Notre Dame Science
Department of Physics

THE NUCLEAR PHYSICS AND ASTROPHYSICS OF R-PROCESS NUCLEOSYNTHESIS

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It has long been known that about half of the elements heavier than iron found in the solar system were assembled via rapid neutron capture in the r-process of nucleosynthesis. However considerable uncertainties in our understanding of the r-process remain, both in the astrophysical site where it occurs and in the nuclear physics of the thousands of unstable nuclei that participate. An often-discussed possibility for the astrophysical site is that of the neutrino-driven wind within a core-collapse supernova; here we discuss aspects of this environment along with an alternate or additional site--hot accretion disk outflows from a black hole-neutron star merger. On the nuclear physics side, the importance of experimental data for and reliable theoretical estimates of nuclear masses and beta decay rates has long been recognized, while neutron capture rates have so far received less attention. Here we discuss how individual neutron capture rates can impact the global r-process abundance pattern.

Nuclear Seminar

All interested persons are cordially invited to attend.