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High B-min Quasi-Stable Operation Regime of an Electron Cyclotron Resonance Ion Source

Monday 20 September 2021 07:45 (20 minutes)

Fundamental studies of excitation and non-linear evolution of kinetic instabilities of strongly non-equilibrium hot plasmas confined in open magnetic traps suggest new opportunities for fine-tuning of conventional electron cyclotron resonance ion sources (ECRIS) widely used for generation of high charge state ions. We report on experiments with a 14 GHz ECRIS, in which adopting the new approach allows to shift the charge state distribution and increase the current of extracted high charge state ions up to two times, achieving, in particular, $95 \mu\text{A}$ of O^{7+} with a modest heating power of 280 W/11.56 GHz. A theoretical model supporting and explaining the experimental findings is proposed. The implications on the commonly used semi-empirical scaling laws for ECRISes are discussed.

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Track Classification: Production of highly charged ion beams