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Trapping Secondary Electrons in ExB Drift for an Alpha Generating Penning Ion Source

A Penning Ion Source test stand has been developed by D-Pace to characterize alpha ion extraction from a helium discharge with variations in: extraction potential up to 15 kV, gas flow rate up to 30 sccm, and magnetic field confinement up to 1.1 Tesla. A brief summary of the Penning Ion Source design is described. Extraction of ions leads to severe sparking on the HV insulator due to ExB drifts of secondary electrons. This paper shows the design of two sets of electrodes which together trap most electrons moving towards this insulator due to ExB drifts. This eliminates the severe HV breakdown on the insulator and allows for a more robust operation of the ion source.

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