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Cosmic Ray Boosted Dark Matter at IceCube

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Cosmic ray (CR) upscattering of dark matter is one of the most straightforward mechanisms to accelerate ambient dark matter, making it detectable at high threshold, large volume experiments. In this work, we revisit CR upscattered dark matter signals at the IceCube detector, considering both proton and electron scattering, in the former case including both quasielastic and deep inelastic scattering. We consider both scalar and vector mediators over a wide range of mediator masses, and use lower energy IceCube data than has previously been used to constrain such models. We show that our analysis sets the strongest existing constraints on cosmic ray boosted dark matter over much of the eV - MeV mass range.

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