FERMI
a Seeded Free Electron Laser Source for Experiments

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Dr. Enrico Allaria
Sincrotrone Trieste, Italy

Based on a 1.5-GeV electron linear accelerator, FERMI@Elettra [1] has two seeded FEL lines that cover the whole spectral range from 100 nm down to 4 nm with fully coherent pulses. The use of the high gain harmonic generation scheme initiated by a tunable laser in the UV allows FERMI to produce light characterized not only by transverse coherence but also by a very high temporal coherence. The use of APPLE II undulators allows control of the FEL polarization that can be varied from linear to circular. Here we will report about the recent FEL commissioning results and the future plans for FERMI@Elettra.

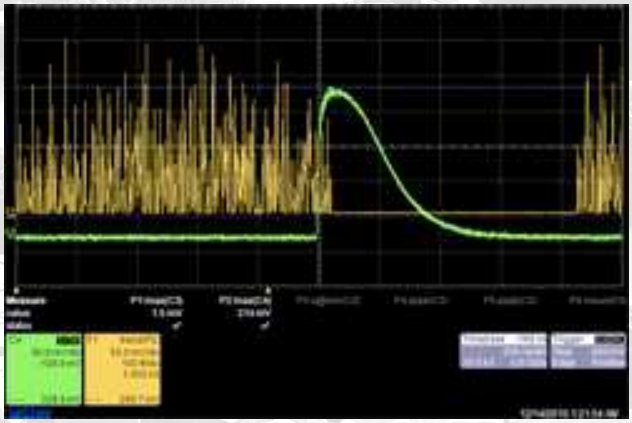

FIGURE 1. *Seeded coherent emission from FEL-1 measured by means of a fast photodiode located in the FERMI@Elettra experimental hall. The undulators were tuned at 43 nm. The green trace shows the time profile of a single pulse with the photodiode in saturation. The yellow trace shows a series o seeded FEL pulses being turned on (left) and off (center-right) by changing the superposition between SEED laser pulses and electron pulses.*

After less than two years of commissioning of the FERMI@Elettra linear accelerator FERMI entered into the final commissioning phase in December 2010 when first evidence of coherent signal in the range from 60 to 20 nm has been demonstrated (Figure 1). Further optimization of the electron beam and the availability of the photon diagnostic systems allowed us during first part of 2011 to produce tens of micro joules in the spectral range between 65 and 20 nm with a very good spectral stability.

References

1. C.J. Bocchetta et al., Conceptual Design Report (CDR) for the FERMI@Elettra project, Sincrotrone Trieste (2007).

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[1] Contact H. Braun 3241