



## 2021-03439 - Post-Doctoral Research Visit F/M Geometry of plasma confinement in stellarators

Level of qualifications required : PhD or equivalent  
Fonction : Post-Doctoral Research Visit

### Context

In collaboration with the start-up Renaissance Fusion, based in Grenoble, we explore fundamental mathematical problems in nuclear fusion power; to rigorously formulate, prove the existence of, and find the optimal "magnetic bottle" of the stellarator type to efficiently confine the ionized gas (plasma) where the fusion reactions take place.

The activity is part of the Action Exploratoire StellaCage.

### Assignment

The post-doc will be based in the Laboratoire Jacques-Louis Lions at Sorbonne Université and will involve periodic visits to Renaissance Fusion in Grenoble. He/she will work in collaborations both with experts in control theory (team CAGE), plasma physics (Renaissance Fusion), and shape optimization (Yannick Privat, Université de Strasbourg). The stellarator design opens many technological and theoretical research challenges. At the core of the proposed project is the design of coils generating a magnetic field in a toroidal domain whose integral lines are sufficiently twisted to optimize the confinement. Such twist is needed to counteract natural drifts of the plasma towards the exterior of the stellarator.

From a mathematical point of view, the post-doc will work on different strategies needed to optimize the magnetic field "bottle" as to better confine the plasma and make it more stable. To that end, one has to select a suitable figure of merit reflecting confinement and stability properties.

### Main activities

The post-doc activities will be organized around three main lines: Foliations of toroidal domains via integral lines of curl-free vector fields to identify suitable magnetic fields. Inverse problems to improve coils' design. Shape optimization to combine the previous two steps.

### Skills

A solid background in Mathematical Physics or Mathematics is required. Previous experience in stellarator physics and/or shape optimization will be highly appreciated. The candidate should speak English fluently.

### Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training

### General Information

- **Theme/Domain** : Optimization and control of dynamic systems
- **Town/city** : Paris
- **Inria Center** : [CRI de Paris](#)
- **Starting date** : 2021-10-01
- **Duration of contract** : 2 years
- **Deadline to apply** : 2022-03-31

### Contacts

- **Inria Team** : CAGE
- **Recruiter** :  
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### About Inria

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### Instruction to apply

#### Defence Security :

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

#### Recruitment Policy :

As part of its diversity policy, all Inria positions are accessible to people with disabilities.

**Warning** : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.