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Linking 3D Climate Models with Transit Spectroscopy from CRIRES+

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The Planetary Spectrum Generator (PSG) is an online tool that synthesizes spectra of planetary atmospheres for a broad range of wavelengths (10nm to 100mm) simulating several space- or ground-based observatories/instruments. The 3D GlobES application of PSG allows us to synthesize observations of exoplanets based on different 3D General Circulation Models (GCM). In particular, we use GlobES to synthesize transmission spectra of exoplanets as observed with CRIRES+, the newly upgraded and refurbished high-resolution spectrograph on the Very Large Telescope (VLT), using the existing 3D GCM models of our potential targets as inputs. We will then use the simulations to assess the feasibility of detecting atmospheres of hot Jupiters and super Earths and to guide us with interpretation of spectral features when CRIRES+ makes positive detections. The combination of advanced observational and theoretical tools will allow us to investigate planetary atmospheres without a priori assumptions about their properties and chemical composition thus providing unbiased insight into their origin, evolution, and habitability.

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