



## Investigating physical and chemical mechanisms in planetary atmospheres and their impacts on the observables

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In the framework of the Priority Programme “Exploring the Diversity of Extrasolar Planets” (SPP 1992) of the German Research Foundation (DFG) we carried out the project “The key physical-chemical processes determining the Composition and Temperature of (exo)planetary atmospheres”. Characterizing the atmospheres of extrasolar planets is a new frontier in exoplanetary science, is dependent on observations and interpretation toolkits. The project intends addressing a key question in current exoplanetary atmospheric research: what are and how do the key chemical and physical processes determine the atmospheric composition and temperature of exoplanets?

Here we will review key novel results and scientific achievements obtained with emphasis on:

(1) A feasibility study on retrieving the vertical temperature distribution and abundances from ground-based high-resolution spectroscopy in the near-infrared, test case: VLT/CRIRES+.

(2) Studies of some mechanisms/effects on spectra, composition and temperature: atmospheric chemistry and dynamic under intensive

irradiation, clouds/hazes effect on the transmission spectrum of mildly irradiated exoplanets, and kinetics-related disequilibrium processes.

(3) A look to the composition of the atmosphere of Jupiter, an archetype of gas giants, as seen by Herschel/PACS.