SAN DIEGO STATE UNIVERSITY DEPARTMENT OF ASTRONOMY MASTER'S THESIS TALK

Speaker: Susan Kurth

Topic: An Investigation of Higher-Order Effects in Modeling Exoplanet HAT-P-7b

Time: 11:00 AM, Thursday, June 18, 2015

Place: Room 215, Physics-Astronomy Building (PA-215)

Abstract:

In its search for Earth-like planets, NASA's Kepler mission observed over 200,000 stars. Among these were the class of planets known as the "hot Jupiters." These are giant gaseous planets with periods less than ~5 days. Here I present an analysis of the Kepler observations of the exoplanet HAT-P-7b, a hot Jupiter with an orbital period of 2.2 days, a mass of 1.8 M_Jup, and a radius of 1.5 R_Jup. Due to its very close proximity to its host star, the planet has a day-side temperature of ~2800 K and a night-side temperature of ~1950 K. The tight orbit also causes planetary reflection, as well as higher-order effects in the system such as ellipsoidal variations, Doppler beaming, and gravity darkening. My thesis explores these effects on the Kepler HAT-P-7 light curve using the state of the art Eclipsing Light Curve (ELC) code. The "short cadence" data from Kepler contain -- 2.1 million measurements, which I phase folded and binned to get robust uncertainties, resulting in a final data set with 2,704 points. Because of the exquisitely high precision of the data (few ppm level), the physical effects mentioned above need to be accounted for. Including these effects enables me to accurately solve for the system parameters.