Quantum algorithms for telecommunication workloads

Record number : OPR-777

Overview

RESEARCH DIRECTION

Stefanos Kourtis, Professeur - Department of Physics

INFORMATION

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ADMINISTRATIVE UNIT(S)

Faculté des sciences
Département de physique
Institut quantique

LEVEL(S)

1er cycle

LOCATION(S)

Département de physique

Project Description

Context
This research project focuses on the development of quantum and quantum-inspired algorithms tailored for telecommunication applications, building on the advanced quantum computing expertise of Prof. Stefanos Kourtis's research group and the cutting-edge technological capabilities of Ericsson Canada Inc., a leader in 5G and distributed cloud architectures. By utilizing both NISQ quantum devices and high-performance classical processors, the project aims to connect foundational quantum research with practical solutions for network optimization and data management.

Project
This project will develop novel quantum algorithms that will accelerate the processing of telecommunication tasks. The algorithms proposed will be tailored to two distinct hardware stacks, both of which are already available, but will also see rapid improvement and proliferation in the short term. First, we will design hybrid quantum optimization algorithms suitable for deployment on existing and upcoming noisy quantum chips. Second, we will devise quantum-inspired algorithms that can be deployed on high-performance computing infrastructure. We will harness this computational arsenal to determine performance advantages in telecommunication challenges. We will target commonly occurring combinatorial enumeration and optimization problems in telecommunication workloads, such as data encoding, network (re)configuration, and routing.

Partner
Ericsson Canada Inc. hosts in Montreal one of Ericsson corporate research labs which focuses on management of distributed cloud architectures and advanced processing technologies. Ericsson is a major telecommunication equipment supplier and a leader in 5G. As 5G will be driven by network softwarization and will be deployed in distributed cloud data centers, Ericsson now has the strategic objective to research new technologies which can accelerate the 5G workloads.

Team & environment
We have a dynamic team of 17 students, postdocs, and researchers, led by Prof. Stefanos Kourtis. The team's research activities enjoy generous financial support from a variety of funding sources.

Our research team is embedded in the Faculty of Science at Université de Sherbrooke, a vibrant and diverse body of students, educators, and scientists. We are part of the dynamic research environment of the Institut quantique, a research institute comprised of more than 30

research groups from the Faculty of Science, the Faculty of Engineering, the Faculty of Humanities and the School of Management, 25 technical and professional staff members, and over 200 students and postdocs.

Application
Though there may not be available positions currently, anyone may show an interest in our team and research by writing us at quantum.ai@usherbrooke.ca.

Discipline(s) by sector

Sciences naturelles et génie

Informatique, Physique

Partner(s)

Ericsson Canada

The last update was on 21 May 2025. The University reserves the right to modify its projects without notice.