

# 2025 Nuclear Global Internship Job Description

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## 1. Basic Information

- Expected Internship duration: *6 months (or more)*
- Internship Area/Topic: *Thermal-Hydraulics, CFD simulation, instrumentation*
- Division/Department Placement: *CEA - IRESNE/DTN/STCP/LTHC at CEA-Cadarache center*
- Supervisor's contact information: *David GUENADOU, [david.guenadou@cea.fr](mailto:david.guenadou@cea.fr)*

## 2. Responsibilities

- 1) Main Purpose: *CFD calculations to understand flow behavior and enhance flow rate measurement methods based on thermal noise detection.*

*Current flow measurement techniques are often intrusive, requiring complex interventions, particularly in regulated environments like the nuclear industry. To address these challenges, CEA has developed a flow measurement method based on analyzing the propagation of thermal signals in a non-isothermal flow. This technique involves installing temperature sensors at two points along the pipeline, with minimal installation constraints. The thermal fluctuations recorded upstream at the first measurement point are carried by the flow to the downstream second point. By comparing the two recorded signals, it is possible to calculate the time of flight between the two sensors, to determine the flow velocity, and thus the flow rate.*

- 2) Tasks/ Key Results Expected

*Experiments carried out in a test section have demonstrated the feasibility of this method. However, reliability improvements seem possible by optimizing the position, size, and type of sensors. Knowing the temperature and velocity fields in the test section would be helpful to achieve this. The subject of this internship aims to use CFD numerical tools to calculate the flow under different operating conditions. Some preliminary work has already been carried out, but it is at an early stage and needs improvement. The calculations will be performed using the CFD code OPENFOAM.*

*Modelling with OPENFOAM : Meshing, Modelling until convergence, Post-treatment and sensitivity studies (quality, flow rate, primary side power...)*

- 3) Knowledge, Skills and Abilities

- *Thermal-hydraulics*
- *CFD (Openfoam)*

## 3. Qualifications (Education)

☐ (1) Bachelor degree (3<sup>rd</sup> year ☐, 4<sup>th</sup> year ☐)

☒ (2) Master degree (or candidate)

☐ (3) Ph. D. degree (or candidate)

☐ (4) Does NOT matter

#### 4. Required documents

☒ Resume / Curriculum Vitae

☒ Cover letter

☒ Academic transcript

☒ Recommendation letter written by academic supervisor

☒ English Test score (TOEFL, TOEIC, IELTS, etc.)

☐ Others ( )

#### 5. Is the host organization providing any additional financial support in addition to the funding from KONICOF?

☒ Yes

- The amount of stipend: EUR 700 per month /~~week~~
- Purpose of the stipend: *ex) assist housing, required minimum wage, etc.*

☐ No



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