PROGRESS TOWARD IMPLEMENTATION OF AN ENERGY ANALYSIS SYSTEM

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Components of a system for measuring the intrinsic energy distributions in ion beams extracted from RIB sources and induced into the beam by sequential charge-exchange in the negative ion formation process have been manufactured, assembled, and installed in the beam-line of Target/Ion Source Test Facility I following the charge-exchange canal. The system, shown schematically in Fig. 1, is housed in a 0.61-m scattering chamber, located at a position immediately following the charge-exchange canal. Beams emanating from the canal will be deflected into a Faraday cup preceding a single-gap, retardation field where they will be retarded to energies between 125 eV and 250 eV before entering a parallel-plate energy- analyzer with energy resolution $\Delta E/E = 0.005$. The system, thus, will have capabilities of measuring energy spreads down to ~0.63 eV. Energy spectra will be derived by digitally varying the voltage of the top plate of the analyzer with a 12 bit DAC mounted at high voltage, controlled with a fiber-optic coupled power supply, located at ground potential. A commercially available multi-channel scaling analysis software package will be used to change the voltage and store energy spectra. Additional software has been written which provides timing signals for the data acquisition system through a counter/timer board. For a specified number of channels and sample dwell time, the board is programmed to provide a start pulse, a sample pulse-train and a stop pulse. The energy analysis system will be implemented this fiscal year to measure energy spreads of beams extracted from RIB sources, energy spreads induced in beams by the charge exchange process and to measure the intrinsic energy spreads of sputter ejected negative ion beams.

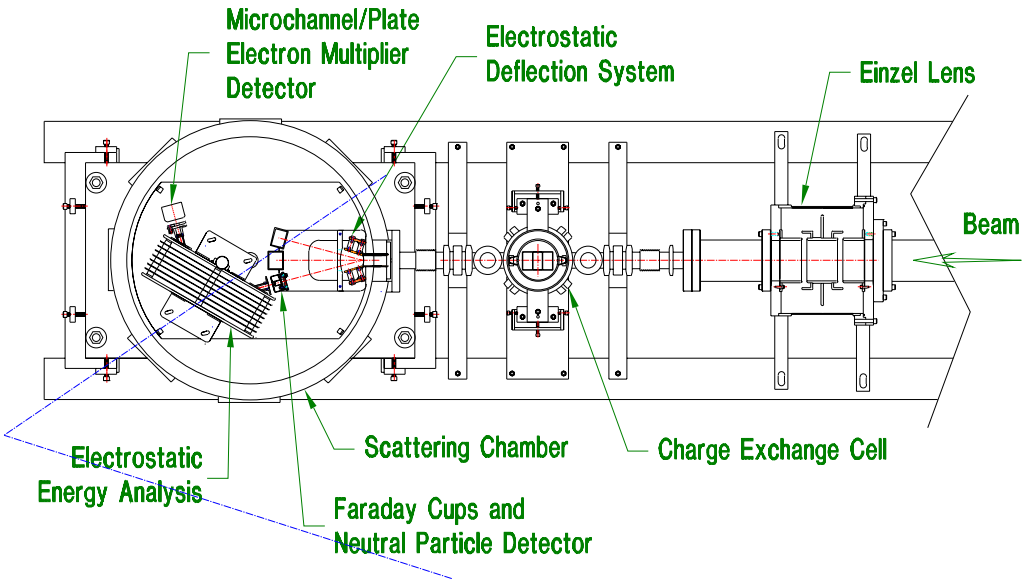

Fig. 1. Schematic layout for the energy analysis system installed at the ITISTF I for measuring the energy spreads in ion beams.

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