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Blazar-boosted dark matter: a cosmic accelerator for terrestrial dark matter detection

Tuesday 2 December 2025 10:40 (30 minutes)

After decades of not finding dark matter, we've gotten creative.

While liquid xenon detectors lead the direct search for 10-1000 GeV dark matter, sub-GeV dark matter particles from the local halo cannot transfer enough energy through nuclear scattering to be detected.

Blazars offer a solution. These supermassive black holes emit powerful particle jets directly toward Earth, and when dark matter from the blazar's host galaxy interacts with material in these relativistic jets, it gains sufficient kinetic energy to produce detectable recoils in xenon nuclei.

I will present the theoretical framework for blazar-boosted dark matter (BBDM) and report the first experimental constraints using XENONnT and LZ data.

We join the long tradition of not finding dark matter, but show that existing detectors can probe this new channel and constrain previously unexplored parameter space.

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