



Offre n°2025-08641

Post-Doctoral Research Visit F/M Postdoctoral Position in Quantum Machine Learning at ENS Paris

Le descriptif de l'offre ci-dessous est en Anglais

Type de contrat : CDD

Niveau de diplôme exigé : Thèse ou équivalent

Fonction : Post-Doctorant

Contexte et atouts du poste

We are seeking a highly motivated and talented postdoctoral researcher to join the QAT team. The successful candidate will conduct research on quantum machine learning (QML) techniques. The candidate will contribute to a variety of projects within the Hybrid HPC-Quantum Initiative, and play a central role in advancing our understanding of quantum algorithms, architectures, and applications.

QAT is a newly-formed team at ENS Paris, dedicated to exploring the foundations and applications of quantum computing. Our focus areas include quantum machine learning, quantum cryptographic primitives, quantum complexity, and quantum error correction. As part of this team, you will work with leading experts to push the boundaries of quantum technologies and contribute to transformative advancements in the field.

Mission confiée

Quantum machine learning has rapidly emerged as one of the most exciting and promising areas in quantum computing. While this field shows tremendous potential, there are key challenges to overcome, including the existence of barren plateaus, the trade-off between expressibility and trainability of quantum models,

and robustness to noise. These challenges raise important questions about the limits of quantum machine learning and its practical applicability on current quantum hardware.

Our team is investigating novel approaches to these issues by exploring the role of Hilbert space properties in enhancing the learning of classical correlations, especially in distributed settings [GNR18quantum, BBKA24distributed]. We aim to improve the design of quantum machine learning algorithms by gaining a deeper understanding of these underlying properties. In particular, our research explores whether distributed quantum advantages can be practically leveraged, and whether there exist problems that can be mapped into centralized quantum models where quantum advantages persist.

In addition to fundamental research in quantum machine learning, we are exploring the use of machine learning techniques to improve quantum algorithm design itself [FWM23variational]. This promising avenue has the potential to yield breakthroughs in both quantum and classical computing.

[GNR18quantum]: Quantum Advantage for the Local Model in Distributed Computing. Gall, François Le and Nishimura, Harumichi and Rosmanis, Ansis.
[BBKA24distributed]: Distributed Quantum Advantage for Local Problems. Balliu, Alkida and Brandt, Sebastian and Coiteux-Roy, Xavier and d'Amore, Francesco and Equi, Massimo and Gall, François Le and Lievonen, Henrik and Modanese, Augusto and Olivetti, Dennis and Renou, Marc-Olivier and Suomela, Jukka and Tendick, Lucas and Veeren, Isadora.
[FWM23variational]: Variational Methods for Computing Non-Local Quantum Strategies. Furches, Jim and Wiebe, Nathan and Marrero, Carlos Ortiz.

Principales activités

- Conduct cutting-edge research in quantum machine learning and contribute to the development of new quantum algorithms.
- Study the role of Hilbert space properties in learning classical correlations and explore their implications for distributed quantum systems.
- Investigate the applicability and limitations of quantum machine learning in NISQ-era devices.
- Collaborate with interdisciplinary teams, including those involved in quantum architecture and complexity theory, to explore hybrid HPC-Quantum systems.
- Contribute to the design of quantum algorithms using both quantum and classical machine learning methods.
- Publish research findings in top-tier journals and present at international conferences.

Compétences

Required Qualifications

- Ph.D. in quantum computing, machine learning, theoretical computer science, physics, or a related field.
- Strong background in quantum computing and familiarity with quantum algorithms.
- Experience with machine learning methods and their application to quantum computing.
- Strong analytical and mathematical skills, including a solid understanding of linear algebra, optimization, and statistical learning theory.
- Ability to work independently and as part of a collaborative team.
- Proficiency in programming languages such as Python, C++, or Julia.
- Excellent written and oral communication skills in English.

Desired Qualifications

- Experience in quantum machine learning or quantum algorithm design.
- Familiarity with quantum programming languages such as Qiskit, Cirq, or others.
- Knowledge of quantum complexity theory, quantum error correction, or quantum cryptography.
- Interest in interdisciplinary research and hybrid quantum-classical systems.

Avantages

- 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 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

Informations générales

- **Thème/Domaine** : Algorithmique, calcul formel et cryptologie
Ingénierie logicielle (BAP E)
- **Ville** : Paris
- **Centre Inria** : [Centre Inria de Paris](#)
- **Date de prise de fonction souhaitée** : 2025-09-01
- **Durée de contrat** : 2 ans
- **Date limite pour postuler** : 2025-03-12

Contacts

- **Équipe Inria** : [CASCADE](#)
- **Recruteur** :
Ollivier Harold / harold.ollivier@inria.fr

A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 200 start-up. L'institut s'efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

Consignes pour postuler

Sécurité défense :

Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

Politique de recrutement :

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.