Long-time simulations of core-collapse supernovae

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Core-collapse supernovae (CCSN) are one of the most energetic events in the universe. They provide conditions extreme enough to produce elements up to silver, and maybe heavier. Numerical simulations of these events are essential to understand the conditions that are relevant for nucleosynthesis, where especially the late-time evolution of the explosion (up to several seconds after bounce) plays an important role.

We perform a systematic study of the impact of neutrinos and rotation on the long-time CCSN evolution, following the shock expansion up to five seconds after bounce. Our results indicate that rotation impacts mass accretion rates and reduces neutrino luminosities, as suggested in previous studies. This has an important impact on the ejected matter and its nucleosynthesis. Moreover, our broad study based on over 20 two-dimensional simulations, provides unique new information of supernova nucleosynthesis and uncertainties.

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