

Neutrinos from Beta Processes in Presupernovae

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We present calculations of the neutrino emissivities and energy spectra from massive stars in the lead up to their explosion as supernovae (presupernovae). Results from the stellar evolution code MESA are used to calculate the neutrino emissivity due to thermal and beta processes. In particular, the beta processes are modeled in detail using a network of 204 isotopes. We show that the contribution of beta processes is substantial, especially in the high energy tail of the spectrum, at $E > 3\text{-}4$ MeV. For a star at $D = 1$ kpc, we find that a 17 ton liquid scintillator detector would observe several tens of events from a presupernova.

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