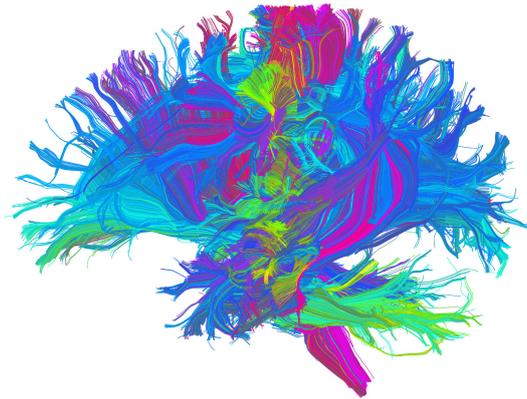


## Research engineer position

### *Visualization software for multi-resolution fiber tracking.*



**Contract duration:** 12-15 months

**Expected beginning:** Summer 2018

**Employer:** École Polytechnique

**Localization:** Laboratoire de l'X (LIX), Palaiseau, Essonne, France.

**Supervisor:** Damien ROHMER (damien.rohmer@polytechnique.edu)

### 1- Overview

Tractography from diffusion-weighted magnetic resonance imaging (DW-MRI) is the only non-invasive technique able to trace in vivo the wiring architecture of the human brain white matter. It is widely employed for both clinical and research purposes. It results in a tractogram which is a bundle of 3D polylines, usually called fibers or streamlines, which are estimates of the trajectories of large groups of neural tracts. Recent methods produce up to one million fibers, which makes it difficult to store, visualize and process them.

At the interface between **Computer Graphics** and **Medical Imaging**, the **MetaTracts** research project aims at developing a *new parsimonious multi-resolution representations for modeling, visualizing and statistically analysing brain tractograms*. Such model will help to better visualize and understand the brain structure.

As a research engineer, your role will be to develop a tool **integrating the multi-resolution model and the visualization algorithms as an interactive software distributed as open-source for the community**. You will work in a close contact with a PhD student who develops the research oriented-algorithm.

## 2- Work program

Your first step will be to assess the current state of the algorithm developed during the PhD associated to the project, and propose the general design of the software with respect to the following objectives.

- Robustly integrates the geometrical multi-resolution model.
- Allows the software to be quickly a support for the research work of the PhD candidate.
- Be generic with respect to the future visualization algorithms that should be plugged onto it.

Your second step will be to start the actual development of the software. As a research engineer, you may share your time between the actual software development and support to the research part of the project on visualization.

Your last step will consist in proposing a robust, public version of the developed code with associated examples, shared on public platforms such as github, and diffusing the information in the relevant communities.

## 3- Required background

We are looking for highly motivated candidates to work in a research environment with Engineering or Master degree. You should have a background in both Computer Sciences and Computer Graphics. Good knowledge of applied mathematics will be a plus.

### Keywords

- Computer sciences: C++ programming, robust software development.
- Computer Graphics: 3D geometry, modeling and rendering,

## 4- Application

To apply to this position, please send to [damien.rohmer@polytechnique.edu](mailto:damien.rohmer@polytechnique.edu) motivation letter, cv, and one or two names of previous supervisors or teachers who worked with you and able to support your application.

## 5- Host structure

The MetaTracts project is a funded research project from the Labex DigiCosme. The project is a collaboration between scientists from two research center: LIX - École Polytechnique ([STREAM team](#)); and LTCI - Télécom ParisTech ([IMAGES team](#)).

Your main employer will be Ecole Polytechnique, and you will work in the LIX building within the STREAM research team. Regular meetings will take place between the two laboratories and you will work in close contact with researchers from both labs.

### Full address

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### Researchers involved in the project

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