



Department of Physics Colloquium

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3:00 PM

Modeling Exploding Stars

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Stellar evolution is driven by the changing composition of a star from nuclear reactions. At the late stages of evolution and during explosive events, the reactive timescale can be short and drive strong hydrodynamic flows. Modeling these events is challenging — multi-dimensional, multiphysics algorithms that run efficiently on modern supercomputers are needed. I will describe some of the challenges we face and how we've overcome them in our open source AMReX-Astrophysics simulation suite. Examples of X-ray bursts, double detonation models for thermonuclear supernovae, and the late stages of massive star evolution will be shown.

Developing simulation codes requires the union of astrophysics, applied math, fluid dynamics, combustion physics and more, which presents a steep learning curve for new students. I will conclude my talk by describing some resources we've made to help train students in computational astrophysics and high performance computing.

This colloquium will be held in-person, in SERC 116