

**Internship Position (master student or equivalent)**

*Simulating brain hemodynamic recovery after cardiac arrest*

**About us:** In the CFL research team at Cemef - Mines Paris, a new ambitious ERC-awarded project (CURE) has recently started with the aim of simulating a variety of biomechanical phenomena involved in cardiovascular diseases. The team originally specializes in CFD, HPC and AI developments, which will be applied to improve patient-specific treatment through high-fidelity simulations of haemodynamics. Here we aim to better assess blood circulation in brain capillaries for patients who suffered from a cardiac arrest, comparing numerical simulations to real medical data.

**Goal:** After a cardiac arrest, it is commonly witnessed that patients' blood circulation is altered in the long term. Some vessels can remain partially occluded, thus increasing the overall hydraulic resistance of the vascular system and triggering other diseases. This is easy to observe with medical imaging techniques for large arteries but remains complex to measure in capillaries. The goal of this internship is to develop a model based on CFD and enriched with medical data in order to assess the post-cardiac-arrest brain vascular state of patients. Of particular interest is the measurement of their capillary hydraulic resistance by numerical means. The model will be validated against real medical measurement data acquired at the CHU of Nice. The intern will not only learn a lot about the numerics/coding aspects but also about the medical world and its specificities.

**Required skills:**

- Advanced coding: scientific and object-oriented python, bash.
- Good knowledge in fluid mechanics, Physics.
- Image processing, data processing.
- Fluent English.

**Environment and conditions:** The internship will take place in Sophia-Antipolis (on the French Côte d'Azur) for 4-6 months. A compensation of around 1000 euros/month is proposed. The intern will work hand-in-hand with two PhD students, which will be in charge of guiding and supervising the project. Additionally, the intern will have the opportunity to consult the medical partners (CHU Nice) regularly during the course of the project.

