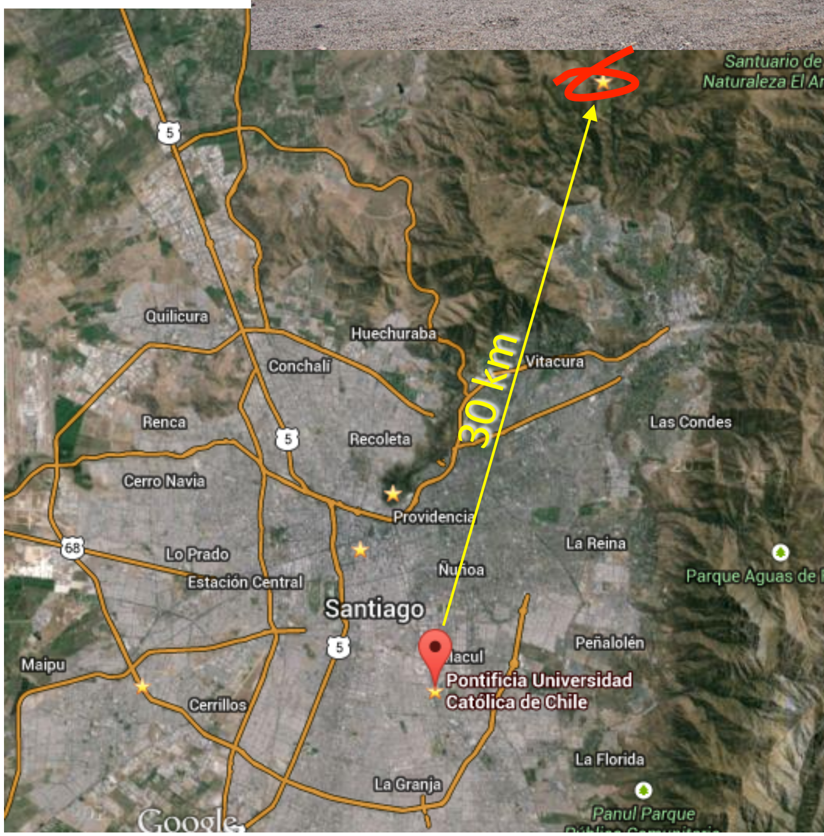
→ It must be uncertain with the potential of ending in a complete disaster

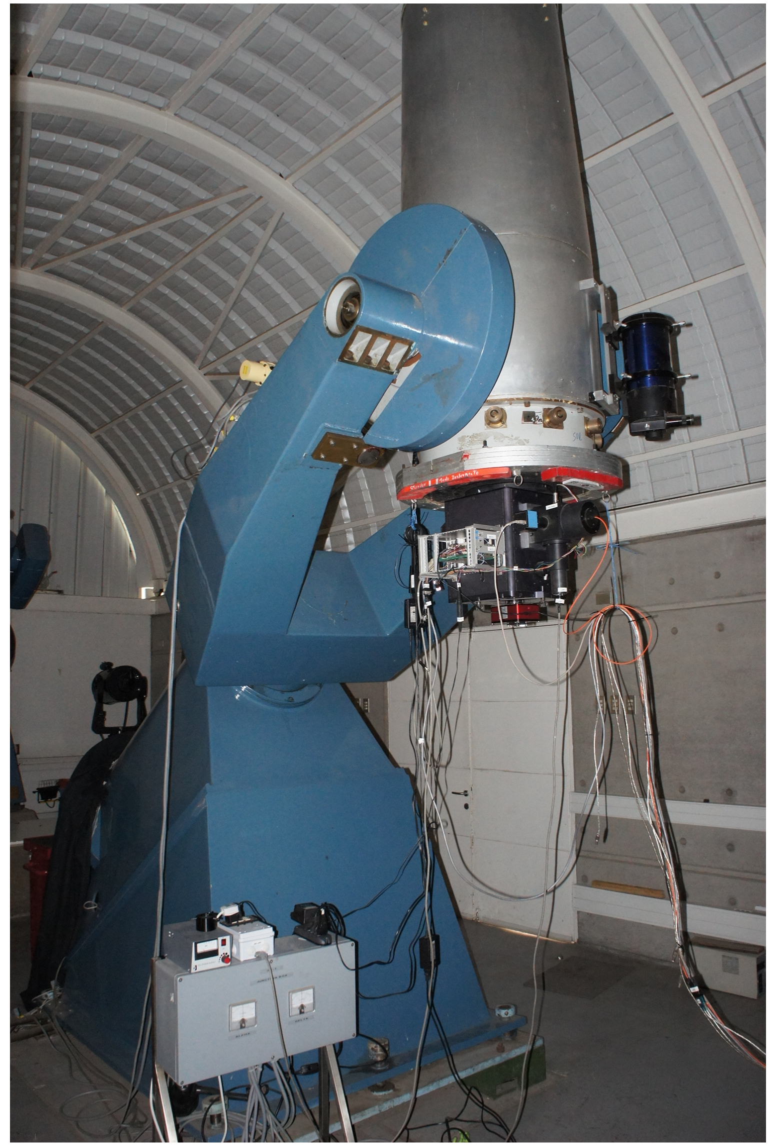
→ You must survive to tell



1849: Gillis expedition
1903: Lick Expedition
1967: Tololo
1969: La Silla
1971: Las Campanas
1998: Paranal
2000: Gemini

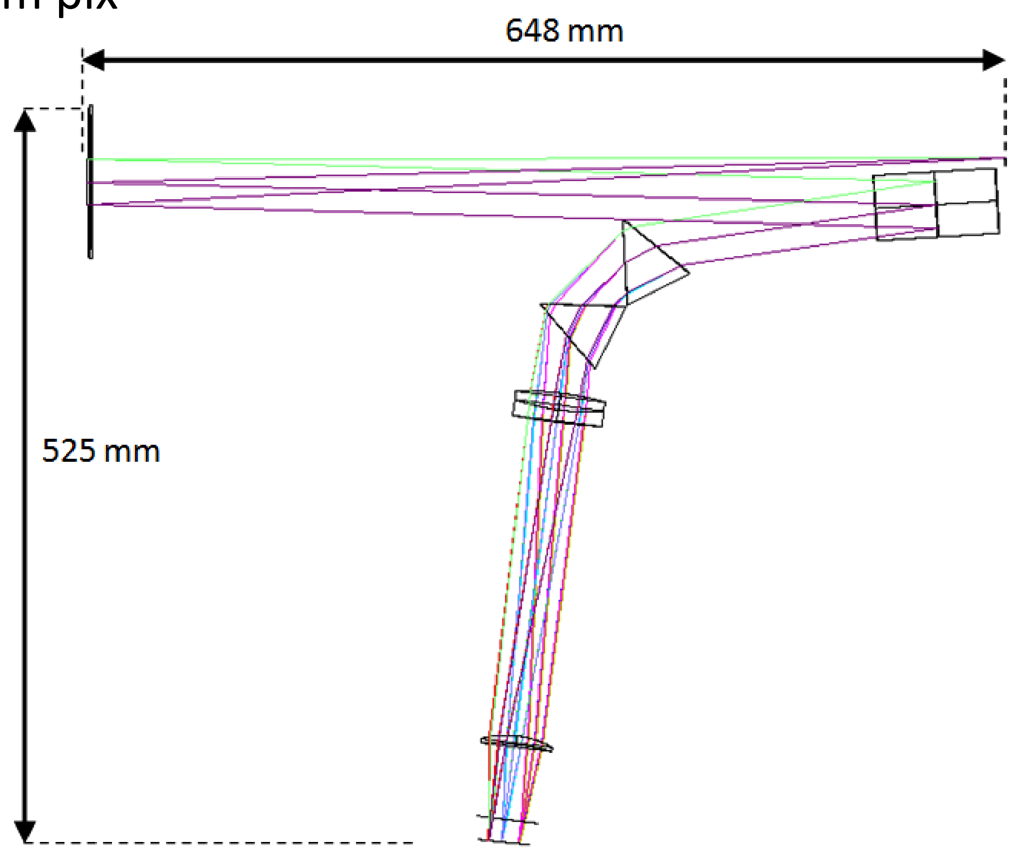
The UC Observatory





Pucheros: PUC High Ech. Res. Optical Spctrograph

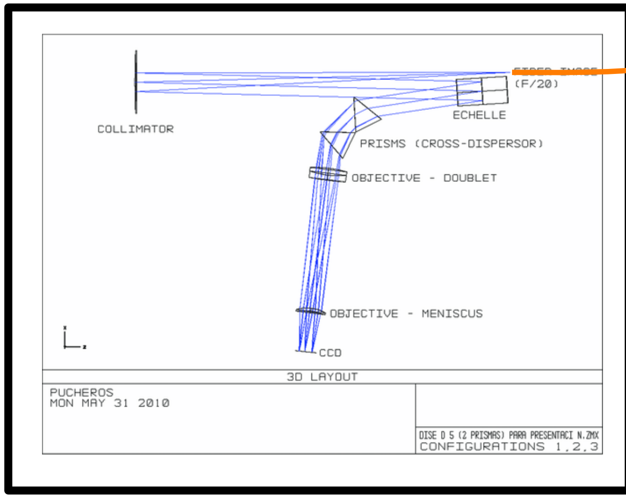
- echelle spectrograph R≈20.000
- Fiber-fed with 50 μm core fibre
- spectral range 400 - 700 nm in one shot
- Mostly off-the-shelf components
- Detector FLI PL100 CCD 1K, 24 μm pix

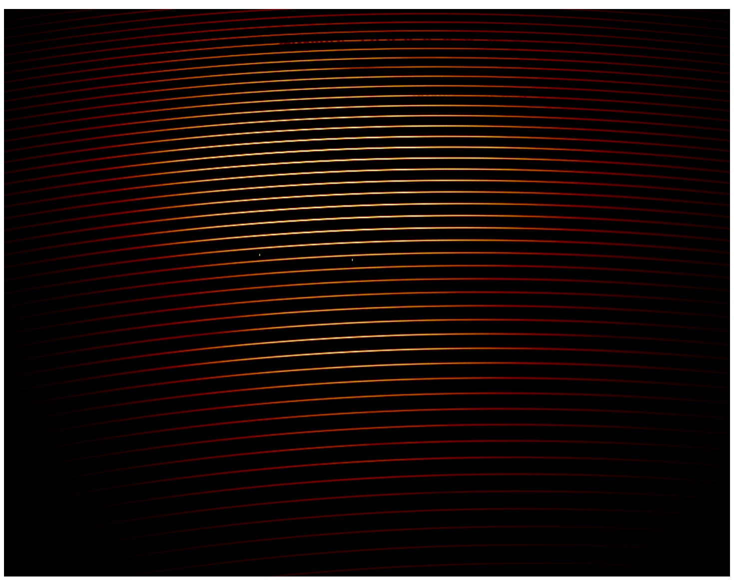


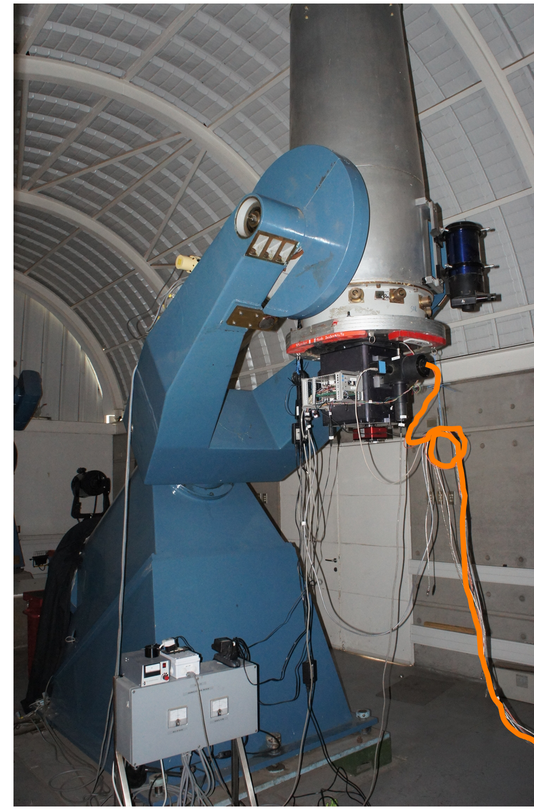
PUCHEROS Optics

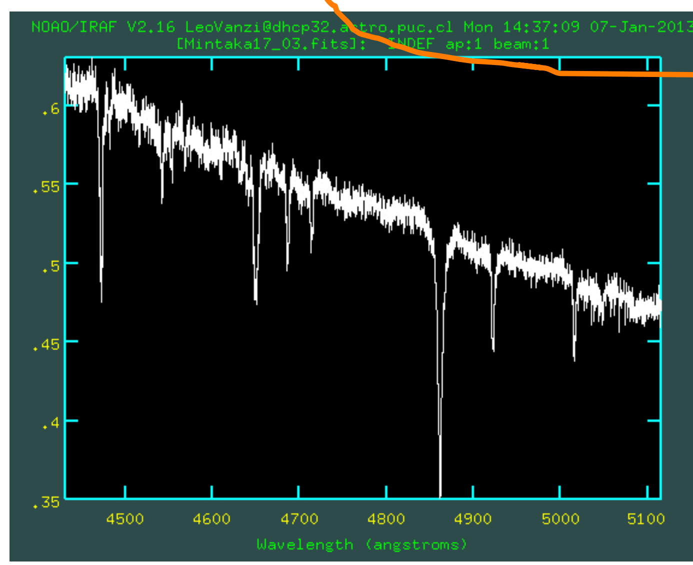
Collim. EFL = 648 mm
Echelle 70° 44.4 gr/mm
2 Prisms SF2 48°
Obj. EFL = 221 mm

PUCHEROS at Santa Martina



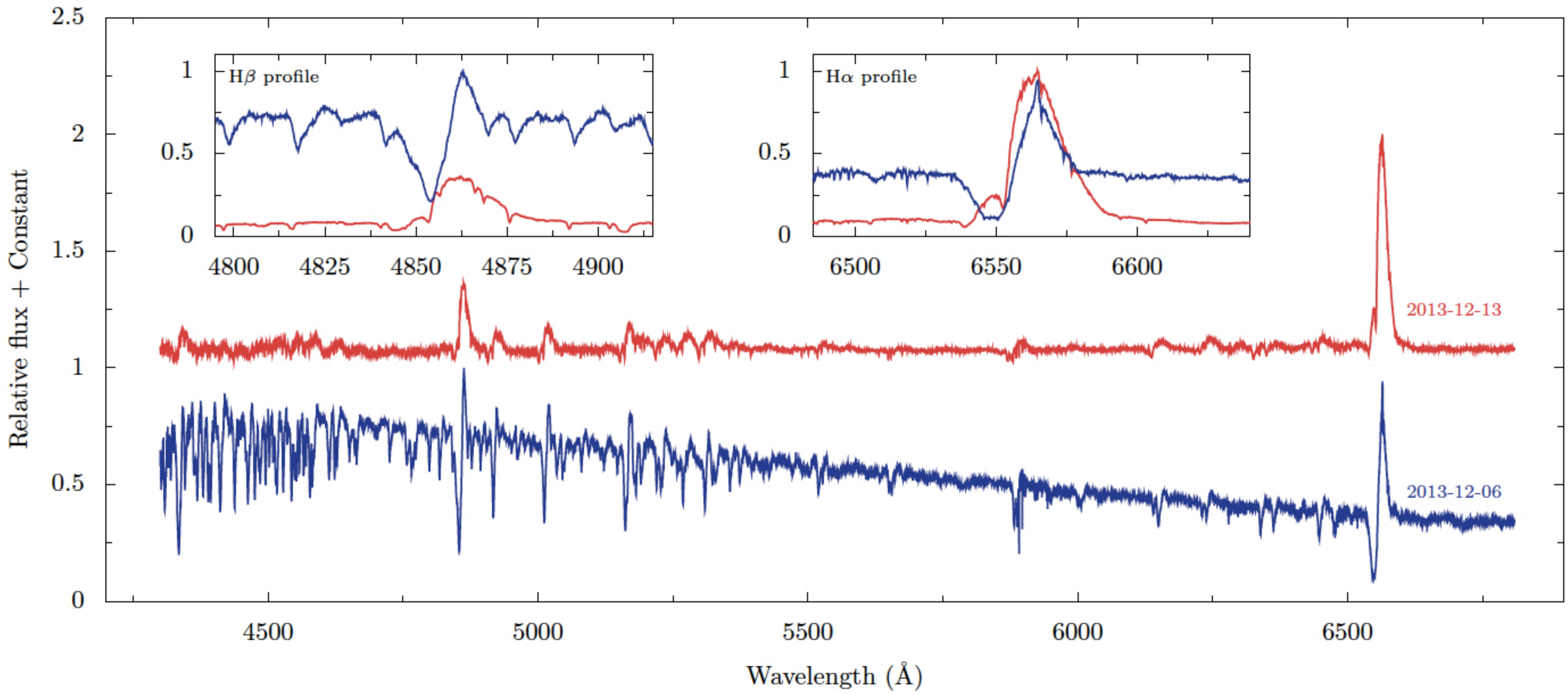






λ

Nova Cen Dec. 2013



PUCHEROS Main scientific driver:

observation and monitoring of Be stars and bright transient objects

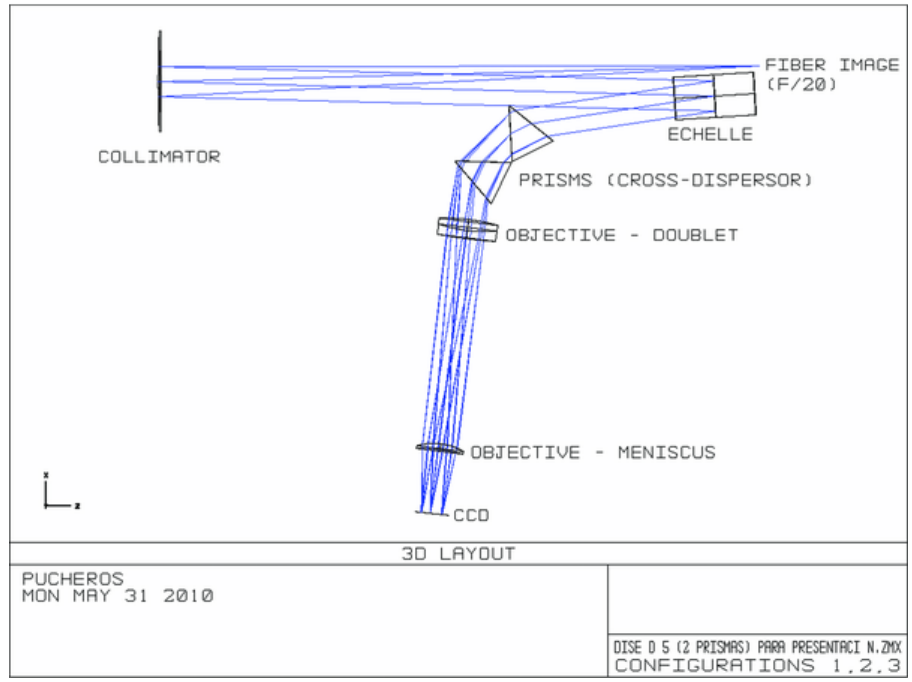
Published papers:

- Vanzi et al. 2012 MNRAS, PUCHEROS: a cost-effective solution for high-resolution spectroscopy with small telescopes
- Chesneau et al. 2014 A&A, The yellow hypergiant HR 5171 A
- Coronado et al. 2015 MNRAS, Orbital and physical parameters of eclipsing binaries from the ASAS catalogue
- Izzo et al. 2015 ApJ, Early Optical Spectra of Nova V1369 Cen Show the Presence of Lithium
- Bluhm et al. 2016 A&A, New spectroscopic binary companions around giant stars and updated metallicity distribution for binary systems

AIUC
CENTRO DE ASTRO-INGENIERIA UC

From PUCHEROS….

- spectral range 390 - 730 nm in one shot
- spectral resolution R ~ 20.000
- Fiber-fed by one single 50 μm core fibre / ∅ 3.5” on sky
- gravity invariant location
- Telescope ESO50 Santa Martina
- limiting mag. V ~ 7

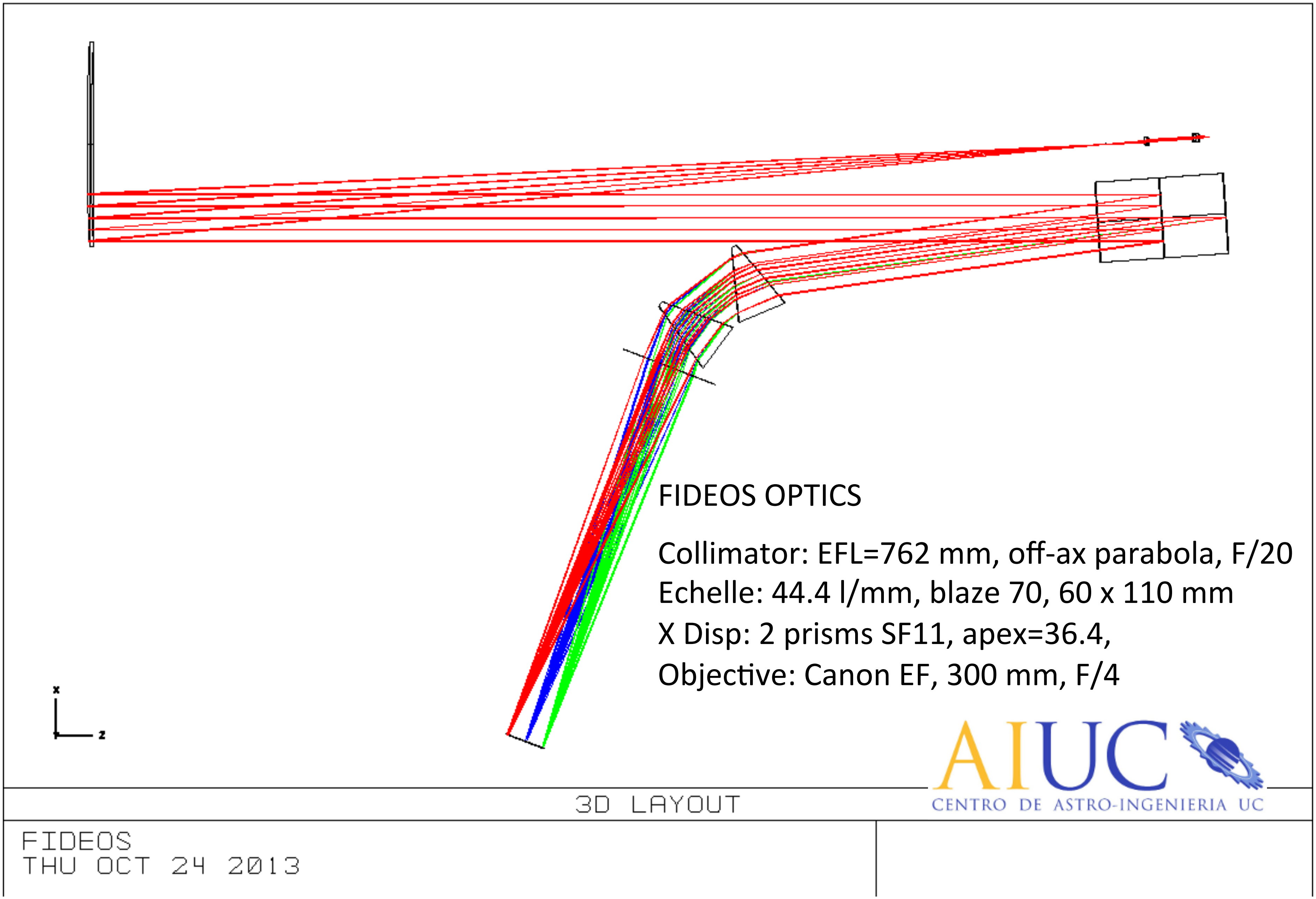


….to FIDEOS

- spectral resolution R ~ 40.000 with slicer
- Fiber-fed two channels with simultaneous calibration
- Telescope ESO 1 m La Silla
- limiting mag. V ~ 9

AIUC
CENTRO DE ASTRO-INGENIERIA UC

FIDEOS SPECTROGRAPH

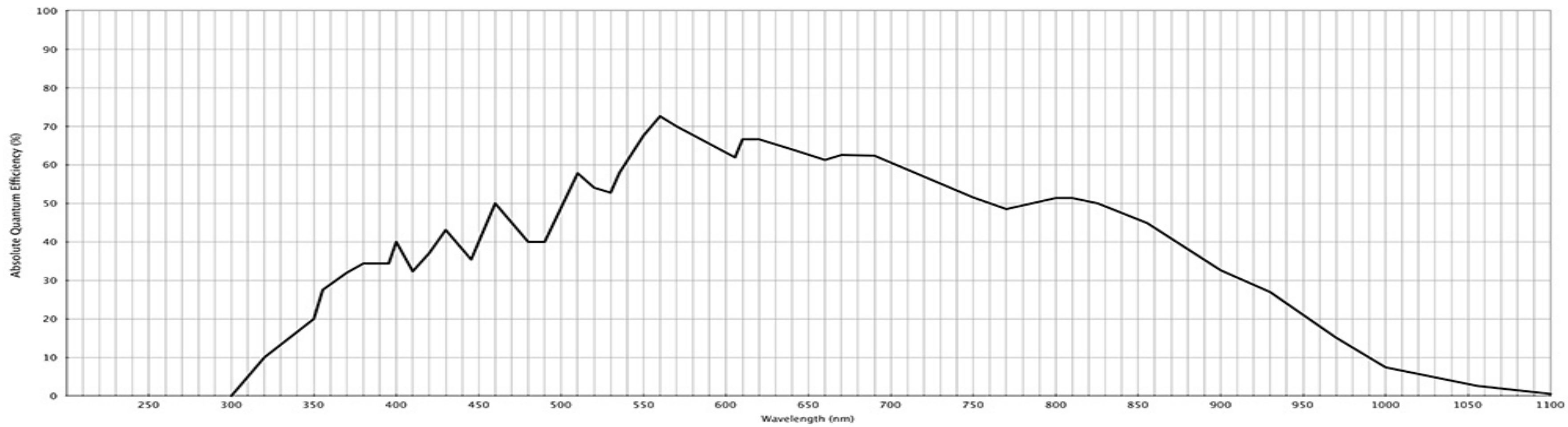


FIDEOS OPTICS

Collimator: EFL=762 mm, off-ax parabola, F/20
Echelle: 44.4 l/mm, blaze 70, 60 x 110 mm
X Disp: 2 prisms SF11, apex=36.4,
Objective: Canon EF, 300 mm, F/4

AIUC
CENTRO DE ASTRO-INGENIERIA UC

DETECTOR: Back Illuminated FLI PL230 2K Midband 15 µm



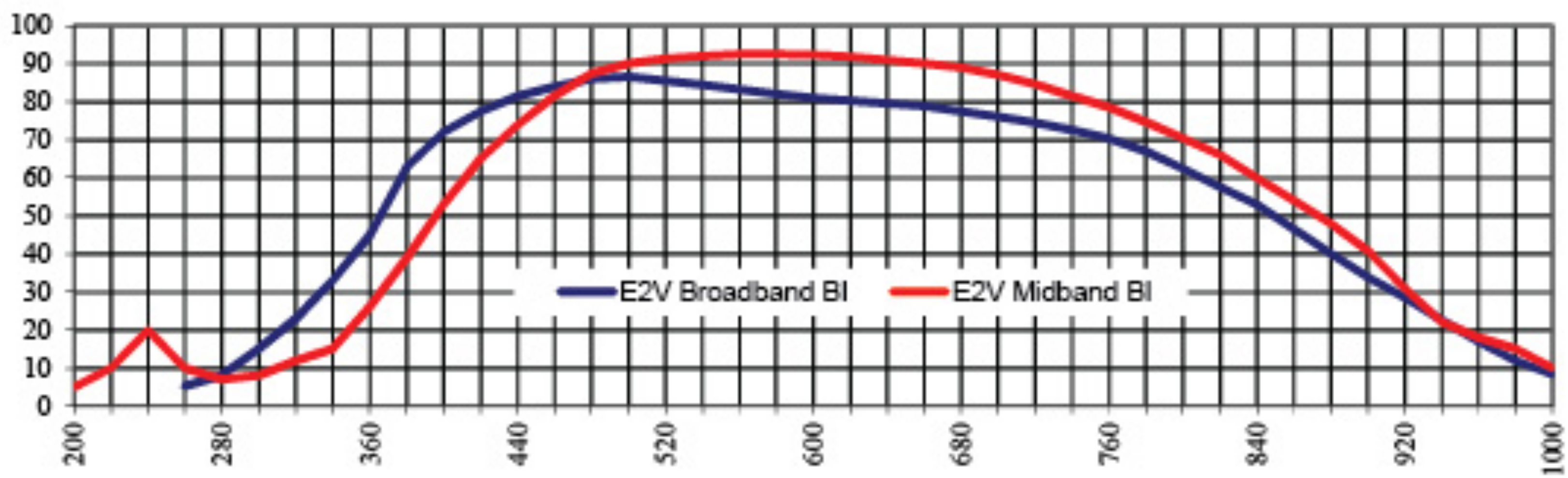
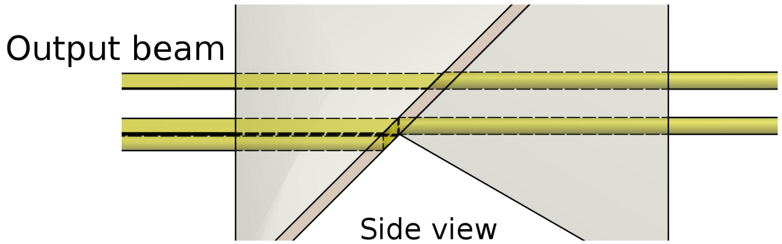
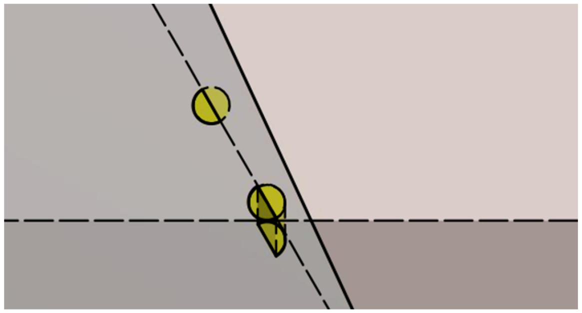


IMAGE SLICER

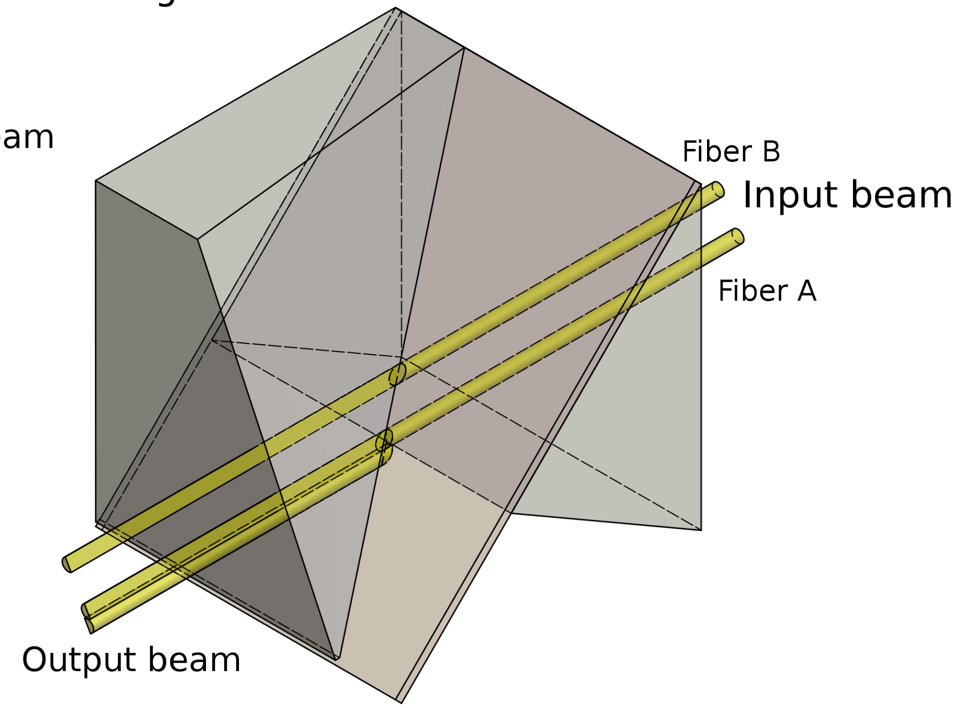
Prism Bowen-Walraven Image Slicer



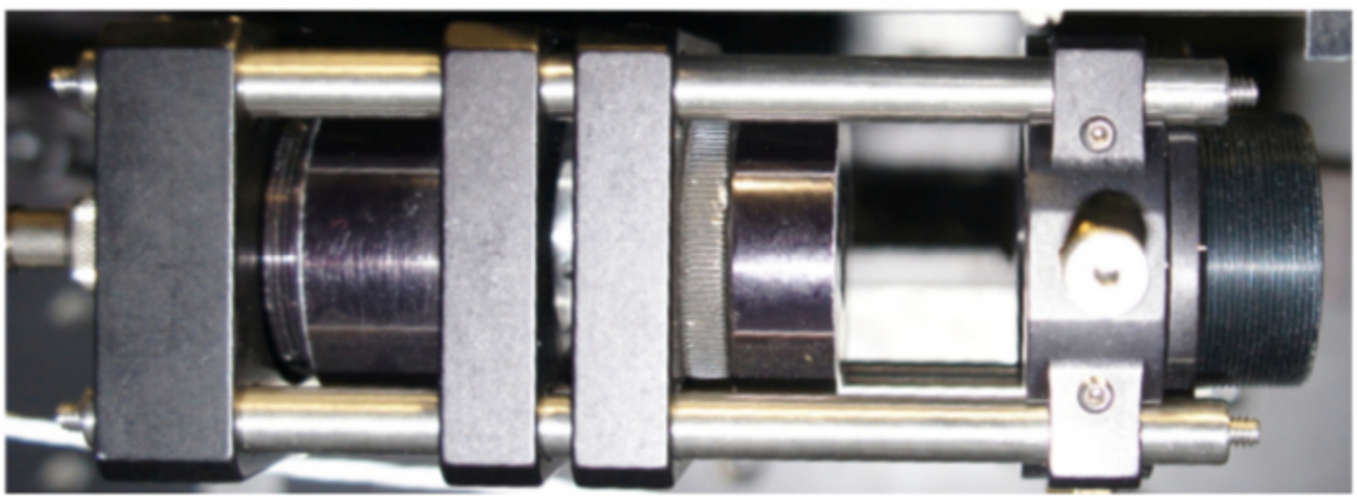
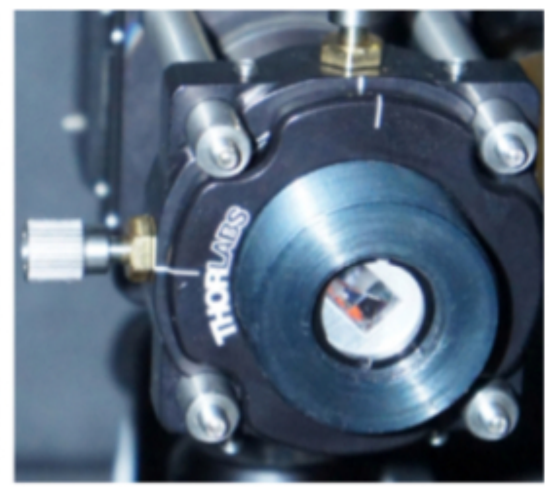
Side view

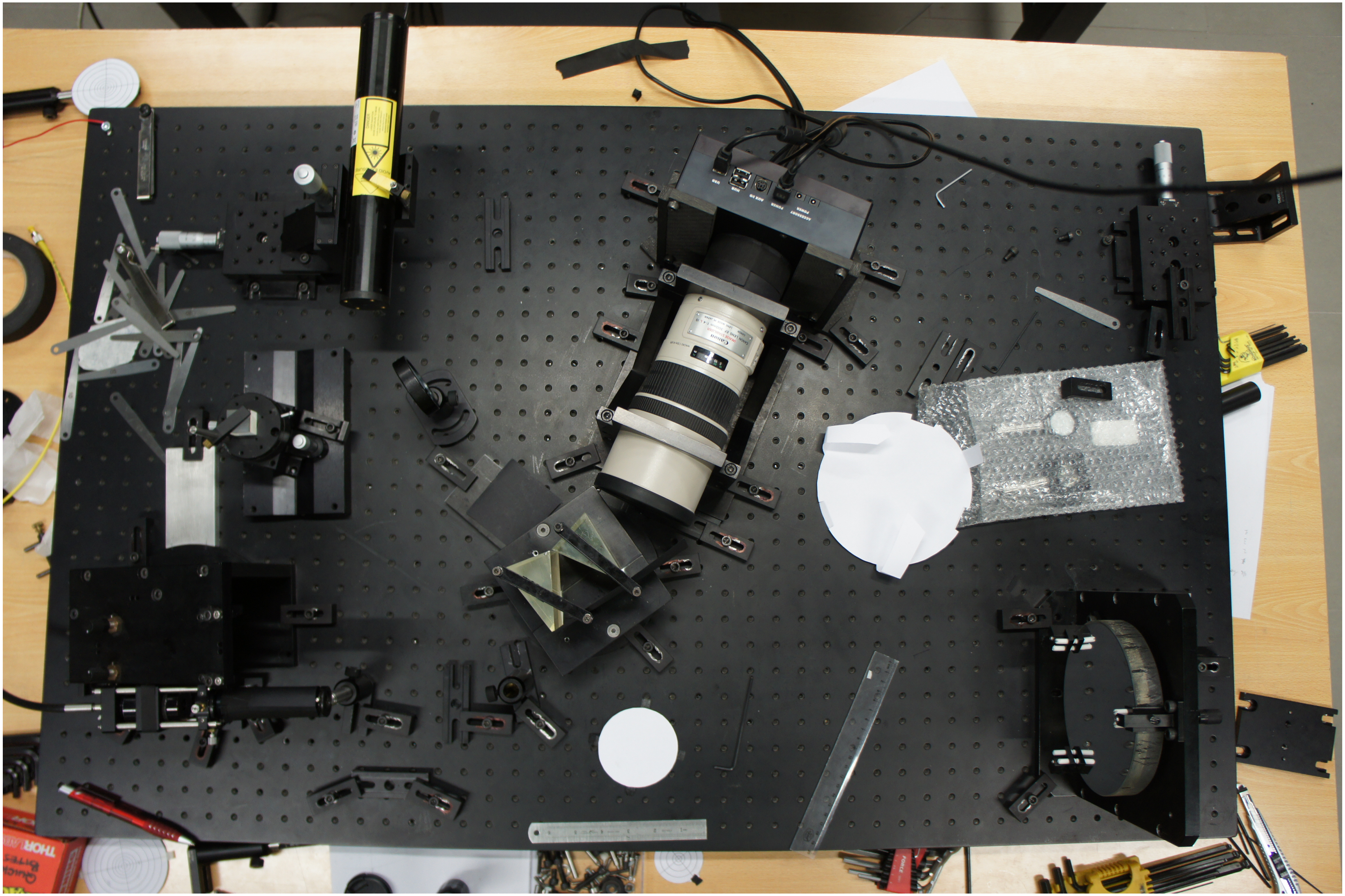


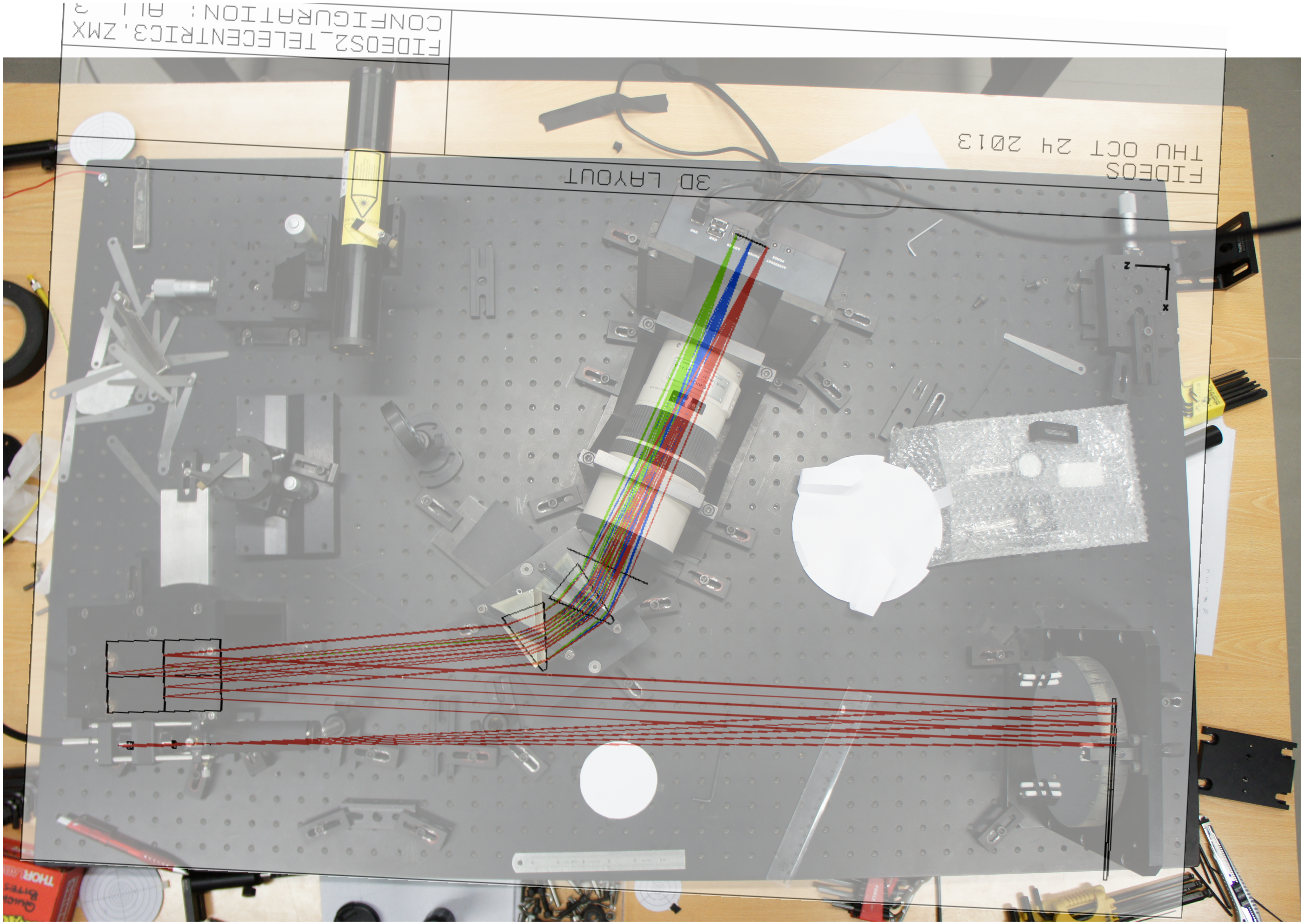
Front view

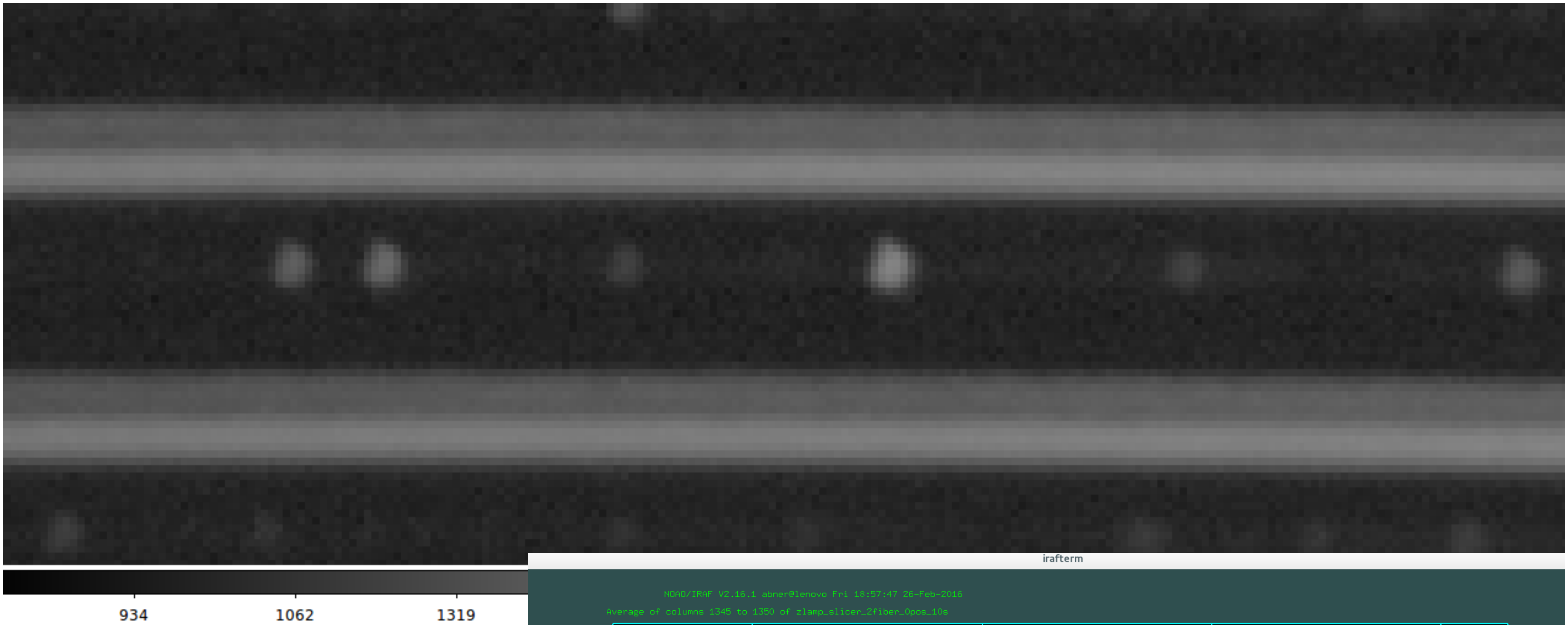


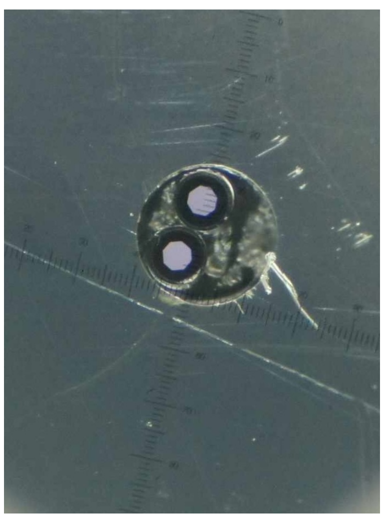


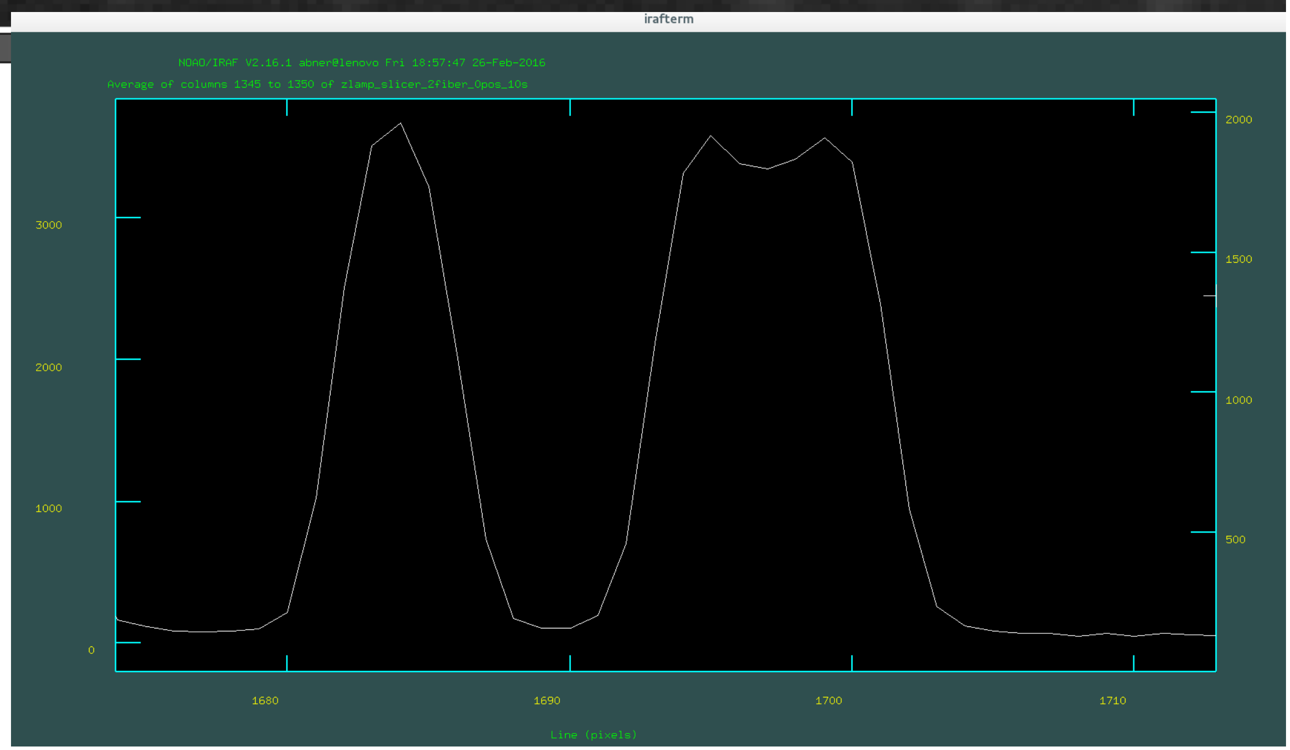


THORLABS

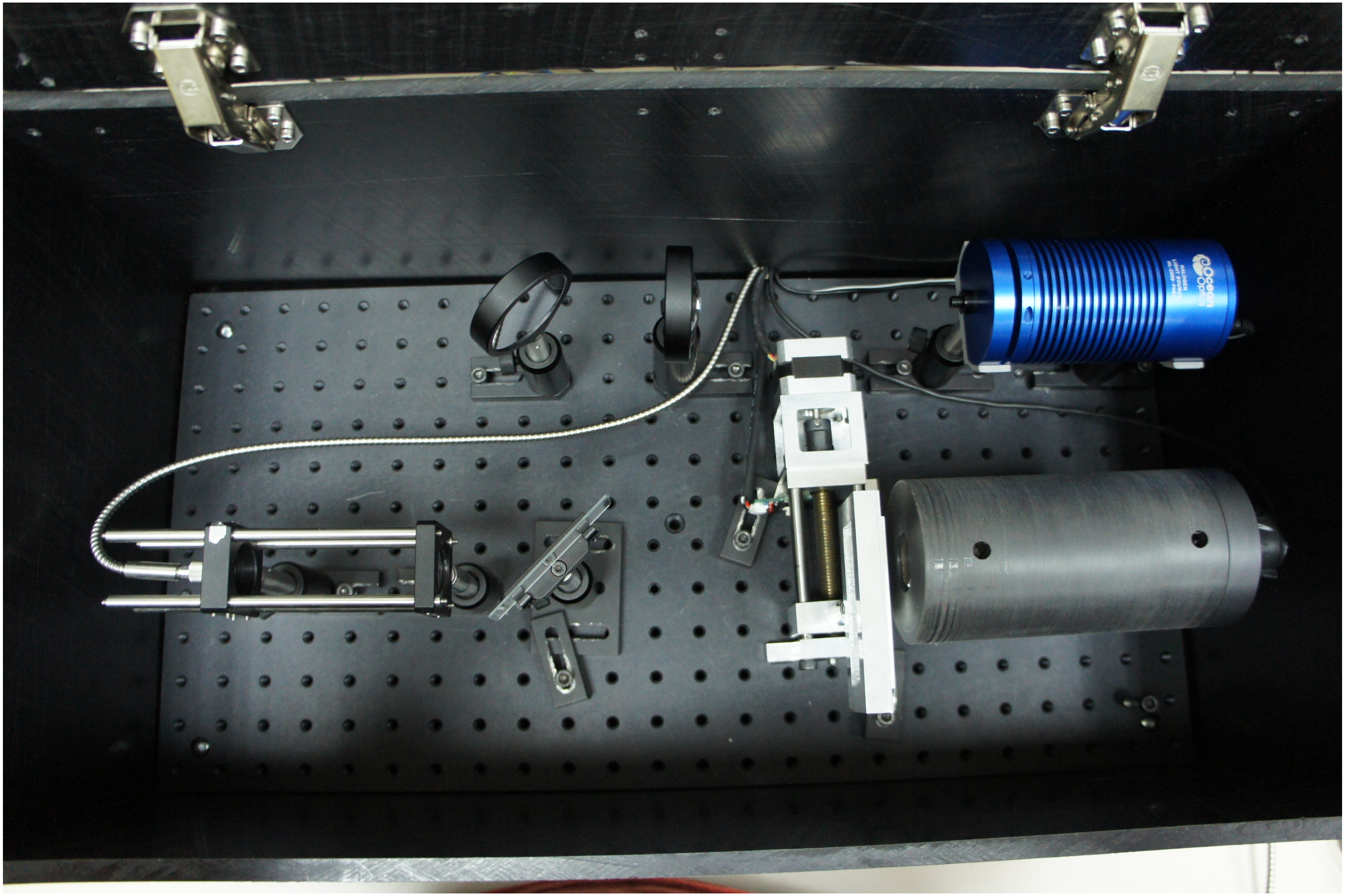



FIDEOS2_TELECENTRIC3.ZMX
CONFIGURATION: ALL 3
3D LAYOUT
FIDEOS
THU OCT 24 2013
THORLABS

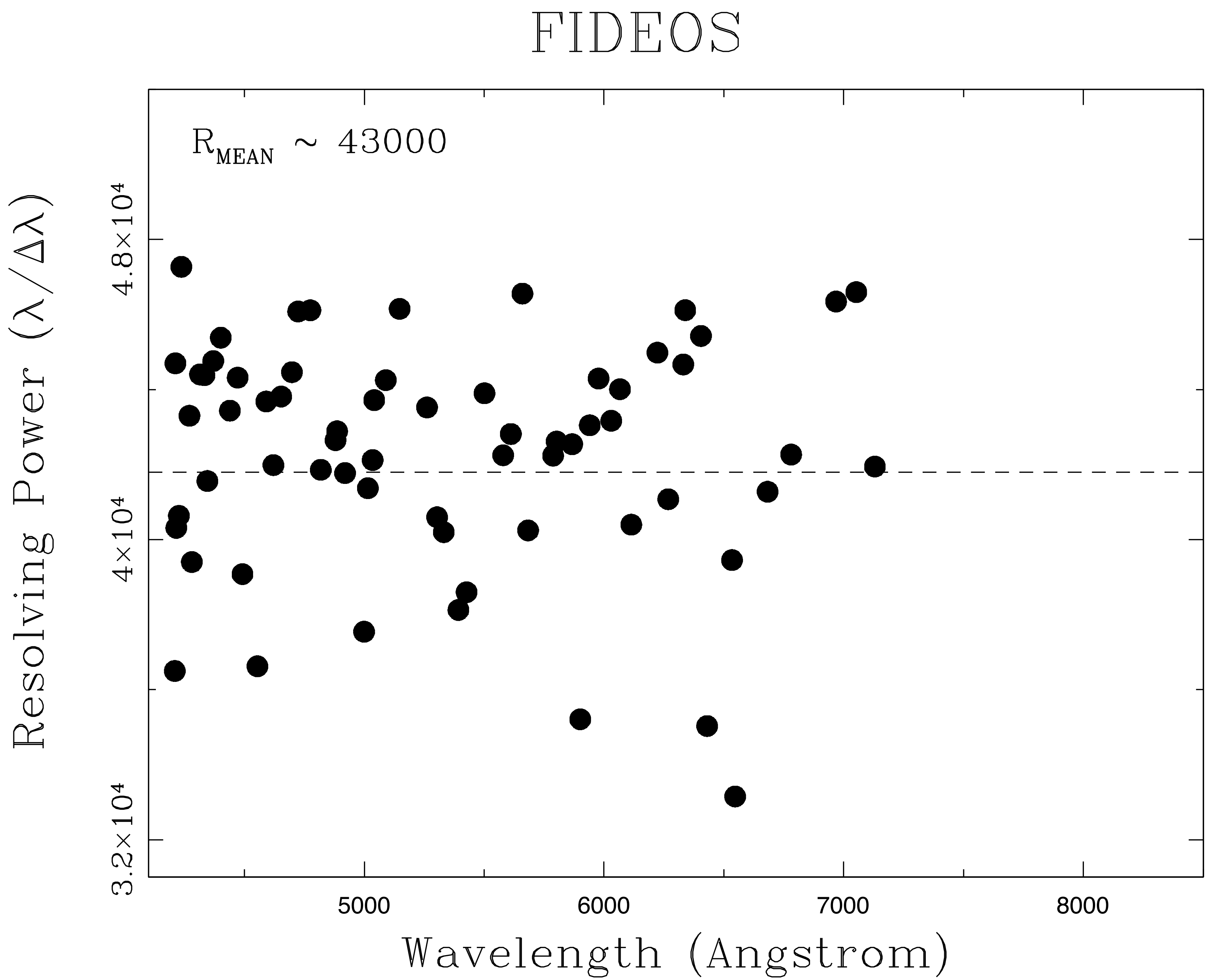

934
1062
1319




irafterm
NOAO/IRAF V2.16.1 abner@lenovo Fri 18:57:47 26-Feb-2016
Average of columns 1345 to 1350 of zlamp_slicer_2fiber_0pos_10s
3000
2000
1000
0
2000
1500
1000
500
1680
1690
1700
1710
Line (pixels)



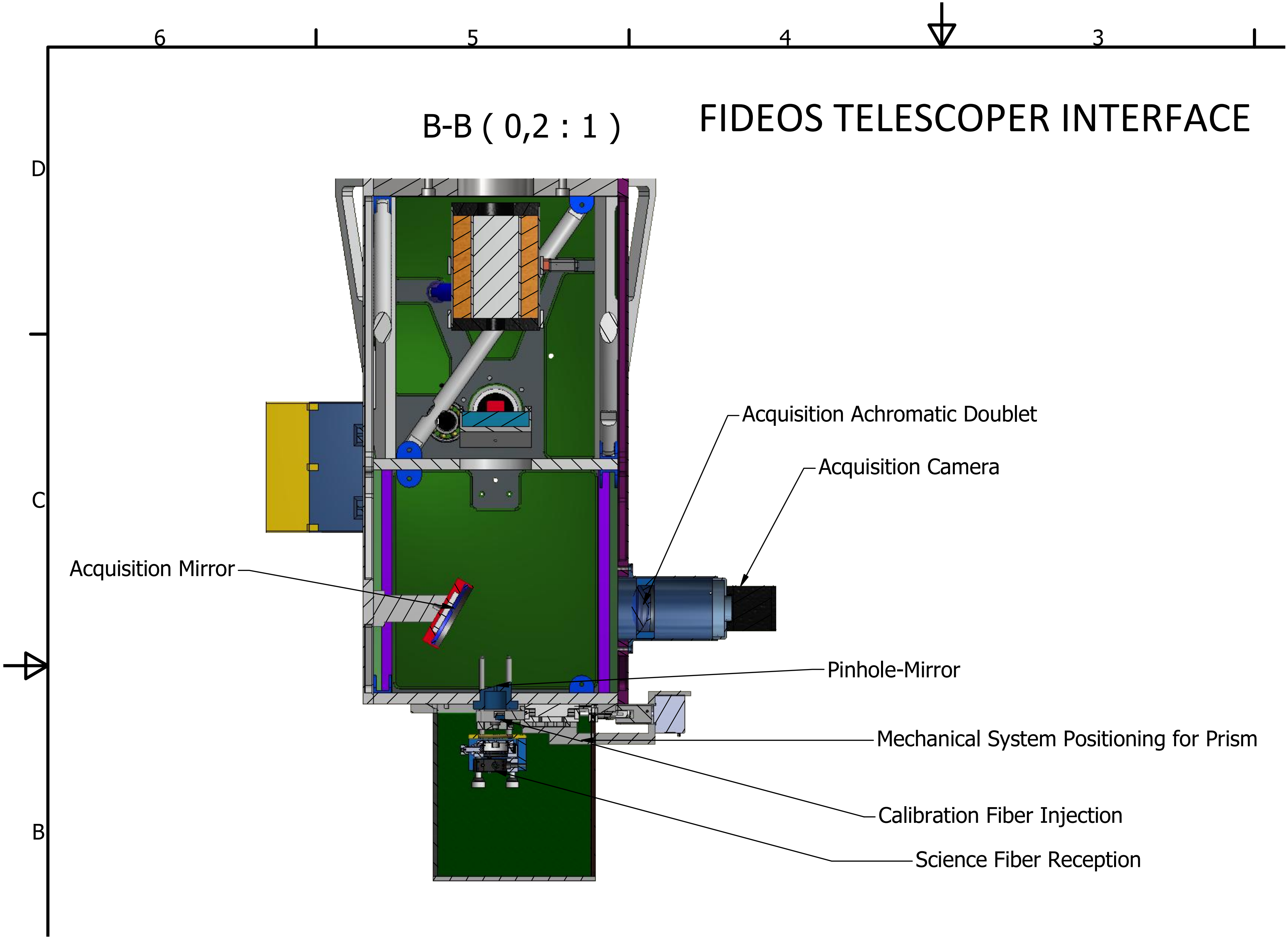
FIDEOS - CALIBRATION UNIT



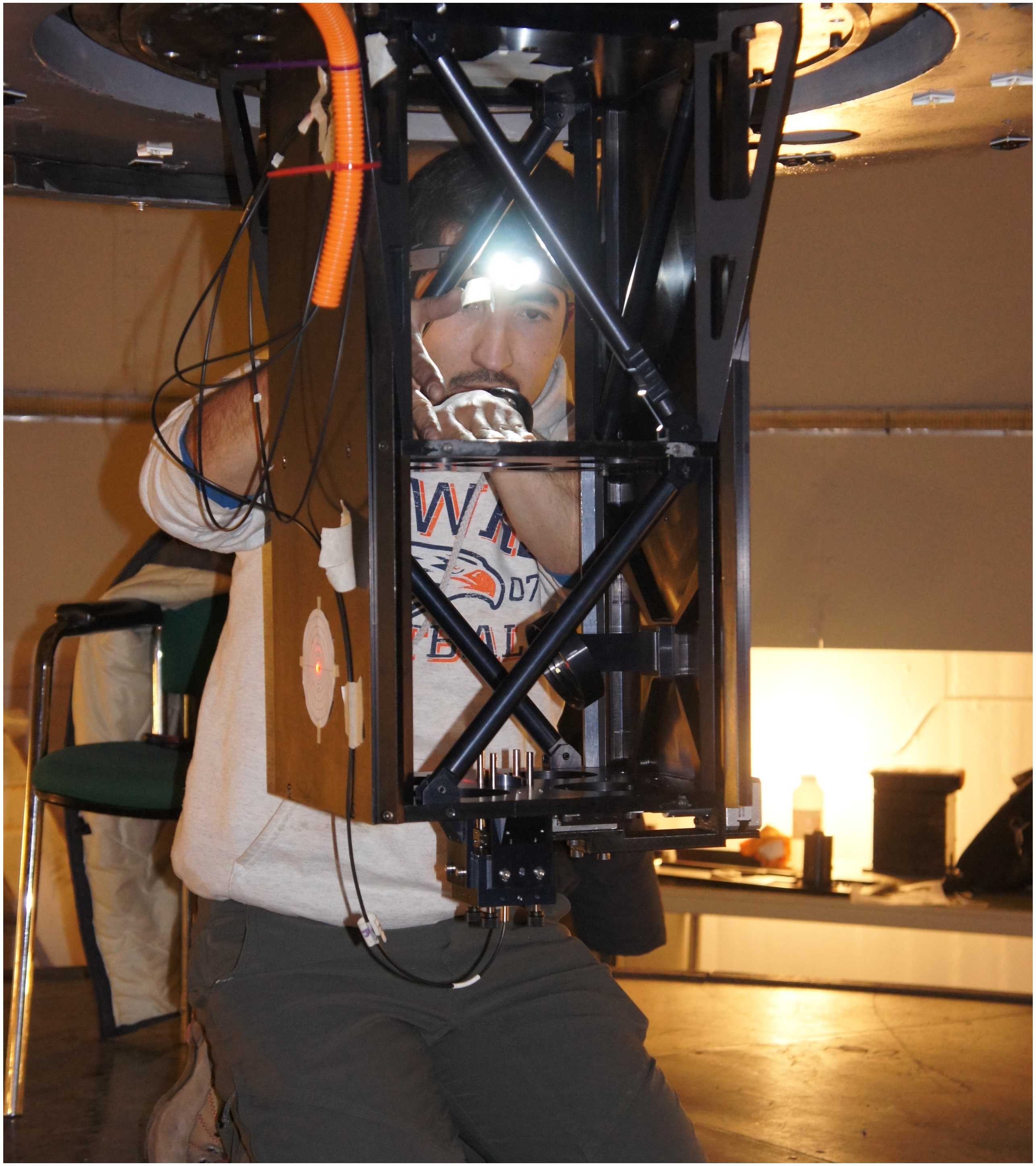
FIDEOS
R_MEAN ~ 43000
Resolving Power (λ/Δλ)
4.8×10⁴
4×10⁴
3.2×10⁴
5000
6000
7000
8000
Wavelength (Angstrom)


Hertz
Part time
Arriendo de furgones
por horas
COPEC
FG·KX·57
CHILE

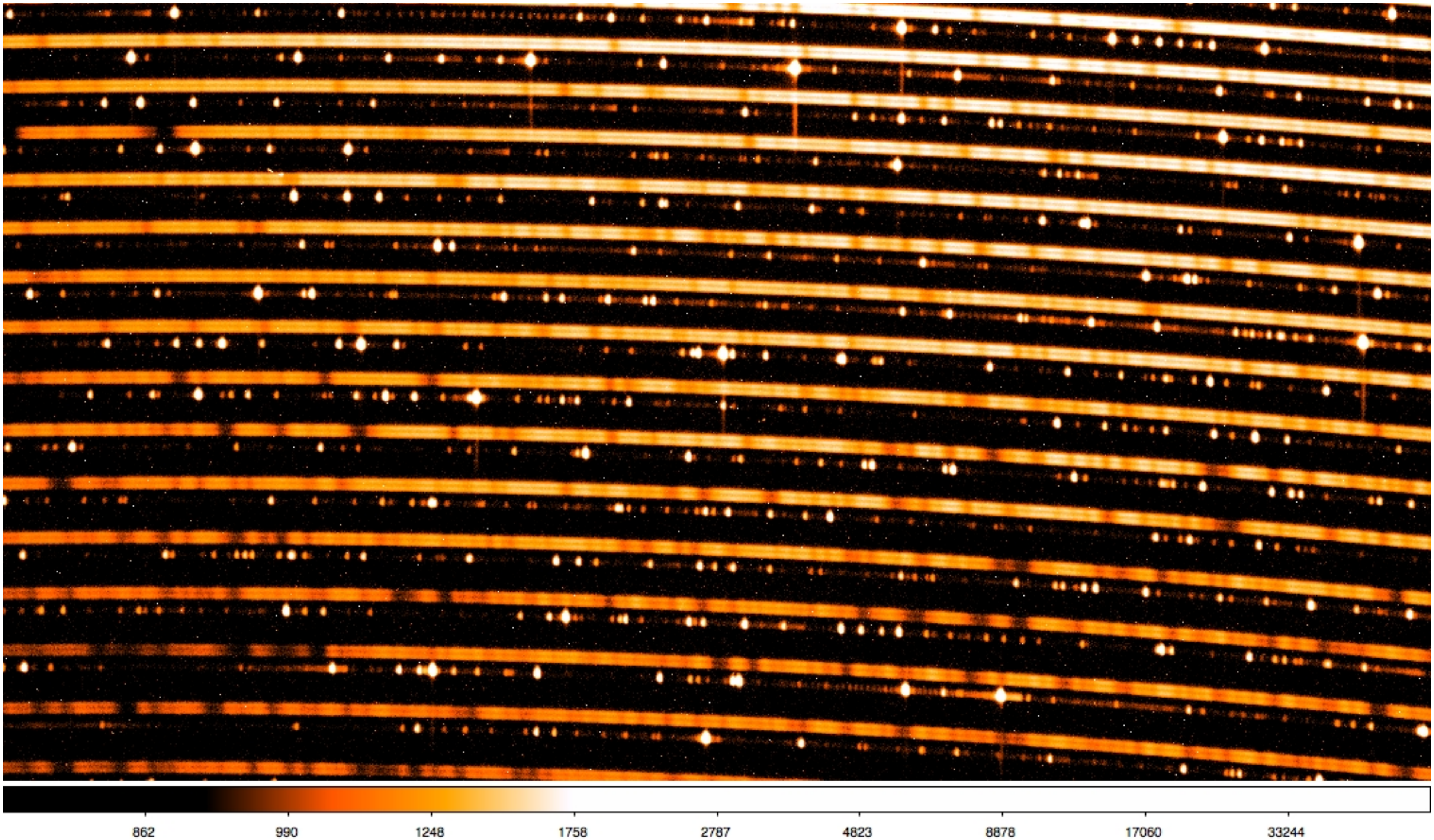
ESO 1m – Universidad Catolica del Norte (with NEW AIUC / ObsTec TCS)



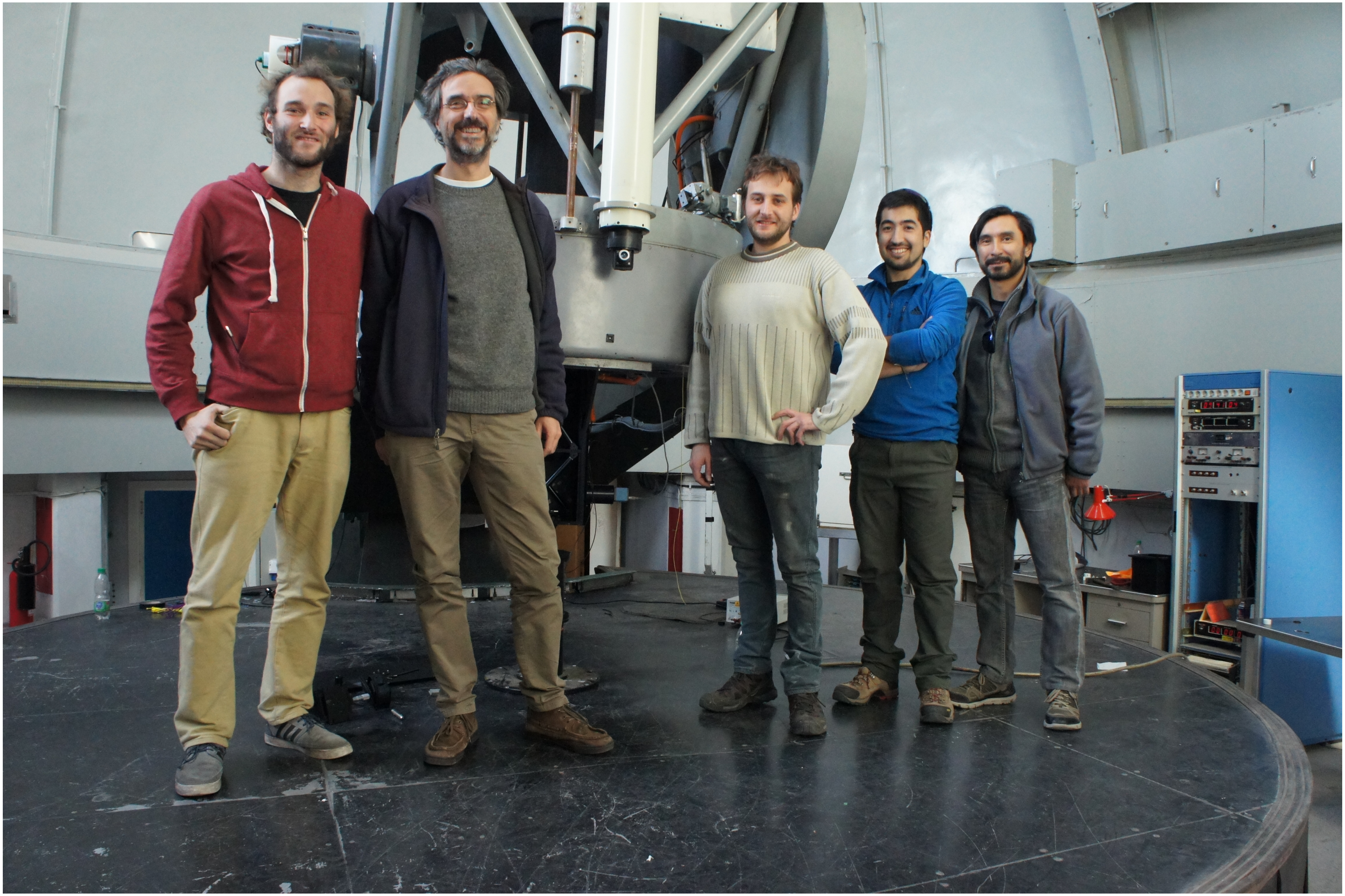
6
5
4
3
D
C
B
B-B (0,2 : 1)
FIDEOS TELESCOPER INTERFACE
Acquisition Achromatic Doublet
Acquisition Camera
Acquisition Mirror
Pinhole-Mirror
Mechanical System Positioning for Prism
Calibration Fiber Injection
Science Fiber Reception



FIRST LIGHT - ANTARES



See Poster by Abner Zapata



Conclusions

→ At the AIUC we are part of a great ADVENTURE

→ We have a team of enthusiastic Astro-Engineers, who survived to tell

→ We have 2 instruments installed at the telescope and more to come

Future

→ Extend all the experience to the IR → TARdYS for TAO

→ MOONS VLT

→ HIRES E-ELT