PFS: The Brazilian connection
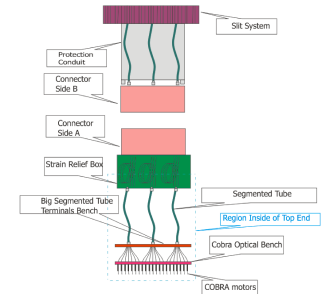
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+ Claudia Mendes de Oliveira (IAG), Raul Abramo (IF), Thaisa Storchi-Bergman (Porto Alegre), Roberto Cid Fernandes (Florianópolis), Abilio Mateus (Florianópolis)...

+ Ligia Oliveira, Antonio Cesar de Oliveira,...

SUM@NAOJ, Mitaka City, Tokyo, Jan 19-20 2011

Why Brazil in the PFS project?

- In the Gemini partnership we were involved with WFMOS ("Team B", PI Richard Ellis)

- We are aware of the *large scientific impact* that PFS may have in science topics of interest of our community

- We want to use our *expertize in optical fibers* to contribute in the optimization of PFS design and performance

Why Brazil in the PFS project?

- PFS is a wonderful tool to address several scientific topics of interest of our community:
  - galaxy evolution
  - large scale structure
  - AGNs
  - cosmology
  - ...

Two routes to study galaxy evolution

☺ **The time-machine method: observe galaxies at several redshifts to trace their evolution**

z=1.7

☺ **The fossil method: retrace history of each galaxy from its spectrum**

PFS/SuMIRe will allow both!

SDSS

Why Brazil in the PFS project?

- PFS is a wonderful tool to address several scientific topics of interest of our community:
  - galaxy evolution
  - large scale structure
  - AGNs
  - cosmology
  - ...

- **SuMIRe also has strong synergy with other surveys of our interest, like J-PAS**

J-PAS: a pathfinder survey
Javalambre Physics of the Accelerating Universe Survey

- Spanish-Brazilian collaboration (PI: Txitxo Benitez)

- Javalambre Astrophysical Observatory – Teruel, Spain

   T250: FOV~7 sq. deg + T80: FOV~3 sq. deg.

- Survey with 42 narrow filters (~100A) of 8000 sq. deg. to a depth of ~22 mag AB (*low-resolution spectra!*)

- Accuracy in photo-z ~0.003(1+z)

- Photometry for ~14 million LRGs (with z<0.9)

- BAO: radial & transversal; galaxy evolution; asteroids...

- from mid 2013 to 2018

- PFS/SuMIRe is the next step: it will unveil the universe beyond J-PAS limits!
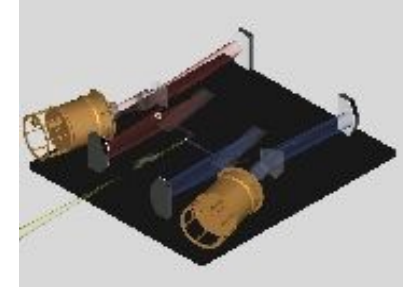
Astronomical Instrumentation for SOAR

- **SIFS: SOAR Integral Field Unit Spectrograph**

  - 1300 fibers IFU,   R ~1000 – 30000 (in commissioning)
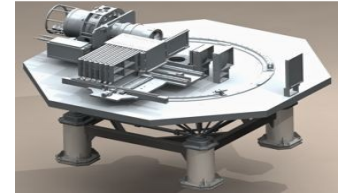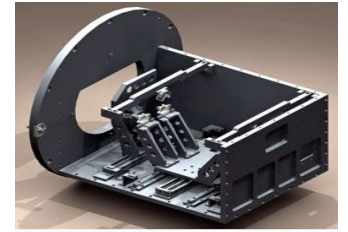
- **STELES: SOAR Telescope Echelle Spectrograph**

  - 300-890nm in one exposure, R=50.000 (2012)

- **BTFI: Brazilian Tunable Filter Imager (with Marseille)**

 - R ~ 5 – 200; R > 2000 with a scanning Fabry-Perot into the beam (in commissioning)

FOCCOS
Optical Fiber Cables & Connectors Sub-system

- It is the interface between the telescope and the spectrograph:

- 2000-3000 fibers, ext.~60m

- Terminations: optical interfaces between the spec and the telescope

- Optimal transference of light

- Next steps:

- connector development

- investigation of telecentricity, f-ratio problems

- hopefully some prototyping by March
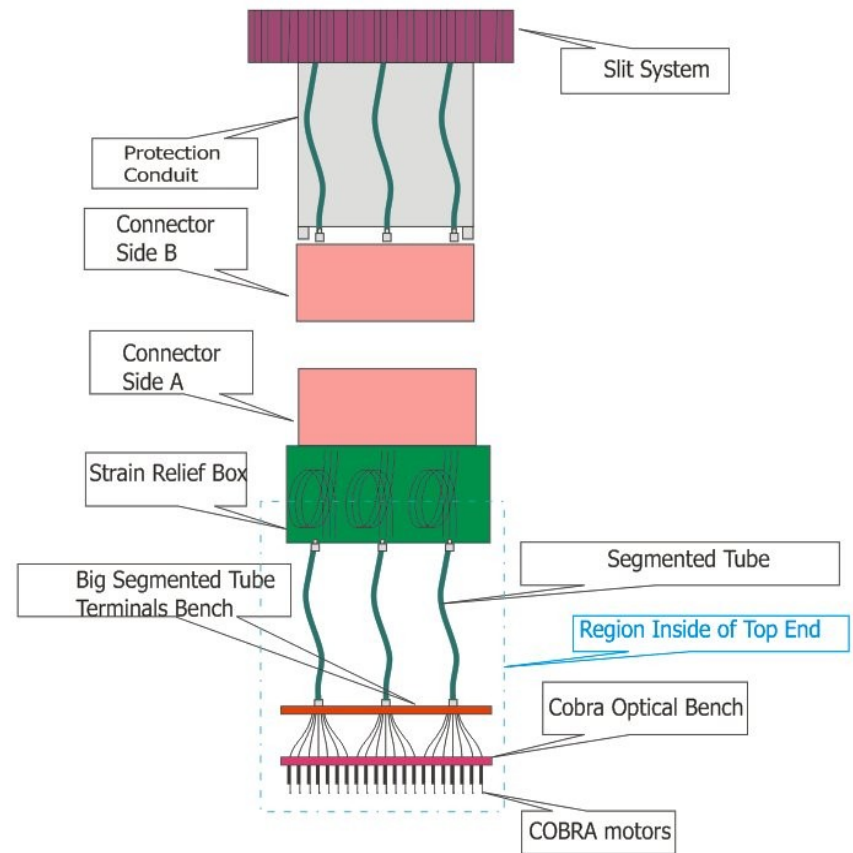

- Ligia Oliveira (OIO), Antonio César de Oliveira (LNA)
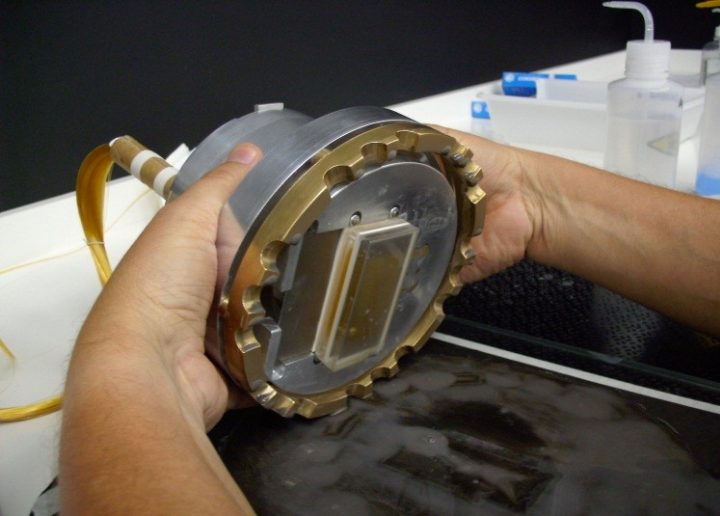
Optical Fiber workshop
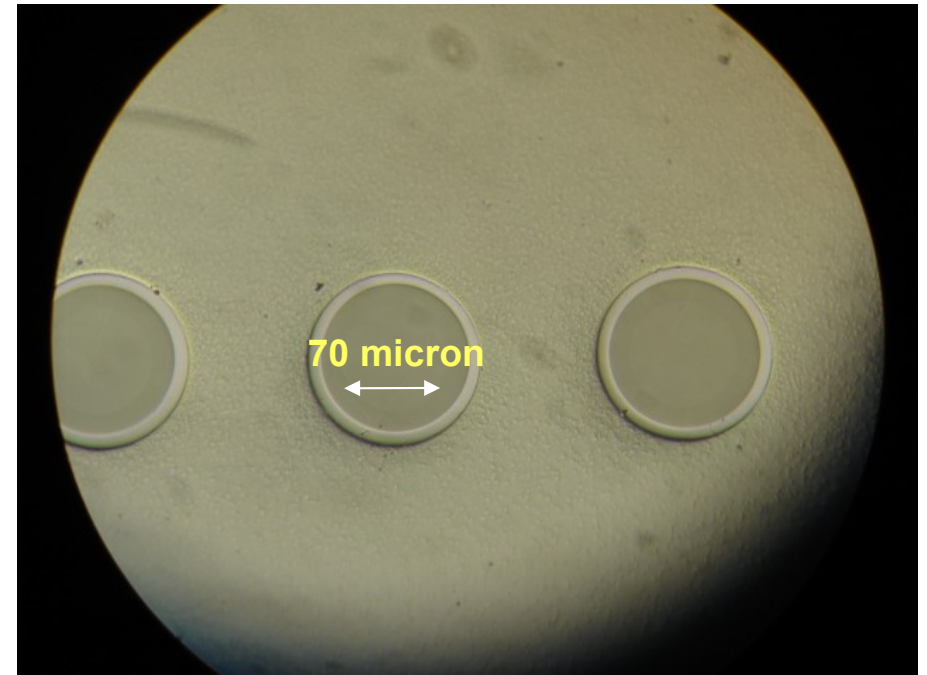
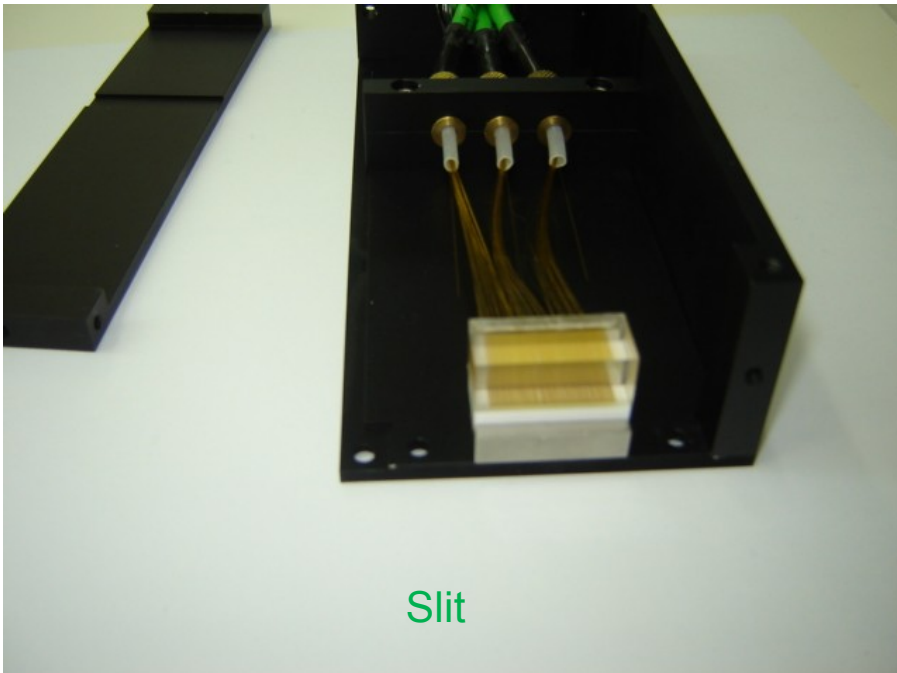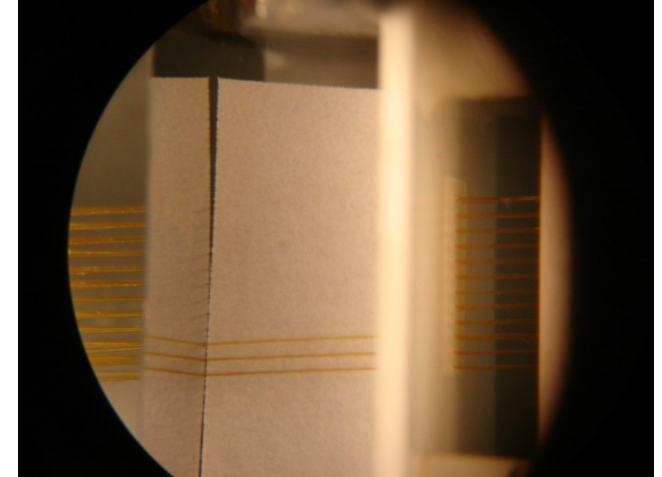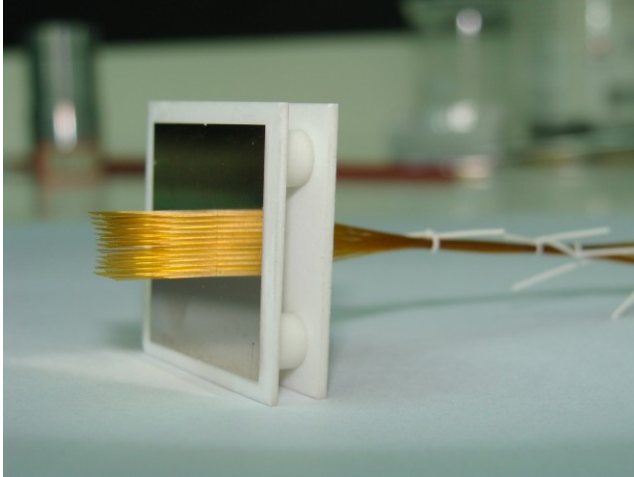# *Dynamical connector: Prototype with 600 optical fibers*

- **Connectors**: matricial device connecting the fibers with the telescope and the spectrograph

- CCD-fed monitoring fibers allows to measure in real time the optical transmission.

- Once these five fibers are aligned, the entire fiber matrix will be aligned.

- The throughput obtained was 84%. (FBP100140170)

- New tests for better throughput will come in 2011

0
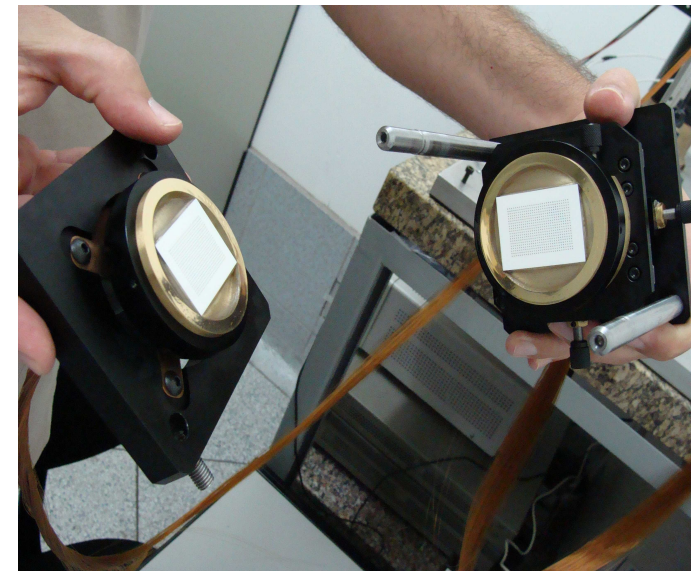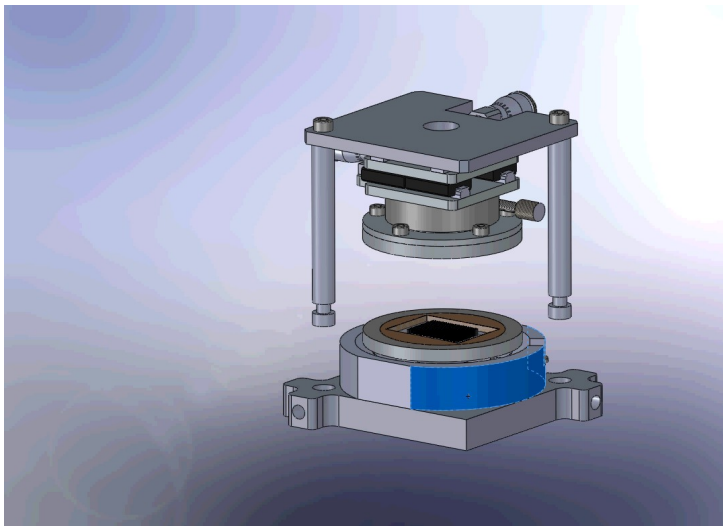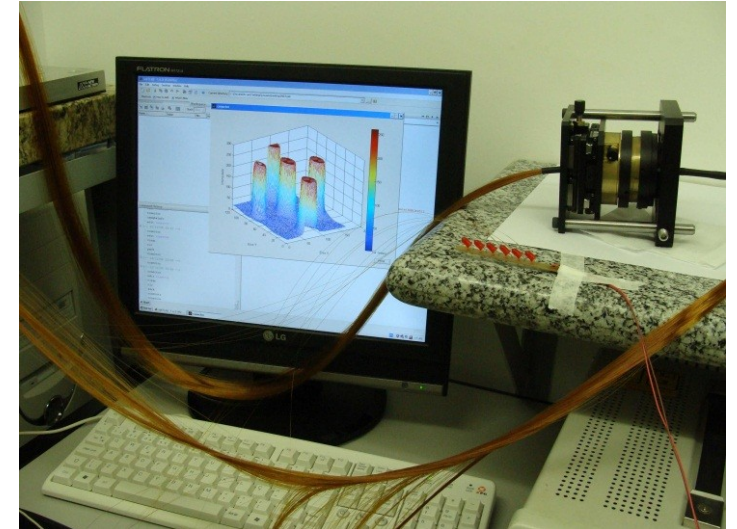
Funding

- **Target: in-kind contribution of US$5M**

- FAPESP: ~US$150,000 (project: Galaxy evolution in the era of large surveys)

  start-up of FOCCOS project: development of the connectors

- USP- submission Feb 2011- US$2M

  creation of a new virtual institute at USP (LabCosmos?) focused on cosmology, extragalactic astronomy and instrument development

- FAPESP - submission Feb 2011- US$3M

  development of the FOCCOS sub-system: design, construction & commissioning

- Back-up: federal funds (CNPq, FINEP)

FRODOS IFU for the Liverpool Telescope
144 optical fiber lenslet system with 70 micron core.

Pith 500 micron

Slit

70 micron

Thank you!