PHYSICS AND ASTRONOMY
SEMINAR

Dr. Orsola De Marco

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"Getting Ready for the Changing Sky"

Abstract

In this talk I will bring together planetary nebulae (PN) hydrodynamic simulations of binary interactions, intermediate luminosity optical transients and more in a review of the work past, present and future that's being carried out by our group. I will start the story with planetary nebulae and the realization that by and large these nebulae are not the product of peaceful single star evolution. They are instead likely to be the result of a binary interaction. Among the many possible binary interactions, we studied the common envelope interaction which, aside from being responsible for one in five PN, is also the gateway to a staggering amount of binary phenomena, including supernova type Ia. Simulations of common envelopes are not very advanced, and we have shown recently just how much we do not understand, along with ways to improve. Aside from simulations, there are other ways to understand these interactions, and I bring observations and analytical considerations to bear on common envelope jets, proposing them as one of the best way to understand common envelopes. It is also likely, that many binary interactions have a light signature and indeed there are outbursts that were ascribed to common envelopes interactions and mergers, such as V838 Mon or V1309 Sco. Such observations will multiply with new time-sensitive observing platforms, such as the LSST. Interestingly, today we think that some nebulae, including some PN, may be the aftermath of these outbursts, observed a few hundred years down the line. Our simulations of a variety of interactions (from those with stars in eccentric orbits, to those where the companion is only a planet), attempt to explore parameter space, an exploration that will be enhanced by our new light module to model and predict lightcurves from transients.

Monday, March 31, 2014
12:00 p.m.
Engineering/Computer Science Building
Room 130