Quantum artificial intelligence with neutral-atom arrays

Record number : OPR-1390

Overview

RESEARCH DIRECTION

Stefanos Kourtis, Professeur - Department of Physics

INFORMATION

stefanos.kourtis@usherbrooke.ca

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.

Discipline(s) by sector

Sciences naturelles et génie

Informatique, Physique

The last update was on 20 March 2026. The University reserves the right to modify its projects without notice.