

Sub-GeV Boosted Dark Matter by Blazars

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As the WIMP paradigm for Dark Matter (DM) is increasingly challenged by the non detection of DM, this motivates the investigation of other DM mass ranges.

In the latest years the focus shifted towards the study of sub-GeV DM, which direct detection is limited by the low energy recoil that it imprints on nuclei. However, the assumption that it has a non zero interaction cross section with the Standard Model, implies that there is a component which is unavoidably up-scattered by high energy cosmic rays.

We consider blazars, AGN accelerating particles in two back-to-back jets, one of which closely aligned to our line of sight as sources of these cosmic rays.

We improve on the previous literature on blazar up-scattering by considering realistic, energy dependent dark matter-nucleon cross sections, including the contribution of inelastic scattering, and we study the recoil produced by DM on nuclei at present and future neutrino detectors, such as Super-K and DUNE.

For some of the possible mediators considered in our work, we set novel bounds on DM-nucleon cross section and we also discuss the role played by astrophysical uncertainty on DM distribution around blazars.

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