Offer #2025-08883

Research internship in continuous-variable quantum information theory

Contract type : Fixed-term contract

Level of qualifications required : Graduate degree or equivalent

Fonction : Internship Research

Context

Within:

- The QAT team
- The EIC project Veriqub

Assignment

CVMBQC with phase-space measurements

Exploratory theory project, interactions with Ulysse Chabaud, Harold Ollivier and collaborators

Measurement-based quantum computing (MBQC) is a paradigm for quantum computing, in which the computation is performed by successive measurements and local operations on a large initial entangled state. Photonic platforms are particularly suited for MBQC, as they allow for the deterministic generation of large entangled states. For qubit computations, MBQC employs Pauli measurements to drive the computation, while continuous-variable (CV) MBQC employs CV homodyne measurements. However, other types of measurements are available such as phase-space measurements, corresponding to displaced parity operators whose mathematical properties resemble those of Pauli operators.

The proposed project aims to explore the possibility of using phase-space measurements to drive a CV quantum computation. A first step will be to study CV state teleportation based on phase-space measurements and classical communication. Then, a second step will be to generalise the construction to universal MBQC. Finally, a third step will be to study fault-tolerance in this computational model.

References

Introduction to MBQC

Introduction to CVMBQC

Phase-space measurements

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

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
- Social security coverage

General Information

- **Theme/Domain :** Algorithmics, Computer Algebra and Cryptology System & Networks (BAP E)

- **Town/city :** Paris
- **Inria Center :** Centre Inria de Paris
- **Starting date :** 2025-06-01
- **Duration of contract :** 4 months
- **Deadline to apply :** 2025-06-06

Contacts

- **Inria Team :** CASCADE
- **Recruiter :**
  Chabaud Ulysse / ulysse.chabaud@inria.fr

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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.

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