Elettra Sincrotrone Trieste

Postdoctoral Research Associate at EIS-TIMEX

Deadline: 7 July 2022
Ref: DB/22/13

Background

Elettra Sincrotrone Trieste is an international multidisciplinary research center operated as a user facility, featuring a 2.0/2.4 GeV, third-generation synchrotron light source (Elettra), a new free-electron laser light source (FERMI) and a variety of support laboratories. The extremely high quality of the machines and beamlines has set new performance records and has been producing results of great scientific and technological interest. In order to allow the laboratory to remain competitive in the next 20 years, an entirely new source - Elettra 2.0 - belonging to the new generation of storage rings (DLSR or Diffraction Limited Storage Ring) is being developed. The new source will exhibit a major increase in the brilliance and coherence fraction of the photon beams. The Elettra 2.0 optics is based on our enhanced symmetric six bend achromat structure (S6BA-E) with a 12-fold symmetry and an emittance of 200 pm-rad at 2.4 GeV. The new structure creates also straight sections in the arcs permitting the installation of additional insertion devices, thus increasing the number of beamlines. Existing beamlines will have to be upgraded and new beamlines developed to take full advantage of the characteristics of Elettra 2.0. The new machine is scheduled for commissioning in the second half of 2026. See http://www.elettra.eu for more information.

Beamline/Activity/Project description

The EIS-TIMEX beamline is designed for time-resolved (< 100 fs) experiments on light-excited condensed matter by using the FERMI free-electron laser (FEL) in the 1.7-80 nm wavelength range and a Ti:Sa fs-laser (260-800nm) as synchronized and fully coherent sources for pump-probe experiments. Main research activities include the study of condensed matter under non-equilibrium conditions, both under high-energy density conditions and below the damage threshold, as well as nonlinear effects in opaque materials (stimulated emission, absorption saturation, spectral broadening, sum frequency or second harmonic generation). More recently, the beamline has been used for investigating the electronic ultrafast response of functional materials and chemical compounds exposed to sub-ps light pulses. Other novel classes of experiments include activating and monitoring slow molecular vibrational modes through combined FEL and fs-laser pulses, as well as impulsive stimulated x-ray Raman scattering in materials.

Time-resolved absorption and reflection spectroscopies in the extreme ultraviolet range are the most used techniques, often operated in pump-probe mode. Pilot ultrafast electron diffraction experiments have been also successfully carried out. More information can be found on the following web page:
https://www.elettra.eu/lightsources/fermi/fermi-beamlines/eis-timex/eis-timex.html

Job description

The successful candidate will closely collaborate with the EIS-TIMEX scientific coordinator and the beamline staff. Initially, he/she will be involved in the realization and optimization of a compact and portable liquid-jet experimental set-up designed to operate in high-vacuum at FERMI. The liquid jet will be tested and installed at the EIS-TIMEX beamline and on the other FERMI end stations. The control system of the liquid-jet facility will be integrated in a TANGO and Python software framework.

Once fully commissioned, the liquid-jet set-up will be employed in combination with the FERMI source exploiting the unique spectral purity and coherence of a seeded FEL. In the beginning, the experimental approach will consist in time-resolved, pump-probe measurements on samples diluted in liquid solvents.

The postdoctoral research associate will have the opportunity to explore diverse scientific cases requiring sub-ps time resolution, including ultrafast charge transfer in molecules, conical intersections, molecular functionality, drug interactions, nanocatalysts, and photocatalysis.

He/she is expected to propose, develop and publish his/her original research, mainly based on experiments with the liquid-jet facility. Elettra Sincrotrone Trieste being a user facility, a 30% of his/her time will be devoted to supporting the external users of the EIS-TIMEX beamline.

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Qualifications

A Ph.D. in Physics, Chemistry or a related discipline is required. The candidate must not have had more than 6-years of total postdoctoral experience, in academic institutions or private companies. Applications will be considered also from candidates who have completed a doctoral course of studies and for whom the defense has been scheduled. In any case, the Ph.D. must be awarded by the end of June 2022.

Proven experience in at least one of the following techniques is required:

- X-ray absorption spectroscopy
- Serial X-ray crystallography
- Impulsive stimulated Raman scattering
- Raman spectroscopy
- fs-laser time resolved methods

A background in some of the following fields is desirable:

- Ultrafast dynamics in solids, molecules and/or gas or liquid phase
- Liquid-jet technology
- Nonlinear light-matter interaction
- Light-activated nanocatalysts
- Photocatalytic water splitting

The following qualifications will be considered as important assets:

- Previous participation in experimental campaigns at FEL or high harmonic generation (HHG) laser facilities
- Experience in the construction of high-vacuum instrumentation
- Programming skills in Python with demonstrated ability in data processing
- Knowledge of the TANGO environment

The successful candidate should possess strong interpersonal skills favoring collaborative research programs in a team-oriented environment.

Good time management skills and ability to prioritize are expected, together with the ability to interact with the facility staff and international users at all levels and to work as part of a multi-disciplinary team. Good oral and written communication skills in English are essential.

The appointment will be a fixed-term contract with an initial duration of 12 months. The salary will be commensurate with previous experience and qualifications of the candidate.

Applications should include a full curriculum vitae, the names and contact information (including electronic mail) of up to three persons who have agreed to provide references.

Due to the situation related to the COVID-19 virus, the interviews will be performed through video conferencing.

The deadline for the submission of the application is July 7, 2022.

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In accordance with the provisions of article 21 of the Italian legislative decree no. 39/2013 and in conjunction with article 53 (subsection16ter) of Italian legislative decree no. 165/2001, employees or former employees of any Italian Public Entity who have exercised authority over Elettra Sincrotrone Trieste S.C.p.A. or have negotiated with Elettra - Sincrotrone Trieste S.C.p.A. within the last three years will be excluded from the present selection procedure.We thank all applicants in advance.
For more information, please contact Emiliano Principi (email: emiliano.principi@elettra.eu).

To apply for this position please visit the following link:
https://www.elettra.trieste.it/it/about/careers/working-withus.html?id=2541