

ABSTRACT FOR POSTER: HEAVY PHOTON SEARCH

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Evidence from cosmic rays and dark matter provides theoretical motivation for a massive gauge boson of a $U'(1)$ gauge symmetry outside the standard model, with very weak interaction with standard model particles through its kinetic mixing with the SM's photon. This hypothesized particle is called the “heavy photon” (abbreviated A'), due to analogy with the SM photon.

Our experiment seeks to produce this particle in a laboratory setting by striking a tungsten foil target with a continuous electron beam. In a process analogous to bremsstrahlung, a heavy photon may be produced in the scattering reaction, and would then decay into an e^+e^- pair, which would be detected by our detector. Our setup consists of a silicon vertex tracker surrounded by a large magnet for tracking the pair, as well as an electronic calorimeter for triggering. To find the A' signal amongst the much larger QED background, we use resonance search (bump-hunt) and displaced-vertex search techniques.

So far, we have taken data with two beam energies: 1.05 GeV during our 2015 engineering run, and 2.3 GeV in our 2016 production run. This poster describes the setup of our experiment and presents preliminary results for the two datasets, as well as projected reach for future running.