



PHYSICS AND ASTRONOMY SEMINAR

Dr. Sarah Ballard

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“Choose Your Own Adventure: Orbital Dynamics and Atmospheres of M dwarf Planets”

Abstract

The landscape of exoplanet science has been dramatically reshaped since the launch of NASA's Kepler mission in 2009. While the mission's primary science driver was to uncover the frequency of Earth-like planets orbiting Sun-like stars, in fact the vast majority of rocky planets in their stellar habitable zones reside in very different environments. M dwarf stars, half the mass of the Sun and smaller, host most of the galaxy's terrestrial worlds. The small stature of these stars, the most prolific type in the universe, render exoplanet detection and characterization easier for upcoming missions. Their atmospheres will almost certainly dominate upcoming exoplanetary studies with next-generation space telescopes. However, they furnish very different conditions for life than have nourished it on Earth. We find that the data much prefer a model with two distinct modes of planet formation around M dwarfs, which occur in roughly equal measure. I'll summarize the implications for habitability from this finding, and the formation mechanisms that could give rise to this dual population. I'll describe an opportunity, using an existing data set of M dwarf planets, to make inroads into the singular question driving much of exoplanetary science: the detectability of signatures of life..

Tuesday, February 23

3:15 p.m.

Elliott Building

Room 060