MICADO: The spectroscopic mode capabilities for exoplanets characterization

Paulina Palma-Bifani, Pierre Baudoz, Gaël Chauvin, and Elsa Huby

MICADO is a general-purpose instrument that will study exoplanets' formation and evolution. We can think about it as an instrument that will follow up the current discoveries to allow a detailed characterization of them in terms of the architecture, orbits, moons, CPDs, compositions of rocky and gaseous planets, detection of molecules, surface characterizations, atmospheric studies like clouds and disequilibrium chemistry, and more. Using the gain in angular resolution, chemical species in the atmospheres of smaller, colder, and more mature planets will be accessible. However, MICADO is not an instrument that should be used blindly. It is crucial to consider it in the context of synergies with current and future facilities and explore techniques to combine information.

We constrain that the main limitations for performing exoplanet-related science will arise from the contamination of the host star speckles rather than the detector noise sources. We are currently characterizing this effect for the long-slit spectroscopic mode (LSS) to
   1. understand the performances of the instrument,
   2. get to know the observational constraints in terms of contrast, projected separation,
   3. develop a data reduction and analysis strategy to deal with exoplanet observations contaminated by the host star where the air dispersion correction is not available, and
   4. understand the science that will be feasible with this first light instrument of the ELT.

I propose to present this ongoing work, a collaboration between the MICADO and MORFEO consortiums.