

## Workshop: Quantum Computing 101 Part I

*Wednesday, 29 May 2024 13:00 (1h 30m)*

Prerequisite: own laptop recommended; no previous experience with quantum computing expected. To use LUMI and Helmi participants will be required to have an institutional or company email address.

13:00-13:30 Alberto Lanzanova: NordiQuEst HPC-QC ecosystem. Going to the details.

13.30-14.30 Jake Muff: Introduction to using a Quantum Computer

14.30 - 15:00 Break (Coffee&Tea)

15:00 - 17:00 Jake Muff: Hands on Variational Quantum Eigensolver

In this workshop, we will have a look at the convergence of high-performance computing and quantum computing. Computational modelling is one field that in the future, is expected to be accelerated by quantum computers.

We start with a presentation NeIC project, Nordic-Estonian Quantum Computing e-Infrastructure Quest (NordiQuEst), by Alberto Lanzanova. NordiQuEst is a cross-border collaboration of seven partners from five NeIC member states that will combine several HPC resources and quantum computers into one unified Nordic quantum computing platform.

A practical approach to quantum programming follows this. In order to use quantum computers, in the future, novel quantum algorithms are required. These can, and should! be developed already now. In this part of the workshop, participants will get a chance to submit a quantum job to a real quantum computer. Participants will be shown how to entangle multiple qubits and be given tips on getting the most out of quantum computers today.

This will be followed by an introduction into a hybrid quantum-classical algorithm: the Variational Quantum Eigensolver. This workshop will utilise the EuroHPC supercomputer LUMI and Finland's 5-qubit quantum computer Helmi.

**Presenters:** LANZANOVA, Alberto; MUFF, Jake

**Session Classification:** Afternoon Workshops Part I