Abstract Submitted
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Preliminary Study of Multi-Electron Triggering in the Light Dark Matter eXperiment (LDMX)[1] MEGAN LOH, Stanford University — LDMX is a Stanford Linear Accelerator Center (SLAC) experiment designed to detect theoretical dark matter in the MeV to GeV mass range. The detector operates by shooting accelerated electrons through a target and measuring the momentum and energy loss after the electrons hit the target, aiming to capture energy loss due to dark bremsstrahlung. There are two main goals for the study, to optimize data collection in the trigger scintillator, and to explore the viability of multi-electron triggering. The incoming electron beam in the current design of the detector is characterized by a Poisson distribution of 1 electron incoming at a frequency of 35 MHz. Each event (electron hitting the target) includes 3.1 kilobytes of data. Recording all of the data from each event would cost 100 GB of data per second. Therefore, it is important to determine a cut-off point between the probable energy loss of a true dark bremsstrahlung event and energy loss from noise and background. The second part of the investigation is to explore multi-electron triggering: increasing the Poisson distribution of the incoming electron beam could increase the efficiency of the detector enormously, at the cost of potential overlaps in energy loss.

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