

SAN DIEGO STATE UNIVERSITY DEPARTMENT OF PHYSICS AND DEPARTMENT OF
ASTRONOMY COLLOQUIUM

Speaker: Prof. William Welsh, San Diego State University

Topic: Kepler circumbinary planets - the best of both worlds

Time: 3:00 PM, Friday, October 3, 2014

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

Abstract:

While long anticipated in both in science and science fiction, the existence of a planet orbiting a pair of normal stars was not firmly established until the discovery of Kepler-16 three years ago. With that single discovery, many questions soon arose about the nature of "circumbinary" planets: What kinds of orbits, masses, and radii could they have? What kinds of binary stars can host planets? How common are they? Since then, nine more transiting Kepler circumbinary planets (CBPs) have been discovered, and several more candidate systems are under investigation - and most of these have been discovered by SDSU astronomers. While still few in number, the sample is becoming large enough that some intriguing patterns are starting to emerge:

- 1) The CBPs are not present in the shortest-period binary systems.
- 2) They tend to orbit very close to their dynamical instability limit.
- 3) As a consequence of their close-in orbits and the spectral types of their host stars, a surprisingly large fraction (~25-30%) lie within the habitable zone.

In addition to their interesting dynamics and the constraints they place on planet formation and migration in general, the circumbinary planets systems play another very important role: they allow extremely precise measurement of the masses and radii of the host stars, often much better than one percent. In my talk I will discuss the discovery and characterization of the Kepler circumbinary planets, the emerging trends, and present the latest discoveries and candidate systems.