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Venue: ESO Telescopium auditorium

Title: High-contrast imaging techniques today and in the ELT era

Abstract:

High-contrast imaging relies on extreme adaptive optics systems, coronagraphs, and signal processing techniques. They are currently used together in a handful of instruments on 8m class telescopes, in particular VLT/SPHERE, to detect and spectrally characterize at low spectral resolutions young giant planets and disks around nearby stars. Our ambition for the next 10-20 years is to do the same for smaller, older planets, closer to their star, i.e., more and more similar to Earth, and to characterize them at much higher spectral resolution, say $R=100000$.

Over the last few years much progress has been made on high-contrast imaging techniques. New coronagraphs and better adaptive optics systems are expected to provide 10 times higher contrast twice as close to the star. The additional correlation at high spectral resolution between synthetic and observed spectra will be key to measuring the abundance of various molecules, and detecting biomarkers in rocky planets. ELTs will make it possible from the ground, while new space telescopes are currently being discussed to make it possible from space.

This talk will start with a brief review of current state-of-the-art high-contrast imaging systems. I will then draw a picture of a dedicated high-contrast imaging instrument designed for the ELT. In particular, I will discuss why the constraints set on the system by the ever-changing complex aperture of this highly segmented telescope should be taken into account, and I will go through several technological developments that could greatly help in that