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DarkQuest: A dark sector upgrade to SpinQuest at the 120 GeV Fermilab Main Injector

Expanding the mass range and diversifying the techniques used in the search for dark matter is an important part of the worldwide particle physics program. Accelerator-based searches for dark matter and dark sector particles are a uniquely compelling part of this program as a way to both create and detect dark matter in the laboratory and to explore the dark sector by searching for mediators and excited dark matter particles. In this proposal, we present the upgrade of the SpinQuest nuclear physics detector at Fermilab with a refurbished electromagnetic calorimeter creating the DarkQuest Experiment. Once upgraded, the DarkQuest experiment will be a proton fixed-target experiment that will have the leading sensitivity to an array of visible dark sector signatures in the MeV-GeV mass range. By building on the existing accelerator and detector infrastructure, DarkQuest offers a powerful upgrade for a modest cost that can be realized on a short timescale.

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