

# **$\beta$ -source Characterization and Limitations of Channeltron 4039**

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Radioactive sources and the devices which measure them are common tools in physics experimentation. One type of source,  $\beta$ -sources, emit electrons in an energy spectrum which is characteristic of its source isotope. This allows experimentalists to identify the composition of sources which has benefits in mass spectrometry, as well as in verifying the efficiency and validity of different types of detectors. This project aims to build a detector apparatus using a Channeltron 4039 electron multiplier (CEM) and use it for particle counting of  $\beta$ -sources. As a source emits an electron towards the CEM a voltage bias accelerates the electron along a dynode coated in an emissive layer. This causes a secondary cascade of approximately  $10^8$  electrons, which is detected as a current pulse. This can then be filtered and digitized into a spectrum using the emulation software Maestro. Detector setup and construction will be presented along with observations on spectrometry uses for the apparatus.