ERA-Shuttle offers academics secondments opportunities to [CERIC](https://www.ceric-eric.eu/)´s Italian Partner Facility. CERIC is a European Research Infrastructure Consortium (ERIC) that integrates and provides access to some of the most advanced analytical facilities in Europe for academia and industry to make progress in all areas of materials, biomaterials and nanotechnologies. The Italian Partner Facility of CERIC offers access to several laboratories and beamlines at Elettra Sincrotrone, a multidisciplinary research center of excellence, open to the international research and developing excellence by providing state-of-the-art services for high-quality, internationally recognized research, thus contributing to enhance the positive impact and relevance of science on society. In the framework of the ERA Shuttle Secondment programme we offer the opportunity to work temporarily at Elettra Sincrotrone Tomolab.

Tomolab is the X-ray computed microtomography (micro-CT) laboratory at Elettra. Micro-CT is of the most advanced techniques in the field of nondestructive evaluation tests. It allows imaging of the internal microstructure of different objects and materials, measuring the three-dimensional (3D) X-ray attenuation coefficient map of the sample. Thanks to this technique, the distribution of regions with different density and/or chemical composition inside the sample can be visualized by means of virtual slicing or using 3D volume rendering procedures. Tomolab has two custom X-ray microtomography setups: one housed inside a cabinet and one in a walk-in shielded hutch. Both are based on microfocus sources and differ in the target:

1- Final voxels with side in the range 5-15 um for centimeter-sized samples

2- Final voxels in the range 15-80 um on samples up to 60 centimeters diameter

The field of view is of the order of 3000 times the voxel size in the plane and about 10000 times in vertical (stacked acquisitions). The maximum voltage of the tubes is currently 150 kVp with focal spot less than 50 um. During 2025 both systems will be deeply revised to improve and extend their capabilities, optimize the data acquisition and processing procedures and increase the throughput.

Because X-ray micro-CT is a nondestructive characterization technique, it represents a powerful investigation tool in many different applications, especially in the area of material science as well as geology or biomaterials. Through image analysis processing tools, it is possible to obtain quantitative information from the investigated samples. In particular, geometrical or morphological features inside the sample volume can be analyzed and useful specific parameters can be extracted.

Studies have recently been conducted, for example, to:

* define the morphology of recycled materials;
* establish the state of conservation and find functional-pathological indications of ancient bone samples;
* evaluate different approaches to dental implantology;
* analyze volcanic and reservoir rocks;
* trace the growth of plants over time.

<https://www.elettra.eu/lightsources/labs-and-services/tomolab/tomolab.html>

**Description of the secondment:**

* **Open Places: 1**
* **Duration:** 6 months. The exact dates and duration will be agreed between the Secondee and CERIC´s Italian Partner Facility.
* **Period:** period during which the secondments can take place: September 2025 – August 2026
* **Location:** Trieste, Italy
* **Roles and responsibilities:** Active participation in measurement campaigns: the candidate will be involved in all the steps from data acquisition, CT reconstruction and volume analysis in collaboration with experts in the specific topic in the field of research in life and environmental sciences. He\she will contribute to elaborate strategies for 3D data analysis and develop procedures both with third-party SW and with proprietary code to implement them.

**Requirements:**

* knowledge of Python and C++ programming languages
* notions of Tomography and Image Processing
* basic knowledge of image analysis software (such as ImageJ, VGStudio, Dragonfly, Avizo, Pergeos);
* Ability to fit into a complex environment and work independently

**Benefits:** The candidate will have the opportunity to deepen his/her knowledge of the tomographic technique and the HW needed to implement it both from a practical and theoretical point of view. He/she will also be able to exploit the SW resources available in the laboratory to improve his/her skills in image analysis by working in contact with users with different backgrounds and with very different research and application problems.

**Application Process:**

Please apply through: *ERA shuttle platform web*

Should you require further information regarding the research at *TOMOLAB*, please contact: *Diego.Dreossi@elettra.eu*

Should you require further information regarding the functioning of the secondment, please contact your home university at:

* + University of Split: projekti@unist.hr
	+ University of Gdansk: Izabela Raszczyk at izabela.raszczyk@ug.edu.pl
	+ University of Malta: Dr. Elena Sultana at elena.sultana@um.edu.mt