



PHYSICS AND ASTRONOMY SEMINAR

Dr. Rob Hoffman

Computational Nuclear Physics Group, LLNL

“Type Ia Supernovae, the Best Bang Since the Big One”

Abstract

The use of Type Ia supernovae (SNe Ia) as “standard candles” for distance determination has brought about a revolution in modern cosmology, showing the first clear evidence of “dark energy” and the acceleration of the expanding universe. The “standard model” of SNe Ia result from the thermonuclear explosion of an accreting white dwarf. After a thousand years of convection, hot spots develop a burning front starting near the center of the star that propagates outward and accelerates through its interactions with turbulence, ultimately leading to the complete disruption of the progenitor. The resultant nucleosynthesis determines the emergent light curve and spectra, the observational signatures of SNe Ia. But until these events are understood from first principles, there remains the possibility that evolutionary effects (e.g. metallicity, rotation, single or multi-point ignition, asymmetric explosion) might influence our interpretation of cosmological parameters, making the use of SNe Ia in an era of “precision cosmology” questionable.

My talk will review highlights of a several year research campaign to develop a first principles understanding of SNe Ia as carried out by the Computational Astrophysics Consortium.

Monday, September 22, 2014

11:00 a.m.

Elliott Building

Room 161