Upgrading SPHERE with the second stage AO system SAXO+

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Abstract

SPHERE+ is a proposal to upgrade the SPHERE extreme Adaptive Optics instrument at the VLT to boost the current performances of detection and characterization of exoplanets and disks. The main science drivers for SPHERE+ are 1/ to access the bulk of the young giant planet population down to the snow line (3-10 au), to bridge the gap with complementary techniques (radial velocity, astrometry); 2/ to observe fainter and redder targets in the youngest (1 – 10 Myr) associations compared to those observed with SPHERE to directly study the formation of giant planets in their birth environment. These objectives can be realized with a new second stage AO system, SAXO+, equipped with a NIR pyramid wavefront sensor to increase the control bandwidth (from ˜1 to 3 kHz) as well as the sensitivity in the infrared (+2-3 mag). SAXO+ is developed in coordination with the ESO technology development group and will serve as a demonstrator for the future planet finder (PCS) of the ELT. The SAXO+ final design review is forseen by the end of 2024 and we expect to start the AIT phase in Q2 2025 and aim to be on sky in 2026. We will provide an overview of the project with science cases, system choices and performance estimation.

Keywords: XAO, pyramid WFS, NCPA, high contrast

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