Contribution ID: **95** Contribution code: **WEP58**   Type: **Poster Presentation**

Structural design of the injection and extraction electrostatic septum of PREF

Wednesday 17 September 2025 17:00 (1 hour)

Proton Radiation Effects Facility (PREF) is a dedicated accelerator generating 10-60 MeV proton beams for studying space radiation impacts on satellites and optoelectronics. To achieve a compact and cost-effective synchrotron (circumference of 18 m), an electrostatic septum system was developed, delivering uniform fields of 72 kV/cm (injection) and 135 kV/cm (extraction) at 350 mm and 730 mm installation spacing, respectively, in a 1×10^{-8} Pa·m³/s vacuum .The system enables ±15 mm adjustment range for both the anode and high-voltage cathode with accuracy within 0.1 mm, while the use of adaptive high-voltage feed-in method ensures stable electrical contact and eliminates mechanical stress during conditioning. Considering the mechanical properties and the bending constraints of the cutting plate, an array of 0.1mm arched tungsten wire ribbons arranged with small spacing were adapted for the structural design. Lab tests confirm the design's superior compliance with physical requirements, and two years of operation demonstrate the devices' high stability and long-term reliability.

Footnotes

Funding Agency

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Session Classification: Wednesday Poster Session

Track Classification: ACCELERATORS: Magnets