



ASTROPHYSICS SEMINAR SERIES

"Photodynamics: revealing the secrets of the lowest-mass planets and stars"

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Monday, February 25, 2013
Refreshments at 3:30pm in CAS 500
Talk begins at 4:00pm in CAS 502

Abstract:

Eclipsing systems are famous for providing abundant opportunities to study the basic properties of stars and planets --- but eclipsing systems with more than two bodies present truly extraordinary opportunities. This is because non-Keplerian effects can be observed and used to determine precise masses, radii, and orbital details from first principles. With the Kepler space telescope, we have discovered hundreds of such systems, including circumbinary planets and triple star systems. Photometric- dynamical analyses ("photodynamics") have already provided precise masses and radii of the lowest mass stars (e.g. KOI-126, Kepler-16), greatly expanding our empirical knowledge of stars near the fully-convective boundary. We have also demonstrated the ability to precisely determine masses of rocky exoplanets (e.g. Kepler-36b) and have enabled detailed dynamical investigations into their orbital architectures. I will describe how my research is seeking to unveil the properties of scores of stars and planets in these currently unexplored domains. I will discuss how this work will clarify the formation, evolution and composition of rocky and even potentially habitable worlds. Finally, I will look beyond Kepler by describing how this work applied to future time-domain photometric observations will revolutionize our knowledge of the smallest planets.