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Halo-independent bounds on the non-relativistic effective theory of WIMP-nucleon scattering from direct detection and neutrino observations

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I will discuss about the halo-independent bounds on the WIMP-nucleon couplings of the non-relativistic effective Hamiltonian that drives the scattering off nuclei of a WIMP of spin $1/2$. We will see that for most of the couplings the degree of relaxation of the halo-independent bounds compared to those obtained assuming the Standard Halo Model is with few exceptions relatively moderate in the low and high WIMP mass regimes, while in the intermediate mass range it can be larger. An exception to this general pattern, with more moderate values of the bound relaxation, is observed in the case of the spin-dependent type WIMP-proton couplings, for which WIMP capture in the Sun is strongly enhanced due to the WIMP scatterings off Hydrogen, the most abundant element in the Sun. Within this class of operators the bound relaxation is particularly small for interactions that are driven by only the velocity-dependent term, for which the solar capture signal is enhanced because of the high speed of scattering WIMPs in the strong gravitational field of the Sun.

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