Astrophysics Seminar

TUESDAY

NOVEMBER 17

12:30 P.M.

RM 184 NSH

Simulations of Supernovae and Their Massive Star Progenitors in 3D

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Core-collapse supernovae are the luminous explosions that herald the death of massive stars. While core-collapse supernovae are observed on a daily basis in nature, the details of the mechanism that reverses stellar collapse and drives these explosions remain unclear. While the most recent high-fidelity simulations show promise at explaining the explosion mechanism, there remains tension between theory and observation. This is likely telling us we are missing important physics in our simulations. I will discuss some interesting candidates for such missing physics that could be crucial to the supernova mechanism. In particular, I will describe our efforts to develop more realistic initial conditions for supernova simulations with fully 3D massive stellar evolution calculations. Such realistic 3D initial conditions turn out to be favorable for successful explosions, in large part because they result in stronger turbulence behind the stalled supernova shock. I will also discuss the important role turbulence is playing in the supernova mechanism and what might be required for accurately modeling the turbulence in our simulations.