

## Resonance Search for a Heavy Photon with the Heavy Photon Search Experiment

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The Heavy Photon Search (HPS) experiment at Jefferson Lab is searching for a hypothetical new  $U(1)$  vector boson ("heavy photon", "dark photon" or  $A'$ ) in the mass range of 20–500 MeV/ $c^2$ . An  $A'$  in this mass region is natural in hidden sector models of light, thermal dark matter. The  $A'$  couples to the ordinary photon through kinetic mixing, which induces its coupling to electric charge. Since heavy photons couple to electrons, they can be produced through a process analogous to bremsstrahlung, subsequently decaying to an  $e^+e^-$ , which can be observed as a narrow resonance above the dominant QED trident background. For suitably small couplings, heavy photons travel detectable distances before decaying, providing a second signature. Using the CEBAF electron beam, located at the Thomas Jefferson National Accelerator Facility, incident on a thin tungsten target, along with a compact, large acceptance forward spectrometer consisting of a silicon vertex tracker and lead tungstate electromagnetic calorimeter, HPS can access unexplored regions in the mass-coupling parameter space.

HPS conducted successful engineering runs in 2015 using a 1.056 GeV, 50 nA beam and 2016 using a 2.3 GeV, 200 nA beam. This talk will present the results of a resonance search for a heavy photon using the 1165 nb $^{-1}$  (7.29 mC) of data collected during the 2015 engineering run.

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### Collaboration name

Heavy Photon Search

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