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Searching for Sub-GeV Dark Matter at Fixed Target Neutrino Experiments

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Low mass dark matter theories, if produced as a thermal relic in the early universe, must be accompanied by light mediators in order to obtain the dark matter abundance observed in the present day universe. These light mediators in turn provide a channel for the production of dark matter at high intensity fixed target neutrino experiments, producing a relativistic dark matter beam, which could then be detected by neutral-current-like interactions in neutrino detectors. The MiniBooNE experiment is now applying this technique by collecting data in beam dump mode for a period of several months (see arXiv.org/1211.2258 for more details). We present updated results from previous work on the sensitivity of fixed target experiments neutrino experiments to a dark sector possessing a vector mediator that is kinetically mixed with the photon (see arXiv.org/1107.4580 and arXiv.org/1205.3499), and show preliminary sensitivity of these experiments to a baryonically coupled dark sector (paper in preparation with B. Batell, D. McKeen, M. Pospelov and A. Ritz), which escapes many of the limits .

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