New Tools for Understanding Exoplanet Atmospheres from Spectroscopy

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As a Sagan Fellow, I will use new techniques to retrieve planet compositions and cloud properties for 3 classes of objects:

- young brown dwarfs
- directly imaged planets
- transiting small planets

R. Hurt/NASA  Marois et al. 2010  NASA/JPL-Caltech
Young brown dwarfs provide a testbed for understanding atmospheric chemistry and clouds.

Free-floating low mass brown dwarfs have the masses/temperatures of exoplanets, but are much easier to observe spectroscopically.
New instruments like the Gemini Planet Imager will allow us to observe young proxies of the solar system.

51 Eri b, the first newly-discovered planet from the GPIES survey, appears similar to a cool (700 K) brown dwarf with water and methane absorption features.

Macintosh et al. 2015
Small planets to date have shown featureless spectra, indicating the presence of clouds/hazes.

As a postdoc, I will collaborate with observers to measure molecular features in a wider range of planets and quantify the importance of clouds and hazes.