Contribution ID: **139** Type: **Poster (by default)**

Design and Evaluation of a Variable-Field Thomson Parabola for a keV Ion Beam

Avalanche Energy is developing deuterium ion beams for the Orbitron fusion concept. To understand the fusion output of the reactor, knowledge of the ion beam species and energy composition is paramount. We have successfully implemented a Thomson Parabola to determine the relative composition and energy spread of multiple species in the beam. To distinguish species within a wide range of masses and energies, we allowed for highly variable electric and magnetic field strengths. To this end, we used electromagnets with an iron core to vary the magnetic field. The iron core focuses and magnifies the field from the coils and doubles as electrodes for a potential difference up to 10 kV.
In this work, we discuss the design and implementation of this diagnostic. We illustrate a magnetic field calibration procedure and discuss requirements for the field strength and shape. We then mount it in the beam line with a downstream phosphor screen, multichannel plate and camera set up to determine beam deflection distance. We finally illustrate the analysis procedures and present results with simultaneous differentiation of D+, D2+, D3+ and Ar+ at energies from 8-12 keV.

Funding Agency

Email Address

shepner@avalanche.energy

I have read the Code of Conduct to attend ICIS2023.

Presenter if not the submitter of this abstract

Primary author: HEPNER, Shadrach (Avalanche Energy Designs)

Co-authors: LANGTRY, Robin (Avalanche Energy); SCHIPMANN, Scott (Avalanche Energy); PODOLSKY, Vladlen (Avalanche Energy)

Presenter: HEPNER, Shadrach (Avalanche Energy Designs)

Session Classification: Monday

Track Classification: Beam Formation, Extraction, Transport, and Diagnostics