

**Internship (6 months):** Exploration of neural mechanisms triggered by focused ultrasound neurostimulation

**Context:** Focused ultrasound (FUS) neurostimulation is an exciting and rapidly expanding field for the treatment of neurodegenerative and psychiatric disorders such as epilepsy, Parkinson's disease and depression, among others. Despite the rapid growth of this promising field, a fundamental understanding of the underlying mechanisms is necessary to further accelerate its transfer to the clinic. This project will consist in the design of tools and platforms to investigate the physical and biological mechanisms involved in this phenomenon. The experimental platforms designed and operated by the candidate will integrate FUS stimulation systems and techniques commonly used for the study of living organisms of increasing anatomical and physiological complexity. These hybrid platforms will be used to describe the electrochemical and electrophysiological responses produced by application of FUS sequences on different neural models ranging from neural cultures *in vitro*, to *in vivo* giant axons of the common earthworm, to full brain *in vivo* studies on rodent models. The techniques that will be used to explore the biological activity of FUS-treated neural models will include real-time *in vitro* fluorescence imaging, electrophysiological and electrochemical measurements of neural activity, and medical imaging systems.

**Mission:** The aim of this master's or engineering's degree internship will be to study current hypotheses of neural signal generation and transmission across neural networks as a result of FUS stimulation. In addition to operating and fine tuning the aforementioned hybrid platforms, the candidate will be expected to develop tools to analyze and display acquired data in such a manner as to address the project's objectives and hypotheses.

**Activities:**

- Design and execute a series of experiments.
- Data collection and analysis.
- Dissemination of scientific results in internal laboratory meetings and local scientific events.

**Requirements:**

- Knowledge in general physics, engineering and acoustics.
- Previous experience with electronics and/or imaging techniques.
- Proficiency in programming (MATLAB) or other coding languages such as Python.
- Appreciation for experimental work, and analysis of experimental datasets

**Additional information:** This project is funded with a national research agency (ANR) grant. The successful candidate will conduct the project's research work at the Laboratory of Therapeutic Applications of Ultrasound (LabTAU, Inserm U1032) located in the Grange-Blanche area, in Lyon, France. The duration of the internship will be 6 months. Remuneration will be assigned according to national standards: 4.05 euro per hour. For application or additional information, please send an updated CV and motivation letter by e-mail to Apoutou N'DJIN ([apoutou.ndjin@inserm.fr](mailto:apoutou.ndjin@inserm.fr)) or Ivan SUAREZ-CASTELLANOS ([ivan.suarez@inserm.fr](mailto:ivan.suarez@inserm.fr)).

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