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Dark matter search in a Beam-Dump eXperiment (BDX) at Jefferson Lab

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The Beam Dump eXperiment (BDX) is an electron-beam thick-target experiment aimed to investigate the existence of Light Dark Matter (LDM) particles in the MeV-GeV mass range. The experiment has been recently approved by JLab Program Advisory Committee with maximum scientific rate. BDX is expected to run in a dedicated underground facility located ~ 20 m downstream of the JLab-Hall A beam- dump, receiving up to 10^22 electrons on target in ~ 1 year time. The detector consists of two main components: a CsI(Tl) electromagnetic calorimeter (Ecal) and a veto system used to suppress the background. The expected signature of the DM interaction in the Ecal is a ~ GeV electromagnetic shower paired with a null activity in the surrounding active veto counters. A complete small-scale prototype of the final detector has been constructed in order to validate the proposed technology and demonstrate the capability to reject the cosmogenic background. Beam-related background was estimated by means of Monte Carlo (MC) simulations. MC tools have been validated with on-site measurements of the muon flux produced by a 10.6 GeV e−beam impinging on the Hall-A dump, at the location of the proposed BDX facility. This talk will present an overview of the BDX experiment, its status and future perspectives.

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