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Neutrino Signals From Accretion-Induced Collapse of White Dwarfs

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About 90% of stars end up as white dwarfs, and there should be about 10 billion white dwarfs in the Milky Way alone. It is well-known that a white dwarf reaching the Chandrasekhar limit of about 1.4 solar masses may undergo a thermonuclear explosion (type Ia supernova). However, it may also go through the Accretion-Induced Collapse (AIC) due to electron capture by neon and magnesium at its core. We perform neutrino radiation hydrodynamic simulations of AIC. A proto-neutron star forms after the core bounce, and a very bright neutrino burst comparable to that of a core-collapse supernova is emitted. There has been no confirmed observation of AIC yet. However, The upcoming multi-messenger observations, especially neutrino detections, offer great opportunities to study AIC with unprecedented details.

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