

## Introduction to Quantum Annealing

*Monday 31 March 2025 11:30 (1 hour)*

This talk is a general introduction to quantum annealing. It covers:

- how does a quantum annealer work in theory and what can it be used for;
- what are the theoretical and practical limitations;
- how to solve problems on quantum annealers, in particular D-Wave quantum annealers as the one hosted by JSC;
- the basic information about the architecture of D-Wave quantum annealers;
- how to formulate an optimization problem as a QUBO or Ising problem;
- different encoding strategies;
- how to incorporate constraints;
- how to embed a (logical) problem onto the given hardware graph (considering physical connectivity);
- how to send a problem to the quantum annealer using D-Wave's Ocean SDK and how to interpret the response;

Finally, some small examples are presented and the talk ends with a short hands-on exercise.

**Presenter:** Dr WILLSCH, Madita (JSC)