

Core-collapse supernovae: 3D MHD simulations and multi-messenger signals

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Systematic studies of core-collapse supernovae have been conducted based on hundreds of one-dimensional artificial models (O’Connor & Ott 2011,2013; Ugliano et al. 2013, Ertl et al. 2015) and two-dimensional self-consistent simulations (Nakamura et al. 2015;2019, Burrows & Vartanyan 2020). We have performed three-dimensional core-collapse simulations for 16 progenitor models covering ZAMS mass between 9 and 24 solar masses. Our models show a wide variety of shock evolution and explosion energy, as well as multi-messenger signals including neutrinos and gravitational waves. We present the dependence of these explosion properties on the progenitor structure.

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