SH2373 Special Relativity 7.5 credits

Speciell relativitetsteori

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

Establishment

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 in Vector Analysis (SI1146, ED1110, or equivalent)

Completed course in Theoretical Electrical Engineering (EI1320 or equivalent)

Completed course in Mathematical Methods of Physics (SI1200 or equivalent)

Language of instruction

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

Intended learning outcomes

After passing the course, the student should be able to:

- Use tensor notation in relativity.
- Use the geometry of Minkowski space and Lorentz transformations.
- Compare the geometry of Minkowski space with Euclidean geometry.
- Apply the concepts of length contraction and time dilation.
- Describe experimental tests of special relativity.
- Use and solve problems in relativistic optics.
- Use and solve problems in relativistic mechanics (including kinematics problems).
- Perform analyzes in electrodynamics (especially analyze Maxwell's equations and use their relativistic invariance).
- Explain the principle of relativity.
- Perform simpler analyzes using the Hamiltonian and Lagrange formalisms in special relativity.

Course contents

Repetition of tensor notation. The meaning of relativity. Einstein's postulates. Geometry of Minkowski space and Lorentz transformations. Comparisons with Euclidean geometry. Length contraction and time dilation. Experimental tests of special relativity. The twin paradox and proper time. Relativistic optics. Relativistic mechanics (especially kinematic problems). Electrodynamics (with focus on relativistic invariance). Hamiltonian and Lagrangian formalisms in relativity.

Examination

- TEN1 - Examination, 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.

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

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.