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Status of the DarkMESA Experiment

At the Institute for Nuclear Physics in Mainz, the new electron accelerator MESA will be operational shortly. The high-power beam dump of the P2 experiment (150 MeV, 150 μA) is ideally suited for a parasitic dark sector experiment –DarkMESA.

The experiment is designed for the detection of Light Dark Matter (LDM), which in the simplest model couples to a massive vector particle, the dark photon γ'. It can potentially be produced in the beam dump by a process analogous to photon Bremsstrahlung and may then decay into Dark Matter (DM) particle pairs $\chi\bar{\chi}$. A fraction of them scatter off electrons or nuclei in the DarkMESA detectors.

This contribution discusses the extension of the simulation framework through the integration of additional models. The current status and first results of the Phase A setup will be shown. Beyond the use of a traditional calorimeter, the possibility of utilizing an opaque liquid scintillator for Phase B is under investigation. First simulation results, initial steps in prototype development, and exclusion limits obtained in co-operation with the NuDoubt^{++} collaboration are presented.

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