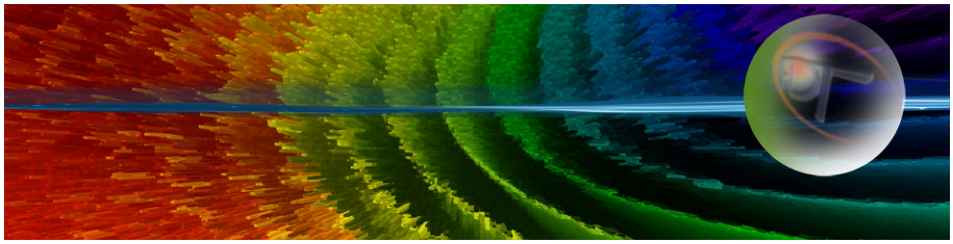

Contribution ID: **63** Type: **not specified**

Photon pulse characterization at FERMI Free Electron Laser

The advent of X-ray Free Electron Lasers (FEL) has opened a new era for exploring the fundamental laws of matter. These machines combine the exceptional properties of conventional lasers (ultra-short, brilliant, coherent, and transform limited pulses) and synchrotrons (short and selectable wavelengths, different polarizations), allowing to probe the ultra-fast dynamics of atoms and molecules in simple and complex systems at a nano-scale level. Among the FELs built and put in operation worldwide in the last years, FERMI (Trieste - Italy) represents the only EUV/Soft X-Ray FEL user facility that takes advantage of the High Gain Harmonic Generation scheme. In this scheme, an external EUV "seeding" laser is used to manipulate the electron bunch so to end up with an FEL emission that inherits the stability and coherence properties of the seed laser itself. In this way FERMI is capable of generating coherent ultra-bright and ultra-short photon pulses that can also present full polarization (linear horizontal or vertical, circular right or left.
In order to optimize the machine and let the users know the detailed parameters of the FEL radiation, a dedicated set of diagnostics is installed along the photon beam transport system. In particular, every pulse is characterized online and shot-to-shot for what concerns its intensity, spatial/angular distribution and position, and spectral content. Moreover, it is possible to determine the polarization, coherence, and pulse length of the FEL emission by means of more elaborate diagnostic tools used in dedicated time slots.
In this presentation the FERMI FEL emission process as well as the diagnostics used to characterize the properties of the different pulses will be presented and discussed.

Primary author: Dr ZANGRANDO, Marco (Elettra - Sincrotrone Trieste and IOM-CNR)

Presenter: Dr ZANGRANDO, Marco (Elettra - Sincrotrone Trieste and IOM-CNR)