

# The HPS experiment at JLab

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Many beyond Standard Model theories predict a new massive gauge boson, aka “heavy” or “dark” photon, directly coupling to hidden sector particles with “dark” charge. These heavy photons are expected to mix with the Standard Model photon through kinetic mixing and therefore couple weakly to normal charge. The existence of this heavy photon could explain the discrepancy between the experimental and theoretical values for the muon’s anomalous magnetic moment, and the unexpectedly high ratio of positrons to electrons in high energy cosmic rays. If the heavy photon couples to charge, then it can be produced in fixed target experiments by electron “bremsstrahlung” and can decay to  $e^+e^-$  pairs. The Heavy Photon Search (HPS) experiment will search for the heavy photon in this way at the Thomas Jefferson National Accelerator Facility (JLab), in the mass range 20-1000 MeV/c<sup>2</sup> and coupling to electric charge  $a'/a$  in the range  $10^{-5}$  to  $10^{-10}$ . The HPS experiment will look for the  $e^+e^-$  decay channel by employing both invariant mass and secondary decay vertex signatures. The experiment utilizes a compact forward spectrometer, silicon microstrip detectors for vertexing and tracking, and a PbWO<sub>4</sub> electromagnetic calorimeter to trigger the experiment and identify electrons and positrons. The experimental setup and the results expected from the production runs foreseen in 2015 will be presented.