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The EuPRAXIA project

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Plasma acceleration is paving the way for new compact accelerators aiming at reducing the scale of the facilities needed by free electron laser (FEL) or high energy physics by employing accelerating gradients much larger than conventional RF structures. The EuPRAXIA Design Study (1) is dedicated to realizing a distributed FEL facility powered by plasma acceleration in the European framework (it is included in the ESFRI roadmap).

As part of the EuPRAXIA project, Frascati National Laboratories propose hosting a cutting-edge facility named EuPRAXIA@SPARC_LAB (2), tailored to meet these specific requirements with a unique combination of a high-brightness X-band RF linac driving a plasma-accelerator-based FEL. We plan to realize a FEL in the XUV (3-15 nm) and we are studying the possibility to have a second beamline beamlines in the VUV (50-150 nm). We are preparing a Technical Design Report, while the building is in the executive drawing phase.

We plan to have dedicated diagnostics for the high quality electron beam, plasma interaction and FEL light: while most of the diagnostics will be well established (to have a reliable user machine), some unique properties of the machine will require innovative solutions.

(1) R. W. Assmann et al, Eur. Phys. J. Spec. Top., 229 (2020), pag 3675

(2) M. Ferrario et al, Nucl. Instr. Meth. Phys. Res. A, 909 (2018) pag 134 ; CDR download at <http://www.lnf.infn.it/sis/preprint/pdf/getfile.php?18-03-LNF.pdf>

Primary author: VILLA, Fabio (Istituto Nazionale di Fisica Nucleare)

Presenter: VILLA, Fabio (Istituto Nazionale di Fisica Nucleare)

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