



4MOST – 4m Multi-Object Spectroscopic Telescope



ASTRON





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4MOST: a Wide-field, high-multiplex optical
spectroscopic survey facility for ESO

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www.4MOST.eu

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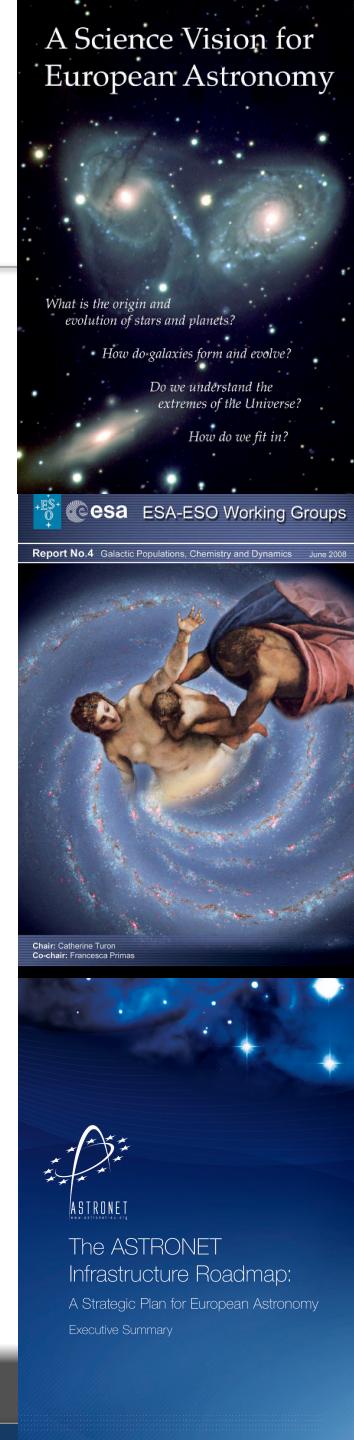


- Status:
 - ESO Council approved 4MOST in June 2015
 - Preliminary Design Review scheduled for June 2016
 - Operations start on VISTA telescope 2021 (at least 2x 5 year)
- Science:
 - Cosmology, galaxy evolution, high-energy and Galactic science
 - Complement large-area space missions: Gaia, eROSITA, Euclid, PLATO
 - Complement ground-based surveys: VISTA, VST, DES, LSST, SKA, etc.
- Survey facility:
 - Consortium delivers instrument, science operations, data products, science
 - Run all-sky 5 year public surveys in parallel, with yearly data releases
 - Key surveys organized by consortium in coordination with community
 - Add-on surveys from community and Chile through ESO peer-reviewed applications

Background: EU strategic docs

- A Science Vision for European Astronomy (ASTRONET)
 - Extreme Universe (Dark Energy & Dark Matter, Black holes)
 - Galaxy Formation & Evolution
 - Origin of Stars and Planets
 - Solar System
- ASTRONET Infrastructure Roadmap
„A smaller project, but again of high priority, is a wide-field spectrograph for massive surveys with large optical telescopes.“
- ESA-ESO Working Group on Galactic populations, chemistry and dynamics
„Blue multiplexed spectrograph on 4 or 8m class telescope“
- Strategic Review on Europe's 2-4m telescopes over the decade to 2020 (ASTRONET/OPTICON)
„Optical wide-field spectrograph on 4m telescopes (N+S)“

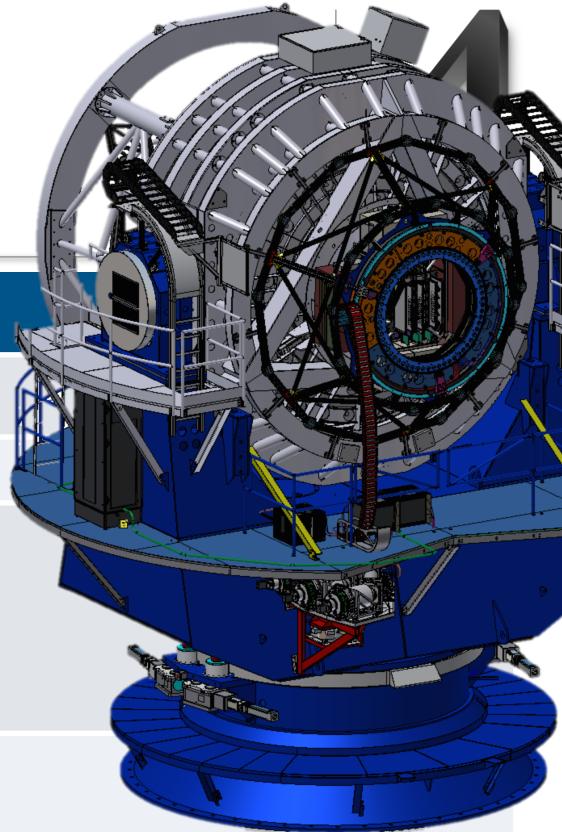
4MOST will play an important role in almost all research areas identified in the ASTRONET Science Vision document



The ASTRONET
Infrastructure Roadmap:
A Strategic Plan for European Astronomy
Executive Summary

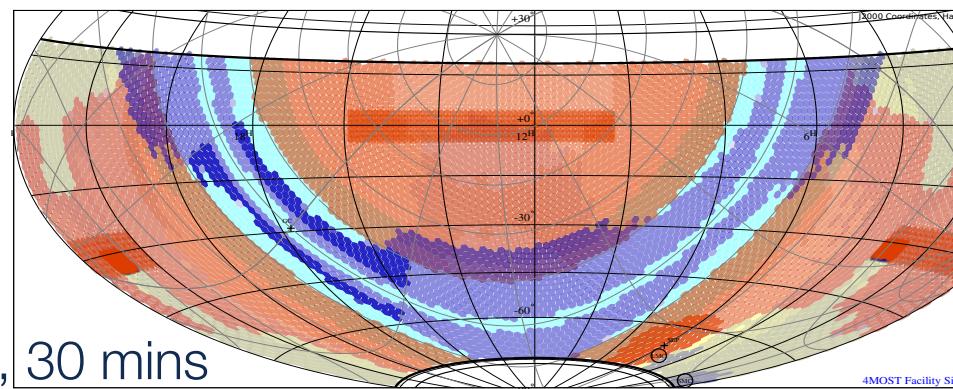
Instrument Specification

Specification	Design value
Field-of-View (hexagon)	~4.1 degree ² ($\phi > 2.5^\circ$)
Multiplex fiber positioner	~2436
Medium Resolution Spectrographs (2x)	R~4000–7000
# Fibres	812 fibres (2x)
Passband	370-950 nm
Velocity accuracy	< 1 km/s
High Resolution Spectrograph (1x)	R~20,000
# Fibres	812 fibres
Passband	392.6-435.5, 516-573, 610-679 nm
Velocity accuracy	< 1 km/s
# of fibers in $\phi=2'$ circle	>3
Fibre diameter	$\phi=1.45$ arcsec
Area (first 5 year survey)	>2h x 18,000 deg ²
Number of science spectra (5 year)	~75 million of 20 min



4MOST Operations

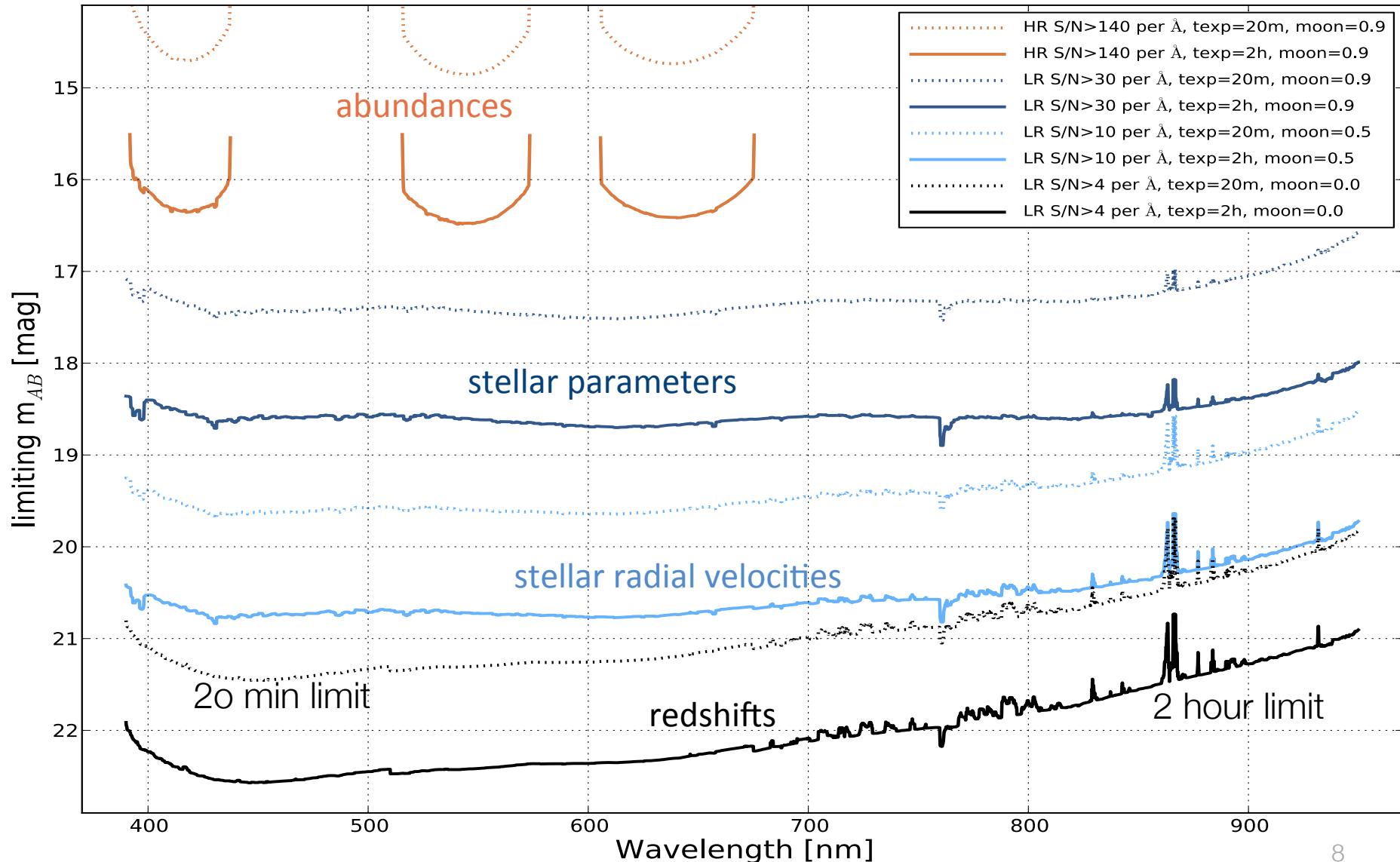
- Unique operations model for MOS instruments that allows observations *for most* science cases
- 4MOST program defined by *Public Surveys* of 5 years
- Surveys will be defined by *Consortium* and *Community*
- All Surveys will run *in parallel*
 - Surveys share fibres per exposure for increased efficiency
- *Consortium Key Surveys* will define observing strategy
 - Millions of targets all sky
- *Add-on Surveys* for smaller surveys
 - Small fraction fibers all sky or
 - dedicated small areas
 - 10^3 to 10^6 targets
- Several passes of sky with 2, 10, 20, 30 mins
- Wedding-cake distribution for total time 1h to 10h



SN research opportunities

- Possible transient return using 2% of fibres:
 - 32 fibres/pointing \times 8/night \times 150 dark nights \sim 40,000 spectra / year (\sim 8 / degree² per pointing)
- Can be live transients or host galaxies
- Scheduling 1–7 days in advance (TBD)
- Aim for live transients near peak in deep drilling fields?
- Use of HR fibres?
- Adding science case currently being negotiated (Bob Nichol)
- ESO member state institutes/individuals can still join
 - Individual membership: 100k€ + 1 FTE
 - 1 staff + 1 post-doc + students

Magnitude limits for typical science cases





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Galaxies Étoiles Physique et Instrumentation