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Core-collapse supernova simulations based on the new HWS EOS

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The equation of state (EOS) of dense matter plays a key role in the evolution of the proto-neutron star (PNS) and the dynamics of the core-collapse supernova (CCSN) explosion. We present new EOS tables based on the model of Huth et al (2021), that consider constraints from nuclear theory calculations, experiments, and astrophysical observations. In this study, we systematically vary nuclear matter properties and study their impact on CCSN simulations. We show the effects of considering the new, density-dependent, effective mass functional, which governs the thermal nucleonic part of the EOS, that has a big impact on the PNS contraction and therefore on the CCSN explosion. In addition, we investigate the impact of cold nuclear matter properties, within their constraints, on CCSN simulations.

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