Finding the Brightest QSOs in the Southern Hemisphere

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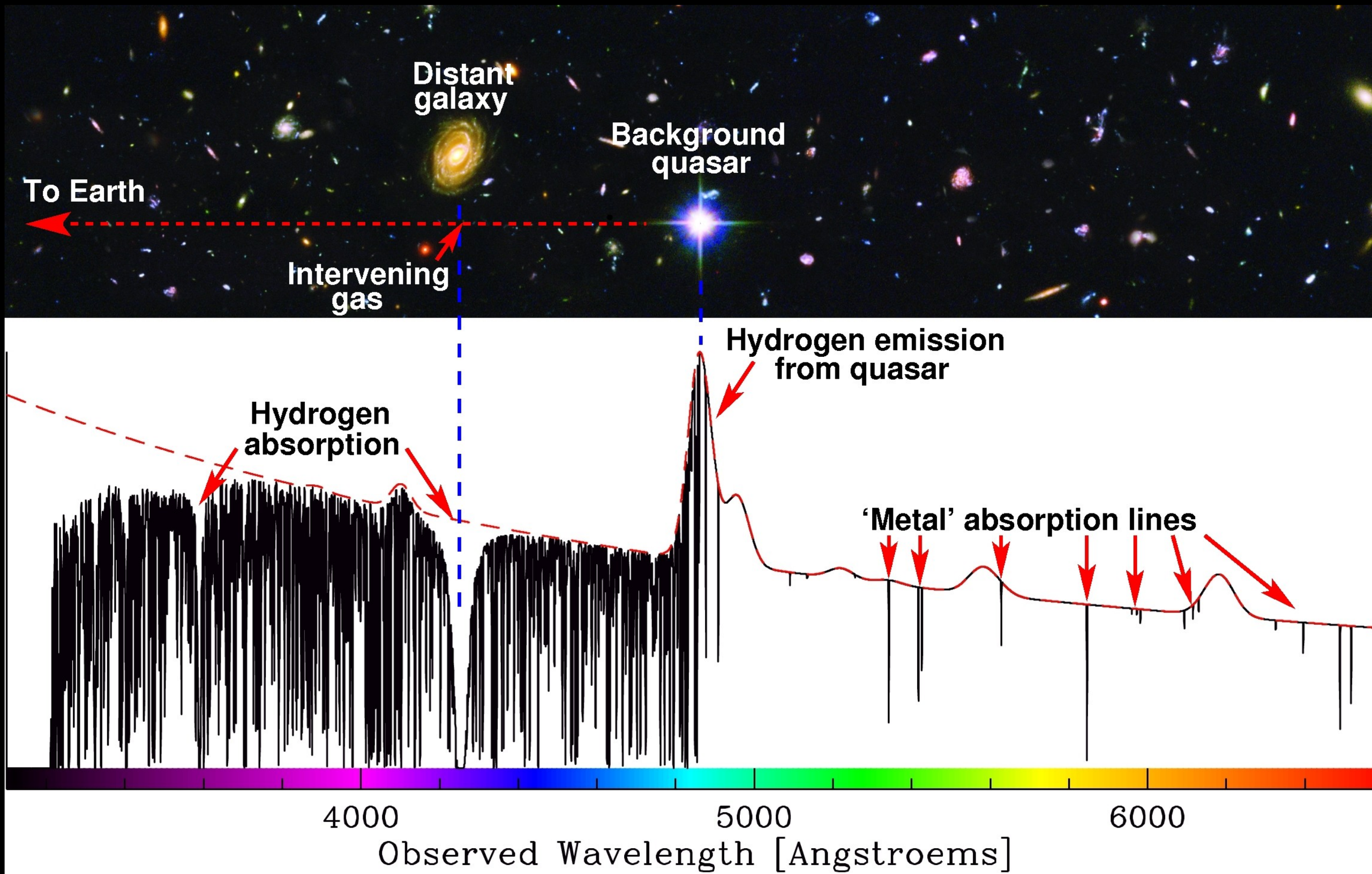
OAPd days - June 18th, 2019

QSO Absorption line study



Science with QSO Absorption lines

The study of QSO absorption lines is a fundamental tool for Cosmology:

-Big Bang Nucleosynthesis, Primordial Element abundances, Temperature evolution of CMB.

-Density, temperature, metallicity of IGM.

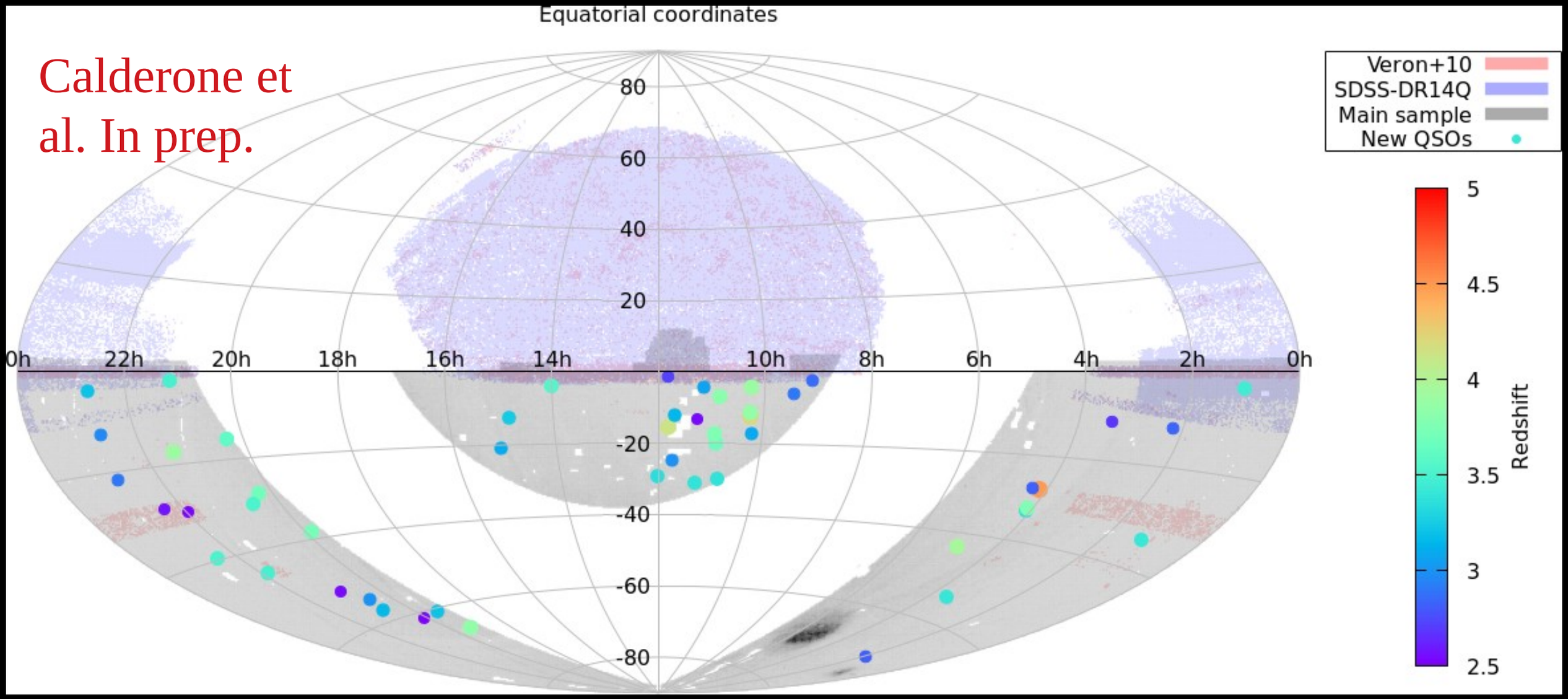
-End of Dark Ages and Reionization.

-Cosmological neutrinos, nature of Dark Matter.

-Variation of fundamental constants with cosmic time.

-Test on General Relativity (Sandage test).

Few QSOs in the Southern Hemisphere



Calderone et al. In prep.

BRIGHTEST QUASARS

Southern hemisphere: HE0940-1050 z=3.09 magV=16.4

Northern hemisphere: B1422+231 z=3.62 magV=15.8

APM08279+5255 z=3.91 magV=15.2

Finding the brightest QSOs at DEC<0

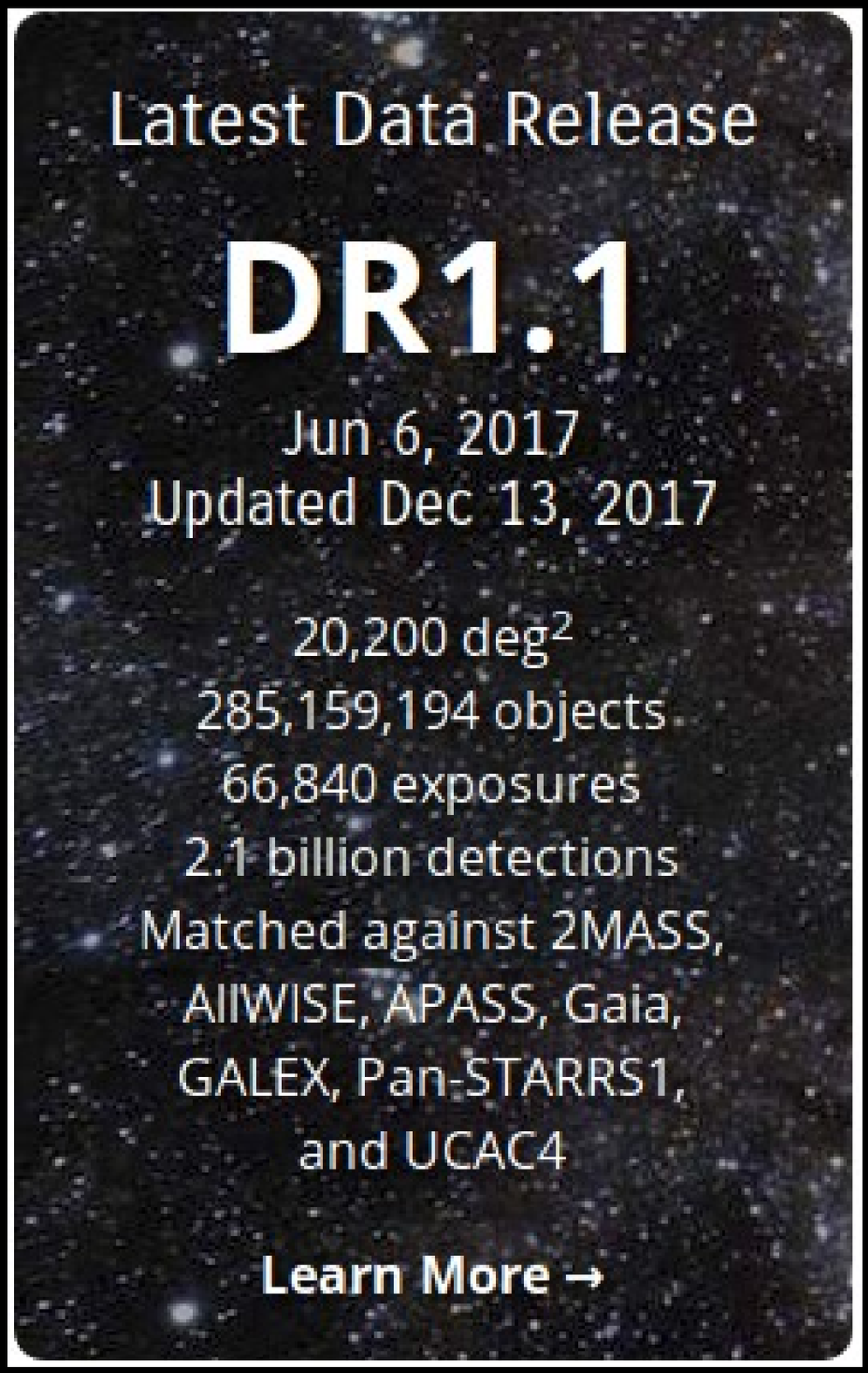
SkyMapper

Australian National University

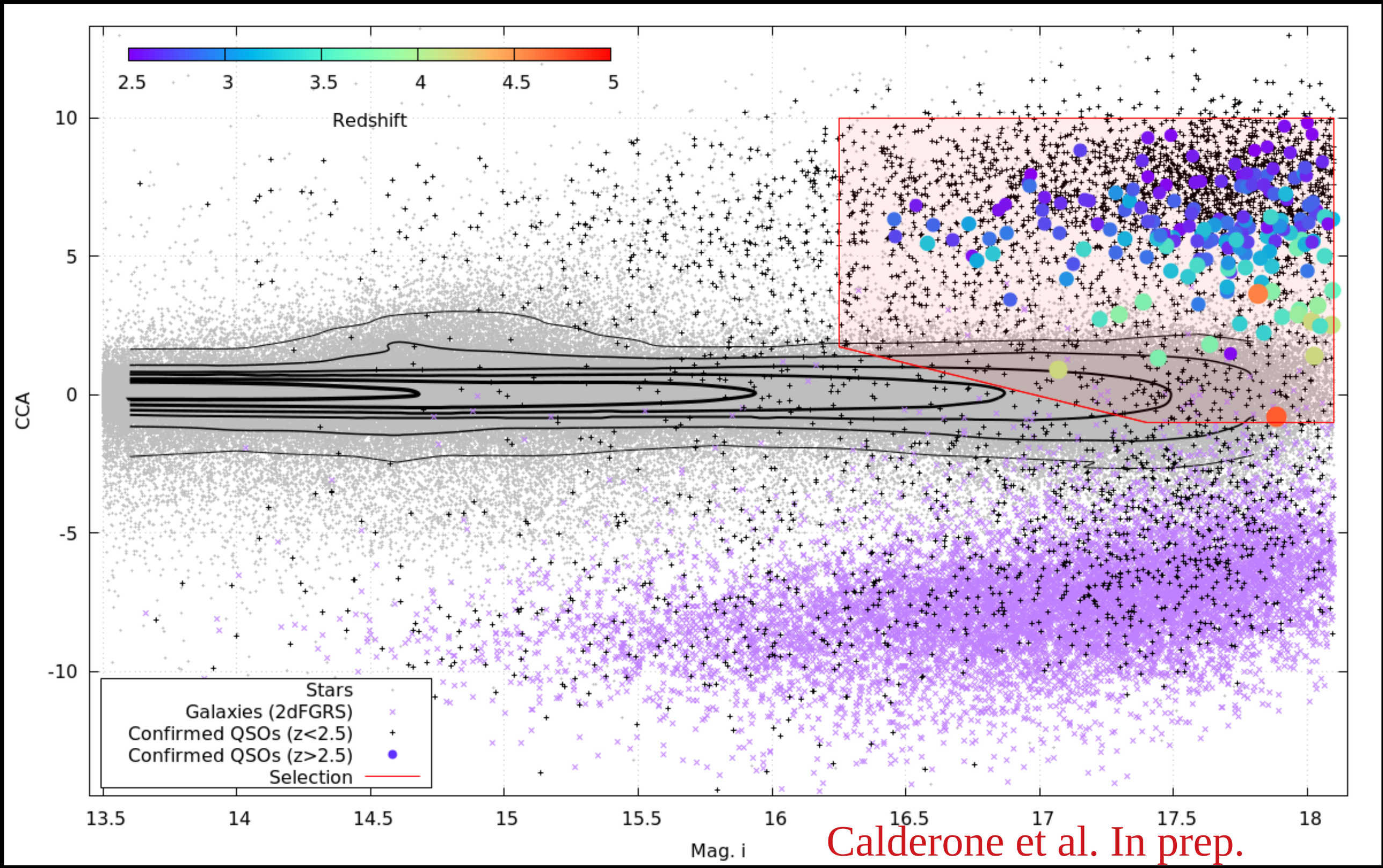
SkyMapper | Southern Sky Survey

-Galactic latitude |b|>25deg
-magI<18.0
1419426 sources in 12500 sq. Deg.

Exclude sources with parallax from GAIA DR2 different from zero at 3 sigma. Exclude sources with proper motions from GAIA DR2 different from zero at 3 sigma.



CCA: CANONICAL CORRELATION ANALYSYS



Calderone et al. In prep.

Spectroscopic follow-up

Two nights at Las Campanas Observatory with DuPont (2.5m) and Magellan (6.5m): observed 66 candidates. Found 46 QSOs, of which 22 at z>3.

Three nights at ESO La Silla Observatory with NTT (3.5m): observed 101 candidates. Found 53 QSOs, of which 28 at z>3.

Boutsia et al. In prep.

A very bright QSO of z=3.9 at DEC<0

Needle in a haystack !!!

Prospects for Future Development

Eight nights at Las Campanas Observatory with DuPont in August 2019 and December 2019.

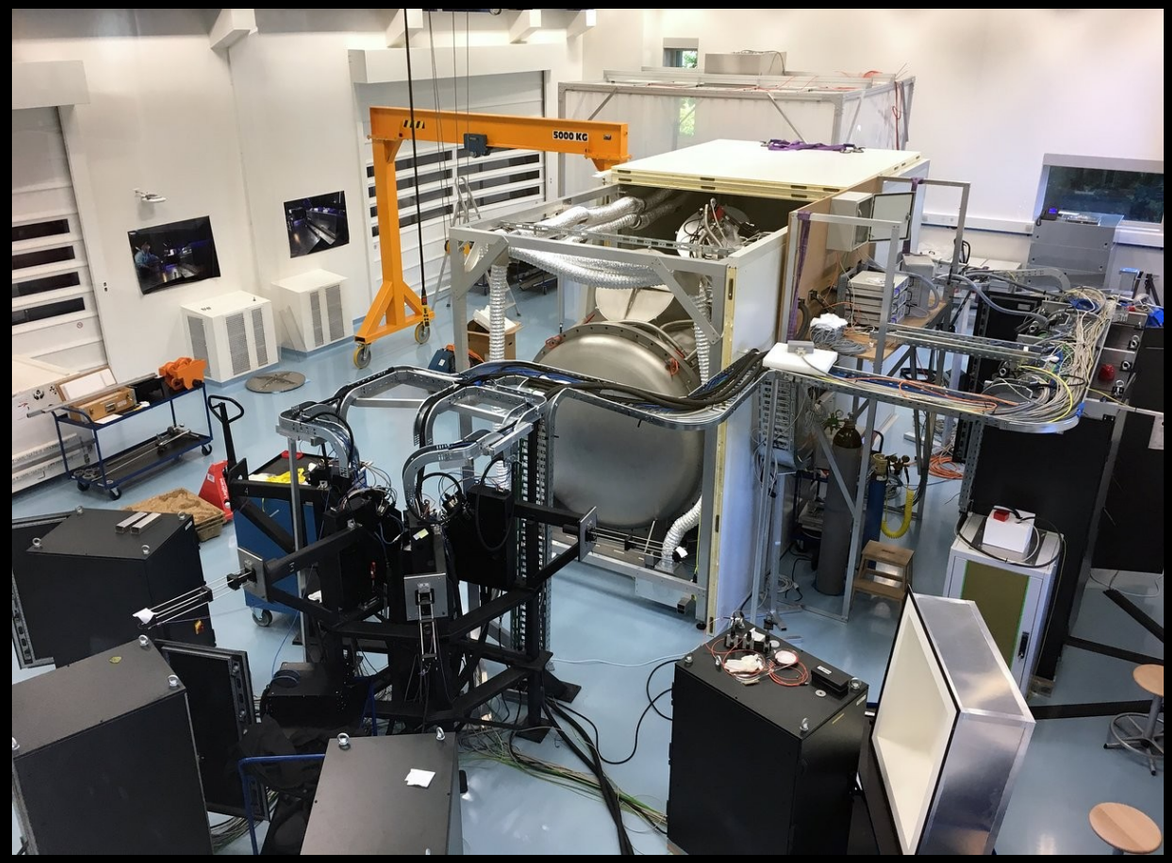
Three nights at ESO La Silla Observatory with NTT in September 2019. Other proposals have been submitted.

Follow-up observations of the brightest confirmed QSOs with UVES, X-Shooter at VLT and Mage, FIRE and MIKE at Magellan.

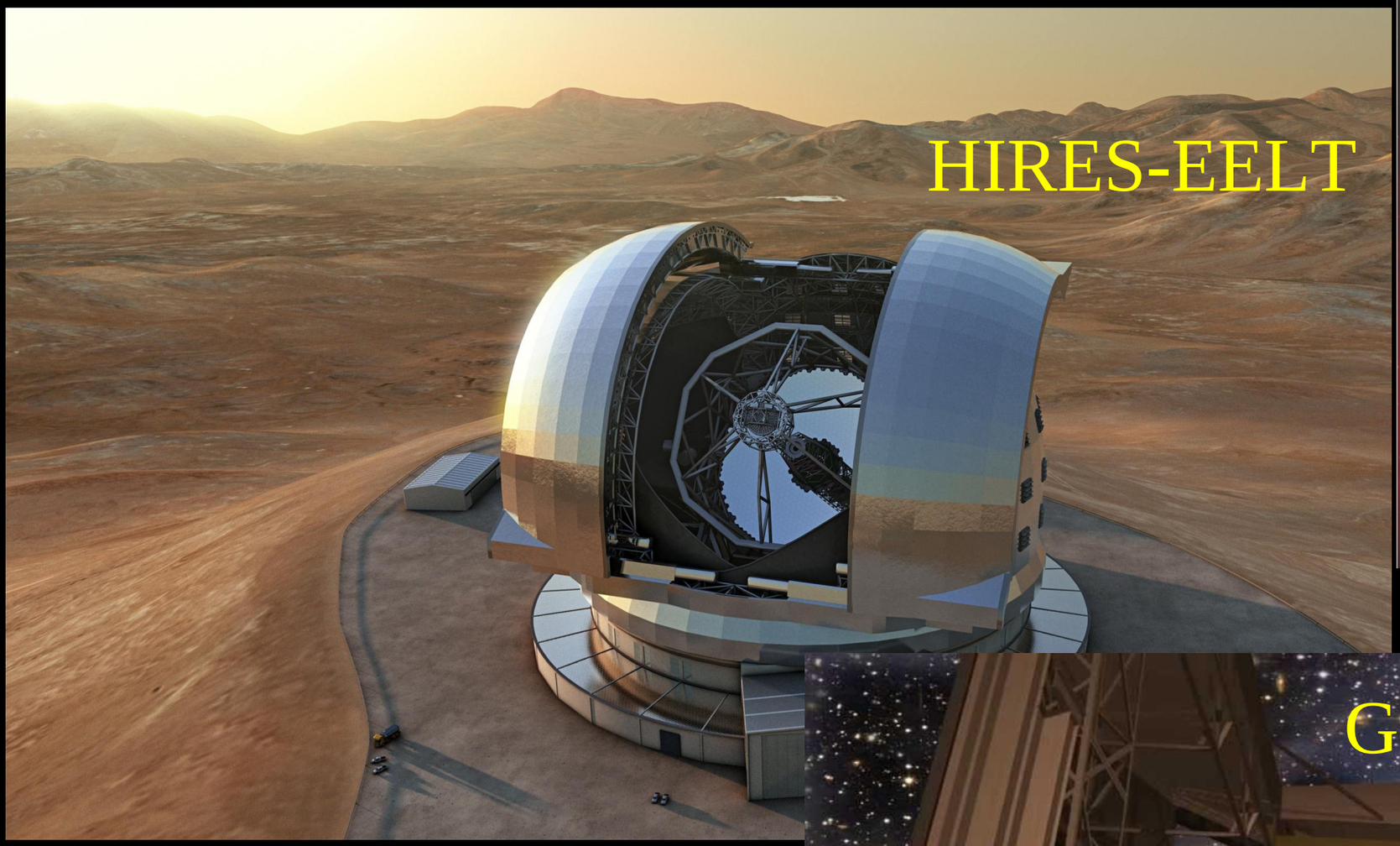
Future Facilities

ESPRESSO-VLT

Science Verification:
deadline 5th July 2019



Future Facilities-II



-CLEF

National and International Collaborations

Link with other groups at OAPd: search for bright QSOs with GAIA (DR4), WEAVE, 4MOST.

Link with INAF-OATs and INAF-OARoma: follow-up spectroscopy with ESPRESSO-VLT and HIRES-EELT.

Link with Las Campanas Observatory (K. Boutsia): follow-up spectroscopy with GCLEF-GSMT.

Thank you!