



Wednesday

January 23

4:00 P.M.

Rm 118 NSH

Exoplanet imaging with extremely large telescopes: A new era of detailed exoplanet characterization

Dr. Rebecca Jensen-Clem, Miller Fellow
UC Berkeley Astronomy Department

In the last thirty years, over 3000 planets have been discovered orbiting nearby stars. This flood of new worlds includes planets unlike any found in our own Solar System, from Jupiter-mass planets with years as short as our day to exotic rocky worlds twice as massive as the Earth. While our understanding of exoplanets' diversity has leapt forward in recent years, fundamental questions remain. For example, what are the dominant planet formation pathways? How do planets acquire their atmospheres? Is there life on other worlds? These questions can only be answered through observations of exoplanets' spectra, where the characteristic imprints of atoms and molecules making up a planet's atmosphere are revealed. The most promising method for obtaining spectra of diverse exoplanets is direct imaging: by nulling the light of the parent star with an optical device called a coronagraph, the planet itself can be seen and its light dispersed into a spectrum. So far, only extremely young, massive worlds have been directly imaged, while older, lower mass objects like the Earth remain hidden in the glare of their host stars. In this talk, I will describe two avenues for advancing the state-of-the-art in exoplanet imaging: 1) detecting low-mass exoplanets at Solar System separations with the W. M. Keck Observatory and Thirty Meter Telescope via predictive wavefront control, and 2) characterizing the atmospheres of directly imaged planets with polarimetry -- an untapped method for probing the physics of clouds in the atmospheres of other worlds.