



PHYSICS AND ASTRONOMY SEMINAR

Prof. Clarence Virtue

Spokesperson for the HALO and HALO-1Kt Experiments

“Using Lead to Learn About Supernovae”

Abstract

As a massive star evolves, near the end of its life, the mass of its iron core reaches 1.4 solar masses. At this point, the Chandrasekhar limit, quantum mechanical forces can no longer resist the gravitational force and a chain of events results in the collapse of the iron core to a neutron star. This occurs over the brief time interval of about 10 ms and is the trigger for a colossal explosion, a core-collapse supernova. In the collapse of the core the radius, containing 1.4 solar masses of matter, decreases by a factor of 25,000, converting enormous gravitational potential energy to heat, resident in the neutron star. Over 99% of this heat, roughly 10% of core's rest mass, escapes the neutron star in some 10's of seconds in the form of neutrinos. Just as neutrinos allowed us to peer into the core of the Sun, they are also our only window into the heart of a supernova. Several supernova sensitive neutrino detectors currently operate worldwide. My talk will focus on HALO and HALO-1kT, an existing and a future lead-based supernova detector, and why they are interesting additions to the set of neutrino detectors designed to extract physics from the next galactic supernova.

Monday May 15, 2017

2:00 p.m.

MacLaurin Building

Room D287