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Dark photons as boosted dark matter

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While most of dark matter needs to be cold and nonrelativistic, as we look at dark sectors, a subcomponent could be boosted. We have looked for indirect detection of boosted dark matter at intensity frontier experiments like Super-K, Hyper-K. We propose a simple scenario of looking for dark photons as the boosted subcomponent of dark matter. This can be used to place competitive constraints on a popular dark matter model, where dark matter is charged under a dark U(1) which kinetically mixes with the photon. We find that Xenon n-ton, Borexino and Super-K and can place very strong contraints on boosted dark photons which can compete with self interaction and direct detection bounds for dark photon mediator.

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