Abstract Submitted
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Black Dwarf Supernova in the Far Future MATT CAPLAN, Illinois State University — In the far future the universe will be populated by sparse degenerate remnants, mostly white dwarfs (WDs), though their ultimate fate is an open question. These WDs will cool and freeze solid into 'black' dwarfs while pycnonuclear fusion will slowly process their composition to iron-56. However, due to the declining electron fraction the Chandrasekhar limit of these stars will decrease down to about $\sim 1.2 M_\odot$, so WDs with masses between 1.2 and 1.4 $M_\odot$ will collapse in the far future due to the slow accumulation of iron-56 in their cores. If proton decay does not occur then this is the ultimate fate of about one percent of all stars in the observable universe. We present calculations of the internal structure of black dwarfs with iron cores as a model for progenitors. From fusion rates we estimate their lifetime and thus delay time to be 10^{1100} years. We speculate that high mass supernovae resemble accretion induced collapse of O/Ne/Mg WDs while later low mass transients will be similar to stripped-envelope supernova, and may be the last interesting astrophysical transients to occur prior to heat death. Though there are few observational consequences, this result may be of popular interest and motivates the study of far future WD evolution.

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