Contribution ID: **1031** Type: **Invited talk**

Recent results in ultrafast science at the LDM beamline

Thursday 29 August 2024 11:20 (20 minutes)

The FERMI Free Electron Laser in Trieste (Italy) has been designed and built as a seeded source, for precise control of the properties of its light pulses. Its excellent longitudinal coherence is inherited from the seed laser, and is its uppermost distinctive feature. In the realm of atomic, molecular and optical science, the use of longitudinal coherence of laboratory lasers as a time reference for precise measurements, as a control parameter for the synthesis of arbitrary waveforms, and for steering the outcome of a photophysical process, has a long history of achievements. One wishes to extend the same concepts to shorter wavelengths, because the latter provide higher spatial and temporal resolution, as well as chemical selectivity.

The Low Density Matter (LDM) beamline at FERMI has been serving the atomic, molecular and cluster science community since its opening at the end of 2012. Through the use of interchangeable supersonic jet sources, it offers the possibility of studying atoms and molecules (including aligned ones), as well as more exotic systems such as superfluid helium droplets or metallic nanoparticles. Ion and electron spectroscopies (time-of-flight; velocity map imaging) and coherent diffraction imaging are available in one of the few different standard configurations of the endstation. Users'equipment can be accommodated as well, and several experiments have also been performed in non-standard configurations. A synchronized infrared laser (with second-, third-, and fourth-harmonic generation capability) is available for optical+FEL experiments. The LDM beamline has worked in close synergy with the Machine Physics team to help characterize FERMI, and develop new modes of operation.

In this talk I will present recent results related to recent technical developments, specifically on molecular dynamics explored with time-resolved core-level photoelectron spectroscopy, nonlinear applications of phase-locked harmonics, and diagnostics of FEL operation, as well as future opportunities.

The results originate from the joint effort of many international laboratories and of a large number of researchers, whose work is gratefully acknowledged.

I plan to submit also conference proceedings

No

Primary author: CALLEGARI, Carlo (Elettra - Sincrotrone Trieste)

Presenter: CALLEGARI, Carlo (Elettra - Sincrotrone Trieste)

Session Classification: Mikrosymposium 6/3: FELs: New facilities and Opportunitites

Track Classification: 6. FELs: New facilities and opportunities