



## **Internship position at LEGI, Grenoble Campus**

### **Fluid mechanic and aero-acoustic study of sound source interaction during human speech sound production**

Pertinent fields: physics/mechanics/aero-acoustics, signal processing and instrumentation

#### **Introduction and objective**

The production of speech sounds depends on sound sources of different nature. Voiced sounds involve the self-oscillation of the vocal folds, where the fluid-structure interaction between the deformable tissues of the vocal folds and the airflow from the lungs is the main sound source. Unvoiced sounds, on the other hand, depend on an aero-acoustic sound source located in the vocal tract. While physical studies deal with both types of sound sources, their dynamics and interaction - the onset, maintenance, cessation or coexistence - are poorly studied. In this internship, it is proposed to study the dynamics and interaction of the sound sources in order to propose a physical model validated on mechanical models that allow to explain the phonetic signals observed during normal speech (including plosives and voiced fricatives) and pathological speech (Parkinson's disease). The internship is part of ongoing PhD research.

*The **overall objective** of this internship is to contribute to the physical and systematic study of the interaction of sound sources of different nature and with different characteristics situated in confined waveguides with different geometries, properties and terminations: flow and aero-acoustic phenomena are studied systematically for different waveguide conditions.*

In all cases, the internship comprises an important experimental component as it needed to reproduce the phenomena under controlled conditions, to perform a quantitative characterisation and to allow model validation. Depending on the profile, competences and level of the candidate, the focus of the internship is adapted.

#### **Location, how-to-apply and contact**

LEGI, Grenoble University Campus: <http://www.legi.grenoble-inp.fr>

Send a CV and motivation letter to:

[annemie.vanhirtum@univ-grenoble-alpes.fr](mailto:annemie.vanhirtum@univ-grenoble-alpes.fr)

[xavier.pelorson@univ-grenoble-alpes.fr](mailto:xavier.pelorson@univ-grenoble-alpes.fr)

#### **Competences required**

Engineering/master student with strong interest in one or all of the following fields: physics/mechanics/aero-acoustics, signal processing and instrumentation, theoretical modeling. Experimental skills are appreciated.