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High performance highly-charged ECR ion sources and matching with high-intensity heavy ion accelerator facility

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Five ECR ion sources operating at 18-45 GHz microwave frequency are being operated or under commissioning to deliver highly-charged ion beams for high-intensity heavy ion cyclotron and linac accelerators at IMP in order to meet different requirements from the accelerators and physics experiments. One of the key issues for the ECRIS and accelerator physicists is how to match the highly-charged ECR ion sources with the accelerators and maximize performance of the accelerators from the point of view of beam intensities, charge states and costs. This paper will discuss how a highly-charged ECR ion source could match with a high-intensity heavy ion accelerator performance cost effectively on the basis of our operation experiences with the five ECR ion sources and the accelerators. If a new high-intensity heavy ion cyclotron or linac would be designed and built, performance and cost can be compared in detail for the cyclotron with an ECR ion source delivering Xe^{20+} and Xe^{35+} , and for the linac with an ECR ion source delivering U^{35+} and U^{55+} . Finally, it has been demonstrated that development of a highly-charged ECR ion source producing intense beams is more performance-cost-effective for a high-intensity heavy ion accelerator.

Footnotes

Funding Agency

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