Abstract *(para el coordinador de la session)*

- In this presentation we describe the main characteristics of the TARSIS IFU instrument proposed for the CAHA 3.5m telescope. TARSIS will be a 3x3 arcmin^2 IFU with ~2x2 arcsec^2 spaxels placed at the Cassegrain focus of the telescope covering ¾ of the FoV with three identical spectrographs optimized for the NUV/blue range of the optical spectrum (from 320 to 520 nm) and ¼ being covered with a red-optimized spectrograph (from 510 to 760 nm). This instrument is designed to carry out a dedicated exploration of z=0.15 clusters up to R=1.5R_{vir} as part of the CATARSIS survey (Sánchez-Blázquez et al., this meeting). The fore-optics will be based on either image slicers or optical fibers projecting the light in two parallel pseudo-slits per spectrograph while the four spectrographs will be collimator-camera systems with a high-efficiency VPH placed in each spectrograph pupil yielding resolutions in the range R=1000-2000.
- TARSIS was selected by the board of the Calar Alto Observatory on July 3rd 2020 to move ahead, along with another instrument, to the Conceptual Design phase.
- The instrument should see first light in 2025.

"Tetra-ARmed Super-Ifu Spectrograph"

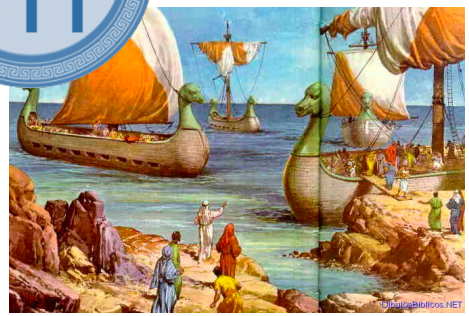
A. Gil de Paz (UCM, co-PI), J. Iglesias (IAA, co-PI), P. Sánchez Blázquez (UCM, PS), M. Relaño (UGr, co-PS)

TARSIS Consortium & Instrument team
CATARSIS Survey Team & Advisory Groups

designed for long trips with unknown destinies...

Context

designed for long trips with unknown destinies...



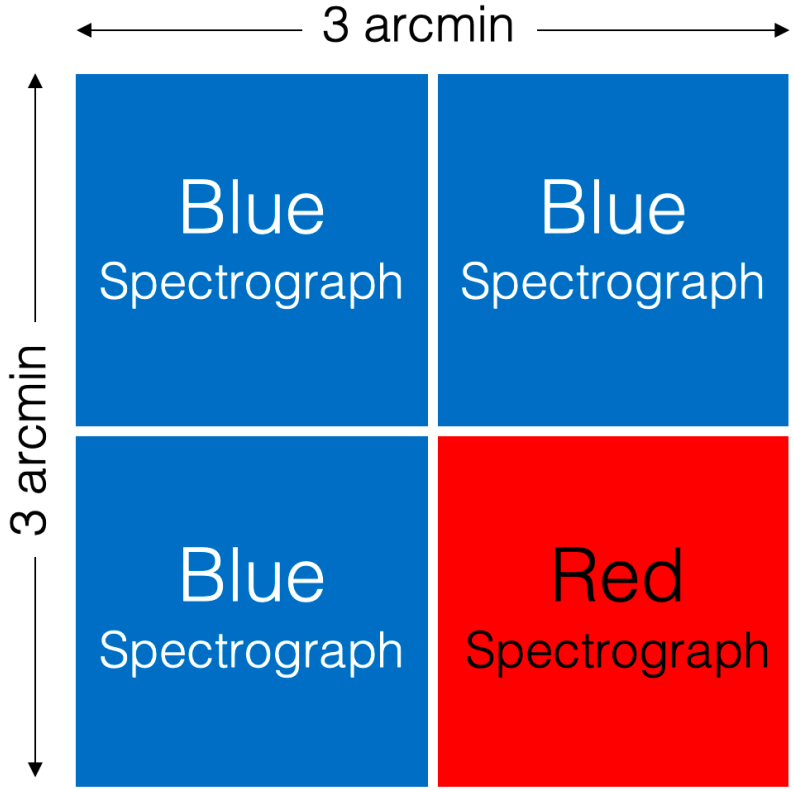
- In **November 2019**, the Calar Alto observatory issued a **call for new legacy science projects (1) using current instruments and (2) requiring new instruments** for the CAHA 2.2m and 3.5m telescopes.
- On **March 10th 2020** a proposal for a new wide-IFU instrument (TARSIS) along with the survey to be carried out it (CATARSIS) was submitted.
- This proposal (both its science and the instrument itself) was presented in a **dedicated meeting held at IAA-CSIC on March 12-13th 2020**.
- After the CAHA SAC released its report, the **CAHA Executive Board recommended on July 3rd 2020 both TARSIS and CATARSIS to move ahead** to the next phase, a competitive (competing with only one another instrument) Conceptual Design. This phase is funded with 90 k€ per instrument.
- **TARSIS** is being developed by **UCM** (PI institution), **IAA-CSIC** (co-PI institution), **INAOE**, **U. Sevilla**, **U. Granada**, **U. Almería**, **CAB** (INTA-CSIC) and the **Fractal SLNE** commpany in close collaboration with **Calar Alto**.
- The **science driving the TARSIS requirements** is being defined by the **CATARSIS Survey Team** and our three **Advisory Groups**: ToO, Galactic Science and Solar System.
- The instrument should see **first light in 2025**.

Selected for Conceptual Design on July 3rd 2020

Project: Summary

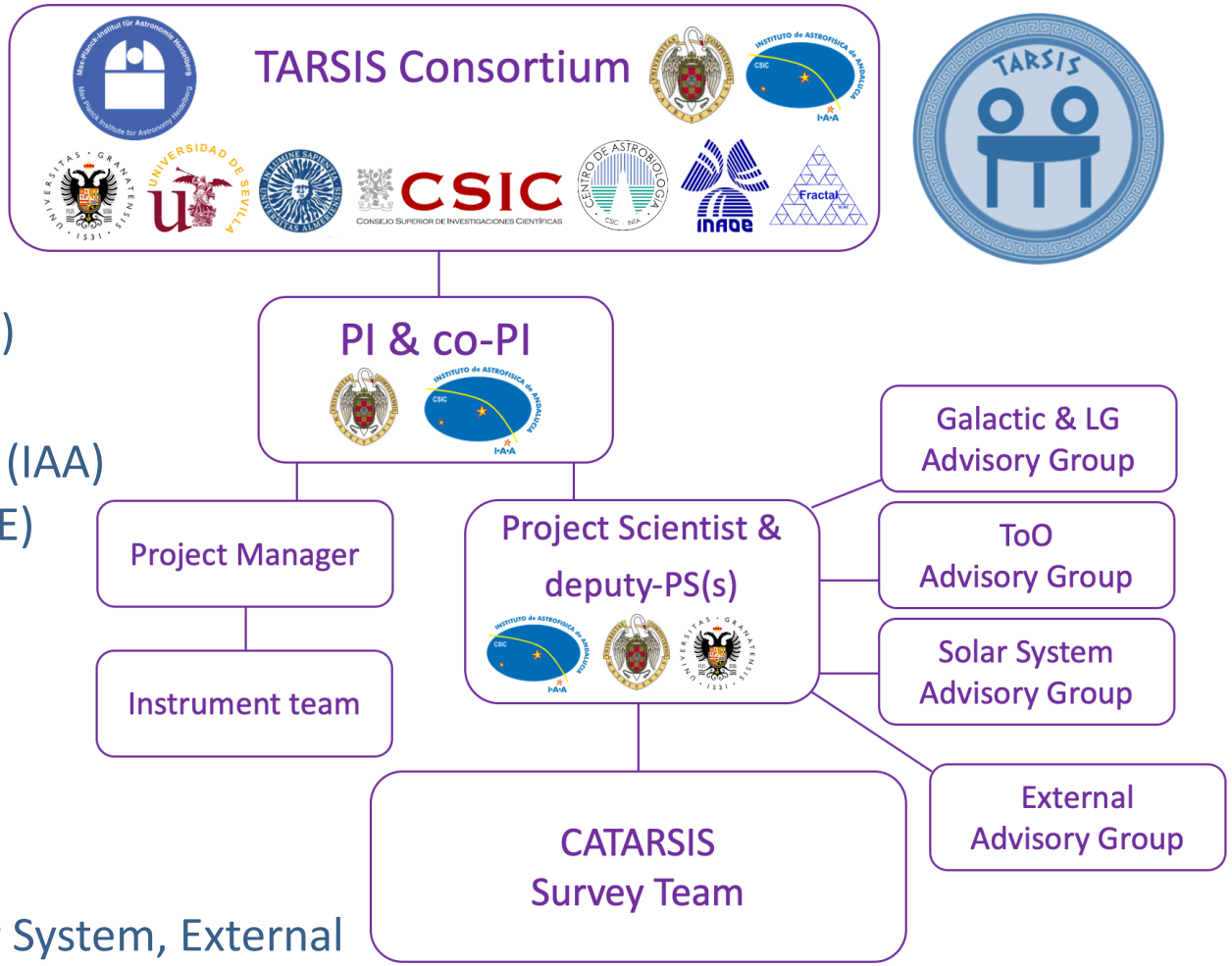
Requirement	Value
Minimum spaxel size	≤2 x 2 arcsec^2
Resolution element	≥3 pix
Spectral resolution	R>1000

Requirement	Value
Efficiency	>20% (Blue), ~30% (Red)
Field-of-View (FoV)	≥8 arcmin^2 (3/4 Blue; 1/4 Red)
Spectral range	320-520 nm & 510-760 nm



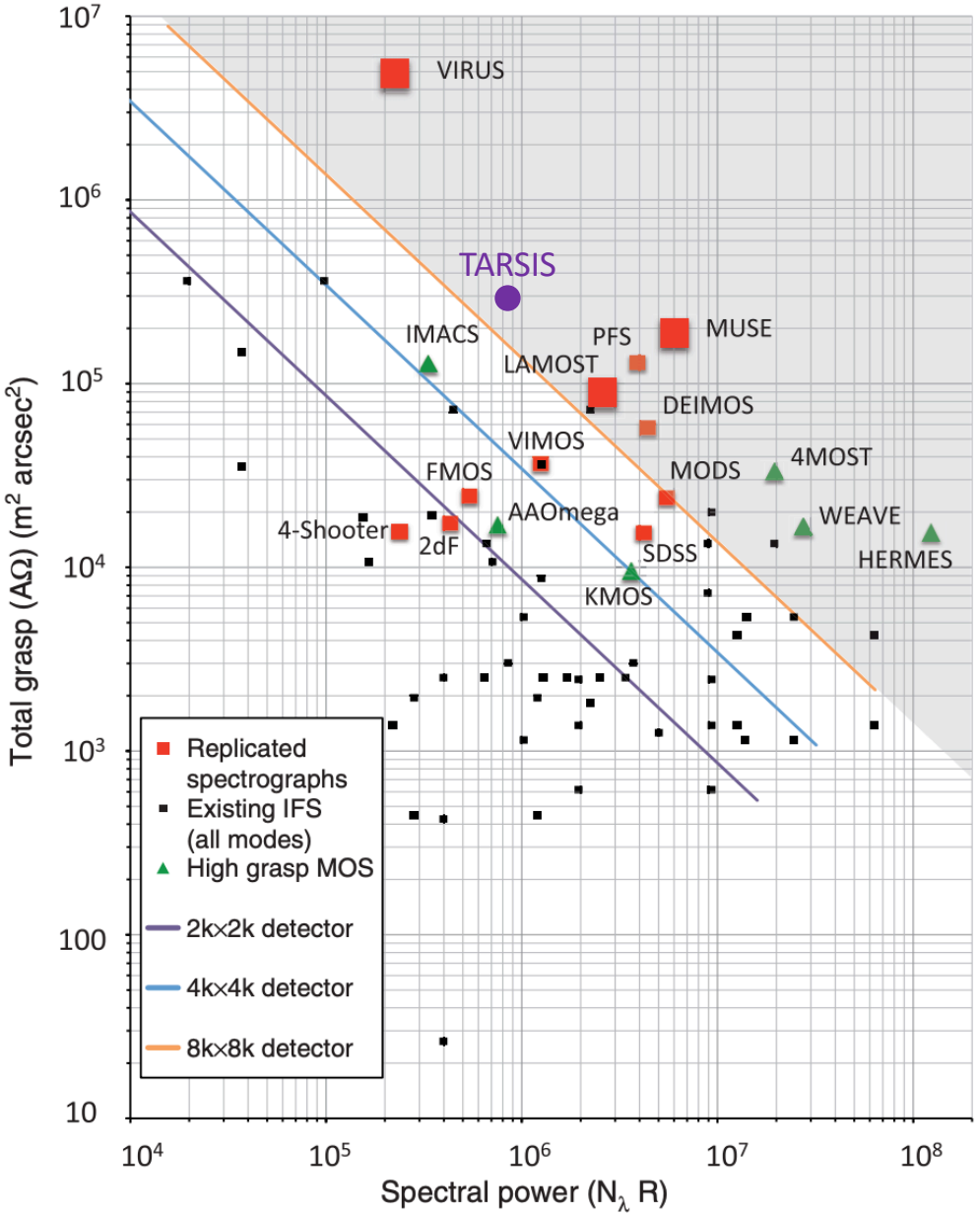
Project:
People & institutions

- **Key people**
  - PI: A. Gil de Paz (UCM)
  - Co-PI & co-PS: J. Iglesias (IAA-CSIC)
  - PS: P. Sánchez Blázquez (UCM)
  - Co-PS: M. Relaño (UGr), J. Iglesias (IAA)
  - PM: M. García Vargas (Fractal SLNE)
- **Consortium**
  - CAHA, UCM, IAA-CSIC, INAOE, US, UGr, UAL, CAB-CSIC, Fractal SLNE
- **CATARSIS Survey Team**
- **Science Advisory Groups:**
  - Galactic & Local Group, ToO, Solar System, External



Project:
Competitors

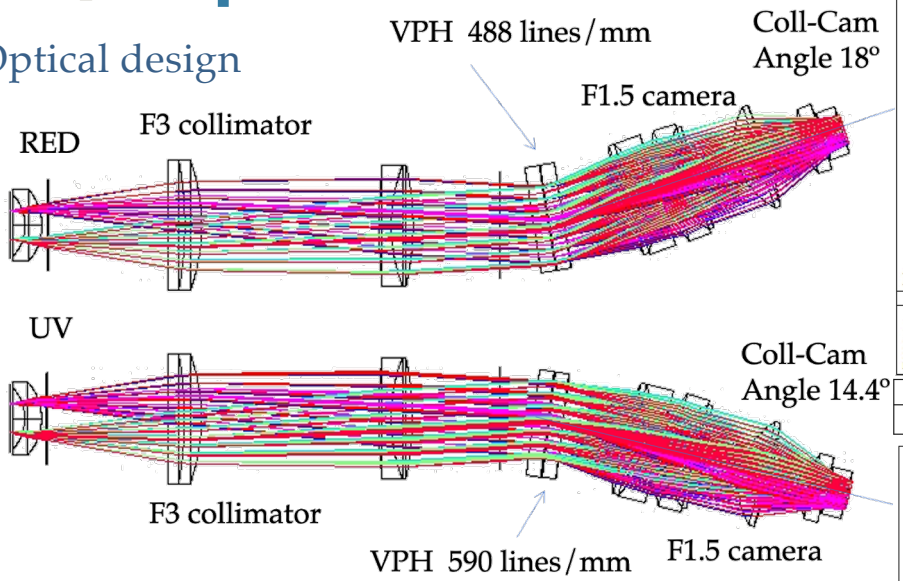
- **MUSE:** 1 arcmin^2 (x9 less FoV) with no coverage below ~480 nm. Not a dedicated instrument.
- **BlueMUSE:** 1.4 arcmin x 1.4 arcmin (x4 less FoV) with first light expected for 2026. Not yet approved. Not a decicated instrument.
- **VIRUS:** No red coverage with R/2 that of TARSIS. Results are not coming out from VIRUS yet.
- **LVM:** Smaller telescope and lower multiplexing.
- **Besides, all but VIRUS are in the South**



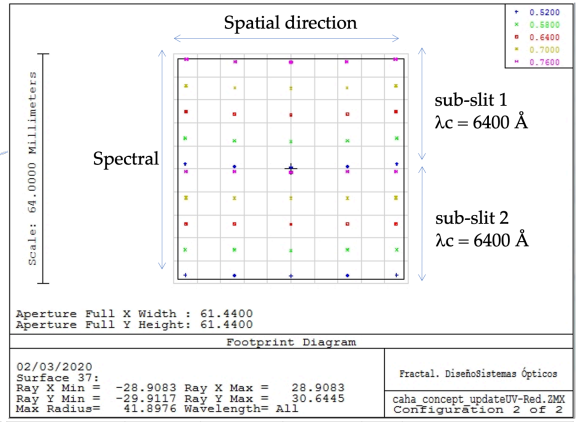
Tetra-ARmed Super-Ifu Spectrograph

Project: pre-Conceptual design

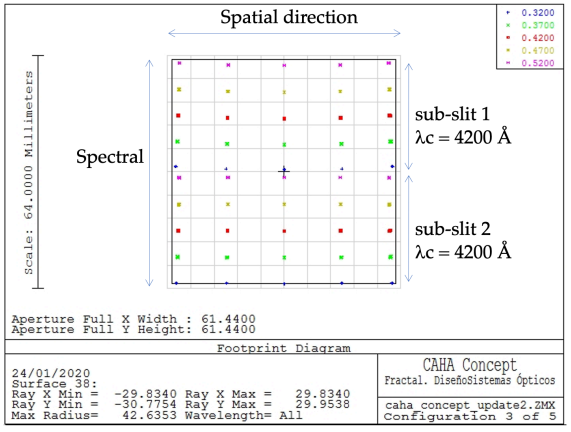
Optical design



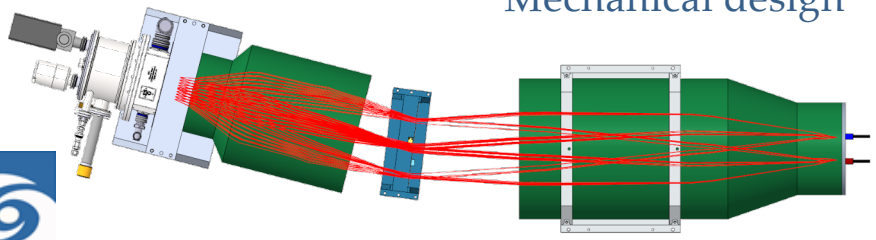
λ (nm)	520	640	760	Δλ
R (3 pix)	1363	1709	2060	1.22 Å/pixel



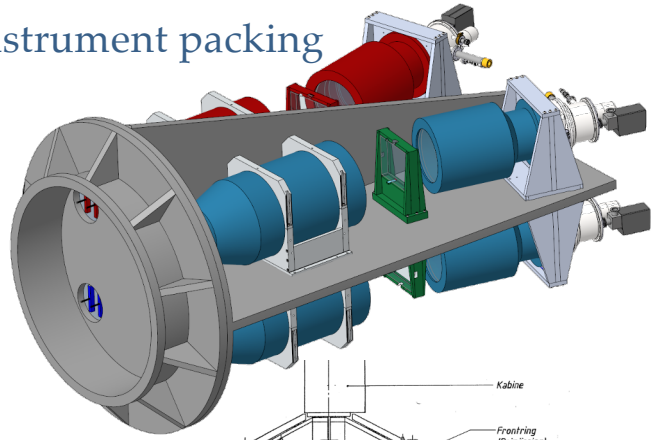
λ (nm)	320	420	520	Δλ
R (3 pix)	967	1300	1698	1 Å/pixel

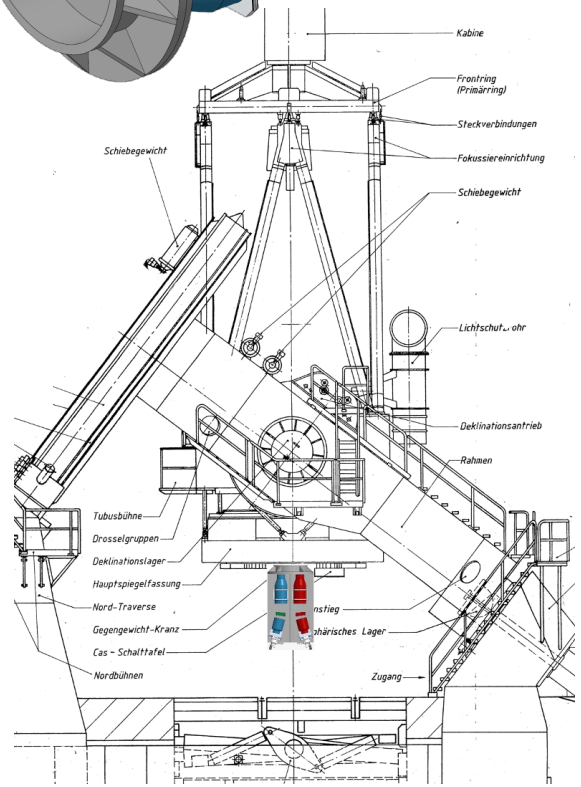


Mechanical design



Instrument packing





Results

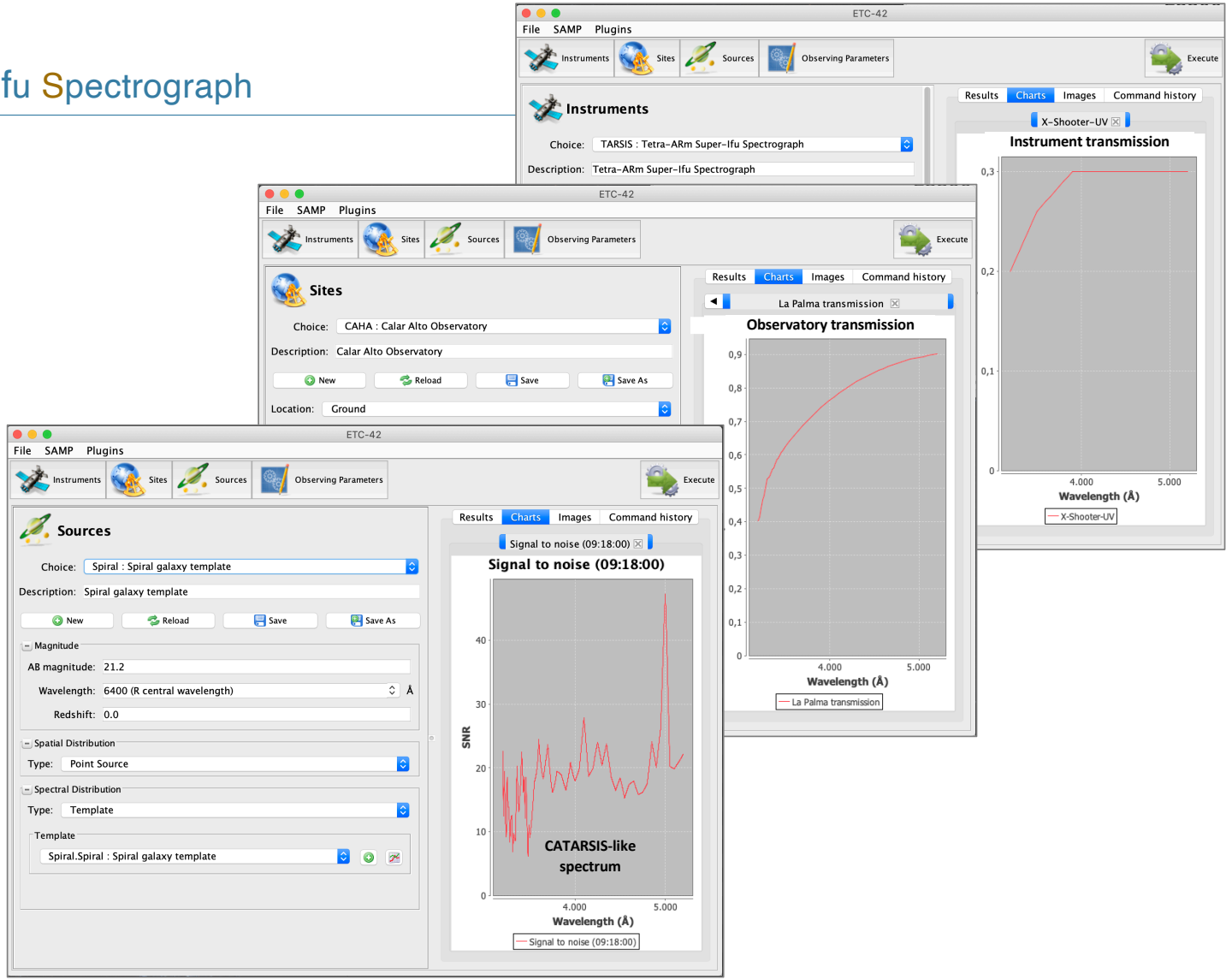
Exposure Time Calculator
(based on the ETC-42 software)

It assumes:

- X-Shooter-like UBV efficiency
- La Palma UV attenuation
- UVES sky spectrum
- MILES-based templates
- CATARSIS observing strategy & exposure times

Conclusion:

- TARSIS meets the CATARSIS requirements for exploring the whole rest-frame 2800-6600Å range in z=0.15 galaxy clusters in 2D spectroscopy (see PSB's GC talk).



Impact & prospects

- TARSIS is a unique instrument able to carry out frontier science both within CATARSIS … *and beyond!*
- It covers **320-760 nm** with uniform sensitivity for flat f_ν spectrum objects. Better in the blue using the CATARSIS observing strategy.
- It's driven by a state-of-art survey: CATARSIS (**PSB's talk @GC**).
- It relies on the expertise of TARSIS instrument team members on MEGARA, CARMENES, WEAVE (**see M.L. García Vargas and E. Carrasco's talks @IS**).
- UV site characterization is on-going (coordinated by J. Zamorano)
- TARSIS will leave a R&D imprint in its partners (including CSIC & JdA) and in CAHA itself.