
RISTRETTO at the VLT: a pathfinder for ELT-ANDES and ELT-PCS

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Abstract

RISTRETTO is a visible high-resolution spectrograph fed by an extreme adaptive optics (XAO) system, to be proposed as a visitor instrument on ESO VLT. The main science goal of RISTRETTO is the detection and atmospheric characterization of exoplanets in reflected light, in particular the temperate rocky planet Proxima b. RISTRETTO will be able to measure albedos and detect atmospheric features in a number of exoplanets orbiting nearby stars for the first time. It will do so by combining a high-contrast AO system working at the diffraction limit of the telescope to a high-resolution spectrograph, via a coronagraphic 7-spaxel integral-field unit (IFU) feeding single-mode fibers. Further science cases for RISTRETTO include: the study of accreting protoplanets such as PDS 70 b & c through spectrally-resolved H-alpha emission; the kinematics of protoplanetary disks through scattered-light Doppler velocimetry; and spatially-resolved studies of Solar System objects such as icy moons and the ice giants Uranus and Neptune. The project is in an advanced design phase for the spectrograph and IFU/fiber-link sub-systems, and a preliminary design phase for the AO front-end. Construction of the spectrograph and IFU/fiber-link has just started. RISTRETTO is a pathfinder instrument in view of similar developments at ESO ELT, in particular the SCAO-IFU mode of ANDES and the future PCS instrument.

Keywords: Exoplanets, Proxima b, habitability, biosignatures, RISTRETTO, ANDES, PCS, H, alpha, accreting planets

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