Abstract Submitted
for the APR09 Meeting of
The American Physical Society

Simulations of Supernova Shock Breakout LUCILLE FREY, CHRIS FRYER, AIMEE HUNGERFORD, LANL — As the radiation-dominated shock wave from core collapse approaches the stellar surface, or the edge of a dense stellar wind, the optical depth of the plasma ahead of the shock decreases until radiation escapes in a burst. This shock breakout (SBO) burst occurs days or weeks before the optical light from radioactive decay peaks and can be used to determine the radius of the progenitor star or its recent mass loss history. Several recently observed X-ray and UV bursts associated with supernovae have been interpreted as shock breakout (SBO) observations, though this interpretation is still being debated. We use a radiation-hydrodynamics code with adaptive mesh refinement to follow the motion of the radiation-dominated shock through SBO with high resolution. We run a suite of one dimensional simulations using binary and single progenitors with a range of explosion energies, wind velocities and mass loss histories, allowing us to compare shock interactions with the stellar atmosphere, wind and previously ejected shells. These simulations will better constrain the properties of the progenitor star and its environment that can be derived from SBO observations.

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Date submitted: 09 Jan 2009 Electronic form version 1.4