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JUNO sensitivity to resonance-enhanced MeV dark matter annihilation in the galactic halo

Friday, 27 June 2025 14:00 (30 minutes)

JUNO sensitivity to the annihilation cross section of MeV dark matter (DM) into neutrinos in the galactic halo (A. Abusleme *et al.* [JUNO], JCAP **09**, 001 (2023)) constrains the DM-extended $U(1)_{L_\mu - L_\tau}$ model, characterized by the Z' boson with mass $m_{Z'}$, the coupling $g_{Z'}$ between Z' and the second and third generations of leptons, and the coupling g_χ between DM and Z'. Focusing on light DM with masses below 100 MeV, we study the annihilation channel $\chi\chi \to Z' \to \nu_{\mu,\tau}\bar{\nu}_{\mu,\tau}$ in the galactic halo with $m_{Z'} \approx 2m_\chi$. We impose the condition that the DM relic density matches the observed value $\Omega_\chi h^2 = 0.12$, which fixes the value of $\langle\sigma v\rangle$ in the early universe. Under this condition, we predict the value of resonance-enhanced $\langle\sigma v\rangle$ in the present-day universe as a function of the coupling product $g_{Z'} \cdot g_\chi$. We discuss the possibility of testing this resonance-enhanced annihilation by JUNO detector.

Please choose your topic

Dark Matter

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