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Dark bi-portals at direct detection

In the context of direct detection experiments, we consider the scenario where dark matter and Standard Model particles interact through two dark vector mediators, one light and one heavy with respect to the momentum transfer in the experiment. From such phenomenology interference effects arise at the level of scattering amplitudes, leading to novel shape features in the differential recoil spectra. We identify the region in parameters space for our model where such effects are dominant and show that high-resolution experiments with composite targets of large atomic mass differences are ideal to explore these scenarios. Using a profile likelihood approach we investigate published results by the CRESST-III experiment and projections of future sensitivities for the COSINUS experiment to constrain the parameter space in our model, thereby showing the potential of such an analysis on a class of dark matter models which exhibit non-standard features in the recoil spectra.

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