

Course size

Course Specifications

Valid as from the academic year 2024-2025

Electroweak and Strong Force (C003211)

Credits 6.0	Study time	Study time 180 h		
Course offerings in academ	nic year 2024-2025			
A (semester 2)	English	Gent		
Lecturers in academic year	2024-2025			
Sevrin, Alexandre VUB		lecturer-in-charge		
Offered in the following programmes in 2024-2025			crdts	offering
Master of Science in Teaching in Science and Technology(main subject Physics and Astronomy)			6	А
Master of Science in Physics and Astronomy			6	А
Master of Science in Physics and Astronomy			6	А

(nominal values; actual values may depend on programme)

Teaching languages

English

Keywords

Electromagnetism, strong and weak forces

Position of the course

Contents

- Chiral interactions
- Non-abelian gauge theories
- The Brout-Englert-Higgs mechanism
- The electroweak interactions as a spontanously broken, chiral SU(2)xU(1) gauge

theory

- The strong force as an SU(3) gauge theory
- Masses and the CKM matrix
- Majorana and Dirac masses, masses for neutrinos
- Introduction to regularization and renormalization, the running of coupling
- constants
- Introduction to grand unified theories
- Introduction to supersymmetry

Initial competences

A reasonable understanding of relativistic quantum field theory, in particular quantum electro dynamics is needed. As a guideline the student should master the material covered in the first eight chapters of "Quantum Field Theory" by F. Mandl and G. Shaw (or equivalent).

Final competences

A microscopic understanding of the electroweak and the strong force through their description in terms of spontaneously broken (non-)abelian gauge theories.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture

Study material

None

References

Course content-related study coaching

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Oral assessment

Examination methods in case of periodic assessment during the second examination period

Oral assessment

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Calculation of the examination mark

The homework assignments and paper forms both 25 % of the final score. The exam (50%) itself will consist of two applications which after working out will be orally discussed with the examinator. 1/4 homework, 1/4 paper, 1/2 exam