

Abstract Submitted  
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**Catching the First Cosmic Explosions: Explosion and Mixing of Pair-Instability Supernovae** KE-JUNG CHEN, UC Santa Cruz, ALEXANDER HEGER, Monash University, STAN WOOSLEY, UC Santa Cruz — We present multidimensional simulations of the thermonuclear supernovae from massive primordial stars. Numerical and theoretical study of the primordial star formation in the early Universe suggest that these stars could have been very massive. Primordial stars with initial masses of 150-260 solar masses may have died as energetic thermonuclear supernovae, so-called pair-instability supernovae (PSNe). We model the explosion of PSNe by using a new radiation-hydro code, CASTRO and find the fluid instabilities driven by nuclear burning and hydrodynamics during the explosion. For red supergiant models, amplitudes of these instabilities are sufficient to break down the spherical symmetry of the supernova ejecta.

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