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Improving constraints on asymmetric dark matter from neutron stars

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Fermionic asymmetric dark matter (ADM) can be captured in neutron stars (NS) via scatterings with the neutron star material. The absence of DM annihilations due to their asymmetric nature would thus lead to their accumulation in the NS core, which can exceed the Chandrasekhar limit to collapse into a black hole (BH), and provide exclusion limits from observations of neutron stars today. We compute the most up-to-date constraints on the ADM scattering rate and mass for a class of fermion DM models using improved capture, thermalization, BH accretion and evaporation rates, discussing the caveats and issues with approximations and assumptions used in the literature to derive these bounds. Our results show that some of the bounds can be significantly relaxed.

Secondary track

T01 - Astroparticles, Gravitation and Cosmology

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