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Shining (Dark)Light on Interactions with the Dark Sector

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Despite dark matter's existence and high abundance in our universe being well supported by cosmological evidence, our current understanding of it is limited due to the lack of observations of dark matter interactions on the particle scale. If and how the Standard Model interacts with the dark sector remains a major open question in particle physics. The DarkLight experiment attempts to reconcile the apparent disconnect between the two sectors through the search for a postulated particle, known as the dark boson, which would mediate interactions between the Standard Model and the dark sector. Based at the TRIUMF superconducting electron linear accelerator, DarkLight aims to produce Standard Model photons and dark bosons from the interaction between an energetic electron beam and a thin high Z target, then measure the momentum of the electron/positron pairs produced in the decay of these particles. By reconstructing the invariant mass of each electron/positron pair's parent particle, a bump hunt can be conducted on the invariant mass distribution. Specifically, DarkLight will be searching for a dark boson in the 10-20 MeV mass range. The DarkLight experiment will provide critical information to the global dark boson search by probing regions of parameter space yet-to-be explored by a lepton based experiment. This talk will discuss the status and upcoming milestones of the DarkLight experiment as the collaboration prepares for the first experimental run, set to take place this year. Particular focus will be given to the capabilities and utility of the DarkLight trigger system; a core responsibility of the Canadian branch of DarkLight.

Keyword-1

Dark matter

Keyword-2

Dark boson

Keyword-3

Trigger system

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