Elettra Sincrotrone Trieste

Scientist at FERMI, T-ReX facility

Deadline: 10 March 2024
Ref: DB/24/5

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

Standing out among the FEL sources currently operating worldwide in the ultraviolet and soft x-ray range, FERMI exploits external seeding to deliver fully coherent ultrashort pulses (in the femtosecond range) with a peak brightness ten billion times higher than that provided by third-generation light sources and unique reproducibility of pulse wavelength, linewidth and intensity. FERMI presents unparalleled opportunities for investigating the structure and transient states of condensed matter, soft matter, and low-density matter through a variety of diffraction, scattering, spectroscopy and resonant excitation techniques.

T-ReX is the facility for table-top time-resolved spectroscopies at the FERMI free-electron laser. Available techniques include Time and Angle Resolved Photoemission Spectroscopy (TR-ARPES), carried with 6 eV, 11 eV and high harmonic generation (HHG) ultrafast probes in an advanced UHV end-station, and a variety of time-resolved optical spectroscopies (TR-OS) with photon energies ranging from the ultra-violet (UV) to the infrared. All together, these spectroscopies provide a unique range of complementary methods to characterize the non-equilibrium electronic and structural properties of complex materials. Recently, T-ReX has started sharing and integrating its laser sources with other FERMI beamlines such as TeraFERMI. Transport of the light produced by these sources to MagneDyn and other beamlines is planned.

Research carried out at T-ReX focuses on the study of the electronic and optical properties of complex quantum materials, including high critical temperature superconductors, charge-density-wave materials, topological insulators and transition metal dichalcogenides. Experiments are typically performed exploiting the combination of techniques based on ARPES and optical spectroscopy in the ultrafast time domain, also in conjunction with other FERMI beamlines. The ARPES end-station and the optical setups are constantly upgraded, in order to expand their capabilities and meet the most challenging experimental needs. A comprehensive description of the instruments and research can be found at: https://www.elettra.eu/labs/t-rex.html.

Job description

The successful candidate will work with advanced instrumentation exploiting ultrafast laser technologies, and contribute to the development of existing and novel experimental set-ups at the T-ReX facility. By working in close collaboration with the T-Rex coordinator, she/he is expected to contribute to the management, operation, maintainance and update of the facility. Furthermore, she/he will be called upon to further develop the UV and VUV HHG laser sources and pursue their integration with FERMI beamlines. The role also demands a proactive approach to supporting users through every phase of their activity, from preparing the experimental set-up to conducting complex data analysis and writing scientific manuscripts.

The candidate is expected to propose and independently develop innovative research in fields such as non-equilibrium electronic and optical properties of complex bulk and layered materials, which will be addressed using optical

spectroscopies and TR-ARPES. The in-house research activities may involve supervising MSc and PhD students. An active effort in disseminating the scientific output of the T-ReX facility will be required in order to promote scientific collaboration activities and expand the research network.

Qualifications

A Ph.D. in Physics or related discipline is required, followed by at least 3 years of postdoctoral experience in laser techniques and laser-based high harmonic generation in academic institutions or private companies. The ideal candidate must possess expertise and a publication record commensurate with career advancement in experimental techniques such as ARPES, TR- ARPES with VUV or HHG probe, Two-Photon Photoemission Spectroscopy, and Time-Resolved Optical Spectroscopy. Please specify relevant publications or thesis. Experience in assisting users will be considered a plus.

The following qualifications are desirable assets:

- Previous participation in experiments at synchrotron radiation or FEL facilities
- Research background in the study of magnetic materials
- Research background in the study of organic materials and thin film growth
- Experience in the supervision of MSc and PhD students
- Data analysis and programming skills (Igor Pro, Python, Labview)

Good time management skills and ability to prioritize are expected, together withtheability to interact with staff and facility users at all levels and to work as part of a multi-disciplinary team,

Good oral and written communication skills in English are essential; good knowledge of spoken and written Italian is desirable.

General information

The appointment envisioned is a permanent position. The salary will be commensurate with previous experience and qualifications of the candidate.

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

The interviews may be held via video conferencing.

The deadline for the submission of the application is March 10, 2024.

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 Federico Cilento (email: federico.cilento@elettra.eu).

To apply for this position please visit the following link:
https://www.elettra.trieste.it/it/about/careers/working-withus.html?id=3781