Offer #2023-07031

Research assistant for development of magic state distillation protocols in GKP codes

**Contract type**: Fixed-term contract  
**Level of qualifications required**: Graduate degree or equivalent  
**Fonction**: Temporary scientific engineer  
**Level of experience**: Recently graduated

**Context**

This contract will be dedicated to the study of schemes for "magic state distillation" in so-called Gottesman-Kitaev-Preskill codes. The goal will be to study possible optimizations of the only currently existing proposal for the single-mode case and then generalize it to the case of concatenated or more exotic multi-mode codes.

**Assignment**

**Assignments**:  
With the help of Francesco Arzani, the recruited person will be taken to develop a theoretical framework to describe magic state distillation in GKP codes and perform numerical simulations to optimize and benchmark the performance of the schemes.

**For a better knowledge of the proposed research subject**:  
The starting point of the project is the scheme described in the paper "All Gaussian universality and fault tolerance with the Gottesman-Kitaev-Preskill code", by Baragiola et al., published on PRL and available at the following url: https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.123.200502

**Collaboration**:  
The recruited person will be in connection with Francesco Arzani and the other members of the QAT group who will provide guidance and collaborate in the development of the project.

**Responsibilities**:  
The person recruited is responsible for developing the theoretical formalism and the necessary numerical simulations.

**Main activities**

**Main activities**: Exploration of the relevant literature, analytical study and translation of existing qubit techniques to the continuous-variable case, coding of the numerical simulations. Writing reports on results.

**Additional activities**: proposal of relevant optimization strategies compatible with relevant experimental architectures.

**Skills**

Technical skills and level required: Successfull applicants will have a good knowledge of quantum computing and the continuous-variable formalism for quantum optics. Previous knowledge of stabilizer codes and bosonic codes represent a plus.

**Languages**: English

**Other valued appreciated**:

**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
Flexible organization of working hours (after 12 months of employment)
Professional equipment available (videoconferencing, loan of computer equipment, etc.)
Social, cultural and sports events and activities
Access to vocational training
Social security coverage

General Information

- **Theme/Domain**: Numerical schemes and simulations
- **Information system** (BAP E)
- **Town/city**: Paris
- **Inria Center**: Centre Inria de Paris
- **Starting date**: 2024-03-01
- **Duration of contract**: 6 months
- **Deadline to apply**: 2024-01-13

Contacts

- **Inria Team**: CASCADE
- **Recruiter**: Arzani Francesco / francesco.arzani@inria.fr

About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

The keys to success

Successful applicants will be passionate about the theory of quantum computing and quantum optics and have a good grasp of the main concepts in quantum error correction.

Desired qualities

- Essential qualities in order to fulfil this assignment are feeling at ease in an environment of scientific dynamics and wanting to learn and listen.

**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.

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.