

Plasma Driven Free Electron Lasers

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A novel type of accelerator technology making use of plasma wakefields promises gradients as high as some tens of GeV per meter. This would allow much smaller accelerator facilities that could be used for a wide range of fundamental and applied research applications. A relevant milestone towards the complete demonstration of the plasma wakefield acceleration concept is the integration of the high gradient plasma modules within a short wavelength Free Electron Laser (FEL) user facility. The PhD student will join the efforts of the ENEA-Frascati group in the simulations, design and optimization of the FEL driven by the electron beam coming from the plasma acceleration section. In particular, these studies include the beam transport and matching into the present undulators section as well as the research and development on short period undulators based on new concept technologies such as Microwave and Optical undulators. This activity is also propedeutical for the design study of the world's first multi-GeV plasma based facility, carried by the European Plasma Research Accelerator with Excellence in Applications (EuPRAXIA) Consortium, and will be developed in collaboration with the SPARC_LAB facility at INFN-Frascati and with the Istituto Nazionale di Ottica at CNR-Pisa.