

The Heavy Photon Search Test Run

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The Heavy Photon Search (HPS) Test Run is the first stage of the HPS experiment which will search for massive vector gauge bosons (heavy/dark photons) in the mass range of 20-1000 MeV/ c^2 at Jefferson Lab. Dark photons are expected on very general theoretical grounds and may mediate dark matter interactions. The dark photon couples to electric charge through kinetic mixing with the photon, allowing its production through a process analogous to bremsstrahlung radiation. HPS will probe dark photons with relative couplings of $\alpha'/\alpha \sim 10^{-5}$ to 10^{-10} using a large acceptance forward spectrometer consisting of a silicon vertex tracker, lead tungstate electromagnetic calorimeter and muon detector to exploit this production mechanism and search for the e^+e^- or $\mu^+\mu^-$ decay of the dark photon via two signatures (invariant mass or displaced vertex). The HPS Test Run uses a simplified version of the full HPS detector to demonstrate the technical feasibility of the apparatus and confirm that the trigger rates and occupancies are well modeled. The design, performance, and results from the HPS Test Run are presented here.