

ECRIS LATEST DEVELOPMENTS

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Abstract

The production of intense beams of highly charged ions (HCI) is one of the most relevant challenge for the future accelerator facilities. Electron Cyclotron Resonance Ion Sources (ECRIS) are nowadays the most powerful devices able to feed accelerators with HCI in a reliable and efficient way. The reliability of frontier solutions for magnets and the increased costs for microwave generators make scaling to larger frequency not viable. Any further improvement of ECRIS output currents and average charge state requires a deep understanding of electron and ion dynamics in the plasma. In the past 20 years different teams have been working in the forefront of ion source developments with both experimental and theoretical activities, proposing different solutions to improve the production rate. The paper will discuss the most recent technological developments in the field, worldwide, together with the modeling issues of non-classical evidences like sensitivity of Electron Energy Distribution Function to the magnetic field detuning, influence of plasma turbulences on electron heating and ion confinement, coupling between electron and ion dynamics and relative impact on the formed ion beam.

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