

Probing Heavy Dark Matter in Red Giants

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Red giants (RGs) efficiently capture dark matter (DM) through elastic scattering with stellar nuclei. Once accumulated in the helium core, the DM population can become self-gravitating and collapse, injecting energy through scattering and (when relevant) delayed annihilation. This localized heating can trigger a premature helium flash, reducing the luminosity at the tip of the RG branch. By requiring consistency with observed RG luminosities, we derive constraints on heavy DM, finding sensitivity to masses around 10^{11} GeV and spin-independent cross sections near 10^{-37} cm, comparable to leading direct-detection limits.

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