

SES21-2021-000177

Abstract for an Invited Paper
for the SES21 Meeting of
the American Physical Society

Dark Matter at Accelerators - the Heavy Photon Search and the Light Dark Matter eXperiment

MATTHEW SOLT, University of Virginia

The constituents of dark matter are still unknown, and the viable possibilities span a very large mass range. Specific scenarios for a thermal origin of dark matter sharpen this mass range to within about an MeV to 100 TeV. Most of the stable constituents of known matter have masses in the MeV to GeV range, and a thermal origin for dark matter works in a simple and predictive manner in this mass range as well, yet it remains largely unexplored. Two complementary fixed target experiments that use a primary electron beam and have unique sensitivity to models of light DM in this mass range are the Heavy Photon Search (HPS) at Jefferson Lab and the planned Light Dark Matter eXperiment (LDMX) at SLAC. HPS searches for visibly decaying dark photons through two distinct methods—a resonance search in the $e+e-$ invariant mass distribution and a displaced vertex search for long-lived dark photons. LDMX searches for invisibly decaying dark photons through a missing-momentum experiment. This contribution will give an overview of the theoretical motivation, the main experimental challenges on LDMX and HPS and how they are addressed, the projected sensitivities in comparison to other experiments, and preliminary results of the HPS displaced vertex search for the 2016 Engineering Run.