Contribution ID: **16** Type: **Keynote**

Ultrafast X-ray Sources: an Opportunity for Science

Wednesday, 14 September 2022 10:45 (30 minutes)

During the last decade X-ray sources experienced a remarkable technical progress that radically extended their achievable scientific horizons with significant impact in many disciplines. As a result, today X-ray sources are no longer intended only as stationary but also as ultrafast pulsed sources for experiments in the sub-picosecond time domain.
A prominent role in this revolution is definitely played by the free electron laser facilities that could undergo a further impressive upgrade with the forthcoming advent of the plasma acceleration technology like that envisaged by the EuPRAXIA European project. However, terrific advances have been also made with the high harmonic generation (HHG) tabletop ultrafast sources operating in the extreme ultraviolet and soon in the soft X-ray range. X-ray sources can improve also through novel exotic schemes devised to compress the X-ray emission of synchrotrons down to the picosecond scale. Adaptive X-ray optics have been developed to extract picosecond pulses from longer synchrotron X-ray pulses. The combination of ultrafast electron and X-ray sources have been successfully attempted, permitting time resolved electron diffraction experiments on isochorically heated metals with 100 fs time resolution.
Notably, many of these advances involves Italian research teams and X-ray facilities, including Elettra-Sincrotrone Trieste. This keynote is intended to explore the potential of emerging ultrafast X-ray sources analyzing several examples of time resolved experiments and techniques accessible to scientists today and in the near future in Italy.

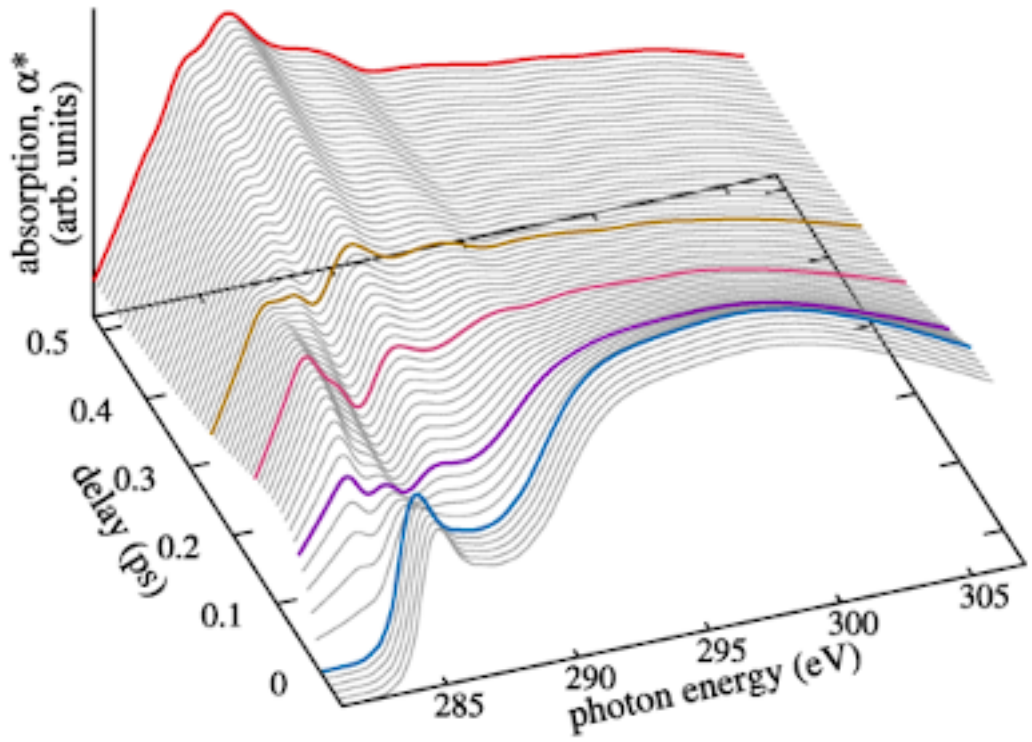

Figure 1:

Figure 1. Time resolved XAS at the C K-edge showing the ultrafast melting of an amorphous carbon sample [1]

[1] E. Principi, S. Krylow, M.E. Garcia, A. Simoncig, L. Foglia, R. Mincigrucci, G. Kurdi, A. Gessini, F. Bencivenga, A. Giglia, S. Nannarone, C. Masciovecchio Phys. Rev. Lett. 2020, 125, 155703

Primary author: Dr PRINCIPI, Emiliano (Elettra Sincrotrone Trieste)

Presenter: Dr PRINCIPI, Emiliano (Elettra Sincrotrone Trieste)

Session Classification: MS

Track Classification: Bright Radiation Sources and Novel Software Applications