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Self-Consistent Simulations of Accretion-Induced Collapse of White Dwarfs IO KLEISER, CHRISTIAN OTT, ERNAZAR ABDIKAMALOV, Caltech, EVAN O'CONNOR, CITA — Accreting white dwarfs and white dwarf mergers are commonly thought to end in thermonuclear explosions that produce Type Ia supernovae (SNe Ia). However, there is an alternative outcome for these systems that has not been theoretically explored as thoroughly, nor has it been securely identified observationally. Some white dwarfs, rather than exploding, should undergo electron capture and collapse to neutron stars. This accretion-induced collapse (AIC) scenario is expected to be intrinsically rare compared to SNe Ia, and past studies indicate that the associated optical transient would be faint and short-lived, near the detection limits of current surveys. However, until now there have not been self-consistent numerical studies of AIC that examine the explosion dynamics, subsequent evolution, and all resulting observables. We use GR1D, a one-dimensional general-relativistic hydrodynamics code, to follow AIC through collapse, core bounce, explosion, and shock breakout and to present new results on its neutrino signature and nucleosynthetic yields. This study is preliminary to the goal of developing fully self-consistent three-dimensional models that will yield predictions for electromagnetic, neutrino, and gravitational-wave signals form AIC events.

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