

# 6 months Internship on Shape Statistics & Atrial Fibrillation

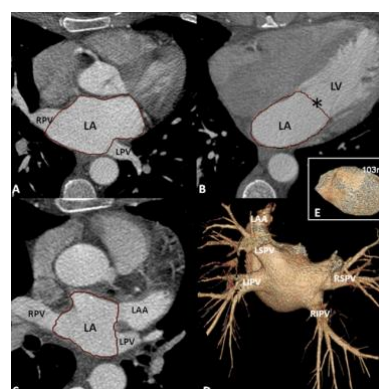
## from Image Data to Stroke Risk

### Clinical Context

Atrial Fibrillation (AF) is a complex cardiac disease characterized by chaotic electrical activation and loss of atrial contraction, which creates a hemodynamic environment that is prone to clot formation and a six-fold increase in risk of ischemic stroke. AF is gaining epidemic proportions and currently affects more than 6 million Europeans, with an annual cost exceeding €13.5 billion, and the number of patients expected to double by 2030.

The majority of AF patients are prescribed anticoagulants that markedly reduce stroke incidence, but at the cost of increased risk of severe bleedings. Individualized anticoagulation management remains a major challenge, and current risk scores for stratifying stroke and bleed show poor performance. The current risk scores are based on population-level statistical correlations only, do not account for the underlying mechanisms of clot formation, and routinely available patient-specific clinical data are under-utilized.

Computational models of the atria have reached a high level of sophistication, and include advanced statistical representations of atrial morphology and motion, as well as biophysically detailed models of tissue and fluid dynamics. Model-based tools for diagnosis and prediction are emerging, but remain insufficiently validated and tested to be used for individualized clinical predictions. The ambition of this project is to identify image-based biomarkers that correlate with stroke, bleeding and other severe complications, and to prospectively outperform the current risk score to reduce individual bleeds by optimizing personalized treatment and clinical follow-up.



### Position Description

The topic of this internship will be to analyse in collaboration with clinicians an existing database of 300+ MDCT images and to use state-of-the-art deep learning algorithms for accurate segmentation of such images. Then the analysis of atrial shape from imaging will be achieved in order to extract features which are correlated with thrombus formation. This analysis could lead to the discovery of important factors for patients' management, which could integrate a new decision support system and impact guidelines.

This position will be based at [Inria](#), the French Institute for Research in Computer Science and Mathematics, in [Epione](#) team of [Inria Sophia Antipolis - Méditerranée](#), located on the French

Riviera. It will be done in collaboration with [IHU Liryc](#), Bordeaux University Hospital, a world leading centre in the treatment of cardiac arrhythmias

A successful candidate would have the opportunity to pursue this project through a PhD within the European project PARIS recently funded on this topic.

### Searched profile

- Background in applied mathematics, statistics or computer science
- Motivated by statistical learning
- Eager to work in the medical field
- Good Knowledge of Machine Learning and Statistical Analysis
- Good coding skills in Python
- Fluent in English (Reading, Writing, Speaking)
- Eager to learn and take initiatives

**Job location:** Inria Sophia Antipolis, 2004 route des Lucioles, 06 902 Sophia Antipolis, France

**Duration:** 6 months

**Start:** Spring 2020

**Salary:** gross remuneration of 1445 Euros/month (net is about 1182 Euros)

**Send your resume, references and motivation letter to:** [maxime.sermesant@inria.fr](mailto:maxime.sermesant@inria.fr)