



Astronomical Instrumentation: SIMPLE

Near infrared spectrometer SIMPLE was proposed as a first-light instrument for the [European Extremely Large Telescope \(E-ELT\)](#). This instrument will be taking high-resolution ($R=130000$) spectra in Y, J, H and K bands studying cool stars, interstellar medium, high red-shift objects, objects inside gas and dust envelopes etc. The polarimetric option will take advantage of amplification of the Zeeman effect with the wavelength to detect weak magnetic fields as e.g. fields in stellar spots.

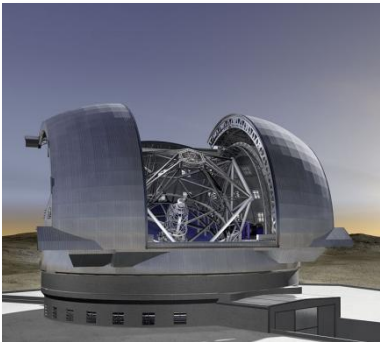


Fig. 1: Artist's vision of the E-ELT

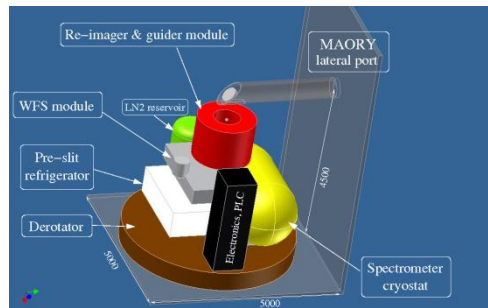


Fig. 2: Possible layout of SIMPLE coupled to an AO system

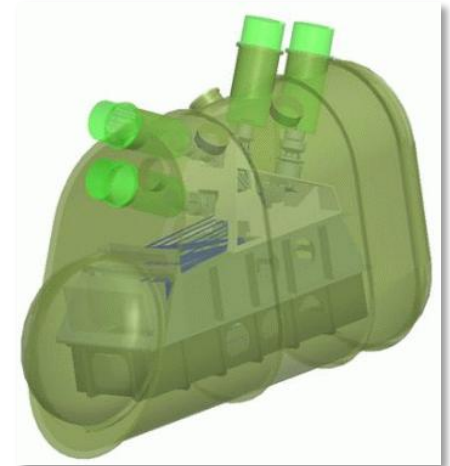


Fig. 3: An alternative design combined with an optical spectrometer

One exciting application is detection of and characterization of atmospheres around exoplanets. SIMPLE will be capable to detect variations in the spectrum of stellar light that passed through planetary atmosphere. We are running numerical simulations to verify the feasibility and to find optimal observing strategy and perfect the data analysis techniques. Below we present some results of these simulations.

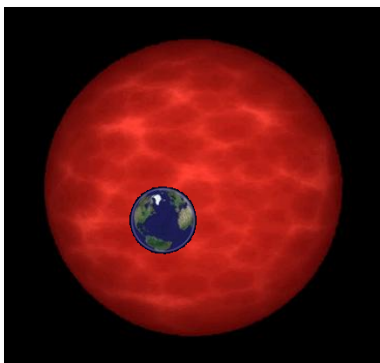


Fig. 4: Artist impression of an Earth-mass planet orbiting and M-dwarf in the habitable zone

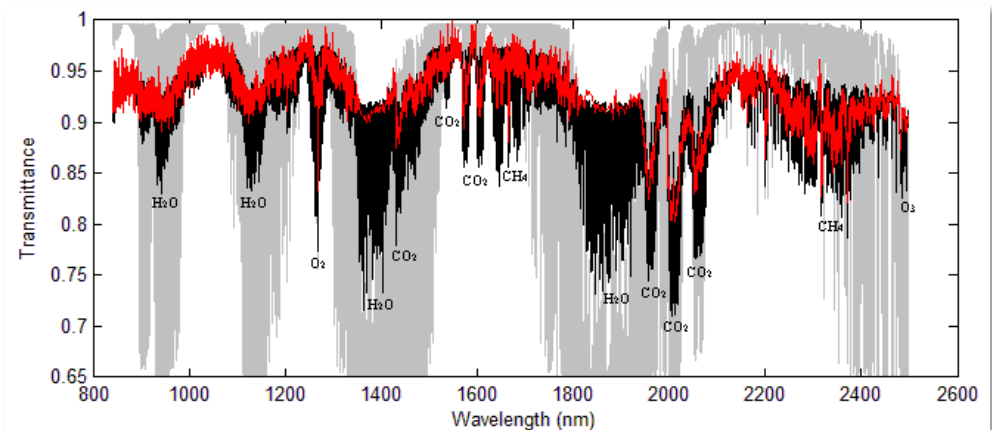


Fig. 5: The true atmospheric absorption (black) and the reconstruction from a series of transit observations by SIMPLE spectrometer (red). The Earth atmospheric absorption is shown in the background in light grey. Important molecular bands are clearly detectable