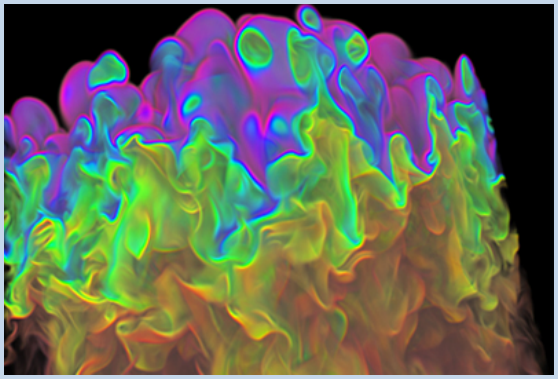
Testing Simulation Codes with Astrophysics

Research

Use weapons simulation codes to model supernovae observations.

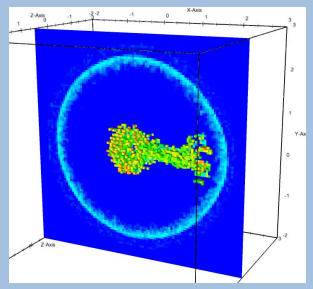


- Modern diagnostics of supernova are arguably better than NNSA Laboratory high energy density experiments
- Fundamental understanding of supernova requires modeling highly turbulent plasma with multiple nuclear reactions

Development

Software tested with supernova is now used extensively within the Los Alamos ASC program

- Past verification and validation efforts have trouble detecting issues that are at the 10-30% level for many mission problems
- Pushing to more extreme regimes allows us to more easily identify and fix code issues

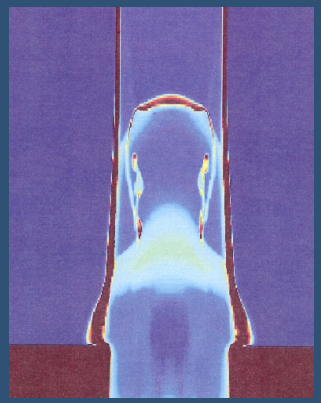


Modeling ^{44}Ti in Cassiopeia A Supernova

Nucleosynthetic yields and light-curves provide much needed data for NASA missions such as Swift and NUSTAR.

Mission Impact

ASC codes and physics are tested in very specific regimes - minor problems in one regime may be critical in others.



Modeling tools and nuclear cross-section measurements are building capabilities needed for nuclear energy and nuclear forensics

Extensive recruitment of technical staff into nuclear design divisions at Los Alamos.