Colloquium

Core Collapse Supernovae and Their Nucleosynthesis

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Wednesday, January 15 ◆ 4 P.M.

Room 118 Nieuwland Science Hall

Refreshments @ 3:30 in 202 NSH

Core-collapse supernovae, the culmination of massive stellar evolution, are among the brightest and most powerful explosions in the universe and are the principle actors in the story of our elemental origins. Our developing paradigm for the initiation of a core-collapse supernova reveals a supernova shock that stalls for hundreds of milliseconds before reviving. Though brought back to life by neutrino heating, the development of the supernova is inextricably linked to three dimensional fluid flows, with large scale hydrodynamic instabilities allowing successful explosions that spherical symmetry would prevent. Unfortunately, our understanding of the nucleosynthesis that occurs in these explosions, and their impact on galactic chemical evolution, is based on spherically symmetric simulations with parameterized explosions, ignoring much that we have learned about the central engine of these supernovae over the past two decades. I will present recent results from two and three dimensional simulations of core-collapse supernovae using the CHIMERA code and discuss how the multi-dimensional character of the explosions directly impacts the nucleosynthesis and other observables of core-collapse supernovae.