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Core-collapse supernova yields in galactic chemical evolution

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The amount and composition of matter ejected in core-collapse supernovae (CCSNe) are key uncertainties in models of galactic chemical evolution (GCE). Extensive grids of stellar models with varying mass and metallicity are needed. Although 3D simulations of stellar evolution and CCSNe have recently become available, the large computational cost only allows large sets of simulations under the assumption of spherical symmetry. In this study, we simulate the collapse and explosion of 67 massive stars with zero-age main sequence masses between 11 and 75 solar masses and three different metallicities. Our CCSN simulations include a self-consistent treatment of the proto-neutron star with a naturally evolving mass cut between remnant and ejecta. We provide nucleosynthesis results from an in-situ nuclear reaction network and use them as input for a GCE model of the Milky Way. This self-consistent chain allows for the exploration of uncertainties and comparison of the results to observations. With this study, we want to encourage the communities of stellar evolution and supernova simulations to use the latest advances in the respective fields to provide information useful for GCE models.

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