

## Post-doctoral Position 12 months

### Project “Influence of surface conditions for spray impact: applications to spray cleaning”

#### **Characteristics of the position:**

Functions/ features	Postdoctoral researcher
Employment type	BAP C – C1B42 Expert in experimental development
Category	A
Body	early career researcher
Quotas	100%

#### **Assignment:**

The successful candidate will be hosted by the Laboratoire LEGI, 1209-1211 rue de la Piscine 38400 Saint-Martin d’Hères (France).

The candidate will be under a fixed-term contract for a period of 12 months at the University of Grenoble Alpes.

#### **Context and work environment**

#### **Structure description:**

**LEGI** is a research laboratory that deals with fluid mechanics in geophysical and industrial applications.

**LiPhy** is a research laboratory based on multidisciplinary approaches to physics.

Both laboratories have several teams covering various aspects of research, which are led by professors, researchers, post-docs and PhD students.

#### **Team description:**

A one-year post-doctoral position is open at LEGI, in the EDT team, to experimentally study the influence of the nature of the surface on the impact of sprays, in relation to spray cleaning. Although the position is at LEGI, the post-doc will also work at LiPhy, in the MODI team, as this is a collaborative project between researchers from both laboratories. The post-doc will be supervised by N. Machicoane at LEGI and E. Lorenceau at LiPhy.

#### **Position’s mission and main activities**

**Mission:** Spray impacts applied to spray cleaning

The project has a duration of 12 months from the date of recruitment expected no later than June 2023.

#### **Main activities:**

Liquid sprays impacting on a surface are commonly involved in processes such as cleaning, cooling, coating and medical or agricultural spraying. The fluid mechanics of these systems is complex as the liquid is fed by a turbulent two-phase flow, bounded by a possibly structured solid surface, and subjected to an intense shear gas flow. This makes spray impact an inherently coupled multi-scale problem. A large number of studies have sought to provide a comprehensive understanding of the impacting spray in the context of cooling or spray coating. Nevertheless, several issues remain to

be resolved in the field of spray cleaning. Firstly, a specificity of this process is that the spray formation involves a high-velocity gas jet, the influence of which on the impact pattern has been little discussed. Secondly, although spray impact is a highly energetic process in which the kinetic energy of the droplets far exceeds the adhesion energy of the small particles by several orders of magnitude, a much lower cleaning efficiency is observed on hydrophobic surfaces than on hydrophilic surfaces. This suggests subtle redeposition phenomena of the particles in the area beyond the film, which have never been studied. This one-year project aims to investigate these phenomena.

**Activities :**

- Design of experiments.
- Implementation of experiments, data analysis
- Theoretical development and comparison with experimental results.
- Writing of publications.

**Restriction or constraints related to the position**

None

**Desired profile**

- **Trade skills/ expertise**

The candidate must have a Diplôme degree in fluid mechanics or liquid physics.

A good knowledge of fluid mechanics, ideally turbulence and/or two-phase flows, and their characterisation and experimental analysis is expected.

- **Personal skills**

The position will involve interaction with the two project leaders and their collaborators in the two laboratories.

Supervisory mission:  Yes  No

**Desired professional experience :**  beginner  2 to 5 years

**Previous formation, diplomas:**

D. in fluid mechanics or liquid physics, with or without post-doctoral experience.

**General information**

The gross salary is 2750 euros/month, equivalent to a net salary of 2210 euros/month.

Applicants should send their CV and covering letter by e-mail to the following persons :

Contact for the questions related to the position:

**Nathanaël Machicoane**, Researcher CNRS:

Mail : [nathanaël.machicoane@univ-grenoble-alpes.fr](mailto:nathanaël.machicoane@univ-grenoble-alpes.fr)

**Elise Lorenceau**, Research Director CNRS:

Mail : [elise.lorenceau@univ-grenoble-alpes.fr](mailto:elise.lorenceau@univ-grenoble-alpes.fr)

Interviews will be scheduled in the first half of 2023.