



Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, Canada

Postdoctoral Fellowship in Quantum Algorithm Development

Department: Physics and Physical Oceanography

Job Type: Full time, contract

Duration: 2.5 years

Salary: \$60,000 per annum

Anticipated Starting Date: on or before March 1st, 2025

Description

We invite applications for two Postdoctoral fellows to perform research related to quantum and classical algorithm development within the group of Dr. James LeBlanc. The appointments are expected to extend 2.5 years from the start date or until August 30th, 2027. More information about the research group can be found at: <https://www.physics.mun.ca/~jleblanc/>.

Research Project Overview

The postdoctoral fellow will be engaged in a research project entitled: *Auxiliary methods for solving many-body Hamiltonians on quantum hardware*.

Finding ways to leverage the best parts of both classical and quantum hardware will be essential to delivering on the promised use of quantum computers for material design, drug discovery and more. The project will push the limitations of known quantum algorithms and develop new methods using quantum hardware to study correlated electron systems. By developing both classical and quantum approaches the team will create well defined benchmarks against which quantum-enabled approximation schemes can be compared and it is expected that opportunities for hybrid algorithms will be identified in the process. Results of the work will be published in scientific articles and codes generated will be released publicly.

The overarching project objective is to study Trotterized Hamiltonian systems and auxiliary representations of interacting Hamiltonians. Specific objectives include:

1. Develop, in tandem, classical and quantum algorithm codes, useful for benchmarking as well as scaling analysis.
2. Apply the codes to model problems as well as simple quantum chemistry molecular problems.

Duties and Responsibilities

These are full-time postdoctoral fellow positions at the St. John's campus of Memorial University. The positions are funded by the NRC challenge program: Quantum algorithms for scientific discovery. Successful candidates are expected to collaborate with NRC researchers and must complete a research participation agreement for this project. The successful applicants will be key players in the collaboration between the group of Dr. James LeBlanc, and researchers with NRC, specifically Dr. Meenu Kumari.

The postdoctoral fellows will be responsible for leading research activities of the project including but not limited to the following core responsibilities:

- Coordinating research activities carried out by personnel, including other postdocs and students.
- Development of classical and quantum algorithms and codes.
- Preparation of data for publication and conference presentations.

Qualifications

Suitable candidates will be those that:

- have earned a doctorate in physics with a computational or theoretical focus, or equivalent
- have a demonstrated record of peer-reviewed publications and conference presentations.
- have proven ability to work independently.
- have expert knowledge of quantum systems, quantum computation/information, and both classical and quantum coding. Knowledge of packages such as qiskit, pennylane or equivalent would be an asset.

How to Apply

Applicants should provide a CV, a brief research statement, and contact info for two references (or letters of reference) by e-mail to: jleblanc@mun.ca.

Review of applications will begin on Oct. 1st 2024. Applications will be considered until the positions are filled.

Memorial University is committed to employment equity and diversity and encourages applications from all qualified candidates, including women, people of any sexual orientation, gender identity, or gender expression; Indigenous peoples; visible minorities and racialized people; and people with disabilities.