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The BDX-MINI detector for Light Dark Matter search at JLAB

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The BDX-Mini experiment is the first electron beam-dump experiment specifically designed to search for Light Dark Matter (LDM) particles in the MeV-GeV mass range. BDX-Mini was exposed for about six months in 2019-2020 to weakly interacting particles (neutrinos and DM) produced by a 2.176 GeV electron beam incident on the beam dump of experimental Hall-A at Jefferson Lab. The detector, positioned 20 m downstream of the dump, is an electromagnetic calorimeter made by lead tungsten crystals for a total volume of 4 dm³. The calorimeter is surrounded by a multi-layer veto aimed to reject cosmic background: the innermost layer of the veto is made by a passive tungsten shielding, while the middle and outer layer are made by plastic scintillators to detect charged cosmic background particles. In addition to the veto system, the dirt between the dump and detector is sufficient to shield the detector from the beam-related background.

In this contribution I will describe the BDX-Mini detector and its excellent performance during a long LDM measurement campaign performed at JLab. Moreover I will show the data analysis technique used for LDM searches and finally I will show the obtained result.

Collaboration

BDX collaboration

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