PHYSICS SEMINAR

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The Search for the Dark Photon with HPS

Abstract

The Heavy Photon Search (HPS) experiment is based out of the Thomas Jefferson National Accelerator Laboratory in Newport News and is designed to test the potential existence of a new particle, the "heavy photon" or "A'," which has the potential to mediate between dark forces and the Standard Model. HPS is designed to detect the decay of an A' particle into e^+e^- pairs utilizing an electromagnetic calorimeter and generated using the Jefferson Lab high-luminosity electron beam incident upon a tungsten target.

In 2016, HPS collected 10.6 pb^{-1} of data and, using a resonance search analysis to search for excesses in the invariant mass spectrum of e^+e^- pairs detected by HPS apparatus, a mass range of 39 MeV to 180 MeV is searched for signs of the A'. HPS finds no statistically significant excess in the invariant mass spectrum, and establishes an upper limit to the coupling constant, ε^2, within the search mass range.

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