Vertex analysis of the 2015 Engineering Run with the SVT at 1.5 mm

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Abstract

The Heavy Photon Search experiment Engineering Run took data during the spring of 2015 at Jefferson lab with a 1.056 GeV electron beam at 50 nA incident on a 4 μm thick tungsten target. This note describes the analysis developed for searching for heavy photons with a detached vertex with the SVT at the nominal position (layer 1 at $\pm$0.5 mm above and below the beam) and requires tracks to have hits in the first layer of the tracker. All cuts and studies were done on 100% of the data so as to study backgrounds on the full data set. The purpose of this note is to establish the procedure and cuts, establish limits, and lay the framework for future vertex searches.

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A search for heavy photons with displaced vertices in the mass range between 20–70 MeV that decay to e^+e^- pairs was performed using the 2015 HPS engineering run. This analysis focused on events with tracks in the first layer of the SVT while the SVT was at the position of $\pm$1.5 mm above and below the beam line.

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