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Design and simulation of negative hydrogen ion extraction system for the C30 cyclotron accelerator

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This study focuses on the design and simulation of a negative hydrogen ion beam extraction system for the C30 cyclotron accelerator. The filament-driven arc discharge multi-cusp ion source, capable of producing H^- ions with 30 keV energy and 2 mA current. The ion source consists of two main components: the driver and the extraction system, with the latter playing a crucial role in ensuring the quality and efficiency of the generated ion beam.
The C30 cyclotron capable of accelerating protons to 30 MeV and deuterons to 16 MeV. It is utilized in medical, industrial, and research applications, particularly in the production of isotopes.
The extraction system design was carried out using the three-dimensional ion-optics simulation code IBSimu. It includes three electrodes: the plasma electrode, the puller, and the ground electrode. The puller is equipped with a water-cooling system and four permanent magnets to create a magnetic field profile for the suppression of co-extracted electrons. The optimized design of the extraction system not only minimizes beam emittance growth but also enhances the overall performance of the accelerator.

Footnotes

Paper preparation format

Region represented

Asia

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