



Contribution ID: 26

Type: **not specified**

Beam Driven Acceleration Scheme to 5 GeV Energy for EuPRAXIA@SPARC_LAB

Thursday, 26 September 2024 09:10 (30 minutes)

The EUPRAXIA@SPARC_LAB facility will host the first ever FEL user facility in the nm range guided by a 1 GeV high-brightness electron beam. Beside this application, plans are underway to provide beams with energies up to 5 GeV through beam driven acceleration schemes relying on the existing RF accelerator whose maximum energy is 1 GeV to date. Different PWFA schemes have been proposed and described in literature to enable several GV/m accelerating gradient in the plasma thanks to the maximisation of the so called transformer ratio'. The paper reports on the techniques useful to produce electron beams through the designed EuPRAXIA@SPARC_LAB RF injector and drive the plasma stage so to provide final beam energy five times higher than the initial one.

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