Quantum artificial intelligence with neutral-atom arrays

Record number : OPR-1043

Overview

RESEARCH DIRECTION

Stefanos Kourtis, Professeur - Department of Physics

INFORMATION

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ADMINISTRATIVE UNIT(S)

Faculté des sciences
Département d'informatique
Département de physique
Institut quantique

LEVEL(S)

1er cycle
2e cycle
3e cycle

LOCATION(S)

Institut quantique

Project Description

Context
To harness the short-term potential of quantum computing, new algorithms are needed to make the most of limited quantum resources. One of the most promising platforms for near-term quantum computing is based on arrays of trapped ultracold atoms.

This research project aims to design, implement, and deploy quantum algorithms and quantum simulation protocols for artificial intelligence applications through a partnership between Professor Stefanos Kourtis' research group and PASQAL, a global leader in neutral-atom quantum computing.

Project
The research objectives of this project are:
a) Develop quantum simulation protocols to study complex collective dynamic phenomena,
b) Design quantum machine learning protocols based on complex quantum dynamics,
c) Invent and apply new quantum algorithms to solve highly complex combinatorial problems in artificial intelligence,
d) Standardize the certification of quantum advantage through high-performance classical computing.

By achieving these objectives, the team aims to demonstrate the utility of neutral-atom quantum computing.

Partner
PASQAL is a global leader in manufacturing quantum processors built from arrays of trapped atoms. Based in France, PASQAL has a strong presence in Sherbrooke's quantum innovation zone, with an office and assembly line already established in the city's Espace Quantique 1.

Team and environment
Our group consists of 17 talented students, postdoctoral fellows, and researchers, led by Prof. Stefanos Kourtis. We are part of the Faculty

of Science at the Université de Sherbrooke, a vibrant and diverse academic community. Our work takes place within the Institut quantique, a world-class research hub that brings together over 30 research groups, supported by 40 technical and professional staff members, and a thriving community of more than 250 students and postdocs.

OPEN POSITION: STAFF RESEARCHER

Qualifications:
• PhD in theoretical quantum physics, quantum information, or another relevant field
• 5+ years of research experience in quantum computing and quantum information
• Previous experience managing deliverables for an external partner in the quantum domain

Assets:
• Familiarity with the physical principles behind neutral-atom quantum computers
• Familiarity with software development tools
• Strong knowledge of software engineering and scientific computing

Task Definitions:
• Conduct rigorous technology watch by reviewing literature daily
• Define projects and deliverables with the external partner (PASQAL)
• Execute and manage projects and deliverables for the external partner
• Assist in supervising students or interns in the specialized subgroup
• Assist in writing scientific articles and publications
• Present project results at conferences and scientific events
• Attend periodic meetings with the external partner to share progress and confirm or adjust quarterly objectives
• Lead weekly reading group meetings on relevant literature and reference works
• Identify and maintain an updated inventory of key researchers and groups in the field internationally
• Identify and maintain an updated list of relevant journals

Employment Conditions
One-year contract, renewable. The contract will be renewed every 12 months depending on the availability of funds. Salary will be determined in accordance with the collective agreement in effect.

Application
Interested individuals should provide the following to quantum.ai@usherbrooke.ca:

• Cover letter
• CV including (i) a list of publications and (ii) the names and contact details of two references
• Sample of independently authored research manuscript or code repository

We welcome and encourage applications from all qualified individuals, particularly those who identify as women, members of underrepresented communities, and individuals from diverse backgrounds.

Discipline(s) by sector

Sciences naturelles et génie

Informatique, Physique

Partner(s)

Pasqal

The last update was on 12 December 2025. The University reserves the right to modify its projects without notice.