Doctoral Research Associate in the MSCA Doctoral Network GAP (image-Guided computational and experimental Analysis of fractured Patients)

Deadline: 12 March 2024
Ref: DA/24/7

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

Age-related bone fractures are a major health concern, resulting worldwide in high economic and psycho- social burden, morbidity and increasing mortality. With aging and in the presence of bone pathologies, human bone becomes more brittle and prone to damage. A disruptive clinical hypothesis considers the SARS-Cov-2 virus responsible for COVID-19 as an additional contributing factor in bone deterioration.

At the macro-scale, identification of fragility occurs through clinical practice: common clinical tools, however, are able to predict only 70% of fractures. For this reason, an in-depth investigation of the bone micro-architecture would be a fundamental tool to identify damage mechanisms, improve the reliability of fracture risk indicators and perform more accurate diagnosis of bone pathologies. This knowledge level goes beyond the current state of the art and this is where GAP comes into play, providing attractive, multi-disciplinary and versatile training strategies for multi-scale detection, understanding and patient-specific treatment of bone fractures. The overarching aim of GAP proposal is to educate young and talented scientists towards a combined high-level experimental and numerical approach for the early-stage detection and mini-invasive treatments of bone fractures, shedding some light on bone micro-scale alterations due to pathologies. The interdisciplinary findings, that exploit cutting-edge multi-scale imaging facilities and advanced artificial intelligent-based strategies, will be a crucial aspect in the training of skilled researchers.

Job description

In the framework of the GAP project, the main objectives of the Doctoral Candidate at Elettra (DC2) will be:

1. develop a procedure to investigate micro-scale damages by phase-contrast microtomography (PC microCT) by means of synchrotron radiation;

2. define a suitable protocol for synchrotron radiation studies, including optimum scan parameters, time-interval evaluation and different samples conditions;

3. perform tests at Elettra to obtain the images of the evolution of micro-damages;

4. automatically detect cracks and micro-damages from synchrotron images by topological and geometrical approaches.

Qualifications

A Master Degree or equivalent in Biomedical engineering, physics, medical physics or computer engineering is required, with a documented background in biomedical, material, computer engineering or related fields.

Basic knowledge of programming (C or Python, etc.) and/or image processing techniques and/or data visualization software (ImageJ, VGStudio, Avizo, etc.) will be considered as a valuable asset.

We welcome applications from doctoral candidates fulfilling the following criteria:

1. Any nationality is acceptable, but the applicant must not have resided or carried out his/her main activity (work, studies, etc.) in Italy for more than 12 months in the 36 months immediately before their recruitment date. Time spent as part of a procedure for obtaining refugee status under the Geneva Convention (1951 Refugee Convention and the 1967 Protocol), compulsory national service and/or short stays such as holidays are not considered as part of the above 36 month period.

2. Must meet the entry requirements for PhD enrolment, i.e., he/she must hold a 2nd Level Master Degree (120 ECTS + 180 ECTS in a bachelor degree) or a Single Cycle Degree (minimum 300 ECTS), or a comparable university degree (Second Cycle qualification) in biomedical engineering, mechanical engineering, physics, computer engineering or related disciplines.

3. Must not have a doctoral degree at the date of the recruitment. Researchers who have successfully defended their doctoral thesis, but who have not yet formally been awarded the doctoral degree will not be considered eligible.

4. Proficient in the English language (if not native speaker). English proficiency of short-listed applicants shall be assessed during the selection interview.

5. Aware of and adhere to the principles set out in the Commission Recommendation on the European Charter for Researchers.

6. Must be available to enroll ina 3-year full-time PhD program atthe Politecnico di Milano.

General information

The appointment envisioned is a fixed term contract with a duration of 36 months.

Applications should include the full curriculum vitae (including publications, if any), a motivation letter, the names and contact information (including electronic mail) of at least one person who has agreed to provide references, english certificate (if not native speakers) and copies of degree and academic transcripts (with grades and rankings), for both the Bachelor's and Master's degrees. Academic records not written in English should be accompanied by a translation into English (it can be either an official translation or self-translation).

The interviews may be held via video conferencing.

The deadline for the submission of the application is March 12, 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 Giuliana Tromba (email: giuliana.tromba@elettra.eu).

To apply for this position please visit the following link:
https://www.elettra.trieste.it/it/about/careers/working-withus.html?id=3821