

Subleading Corrections to Heavy Higgsino and Wino Direct Detection

In the heavy WIMP limit, the cross sections for Higgsino-like particles scattering on nucleons is severely suppressed by an amplitude level cancellation, making it important to assess the impact of formally subleading effects. The power correction of order m_W/M to the heavy WIMP limit is computed for general electroweak doublet dark matter candidates, and a model of nuclear modifications to the free nucleon cross section is evaluated. The direct detection signal in the pure Higgsino limit remains below neutrino backgrounds for WIMPs in the TeV mass range. Corrections to the pure Higgsino limit are parameterized by a single parameter in the heavy WIMP expansion through $\mathcal{O}(1/M)$. Conditions on this parameter to yield significant cross section enhancements are investigated. Nuclear corrections are applied also to the heavy Wino case, completing the investigation of combined subleading effects from perturbative QCD, $1/M$ power corrections, and nuclear modifications.

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Session Classification: New Physics & Multi-messenger