

# Development of an X-band LLRF prototype for the EuPRAXIA@SPARC\_LAB LINAC

*Tuesday 27 August 2024 16:00 (2 hours)*

EuPRAXIA stands for “European Plasma Research Accelerator with eXcellence In Applications”. It’s a next generation free-electron laser (FEL) aimed at developing a compact, cost-effective particle accelerator based on novel wake-field accelerator technology. Traditionally, high-energy physics requires higher acceleration voltages, so developing an X-band acceleration technology, enables the possibility to achieve high gradients with very compact structures. EuPRAXIA@SPARC\_LAB LINAC injector features 1 S-band RF gun, 4 S-band and 16 X-band structures, achieving a max beam energy of 1 GeV. Low-Level Radio Frequency (LLRF) systems are crucial for RF station synchronization and machine stability at femtosecond precision. Currently, there are no commercially available X-band LLRF solutions, especially for pulse processing and control in the 100ns range. This project aims to develop an X-band LLRF prototype, in collaboration with INFN, tailored to meet EuPRAXIA@SPARC\_LAB LINAC’s demands. Once confirmed on a real testbench, the prototype will be used as a starting point for industrialization into a commercial instrument. This paper presents the prototype’s architecture and preliminary results.

## Footnotes

## Funding Agency

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