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Sensitivity jitter studies of the EuPRAXIA@SPARC_LAB RF injector

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The objective of the EuPRAXIA@SPARC_LAB European user facility is to operate a stable, reliable, and reproducible machine. This study delves into a comprehensive analysis of injector jitter to assess the machine's stability concerning RF and laser jitters. The stability and reproducibility of the beam are significantly influenced by RF generation. As such, a portion of the work concentrates on studying sensitivity jitter across all RF injector components. The investigation begins with the assessment of cathode beam parameters' jitters, such as variations in charge, spot size, and bunch separation. The impact of these variations on beam stability is scrutinized. To enhance beam stability, an X-band High Harmonic Cavity (HHC) is employed to pre-correct the longitudinal phase space of the bunch. This correction serves to shorten and flatten the charge distribution, allowing for manipulation of the beams to achieve proper longitudinal and transverse parameters at the photoinjector exit.

Footnotes

Funding Agency

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LaTeX

Region represented

Europe

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