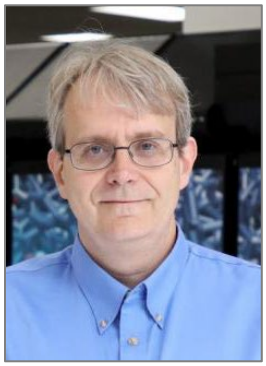
College of Natural Sciences & Mathematics
UNIVERSITY OF DENVER

Physics & Astronomy Colloquium

October 22, 4:00pm, Olin 105



Dr. W. Raphael Hix

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Department of Physics and Astronomy

The Multi-Dimensional Character of Core-Collapse Supernova Nucleosynthesis

Observations of supernovae and their remnants reveal highly aspherical distributions of the newly-formed elements that are the dying stars' contributions to the interstellar medium. Modern simulations of the supernova's neutrino-powered central engine reveal that these inhomogeneities originate in the first seconds of the explosions and grow as the supernova ejecta propagates through the outer layers of the star. We will highlight recent simulations, combining high fidelity treatments of the neutrino field that drives the explosion, the multi-dimensional fluid flow that taps this energy source and the thermonuclear kinetics responsible for the composition of the ejecta, revealing the multi-dimensional character of core-collapse supernova ejecta. We will also discuss how these multi-dimensional simulations challenge of our current, largely spherically-symmetric, understanding of nucleosynthesis is Core-Collapse Supernovae.

Bio: Raph Hix is a computational nuclear astrophysicist whose research interest is cosmic nucleosynthesis in all its forms. This has taught him much about how stars live, die and are sometimes reborn. His publications touch on core-collapse and thermonuclear supernovae, neutron star mergers, novae, X-ray bursts and the Big Bang.