SK2906 Quantum Circuits 7.5 credits

Kvantkretsar

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

The course syllabus is valid from Spring 2022 according to the school principal's decision: S-2022-0529 Decision date: 2022-02-24

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Engineering Physics

Specific prerequisites

English B / English 6

Completed course SI1146 Vector analysis and Sl1155 Theoretical physics.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After finished course the student should be able to:

• apply basic theories of quantum transport

• formulate and analyze lumped-element model for quantum circuits

• explain basic concepts of quantum-limited measurement

Course contents

Basic quantum transport theory: Landauer's formula and Landauer-Biittiker's formalism, coulomb-blocked and single-electron circuits. Basic superconducting electronics: The Josephson effect and classical non-linear dynamics of superconducting circuits. Quantum electrodynamics of superconducting circuits and superconducting quantum bits. Hybrid quantum systems such as quantum optomechanics and quantum acoustics.

Examination

• INL1 - Homework Problems, 7.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Ethical approach

• All members of a group are responsible for the group's work.

• In any assessment, every student shall honestly disclose any help received and sources used.

• In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.