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Characterizing the Atmosphere of a Young Planet

Since the discovery of the young, directly imaged planet 51 Eri b, its emergent spectrum has proved challenging to interpret. The initial discovery paper (Macintosh et al. 2015) interpreted the spectrum as indicative of a low mass (few Jupiter masses), effective temperature near 700 K, and partial cloudiness. Subsequent observations in K band, however, seem to invalidate the early models. In addition, newly improved photochemical point to the likely presence of exotic haze species in the atmosphere. In my presentation I will explore the photochemistry of the atmosphere and discuss whether disequilibrium chemistry, hazes, clouds, or non-solar abundances of heavy elements may be responsible for the unusual spectrum of this planet. The implications for the interpretation of other young Jupiters in this mass and effective temperature range will also be considered.