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Multi objective Bayesian optimization of ECR ion source at the Linear IFMIF Prototype Accelerator.

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The Linear IFMIF Prototype Accelerator (LIPAc) is designed to validate the main key technical solutions for the particle accelerator of the International Fusion Materials Irradiation Facility, which will answer the need of the fusion community for a high energy (14.1 MeV) high intensity neutron source. LIPAc is jointly developed under the EU-Japan Broader Approach agreement to accelerate 125mA of D+ to 9MeV in Continuous Wave. Its Electron Cyclotron Resonance (ECR) ion source was developed by CEA and successfully demonstrated >150mA D+ beam at 100 keV in CW. In this work we present the multi objective Bayesian optimization of several of its tunable parameter (confinement magnetic field, RF power, gas flow, etc.) to find the most suitable compromise between average extracted beam current and its stability over time.

Primary Keyword

bayesian optimization

Secondary Keyword

ML-based optimization

Tertiary Keyword

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