ECal Geometry for the Light Dark Matter eXperiment[1]

HONGYIN LIU, JOSEPH INCANDELA, AMINA LI, VALENTINA DUTTA, MATTHEW KILPATRICK, University of California, Santa Barbara, LIGHT DARK MATTER EXPERIMENT (LDMX) COLLABORATION — Dark matter – beyond standard model matter – could be a dark sector of particles. The Light Dark Matter eXperiment (LDMX) probes into the dark sector to identify particle dark matter in the sub-GeV mass scale. LDMX assumes the model of charged dark matter particles which interact under an EM-like force, described by U(1) symmetry and mediated by a dark photon. By aiming a 4-16 GeV electron beam at a fixed tungsten target, dark matter should be produced via a dark bremsstrahlung process. Along with machine learning techniques, the electromagnetic (ECal) and hadronic calorimeters reject background processes. The signal for dark matter will be a significant missing momentum signature, which can then be used to reconstruct information about the dark matter particles. We design the ECal to optimize its efficiency for rejecting background processes. This presentation will discuss the current stages of dark matter search, LDMX, and changes to the ECal geometry for better efficiency.

Hongyin Liu
University of California, Santa Barbara

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