

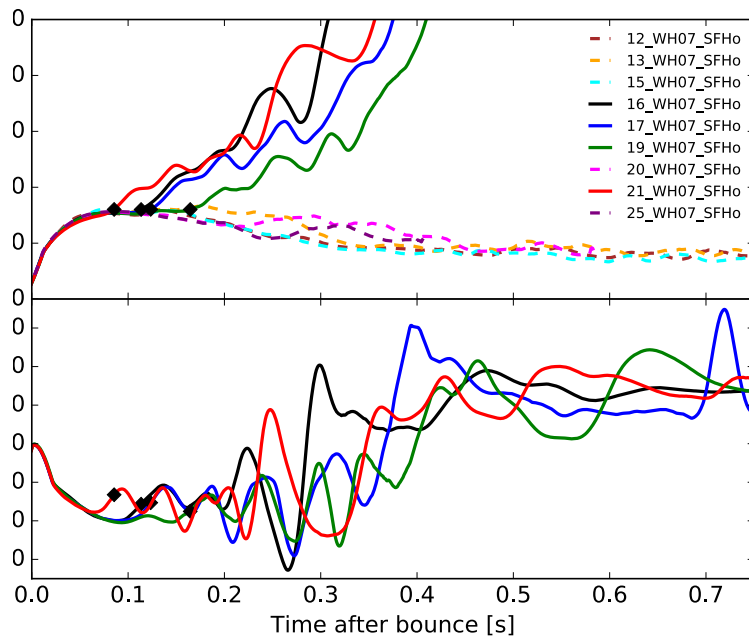
Princeton: Crucial Physics of CCSN

Objectives

To understand the sensitivity of core-collapse supernova explosions to the neutrino and nuclear EOS microphysics.

Impact

Exploring such sensitivities reveals the physics inputs on which to concentrate to accelerate understanding of the explosion mechanism and signatures.



Accomplishments

We have determined that near criticality there is enhanced sensitivity to various neutrino-matter couplings. Such sensitivity is manifest only in multi-D simulations, once again emphasizing the crucial role of neutrino-driven turbulence in the supernova phenomenon. Moreover, we have determined through this study that the differences seen by various theoretical groups is explained by the sensitivity revealed and that, as a consequence, their results are actually closer to one another than it might have appeared.

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Toward Exascale Astrophysics of
Mergers and Supernovae