Abstract Submitted
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Developing a Time-of-Flight Spectrometer for Rutherford Backscattering Studies with Low Energy Ions[1] KURTIS FLETCHER, KALLAH EDDY, NOAH HELBURN, MATTHEW LEUNIG, ETHAN SMITH, STEPHEN PADALINO, SUNY Geneseo — A Time-of-Flight Spectrometer is being developed at the Low Energy Ion Facility at the State University of New York at Geneseo to perform surface analysis with low energy (25-50 keV) ions via Rutherford backscattering. The Time-of-Flight Spectrometer has been designed to measure the energy spectrum of elastically scattered helium ions or deuterons produced by a Peabody Scientific PS-100 Duoplasmatron ion source. Scattered ions pass through a biased 5 μg/cm^2 carbon foil, causing the foil to emit electrons, which are detected by a Channeltron electron multiplier (CEM), producing a start signal. The ions then propagate a certain distance, or flight path, before striking another CEM, producing a stop signal. The time between the start and stop signals is the time-of-flight for the ion. The modular design of the spectrometer allows one to modify the length of the ion flight path. The kinetic energy of 50 keV and 25 keV incident alpha particles has been measured for various targets, resulting in reasonable agreement with predicted values. Preliminary studies indicate that the count rate of the CEM detectors decreases as their temperatures increase; current work focuses on alleviating this problem to enable reproducible quantitative analysis of thin films and surfaces.

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