Notre Dame Science
Department of Physics

LEARNING ABOUT THE HEAVENS ON EARTH USING RADIOACTIVE ION BEAMS

Dr. Romualdo deSouza
Indiana University

Monday, January 24, 2011
4:00 p.m. NSH 124

Nuclear Seminar

Neutron stars aside from being fascinating objects present a unique environment for nuclear reactions. Binary systems consisting of a neutron star and a conventional star provide an environment where accreted material on the surface of the neutron star undergoes gravity driven (pycnonuclear) fusion. A resulting X-ray burst is observed. Over the past decade a subset of X-ray bursters have been observed that is considerably more energetic than the conventional X-ray burster. For these super-bursters the energy release in a burst is 1000-fold larger than a conventional burster. The energy source underlying the X-ray superburster is unknown. It has been hypothesized that fusion of neutron-rich nuclei in the crust, namely carbon and oxygen, provides the energy source for the superburster. To test this hypothesis we have initiated a research program to measure the fusion excitation function for neutron-rich light nuclei. I will detail the experimental approach and the challenges to measuring such reactions. A recent attempt to measure the fusion excitation function for $^{12}C + {}^{20}O$ at the GANIL SPIRAL facility will be described together with plans for intended experiments at MSU's ReA3 accelerator.

All interested persons are cordially invited to attend.