



Ph.D. RESEARCHER

Advanced characterization of 3D printed metal components

Our mission

The main objective of this Ph.D. position is the determination and optimization of the stress state and deformation behaviour of metallic components made by the 3D printing technique wire-arc additive manufacturing (WAAM). For this purpose, advanced neutron diffraction at the **Institut Laue-Langevin (ILL) in Grenoble** (France) will be performed for mapping the residual stresses as well as providing phase-specific information towards load partitioning studies of mechanical behaviour. The work will take place within a direct collaboration with the Metal Processing Group (PROCOMAME) of the Department of Materials Science and Engineering of the **Technical University of Catalonia (UPC) in Barcelona** (Spain). Here, the development of the WAAM process as well as complementary materials characterisation and simulation will be performed.

Your tasks

You will study the relationship between crystal structure, phase composition and microstructure states as a function of processing variables to identify the failure modes of WAAM components. To this end, you will develop laboratory and neutron characterization of metal additive manufactured hardware: study of phases and residual stresses upon fabrication, control after/during different post-processing steps and validation of final component (i.e. operando conditions under load). The experimental work will serve to propose experimentally-based mechanical simulation for part quality validation and the processing optimization in AM.

In particular you will be responsible for:

- Develop a testing plan and experiments set ups including residual stress mapping (ex-situ) and monitoring (in-situ) of WAAM material and operando studies on internal stresses development and phase formation at SALSA and at XtremeD instruments.
- Further develop the instrumental setups at ILL in collaboration with the diffraction group
- Fabrication of materials and performance of experiments
- Experiment and data treatment with autonomy
- Implement FEM of AM materials
- Report to all partners
- Publications in peer reviewed journals
- Assess next steps of the research and potential industrial implementation of results

Your profile

- Highly motivated candidate with a M.Sc. in physics, materials science or alike.
- Background in materials science and experimental physics.
- Motivation to expand your expertise by learning new disciplines.
- Practical experience in experimental research including: phase analysis, diffraction methods, engineering structural alloys, metal 3D printing.
- Laboratory skills in designing and carrying out experimental work



- Computing skills and a general interest in software development would be an advantage.
- Sound knowledge of English. French and Spanish will be also valued.
- Adequate communication skills within international consortiums.

About ILL

The Institut Laue-Langevin (ILL) in Grenoble (France) operates the Europe's leading research facility for basic and applied research with neutrons. The passion for progress and technology unites us and makes innovation in science and research possible every day. A hub for research and technology, the city of Grenoble is ideally located in the heart of the French Alps (just 3 hours from Paris/Provence by train, 1 hour from Lyon international airport and 1.5 hours from Geneva).

About UPC

The Universitat Politècnica de Catalunya · BarcelonaTech (UPC). It is a public institution of research and higher education in the fields of engineering, architecture, sciences and technology, and one of the leading technical universities in Europe. Every year, more than 6,000 bachelor's and master's students, more than 500 doctoral students graduate and 3,067 graduates in lifelong learning. The UPC's approach to research is highly varied and covers applications and basic research in many knowledge areas. The impact of this research makes the UPC one of the main European technology universities.

Benefits

This post is based on a contract at ILL during Years 1 and 2, and on a contract at the UPC during Year 3.

We guarantee you a 36 months Ph.D. contract in a multi-cultural and multi-disciplinary scientific environment. We offer generous social benefits (e.g., excellent health cover), moving and relocation assistance (under certain conditions). We also offer language courses and subsidies for the use of public transport and the staff canteen, as well as for holidays and a variety of cultural and sports activities.

Expected start date: 01.09.2023 (approximate)

Sounds interesting?

Then, why not take your next career step? Do not wait to send your application in English to our e-mail addresses below (quoting reference 2023-25 [Open PhD positions - ILL Neutrons for Society](#)) **before the 30th June 2023**. Include your CV (max 3 pages), a short statement describing your motivation and prior experience (max 1 page), a list of your top publications and the contact of 3 referees (one from your present work place).

For further information do not hesitate to contact Dr. P. Barriobero (pere.barriobero@upc.edu) and Dr. S. Cabeza (cabeza@ill.fr).

The evaluation will be on the basis of the academic record and credentials, previous research experience, exposure to relevant disciplines and proficiency in English.

We are committed to equal opportunities and diversity and therefore welcome applications from all suitably qualified candidates.