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Solar γ -rays as a Complementary Probe of Dark Matter

We show that observations of solar γ -ray fluxes offer a novel probe of dark matter, in scenarios where interactions with the visible sector proceed via a long-lived mediator. As a proof of principle, we demonstrate that there exists a class of models which yield solar γ -ray lines observable with the next generation of γ -ray telescopes, while being allowed by a large variety of experimental constraints. Our results suggest that fluxes of solar γ -ray lines can be up to two orders of magnitude higher than the ones from the galactic center, and are subject to very low backgrounds. Solar γ -ray observations are complementary to the future direct/indirect dark matter detection efforts, especially when dark matter capture and annihilation in the Sun happen out of equilibrium.

Experimental Collaboration

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