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Axion effect on the minimum stellar mass that experiences central carbon burning

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We study the effect of axions in the evolution of stars that are close to the minimum stellar mass that experiences central carbon burning, called Mup. This mass limit is a fundamental property in astrophysics as it defines which stars end their evolution as carbon-oxygen white dwarfs (CO WDs) and which ones as oxygen-neon white dwarfs, electron-capture supernovae and normal core collapse supernovae (CCSNe).

We consider DFSZ axions produced by Primakoff, Compton and Bremsstrahlung processes, adopting for the coupling constants to photons and electrons a set of values from zero (no axions) to maximum values that take into account updated constraints derived from Globular Cluster properties, as the luminosity of the RGB tip and the R parameter.

Our results show that axions may increase Mup to values that are in tension with the observationaly derived minimum mass of CCSNe progenitors and with the maximum stellar mass
that produces a CO WD.

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