

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

Speaker: Dr. Saeqa Vrtilik -- Harvard-Smithsonian Center for Astrophysics

Topic: A Hertzsprung-Russell Diagram for X-ray Binaries?

Time: 3:00 PM, Friday, February 20, 2015 (refreshments served at 2:45 PM)

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

Abstract:

X-ray binaries, consisting of a normal star orbiting a compact object, owe their prominence to one of the most efficient energy release mechanisms known: accretion of matter onto compact objects. The diverse behaviors displayed by X-ray binaries are extensively studied, yet one of the most fundamental physical markers of each of these systems --- whether the central accreting object is a black hole or a neutron star --- has been remarkably difficult to establish. We have found that given a rather simple kind of X-ray data (time series in only three broad energy channels) various types of X-ray binaries separate into complex but geometrically distinct volumes. We are testing clustering techniques with the goal of characterizing the spatial geometries of different object types in a statistically sound manner. This provides a model-independent means of identifying the nature of the compact object in X-ray binaries. We note that the tools we develop meet analogous purposes in all data-driven fields, as the fundamental problem of classification of multivariate data with complex geometric dependencies is field-spanning.