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Searching for Secluded Dark Matter with Present and Future Gamma-ray Observatories

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The true nature of the largest matter density component of the Universe, the so-called dark matter, is one of the most elusive problems of Physics. One primary candidate to explain dark matter are Weakly Interacting Massive Particles (WIMPs), as they provide the right relic density with a cross-section at the electroweak scale, however, up-to-date no WIMP signals were observed until now. Secluded models are good alternatives to the standard ones. In this case, instead of a direct annihilation to the standard model (SM) particles, the dark matter annihilates into mediators which subsequently decay into SM particles. In this way, secluded models may avoid the stringent limits from direct searches, and, at the same time, be probed by indirect detection experiments. In this talk, we will present the sensitivity of several gamma-ray instruments (current and future), including Fermi-LAT, H.E.S.S., CTA, and SWGO, to secluded dark matter annihilations in several targets, such as the inner galactic halo, dwarf spheroidal galaxies and the sun, covering a wide range dark matter masses, from tens of GeV to hundreds of TeV. In particular, the combination of present and future observatories will be able to probe cross-sections below the thermal relic value for dark matter particles in the whole mass range between 100 GeV and 100 TeV or between 100 GeV and ~ 40 TeV depending on the annihilation channel.

Collaboration name

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