A Time-of-Flight System for Low Energy Charged Particles
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Motivation
Standard surface barrier detectors (SBD) cannot be used to measure energy spectra of keV range ions because these ions stop in the dead layer of the SBD. We have developed a system to calculate energy spectra by measuring the time-of-flight (TOF) spectrum of ions and have demonstrated proof-of-principle using MeV alpha particles from a 4.4 MeV Americium-241 source. This TOF spectrometer will be employed to study 15-30 keV backscattered ions from a duoplasmatron ion source.

TOF Spectrometer
Ions enter the TOF spectrometer and generate secondary electrons by passing through thin carbon films mounted on a -2.0 kV biased grid. The secondary electrons are collected using a channeltron electron multiplier (CEM) which generates start signal for a time to amplitude converter (TAC). A stop signal is generated by an identical arrangement downstream. For these tests an SBD is also installed at the end of the beam path to obtain energy spectra directly.

Varying Flight Path
The flight path was varied by adjusting the beamline.

Future Work
Future plans include investigations to improve the energy resolution for the TOF system. This system will be employed with the low energy duoplasmatron beam to study ions backscattered from various targets.

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