

2024

Quantum Field Theory 2: The Standard Model (NWI-NM122)

General information

Course ID

NWI-NM122

Credits

3 EC

Category

Master

Instruction language

English

Offered by

Radboud University - Faculty of Science - Wiskunde, Natuur- en Sterrenkunde - - - -

Start courses and course registration

OSIRIS Student

You can register yourself via OSIRIS Student. To do so, go to [Enroll / Course](#).

Enrolment periods

- **Period 3**

Enrolment period

1 December 2024 until 7 January 2025 23:59

Unenrolment

until 6 April 2025 23:59

Start courses

27 January 2025

Course details

Content

It is shown how to adequately describe electromagnetic, strong and weak interactions by means of Abelian, non-Abelian, as well as spontaneously-broken symmetries. This is used to construct the Standard Model of electroweak interactions from basic experimental observations and basic physical requirements (like unitarity and predictability).

Subjects:

1. Non-Abelian gauge theories
2. Group structure of the Standard Model: strong and weak sector

3. Group structure of the Standard Model: electroweak "unification"
4. Particle masses in gauge theories and in the Standard Model
5. Gauge eigenstates vs mass eigenstates
6. Flavour mixing and CP violation
7. Neutrinos in the Standard Model

Instructional Modes

lectures and exercise classes

Aims

- The student has a good knowledge of non abelian gauge theories
- The student knows the experimental and theoretical restrictions that have led to the construction of the Standard Model
- The student understands the role of the Higgs mechanism in generating masses in the Standard Model
- The student has a good knowledge of the flavour sector and CP violation in the Standard Model
- The student is familiar with the special features of the neutrino sector

Level

More advanced course for particle physics students, with an emphasis on theoretical aspects

Presumed foreknowledge

Bachelor courses on Quantum Mechanics, NWI-NM040B Quantum Field Theory

Test information

Final assignment (40%) + oral exam (60%)

Instructional modes

Instructional modes

- Course

Tests

Tests

- Final Result
Test weight
1

Lecturers

Contactperson for the course

- prof. dr. W.J.P. Beenakker

Coordinator

- prof. dr. W.J.P. Beenakker

Examiner

- prof. dr. W.J.P. Beenakker

Lecturer

- prof. dr. W.J.P. Beenakker

Materials

Recommended material

- Book
Michael E. Peskin and Daniel V. Schroeder, An introduction to Quantum Field Theory, Westview Press 1995, 1st Edition