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Deeply Inelastic Dark Matter

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We examine the production of low mass dark matter particles at the fixed target on the NuMI beamline at Fermilab. Such particles can rescatter in the MINOS near detector producing neutral current-like events. In particular, we bound the couplings of GeV scale Dirac fermion WIMPs for the case that the WIMP-quark interaction is mediated by a (pseudo-)scalar or (axial-)vector which is lighter than the dark matter and compare these bounds to those from old beam dump experiments. We introduce a dipole model to allow the probing of very low mediator masses.

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