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SHARP: an advanced Near-IR spectrograph to unlock the Universe beyond Habitable Worlds

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SHARP is a conceptual study for a near-IR (0.9-2.4 mu) spectrograph designed to exploit the capabilities of future ground-based AO-assisted Extremely Large Telescopes (ELTs) and space-based Habitable World Observatory (HWO). The instrument concept is driven by the goal of creating a spectrograph capable of tackling the most important questions in astrophysics and cosmology, from exploring primordial galaxies to studying the properties of candidate Habitable Worlds, bridging the gap between the local and the distant Universe. This requires versatility to accommodate diverse observational needs. SHARP consists of two main units: NEXUS, a slit Multi-Object Spectrograph (MOS) optimized for detecting the faintest sources, and VESPER, a multi-object Integral Field Unit (multi-IFU) designed for brighter ones. The high angular resolution, multi-object capabilities, and near-IR coverage enable studies of stellar and planetary formation, exoplanet atmospheres, high-redshift galaxy properties, as well as the search for primordial Population III stars. SHARP would leverage the HWO aperture to surpass the capabilities of NIRSpec@JWST, complementing other UV/Vis spectrographs and enabling spectroscopy of High-Resolution Imager observations in the near-IR. In this talk the main scientific drivers, the resulting main requirements and the basic properties of SHARP will be summarized.

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