

# The Heavy Photon Search Experiment at Jefferson Lab

Sho Uemura  
SLAC National Accelerator Laboratory  
for the HPS Collaboration

## Abstract

The Heavy Photon Search (HPS) is a new experiment at Jefferson Lab searching for massive U(1) vector bosons (also known as heavy photons, dark photons, or  $A'$ ) of mass 20–1000 MeV that couple to electric charge with relative coupling  $\alpha'/\alpha$  of  $10^{-5}$ – $10^{-10}$ .

The HPS experiment is designed to produce heavy photons in a process analogous to bremsstrahlung using an electron beam on a fixed target, and detect decays to  $e^+e^-$  pairs with two signatures (invariant mass resonance and displaced decay vertex). The detector is a compact, large-acceptance forward spectrometer comprising a silicon microstrip tracker for momentum measurement and vertexing and an electromagnetic calorimeter for triggering on  $e^+e^-$ .

Precise beamline controls, high-rate trigger and DAQ, and good time resolution are needed for a detector that comes within 0.5 mm of the beam and is sensitive down to  $\pm 15$  mrad from the beam plane, and must cope with the intense beam background in this environment. A low-mass tracker and clean track reconstruction are needed for the best sensitivity.

This talk will describe the HPS experiment and its current status after test, commissioning, and engineering runs.