

October 2025

## Master internship

# Multi-GPUs computing of solidification microstructures using the phase-field model.

## General information

**Workplace:** Nancy, France**Type of contract:** master internship**Contract period:** 4 to 6 months**Starting date:** February 2026**Proportion of work:** Full time**Remuneration:** according to French law**Desired level of education:** Master's degree in computer sciences, physics, chemistry or material sciences.**Experience required:** -

## Missions / Activities

In materials sciences, the deep understanding of the microstructure dynamics relies on the high accuracy of the numerical methods. During the last two decades, the thin interface phase-field (TIPF) methods have emerged as a powerful numerical tool to tackle the time dependent free boundary problems (i. e. Stefan problems) like solidification problems.

The TIPF can solve problems at relevant experimental scales (~mm) with high accuracy by bridging the scales between the capillary (~nm) and the diffusion (~mm) lengths. To achieve such a high accuracy at those scales, the codes are developed using high performance computing (HPC) techniques.

In the present work, the homemade developed code is based on Cuda C. It will be requested from the intern student to optimize the code considering different multi-GPUs techniques (HPC) and set a guideline of the most efficient technique according to data centers architectures.

## Work context

The intern student will be supervised by Dr A. K. Boukellal and Dr M. Plapp.

The intern student will be based at IJL, and regular zoom meetings will be organized with Dr. M. Plapp (from Laboratoire de Matière Condensée, Palaiseau).

## Skills

Knowledge of high-performance computing (HPC) and GPU parallelization.

Knowledge of thermodynamics of phase-transitions (Solidification), metallurgy

High interest to numerical simulations.

Knowledge of English (oral and written) is important, and knowledge of French would be an advantage.

As an enthusiastic student you like teamwork and have a flexible approach to collaborating with experimentalists.

## Constraints and risks

The position you are applying for is in a sector relating to the protection of scientific and technical potential. It therefore requires, in accordance with the regulations, that your arrival be authorized by the competent authority of the Ministry of Higher Education, Research and Innovation.

## About Institut Jean Lamour

The Institute Jean Lamour (IJL) is a joint research unit of CNRS and Université de Lorraine.

Focused on materials and processes science and engineering, it covers: materials, metallurgy, plasmas, surfaces, nanomaterials and electronics. It regroups 183 researchers/lecturers, 91 engineers/technicians/administrative staff, 150 doctoral students and 25 post-doctoral fellows. Partnerships exist with 150 companies and our research groups collaborate with more than 30 countries throughout the world. Its exceptional instrumental platforms are spread over 4 sites; the main one is located on Artem campus in Nancy.

### Application

Applicants are invited to send a CV and cover letter together with diploma copies to:

A. K. Boukellal (CNRS Researcher) : [ahmed.boukellal@univ-lorraine.fr](mailto:ahmed.boukellal@univ-lorraine.fr)

M. Plapp (CNRS Researcher) [mathis.plapp@polytechnique.fr](mailto:mathis.plapp@polytechnique.fr)