Characterising exoplanetary atmospheres with the CRIRES+ instrument on VLT

Linn Boldt-Christmas (Uppsala University)
Ansgar Wehrhahn, Fabio Lesjak, Adam D. Rains, Nikolai Piskunov, Lisa Nortmann

In recent years, the study of exoplanetary atmospheres has grown increasingly advanced with the advent of several new instruments and improved methods. With these new tools, we are moving beyond identification of particular molecules to the analysis of atmospheric structure, physical conditions, chemistry and dedicated climate models. Studies in emission and transmission spectroscopy of this kind benefit greatly from spectrographs with high resolutions and high wavelength coverage in order to recover detailed spectral information across a wide range of spectral bands. CRIRES+ is a cross-dispersed infrared echelle spectrograph on the 8m Very Large Telescope (VLT) at Paranal Observatory, Chile, in operation since October 2021. CRIRES+ was conceived to perform spectroscopic observations of exoplanets as it has a high resolution (R~100,000) across a wide simultaneous wavelength coverage in each of the Y to M band, delivering highly stable and good quality observations. With these strengths, CRIRES+ is unique tool for transit spectroscopy of even low-mass exoplanets. In this talk, I will discuss the observational studies of exoplanetary atmospheres with CRIRES+, present examples of first results, and outline some of our future plans.