

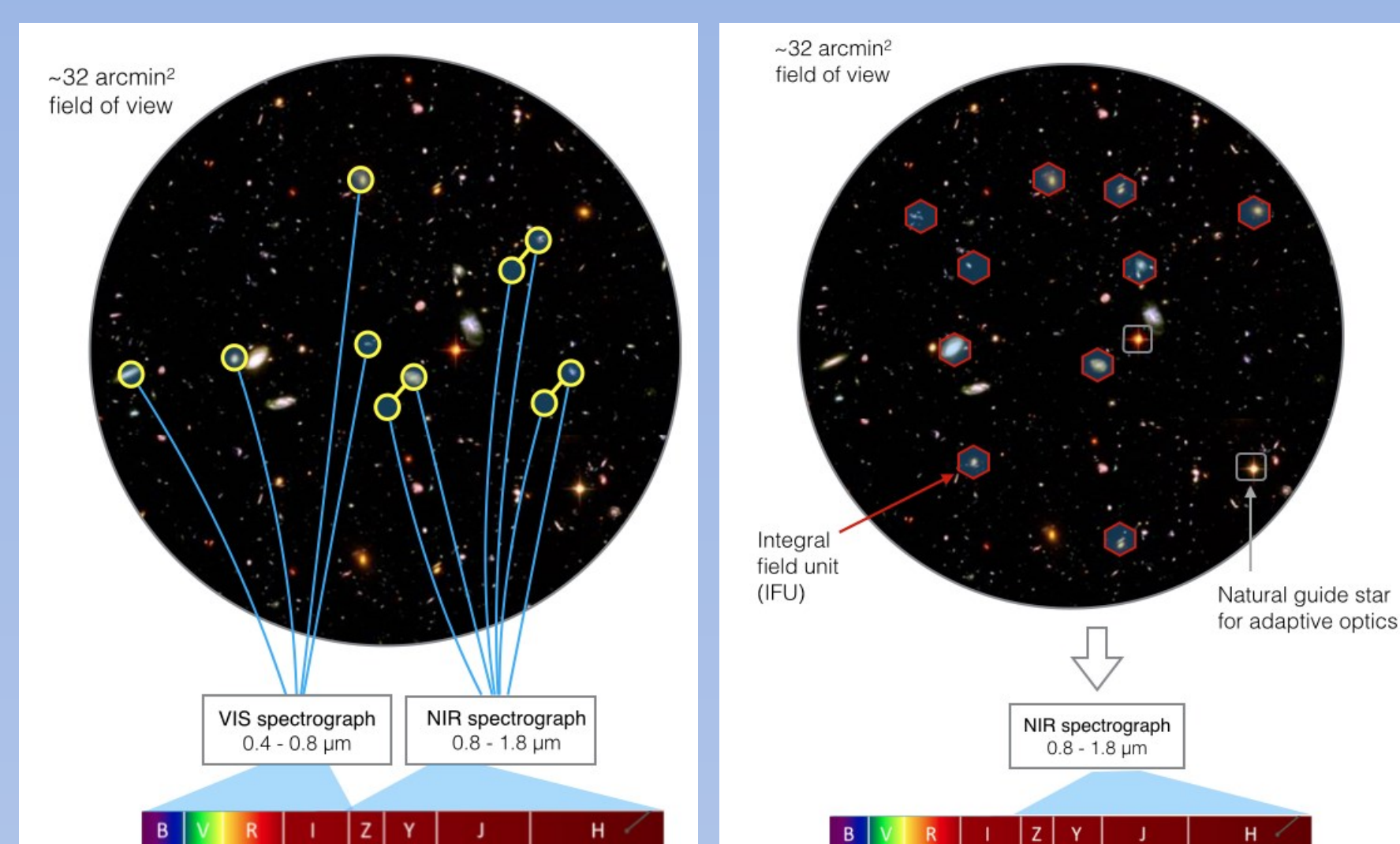
The MOSAIC multi-object spectrograph for the ELT

The visible fibre and spectrograph system contributions for the ELT-MOS

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Abstract The multi-object spectrograph MOSAIC is one out of five instruments, currently in development for the European Extremely Large Telescope (ELT) of ESO. MOSAIC will use the entire field of view of the ELT with its 39m primary mirror and will enable the simultaneous observation of hundreds of objects in the optical and near-infrared spectral range. MOSAIC also offers imaging spectroscopy using deployable integral field units. The scientific goals range from the analysis of the most distant galaxies in the early phase of the universe, as well as the inter- and circum-galactic medium, following their evolution and mass assembly across ages, to resolved stellar populations in relatively nearby systems. Furthermore, MOSAIC will provide spectroscopic follow-up to discoveries made by the JWST, and the Euclid and Athena missions of ESA. The MOSAIC consortium includes institutes from 12 countries and is led by the Laboratoire d'Astrophysique de Marseille (LAM). The German partner institutes are the Leibniz-Institut für Astrophysik Potsdam (AIP) and the Landessternwarte Heidelberg (LSW), to develop the visible fibre-link and spectrographs, respectively.

MOSAIC observing modes



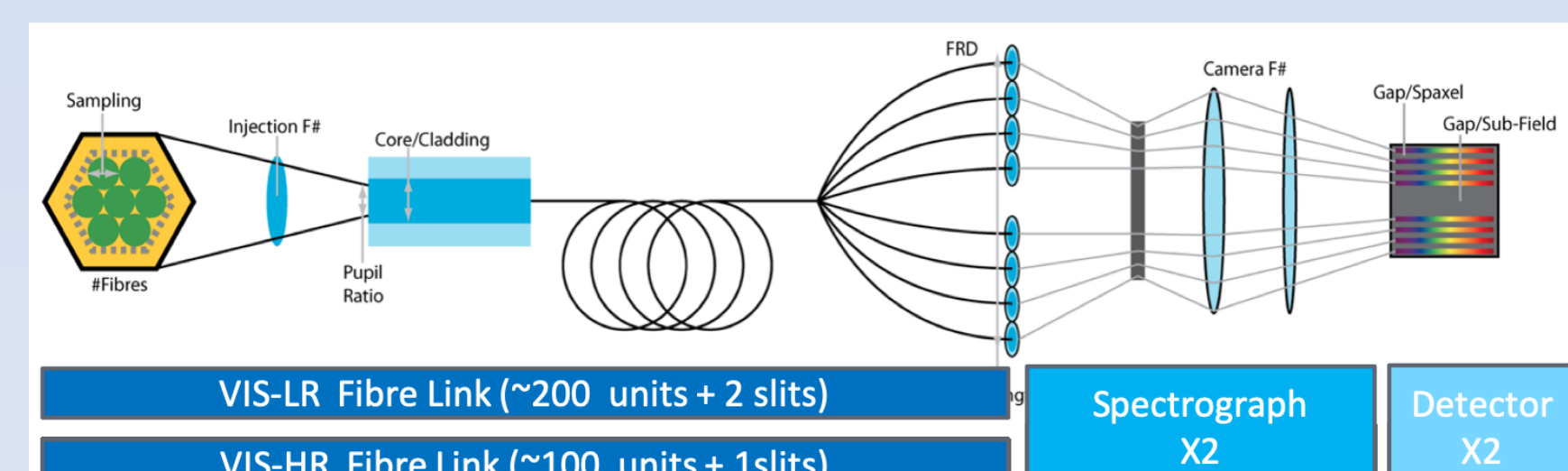
Left: The **Multiplex Mode** allows to observe objects simultaneously either in the visible or in the near infrared regime, using beam-switching techniques.

Science drivers: Resolve stellar populations of local group galaxies, galactic archeology, the origin of dwarf galaxies, IGM tomography.

Right: The **Integral-Field Mode** uses integral field units (IFUs), combined with a ground-layer adaptive optics system (GLAO) to obtain spatially resolved observations for extended objects across the ELT field of view in the near-IR [7].

Science drivers: Detecting & studying first galaxies, CGM and galaxy mass assembly.

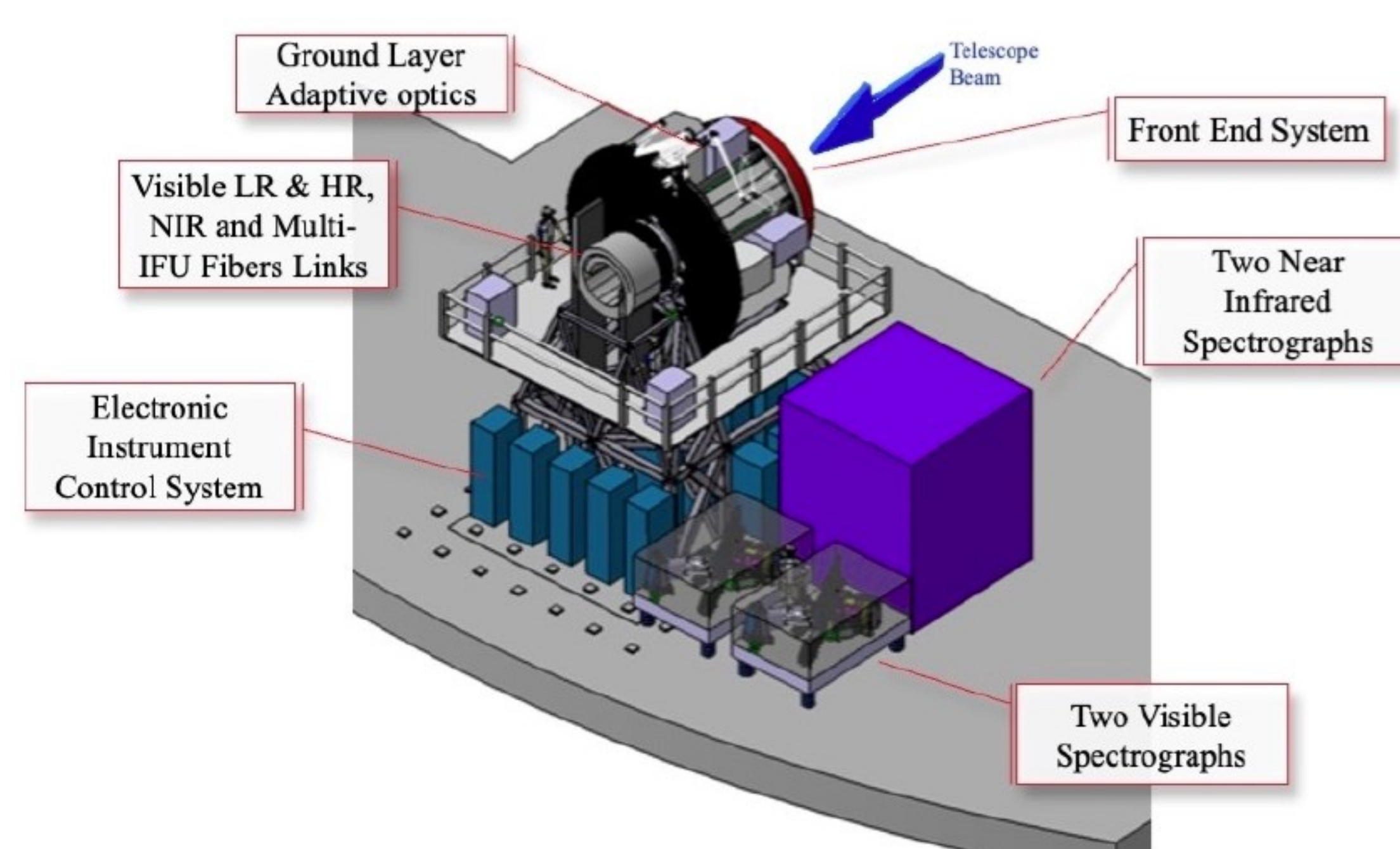
In all observation modes, optical fibres are used to connect the telescope's focal plane to the visible and NIR spectrographs. The development and construction of the optical fibre system is the work package of the AIP, based on its expertise with various precursor instruments



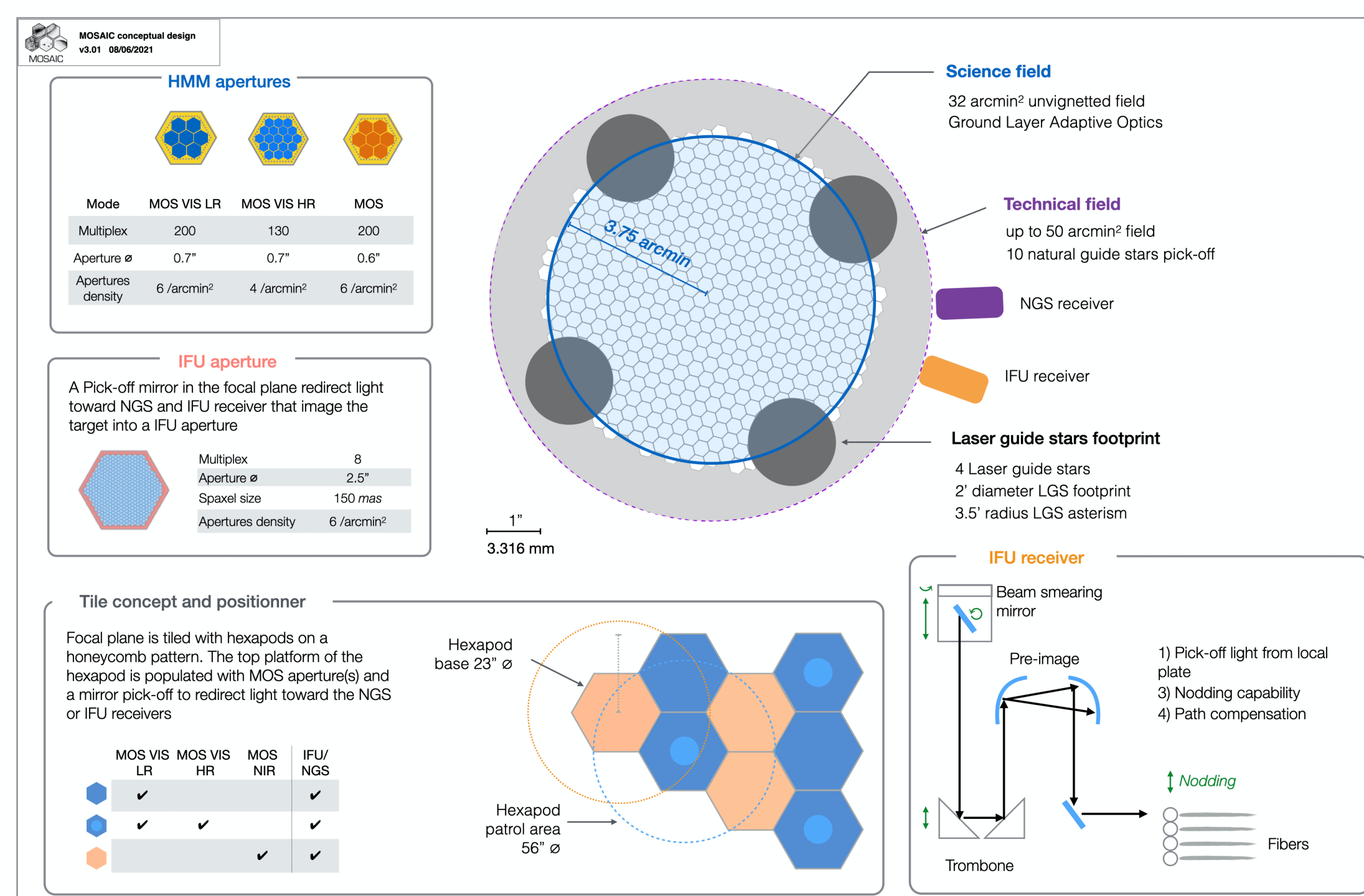
Schematic of the light path in the visible: sampling by microlens-array, transport by fibres, dispersion in the spectrograph.



CAD view of the ELT with a Laser Guide Star System to facilitate the Adaptive Optics. Insert: MOSAIC model on the Nasmyth platform (image credit: ESO).

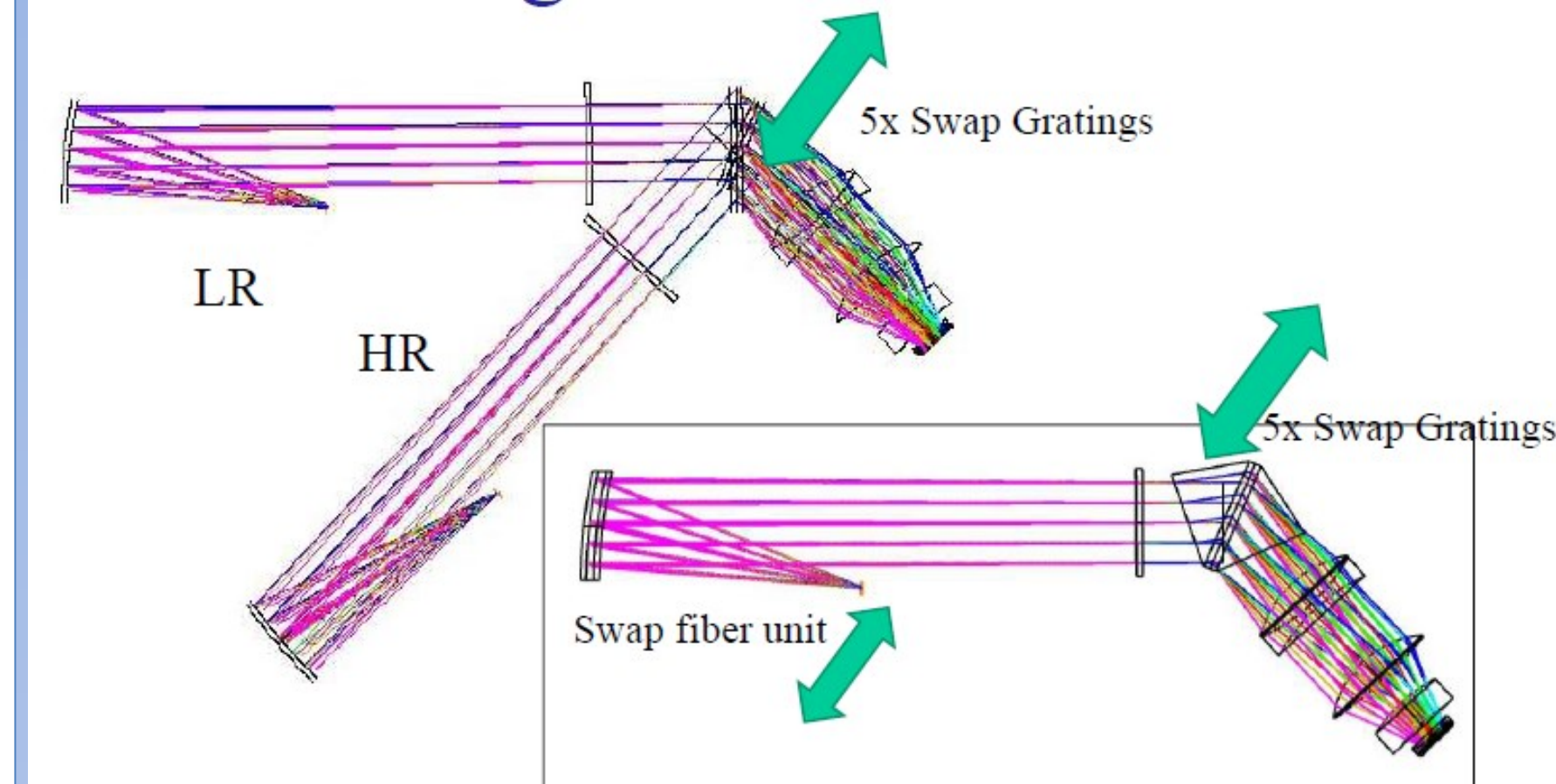


Conceptual layout of the MOSAIC instrument at the ELT Nasmyth platform with its main sub-systems. (credit: MOSAIC consortium).



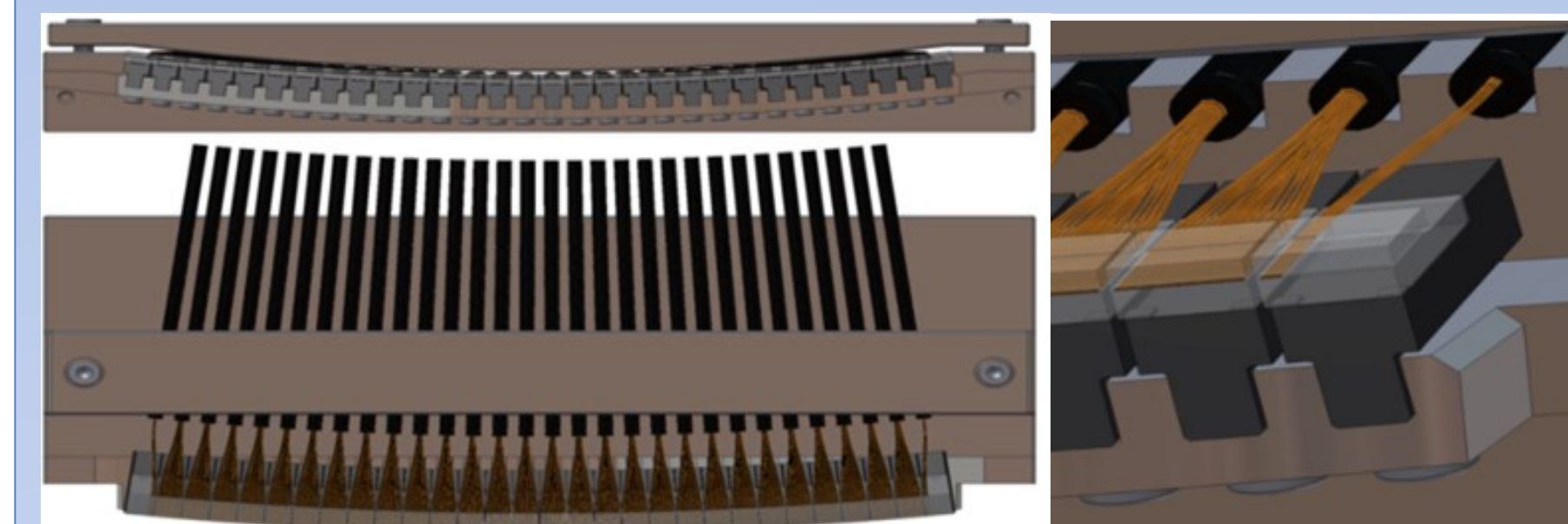
The MOSAIC shared focal-plate with multi-function tiles which can serve as pick-offs for any of the modes (MOS and IFS) and AO functions [7].

Visible Spectrograph

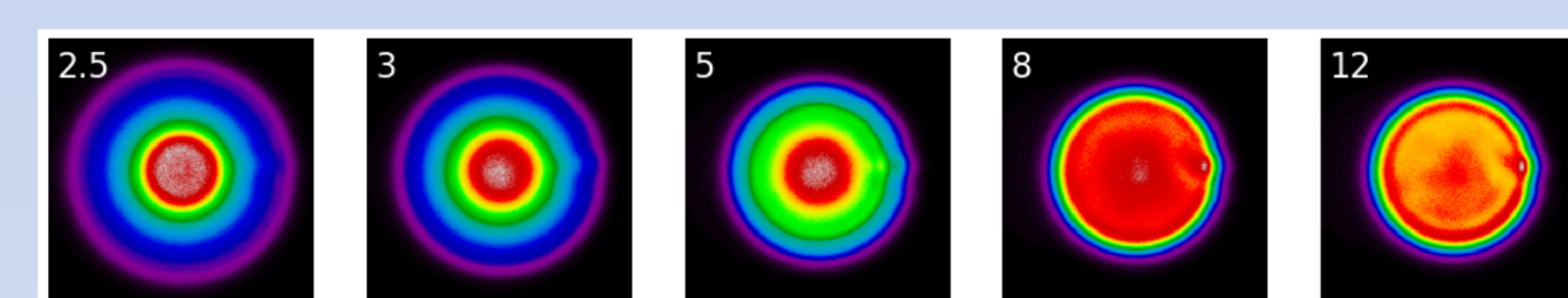


Optical design options for the visible spectrograph (covering 450-800nm) for both a low- and a high-resolution (LR=4000/HR=18,000) mode. (design by LSW/OSE)

Visible Fibre-Link



Left: Front and top view of a fibre slit assembly, featuring curvatures in two dimensions, and 30 slit-lets with 800 fibres. Right: Zoomed view of populated V-groove slitlets (design by AIP, based on 4MOST).



Measured near field light distributions at the fibre output using different input F-numbers (from 2.5 to 12) [3].

References

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Acknowledgements

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