Offer #2024-08018

PhD Position F/M Resources for bosonic quantum computing: identification and verification

Contract type : Fixed-term contract

Level of qualifications required : Graduate degree or equivalent

Fonction : PhD Position

Context

Within the framework of a partnership:

This PhD project is in the framework of the project Veriqub, funded by the European Innovation Council, which aims to develop a new approach to the efficient verification of resourceful quantum computing architectures with bosons, using continuous-variable measurements.

Assignment

Assignments:
Under the supervision of the PI Ulysse Chabaud in the team QAT (hosted by CASCADE), the recruited person will deepen the understanding of quantum computational resources in the context of bosonic quantum information processing.

For a better knowledge of the proposed research subject :
Quantum information processing promises considerable advantages over classical information processing, especially for computation, cryptography, communication, and sensing. In recent years, alternative approaches to quantum information processing in which bosons are the carriers of information have attracted increasing attention, because they offer a viable path to fault-tolerance and scalability. For instance, bosonic modes of light in quantum optics allow for the deterministic generation of the largest entangled quantum states to date, over a million of addressable subsystems, while bosonic modes of superconducting microwave cavity fields coupled to circuit quantum electrodynamics (QED) provide exciting prospects for quantum error-correction. Regardless of their underlying architecture, identifying what makes quantum computers more powerful than their classical counterparts is a very active area of research. These are fundamentally quantum properties such as entanglement, contextuality and non-Gaussianity, to name but a few. These properties of physical systems, which are indispensable to any quantum advantage over classical computers, are known as *quantum computing resources*. Their theoretical understanding is of major importance for the development of quantum computing technologies.

Collaborations:
The recruited person will be in connection with various international researchers,
including those involved in the Veriqub project (both theorists and experimentalists) from Laboratoire Kastler-Brossel in Paris, France, from the University of Milan in Italy, and from the Chalmers University of Technology in Gothenburg, Sweden.

Main activities

Main activities:

- Literature review
- Participation to local seminars and workshops as well as international conferences
- Developping autonomy as a researcher
- Participation to the life of the team
- Writing of research articles and thesis manuscript

Skills

Technical skills and level required :

Languages :

Relational skills :

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 :** Algorithmics, Computer Algebra and Cryptology
  Information system (BAP E)
- **Town/city :** Paris
- **Inria Center :** Centre Inria de Paris
- **Starting date :** 2024-10-01
- **Duration of contract :** 3 years
- **Deadline to apply :** 2024-08-31

Contacts

- **Inria Team :** CASCADE
- **PhD Supervisor :**
  Chabaud Ulysse / ulysse.chabaud@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

There you can provide a "broad outline" of the collaborator you are looking for what you consider to be necessary and sufficient, and which may combine :

- tastes and appetencies,
- area of excellence,
- personality or character traits,
- cross-disciplinary knowledge and expertise...

This section enables the more formal list of skills to be completed and 'lightened' (reduced) :

- "Essential qualities in order to fulfil this assignment are feeling at ease in an environment of scientific dynamics and wanting to learn and listen."
- " Passionate about innovation, with expertise in Ruby on Rails development and strong influencing skills. A thesis in the field of **** is a real asset."

> **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.