Elettra Sincrotrone Trieste

Electronic Engineer for THz-Skin project

Deadline: 15 April 2026
Ref: GA/26/14

Background

Elettra Sincrotrone Trieste is an international multidisciplinary research centre offering international users access to synchrotron and free-electron laser radiation for the characterization and processing of matter. The extremely high quality of the light sources 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 synchrotron radiation source - Elettra 2.0 - belonging to the new generation of storage rings (DLSR or Diffraction Limited Storage Ring) is being installed and will join the already operating free-electron source FERMI in the second half of 2026. 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 are being upgraded and new beamlines constructed to take full advantage of the characteristics of Elettra 2.0. See http://www.elettra.eu for more information.

Beamline/Activity/Project description

The Instrumentation and Detectors Laboratory at Elettra Sincrotrone Trieste has been developing state-of-the-art scientific hardware and software, which include novel particle detectors, custom electronic boards, low-level programming based on FPGAs and microcontrollers, and high-level software for instrument control and data acquisition. The Laboratory is involved in different research and development projects. In particular, the THz-Skin project was recently funded by the European Innovation Council to develop a portable THz radiation detector for the early diagnosis of skin tumors. In the EU skin cancer causes 36,000 deaths per year and €9 billion in healthcare and indirect costs. Diagnosis relies on expensive tools and specialists, thus preventing mass screening to improve patient outcomes and costs. The THz-Skin project addresses this by developing a platform that merges advanced detection technology with unique spectroscopic data for effective, accessible diagnostics. We build on the well established fact that cancer biomarkers give rise to spectral fingerprints in the terahertz-far infrared range. By resolving these features from body thermal emission, we achieve real-time, zero-radiation, non-invasive, label-free cancer diagnostics - a real breakthrough in early skin cancer detection. Our platform blends high-performance, miniaturized sensors with a large, open-access spectral fingerprint library of skin conditions. Inspired by the RGB model for visible light, our Multifrequency Pixels (MFPs) decompose skin thermal emission into spectral bands in the 3-25 THz range, where biomolecular cancer signatures occur. Our MFPs consist of compact, low-cost micromechanical bolometers fitted with frequency-selective metasurfaces, achieving body thermal radiation analysis with high sensitivity and without cryogenic or bulky spectrometers. Diagnostic capabilities can be continuously improved by optimising MFP architecture and expanding our spectral library with simulated and experimental data. Our platform is designed for scalability, affordability and broad deployment in primary care settings. It is also designed to integrate with AI diagnostic tools, adding sub-cutaneous, cancer specific information to standard camera images. To ensure real-world readiness, our system will undergo in vivo validation using animal models, demonstrating its diagnostic performance in biologically relevant conditions and paving the way to a new era in advanced skin diagnostics.

Job description

The successful candidate will contribute to the development of the excitation and readout electronics for THz microbolometers, based entirely on FPGA systems capable of controlling more than one hundred DAC/ADC channels in parallel. A key feature of the platform will be its advanced real-time frequency-domain multiplexing and ultra-low-latency signal processing, allowing the system to support hundreds of parallel phase-locked loops (PLLs), potentially customizable on a per-pixel basis, and providing unprecedented levels of granularity and parallelism.

The specific role of the successful candidate will focus on the use of System-on-Chip (SoC) platforms from the Intel Altera family, interfacing a Linux-based operating system with HDL code that he/she will develop to implement the real-time processing tasks on the programmable logic.

Elettra Sincrotrone Trieste

Qualifications

A master in Electronic Engineering or related field is required together with the following skills and knowledge:

- basic knowledge of the Verilog HDL language;
- knowledge of the main techniques for THz signal acquisition with particular emphasis on methods based on mechanical microbolometers;
- good knowledge of the Linux operating system;
- good knowledge of LabVIEW and Python programming languages;
- experience with the Altium CAD Designer environment for the development of electronic boards.

The following skills would be considered an asset:

- knowledge of automatic control systems theory;
- familiarity with the MATLAB software package and the C and C++ programming languages.

Good time management skills and ability to prioritize are expected, together with the ability 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.

General information

The appointment envisioned is a fixed-term employment contract with a duration of 36 months, governed by the National Collective Labour Agreement (CCNL) for the Metalworking and Plant Installation Industry and by the Company Labour Agreement.

The salary will be commensurate with the previous experience and qualifications of the selected candidate.

Applications must include completed, dated, and signed curriculum vitae, a motivation letter, including the contact details of at least one person who has agreed to provide a reference.

The interviews may be held via video conferencing.

The ranking of suitable candidates resulting from this selection process may be used within the following 24 months.

Employees or former employees of Elettra Sincrotrone Trieste S.C.p.A., as well as current or former personnel provided by temporary work agencies will be excluded from the present selection procedure. 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 also be excluded from the present selection procedure, in accordance with the provisions of article 21 of the Italian legislative decree no. 39/2013 and in conjunction with article 53 (subsection 16ter) of Italian legislative decree no. 165/2001.

The deadline for the submission of the application is April 15, 2026.

We thank all applicants in advance.
For more information, please contact Giuseppe Cautero (email: giuseppe.cautero@elettra.eu).

To apply for this position please visit the following link:

Elettra Sincrotrone Trieste

https://www.elettra.trieste.it/it/about/careers/working-withus.html?id=4291