The Department of Mechanical Engineering
College of Engineering and Applied Sciences
Stony Brook University

SEMINAR

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Capturing the Fire: Modeling Combustion in Astrophysics

Friday, April 15, 2022 at 1:00pm, Room 173 Light Engineering Building

Zoom Link for those who cannot attend in person:

https://stonybrook.zoom.us/j/96161025633?pwd=cjlQbVhBWnZpbzY1ektFVno5YmEwUT09

Meeting ID: 961 6102 5633; Passcode: 145261

Abstract

Many explosive astrophysical events are powered by rapid thermonuclear burning and the outcome of an eve
distribution of nuclides in the remnant, depends sensitively on the details of this burning. I will describe our effo
combustion in the context of one class of astrophysical events, thermonuclear (type Ia) supernovae. I will brie
supernovae, present our method for modeling subsonic convection in the "smoldering" progenitor star, and pr
capturing scheme for modeling the explosion. I will describe how the scheme includes the effects of fluid instab
turbulence, and the evolution of the dynamic ash in nuclear statistical equilibrium. I will also describe our post-
to obtain detailed composition by integrating density and temperature histories of Lagrangian tracer particles.

Biography

After an MS in Physics from Clemson University, Alan Calder completed his PhD in Physics at Vanderbilt Univ
at the National Center for Supercomputing Applications (University of Illinois) and then a postdoc and researc
University of Chicago. He came to Stony Brook in 2007 as part of a cluster hire of computational scientists for
Institute for Advanced Computational Science at SBU. His research is in nuclear astrophysics and he is also in
and validation methods for codes and simulations of multi-physics problems such as those of astrophysic