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PUSHing Core-Collapse Supernovae to Explosions in Spherical Symmetry: Explodability and Nucleosynthesis Yields[1] SANJANA SINHA, North Carolina State University, KEVIN EBINGER, University of Basel, CARLA FROHLICH, North Carolina State University, ALBINO PEREGO, TU Darmstadt, MATTHIAS HEMPEL, MATTHIAS LIEBENDOERFER, F.-K. THIELEMANN, University of Basel — Core-collapse supernovae (CCSNe) are the highly energetic deaths of massive stars. They play a vital role in the synthesis and dissemination of many chemical elements. CCSN nucleosynthesis calculations have previously relied on artificial explosion methods that do not adequately capture the physics of the innermost stellar layers. Multidimensional simulations currently being performed to fully unravel the explosion mechanism of CCSNe are very computationally expensive. The PUSH method, calibrated against SN1987A, provides parametrized spherically symmetric models that follow the consistent evolution of the proto-neutron star as well as the electron fraction of the ejecta. This method is computationally affordable and captures the physics relevant for nucleosynthesis calculations. Here, we present the results of a broad study that investigates the explodability and nucleosynthesis yields of progenitors covering a wide range of ZAMS masses. Comparisons of the predicted explosion properties and yields with observational CCSNe and metal-poor star data will also be presented. The complete set of nucleosynthesis yields will be a valuable input to models of galactic chemical evolution.

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