



Introduction to Quantum-Computing

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We will cover the basic quantum physics underlying the domain and then create individual accounts on IBM Q-Experience which allow us to compose small quantum codes (on 1-5-14 qubits).

Tasks

We will go through the technical details of quantum logical gates and understand how to calculate the particular results - as well as through an introduction of the QASM-2 programming language. We will create small projects and analyse their results (Grover quantum search algorithm, quantum Fourier transform, etc).

Preliminary schedule by topics/tasks

- two state quantum mechanics
- quantum logical gates and calculating results
- QASM-2 programming language
- IBM Q-Experience accounts and small projects testing what we learned
- a more significant project of your choice (Grover, FFT, Deutsch-Jozsa, etc)

Required skills

- basic knowledge of quantum mechanics (quantum states, calculation of particle in quantum-well, spin-states)
- basic knowledge of digital electronics in handling logical gate computations.

Acquired skills and experience

- physics of digital two state quantum systems
- calculation of quantum logical gate circuits
- QASM-2 programming language
- designing quantum code for specific applications

Recommended literature

An introduction to quantum computing - <https://arxiv.org/pdf/0708.0261.pdf>

Maximum number of project vacancies: 4