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Towards Modeling Self-Consistent Core Collapse Supernovae MEREK CHERTKOW, W. RAPHAEL HIX, Oak Ridge National Lab & University of Tennessee Knoxville, STEPHEN BRUENN, Florida Atlantic University, ERIC LENTZ, Oak Ridge National Lab, JOHN BLONDIN, North Carolina State University, O.E. BRONSON MESSER, Oak Ridge National Lab, CHING-TSAI LEE, University of Tennessee Knoxville, ANTHONY MEZZACAPPA, Oak Ridge National Lab, PEDRO MARRONETTI, KONSTANTIN YAKUNIN, Florida Atlantic University — Core-collapse supernovae (CCSN) are multi-dimensional events and the codes we develop to model them must follow suit. Our group at the Oak Ridge National Lab has successfully generated self-consistent explosions in 2D of 12-25 solar mass stars using our code CHIMERA. This code is made up of three essentially independent parts designed to evolve the stellar gas hydrodynamics (VH1/MVH3), the "ray-by-ray-plus" multi-group neutrino transport (MGFLD-TRANS), and the nuclear kinetics (XNET). Incorporation of passive tracer particles, for post-processing nucleosynthesis, allows us to explore effects that stem from anisotropies, instabilities, and mixing. An extension of our alpha-nuclear network to 150 species, has enabled us to identify nuclear processes such as the nu-p process and better follow the neutronization during the explosion. These advances also allow us to investigate lower mass limit O-Ne-Mg CCSN and possible sites for the production of weak r-process elements. In this poster, we will present results of these efforts.

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