

# The Heavy Photon Search Experiment: Searching for Dark Photons at Jefferson Laboratory

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July 2, 2012

The Heavy Photon Search (HPS) is an experiment at Jefferson Lab which will search for heavy  $U(1)$  vector bosons in the mass range of  $20 \text{ MeV}/c^2$  to  $1 \text{ GeV}/c^2$ . These “heavy photons” or “dark photons” are expected on very general theoretical grounds and are motivated by recent astrophysical evidence suggesting they may mediate dark matter annihilations and/or interactions with ordinary matter. The dark photon couples to the ordinary photon through kinetic mixing which induces their weak coupling to electrons. Since they couple to electrons, dark photons are radiated in electron scattering and can subsequently decay to narrow  $e^+ e^-$  resonances which can then be observed above the dominant QED Trident background. For suitably small couplings, dark photons travel detectable distances before decaying, providing a second signature. Using Jefferson Lab’s high luminosity electron beam along with a compact large acceptance forward spectrometer, silicon vertex tracker,  $\text{PbWO}_4$  electromagnetic calorimeter and a muon detector, HPS will explore a large and unexplored domain in the mass/coupling plane with extraordinary sensitivity. In this talk, I will review the motivations driving the searches for dark photons and give an overview of the HPS experiment.