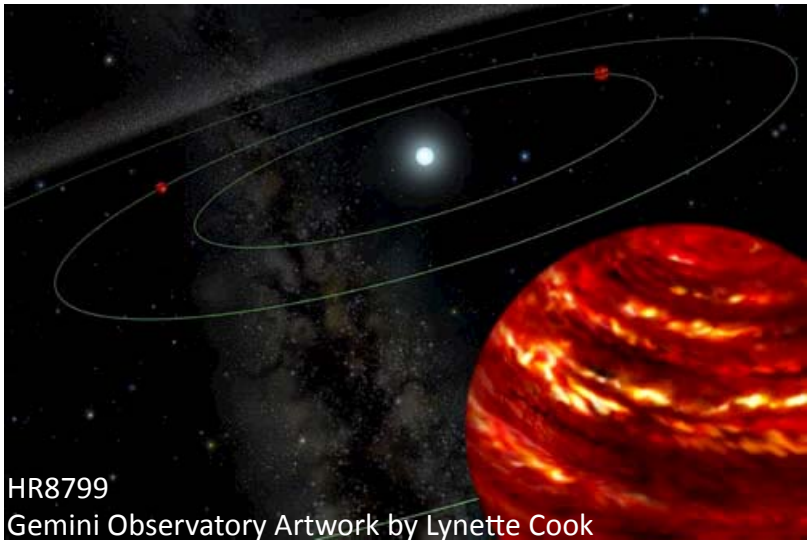
Characterizing exoplanet atmospheres with high-contrast 0.5–5μm adaptive optics

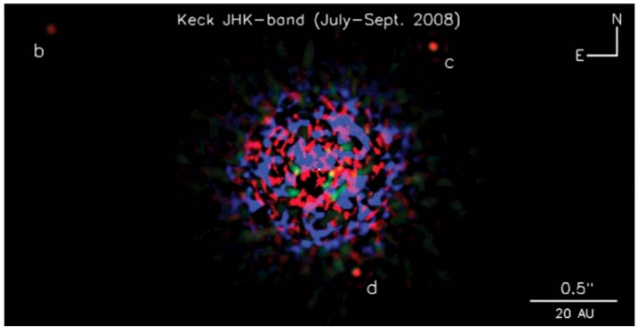
Katie Morzinski—University of Arizona, from Fall 2011



Extrasolar planets exhibit striking diversity—
What characteristics and processes determine their properties?

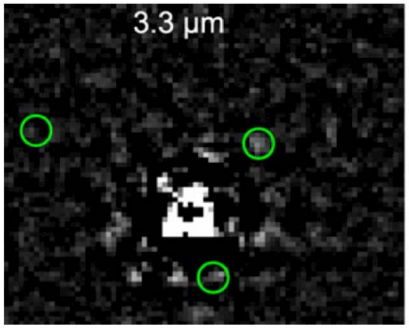
Objective:

Directly image Jupiter-like exoplanets across a broad optical/infra-red spectral regime to characterize their atmospheres



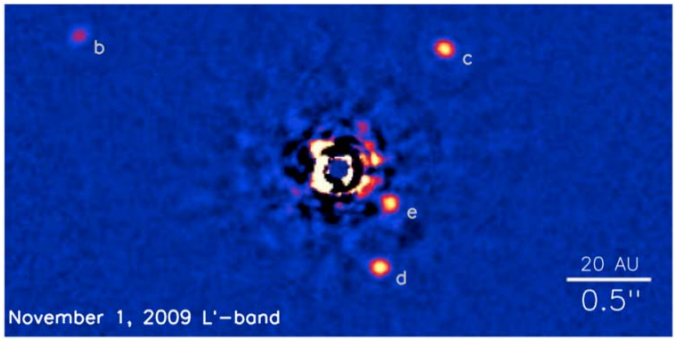
1-2µm

Marois et al. 2008 Science 322



3.3µm

Hinz et al. 2010 ApJ 716



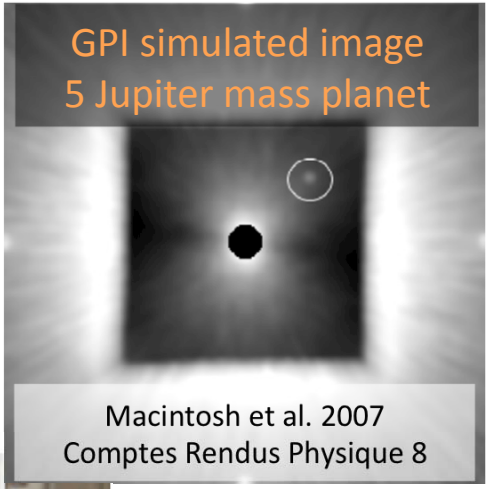
3.8µm

Marois et al. 2010 Nature 468

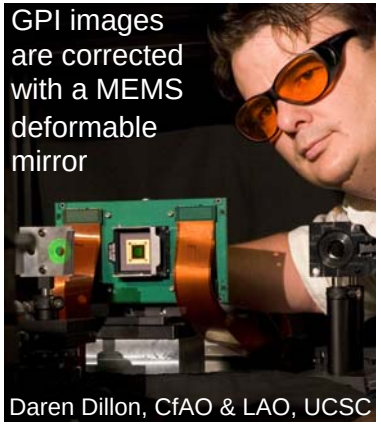
Commission & employ two cutting-edge high-contrast adaptive optics systems:

Magellan "MagAO"

& the Gemini Planet Imager (GPI)



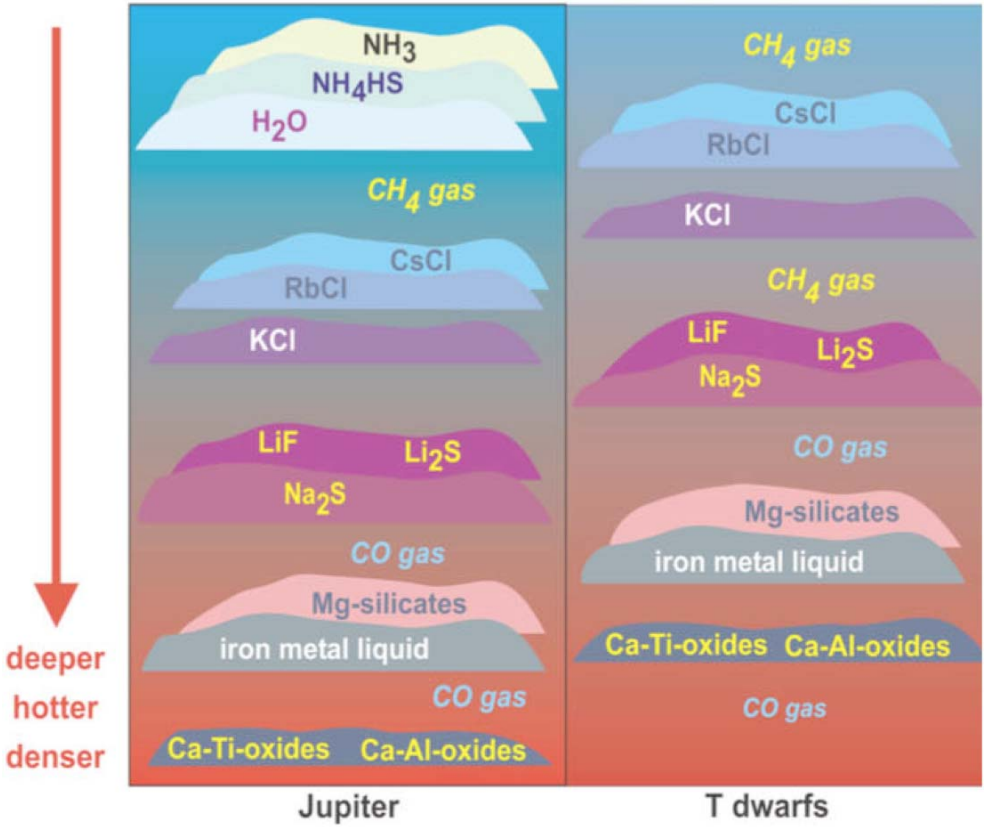
MagAO images are corrected with an adaptive secondary mirror



Jupiter, visible light, NASA Cassini

Jupiter, near-IR, Altair AO, Gemini Obs.

Jupiter, 4.85 μm, NASA IRTF



Interpret data with models to determine composition, temperature vs. pressure, cloud layers, mixing, etc.

Lodders & Fegley 2006 ISBN 3-540-30312-X