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The Most Powerful Stellar Explosions[1] KE-JUNG CHEN, University of Minnesota, ALEXANDER HEGER, Monash University, STAN WOOSLEY, UCSC, ANN ALMGREN, WEIQUN ZHANG, LBNL — We present the results from our 3D simulations of thermonuclear supernovae from the stars with initial masses above 80 solar masses by using CASTRO, a new, massively parallel, multidimensional Eulerian, adaptive mesh refinement (AMR), radiation-hydrodynamics code. We first use Kepler, a one-dimensional spherically-symmetric Lagrangian code to model the possible explosions beyond hypernovae. These extreme explosions include two types of electron/positron production instability supernovae and one type of general relativity instability supernovae. The resulting 1D presupernova profiles are mapped onto 3D grids of CASTRO as initial conditions. We simulate the explosion in 3D and resolve the emergent fluid instabilities. In this talk, we will discuss the energetics, nucleosynthesis, and possible observational signatures of these supernovae.

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Ke-Jung Chen
University of Minnesota

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