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Non-perturbative effects in indirect detection of dark matter with (pseudo)-scalar interactions

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Indirect detection is one of the most powerful methods to search for annihilating dark matter (DM) covering a broad range of masses and interactions. Recently, non-perturbative effects have been shown to significantly alter model observables. In this work, we investigate the impact of non-perturbative effects in the indirect detection of DM. For this purpose we utilize a minimal model consisting of a fermionic DM candidate in the TeV mass range that interacts via scalar- and pseudo-scalar interactions with a massive scalar mediator mixing with the Standard Model Higgs. The scalar interaction induces an attractive Yukawa potential between DM particles, such that DM annihilation is Sommerfeld enhanced, and DM bound states can form. We discuss the impact on indirect detection for a range of targets and derive bounds on the parameter space of the model.

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