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Heavy Ion Implantation Analysis in Graphite for the FRIB Charge Selector

Wednesday 13 August 2025 16:00 (2 hours)

An advanced charge selector is currently under development at the Facility for Rare Isotope Beams (FRIB) to intercept unwanted charge states of stripped heavy ion beams. Rotating graphite wheels are employed to absorb beams with a power up to 5 kW and a size as small as an rms width of 0.7 mm × 1.25 mm.
The implantation of beam ions and accumulated radiation damage affect the material properties, potentially leading to its structural failure. Determining the foreign ion accumulation behavior is one critical aspect for predicting the operational lifetime of the graphite wheels. In this study, ion implantation distribution was first characterized using SRIM simulations, then coupled with Monte Carlo analysis to account for wheel geometry and rotational dynamics. The evolution of the ion concentration profiles was subsequently determined considering the diffusion effects. The analysis reveals that strategic beam positioning optimization, combined with diffusion effects, substantially reduces peak ion concentrations and implantation rates, providing essential data for graphite wheel lifetime assessment.

Please consider my poster for contributed oral presentation

No

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

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