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A Coherent Imaging XUV-FEL users end-station for the EuPRAXIA@SPARC_LAB FEL

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A proposal for building a Free Electron Laser, EuPRAXIA@SPARC_LAB, at the Laboratori Nazionali di Frascati, is at present under consideration. This FEL facility will exploit plasma acceleration to produce ultra-bright photon pulses with durations of few femtoseconds down to a wavelength between 2 and 4 nm, in the so called "water window". The project is now focused on machine development, but it will host a user end-station to allow performing photon experiments in different areas.

The main class of experiments will be that focused on coherent diffraction imaging (CDI). For what concerns biological samples, 2D and 3D images of biological objects, such as proteins, viruses and cells can be obtained by CDI. In the water-window energy range the absorption contrast between the carbon of the biological molecules and the water surrounding them is indeed quite high and therefore biological samples can be imaged in their native state.

For what concerns condensed matter physics materials science: the FEL radiation will be exploited to study clusters, magnetic materials and nucleation dynamics. In this context, the possibility of inducing changes in samples via pump pulses leading to the stimulation of chemical reactions or the generation of coherent excitations would tremendously benefit from pulses in the soft X-ray region. High power synchronized optical lasers will also be made available for laser pump-FEL probe experiments. Moreover, a split-and-delay station will allow performing XUV-XUV pump-probe experiments.

In order to perform the widest possible class of experiments, from coherent imaging, to diffraction and spectroscopy, emission, absorption, a top class experimental end-station, including a dedicated section with beam diagnostics and focusing devices and a highly flexible experimental chamber will be built. In this poster we will give an overview of the users end-station including details about beam characterization, data collection, analysis and data storage.

Primary author: STELLATO, Francesco (INFN)

Co-authors: MARCELLI, Augusto (INFN & ISM-CNR); MASCIOVECCHIO, Claudio (Elettra Sincrotrone Trieste); VILLA, Fabio (INFN); GIANNESSI, Luca (ENEA & Elettra Sincrotrone Trieste); CORENO, Marcello (ISM-CNR); FERRARIO, Massimo (INFN); MORANTE, Silvia (Università Roma Tor Vergata & INFN); LUPI, Stefano (IOM-CNR & INFN); DABAGOV, Sultan (INFN)

Presenter: STELLATO, Francesco (INFN)

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