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Transmission of Highly Charge Heavy Ion Beams from an ECR Source with High Efficiency and High Quality

Due to the unique magnetic field structure of the Electron Cyclotron Resonance (ECR) ion source, conventional idealized beam models cannot adequately reproduce the state of high charge state ion beams extracted from it. Consequently, beam transport designs based on idealized models exhibit suboptimal performance in efficiently generating high-quality beams during practical transport. Advanced techniques involving phase space reconstruction and back-simulations considering space charge effects are capable of more realistically depicting the phase space evolution of high charge state ion beams during transmission. The resulting end-to-end simulations obtained using this methodology provide a reliable guarantee for the production of high-quality beams. This approach has been partially validated at the Low Energy Accelerator Facility (LEAF), where it has yielded highly favorable outcomes. The corresponding knowledge and experience have subsequently been applied to the design of the Low Energy Beam Transport (LEBT) segment of the High Intensity Accelerator Facility (HIAF) project. This poster aims to provide a brief overview of the progress made in this work.

Funding Agency

Email Address

jiazehua@impcas.ac.cn

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Yes

Presenter if not the submitter of this abstract

Primary author: JIA, Zehua (imp)

Co-authors: Mr ZHANG, Bo (imp); Mr LI, Jibo (imp); SUN, Liangting (Institute of Modern Physics, Chinese Academy of Sciences); Mr ZHANG, Peng (imp); WU, QI (Institute of Modern physics,CAS); Mr YANG, Yao (imp); Ms TANG, Yu (imp); Mr ZHAI, Yuhan (imp)

Presenter: JIA, Zehua (imp)

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