

Heavy Photon Search at Jefferson Lab

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A popular model for light (sub-GeV) Dark Matter (DM) is that its constituents belong to a Hidden Sector, uncharged under the Standard Model (SM) forces, and coupled to the SM through a new force carrier. In particular, theoretically well-motivated models propose the existence of a new U(1) light gauge boson, called the heavy (or dark) photon A' which kinetically mixes with the SM photon. The Heavy Photon Search (HPS) at the Thomas Jefferson National Accelerator Facility (JLAB, USA) has been primarily designed to search for electro-produced heavy photons decaying into electron-positron pairs. In HPS, experimental signatures of heavy photon decays are either the detection of displaced decay vertices or a resonant peak in the electron-positron invariant mass spectrum, depending on the heavy photon mass and the coupling strength. In this presentation, I will describe the design and performance of the HPS detector before presenting the results of the analysis of data collected during the 2016 engineering run. Additionally, I will talk about the status of the ongoing analysis of two additional, larger datasets from 2019 and 2021.

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