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Halo-independent bounds of WIMP-nucleon couplings from direct detection and neutrino telescope observations

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I will discuss the halo-independent bounds on the WIMP-nucleon couplings of the non-relativistic effective Hamiltonian that drives the scattering process off nuclei of a WIMP of spin 1/2 combining direct detection experiments and neutrino telescopes data in order to cover the full WIMP incoming speed range.

In the elastic interactions, for most of the couplings the degree of relaxation of the halo-independent bounds compared to those obtained with the Standard Halo Model is relatively moderate in the low and high WIMP mass regimes while in the intermediate mass range it can be large. An exception with moderate bounds at all WIMP masses is observed in the case of several WIMP-proton couplings that depend on the nuclear spin and on the WIMP incoming velocity.

In the case of inelastic scattering, I show that a non-vanishing mass splitting modifies incoming WIMP speed range and that for particular combinations of WIMP mass and mass splitting the complementarity between two detection techniques is lost. In low-mass regime the neutrino telescope bound is sufficient alone to provide a halo-independent constraint. On the other hand at large WIMP masses the halo-independent bound is given by a combination of two kinds of experiments.

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