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The Light Dark Matter eXperiment

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The Light Dark Matter eXperiment (LDMX) proposes a high-statistics search for low-mass dark matter in fixed-target electron-nucleus collisions. Ultimately, LDMX will explore thermal relic dark matter over most of the viable sub-GeV mass range to a decisive level of sensitivity. To achieve this goal, LDMX employs the missing momentum technique, where electrons scattering in a thin target can produce dark matter via "dark bremsstrahlung" giving rise to significant missing momentum and energy in the detector. To identify these rare signal events, LDMX individually tags incoming beam-energy electrons, unambiguously associates them with low energy, moderate transverse-momentum recoils of the incoming electron, and establishes the absence of any additional forward-recoiling charged particles or neutral hadrons. LDMX will employ low mass tracking to tag incoming beam-energy electrons with high purity and cleanly reconstruct recoils. A high-speed, granular calorimeter with MIP sensitivity is used to reject the high rate of bremsstrahlung background at trigger level while working in tandem with a hadronic calorimeter to veto rare photonuclear reactions. This talk will summarize the small-scale detector concept for LDMX, ongoing performance studies, and near future prospects.

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