Laboratoire Hubert Curien
UMR • CNRS • 5516 • Saint-Étienne

European Innovation Council

Funded by the European Union

Post-doc position within the THREAD EIC project – MOPERE team

Thermite materials for satellite demise strategies: experimental radiation stress tests

Duration: 20 months

Location: Saint-Etienne, France

Expected start date: Jan 7th 2026 (approx.)

Application deadline: Oct 31st 2025

Credits: https://www.aero.polimi.it/it

THREAD EIC Project

The THREAD project - Thermite Reactions Assisting Satellite Demise - funded under HORIZON-EIC-2024-PATHFINDER, offers an innovative solution to the **challenge of the growing number of decommissioned satellites returning to Earth and surviving re-entry**, which poses safety risks and environmental concerns on the ground. It is the first EU-funded initiative aiming to introduce the Thermite-for-Demise (T4D) concept directly into the satellite design and manufacturing process.

The idea is to **exploit localized exothermic reactions to support the controlled destruction of satellites during reentry**. The technology relies on small, non-explosive thermite charges - composed of metal and metal oxide - embedded at key structural points within the satellite. These charges are designed to ignite without any external input and generate intense localized heat that enhances the breakup of the structure, even when satellites are no longer active. Thus, this approach aims at greatly improving safety outcomes on the ground.

The project is coordinated by Politecnico di Milano, Italy and led by Prof. Filippo Maggi of Aerospace Science and Technology Dept. It brings together a consortium of international partners, including Université Jean Monnet Saint-Etienne, leading WP4. THREAD aims to validate T4D technology through material development, wind tunnel testing, and cost-benefit analysis, paving the way for **safer and more sustainable satellite disposal within the emerging space economy**. WP4 focuses on the **environmental stress tests** and analyses the response of thermite solutions, their elementary building blocks, and the thermite-based concepts to **life-long stresses suffered from launch to ignition at satellite re-entry**.

More information on THREAD can be found at the following links:

www.thread-eic.eu

https://cordis.europa.eu/project/id/101186901

Position description

THREAD needs to **characterize thermite materials** and thermite-based solutions to the complex stress environment expected during their whole operation lifetime, including ground transport, storage, launch, and in-orbit permanence until correct activation and operation during re-entry. To ensure the feasibility of the demise strategy, experimental campaigns will assess the **impact of combined temperature, ionizing radiation and mechanical stresses on thermites**.

Objectives

The following activities are covered by this position:

- **Computational studies** of space radiation environment with dedicated software.
- **Dosimetry studies** in thermite materials and components realized with Monte Carlo codes.
- Definition of a stress matrix accounting for **mechanical, thermal and radiation tests**.
- Design development and realization of setups for **safe thermite irradiation**.
- **Irradiation campaigns** using the in-house X-ray platform: development of methodologies.
- **Multi-scale characterization**, e.g. tensile tests, spectroscopy such as Raman and FT-IR.
- Impact of parameters such as **dose rate, temperature, atmosphere**, to be studied.
- Identification of **functional endpoints** for thermites in use and mitigation strategies.
- Analysis of collected results and their organization in an **open-dataset**; drafting of reports and manuscripts to be submitted for **publication** to open-access journals and databases.

Prerequisites

We are looking for candidates who meet the following criteria:

- **PhD** in physics, engineering, materials science, chemistry or space science.
- Interest in practical work to run experiments.
- Flexible attitude and adaptability towards the operation of **experimental settings**.
- Positive attitude towards a **multidisciplinary environment** with multiple collaborators.
- Good knowledge of the **English language** (oral and writing)
- **Available to travel** for project meetings, conferences, visits to other laboratories.

The following additions would be a great asset:

- Specific background in radiation physics, materials science or space disciplines.
- Experience with **Monte Carlo simulation tools** such as PHITS, FLUKA, Geant4, OMERE.
- Knowledge of the space radiation environment and/or design for satellites re-entry strategy.
- Experience with programs such as Matlab, C++.
- Knowledge of French language

The Hubert Curien Laboratory and the MOPERE team

The Hubert Curien Laboratory is a Joint Research Unit (UMR 5516) of the National Center for Scientific Research - CNRS and the Université Jean Monnet - UJM, located at 18 Rue Professor Benoît Lauras in Saint-Etienne, and administratively attached to the Faculty of Science and Technology of the UJM.

Additional information can be found on the following web page:

https://laboratoirehubertcurien.univ-st-etienne.fr/en/teams/materials-for-optics-and-photonics-in-extreme-radiation-environments.html

Contact

For further information on this position, please contact: matteo.ferrari@univ-st-etienne.fr

Prof. Matteo Ferrari CPJ (Work Package 4 leader)

How to apply

Applicants should send the following documents directly to Matteo Ferrari:

- A complete CV;
- A cover letter;
- A copy of a valid ID document (ID card, passport…)

Admission to the laboratory facilities is subject to obtaining a favorable access clearance issued by the French ministry of Higher Education and Scientific Research. Estimated processing time: 2 months.

Note: All employment at the Hubert Curien Laboratory is decided on the sole basis of qualifications, competence, integrity and organizational need. **All are encouraged to apply to job openings regardless of their origin, identity, health, beliefs and orientations**.