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Beam intensity prediction using ECR plasma images and machine learning

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Long-term beam stability is one of the important issues in supplying multivalent heavy ion beams using an Electron Cyclotron Resonance Ion Source (ECRIS). When the beam intensity drops for long-term operation, the ECRIS parameters need to be tuned to restore the original beam intensity. Continuous measurement of the beam intensity using a Faraday cup (FC) is impractical while the beam is in use. We have had to rely on an unreliable method of monitoring the total drain current to estimate the beam intensity during beamtime. To resolve this issue, we propose a new method for predicting the beam intensity at FC using machine learning. Our approach incorporates plasma images, captured through a hole in the beam extraction electrode, and operating parameters as input data for the machine learning model. In short-term test datasets, our model has successfully produced rough predictions of the beam intensity. This presentation will detail the prediction model and its prediction results on the test data.

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

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