Syllabus

för kurs inom utbildning på forskarnivå

Fördjupning i partikelfysik
Further Particle Physics

7,5 Högskolepoäng
7,5 ECTS credits

Course code:	FK40007
Valid from:	VT 2020
Established:	2019-11-28
Department:	Department of physics
Subject:	Physics and theoretical physics.

Decision
This syllabus was adopted by the committee for education at graduate level 2019-11-28..

Prerequisites and special admittance requirements
Admitted to graduate level education

Learning outcome
The major learning outcome of this course is to train the students to understand the broad concepts of experimental particle physics, including direct searches for new physics and indirect approaches using precision measurements of parameters. The students will appreciate the connections between fundamental physics and symmetries realised in nature, and apply these principles to understand both the Standard Model's structure and cases for Beyond-Standard-Model Physics where symmetry plays the central role, e.g. super symmetry. The students will gain insight into the fundamental parameters of the Standard Model, and how these are explored in precision electroweak and strong physics measurements. After attending this course, students should be able to follow very general seminars on a variety of experimental particle physics topics.

Course content
The course will cover the connection between symmetries in nature (using the language of Lie group theory), and how these are realised in particle physics through examples of QED (Quantum electrodynamics), QCD (Quantum Chromodynamics), and spontaneous symmetric breaking in electroweak theory (the Higgs mechanism). Experimental measurements of the parameters of electroweak theory and QCD will also be described, including PDF (Parton Distribution Functions) and DIS (Deep Inelastic Scattering) measurements in the latter case. The role of indirect and direct searches for new physics will be highlighted. These will include the neutrino mass problem and how oscillations are measured, the g-2 discrepancy and measurement, and searches for exotica and SUSY (Supersymmetry) at the LHC (Large Hadron Collider).. Finally, the basics of Monte Carlo simulation will also be covered, and how this connects to event generation, fragmentation, and hadronisation.

Forms of instruction
Teaching will be delivered in the form of lectures, together with problem sets. We will offer tutorials on the problem sets.

Compulsory components
All students participating in the course are expected to complete one problem set.

Forms of examination

Students will be assessed via problem sets distributed throughout the lectures, and finally an oral examination on the general concepts of the course

Grading

The course is graded with grades Pass / Fail.
Studenter som antagits mellan 2017-06-30 och 2017-12-31 kan beviljas dispens från obligatoriet. Dock är etikmomentet obligatoriskt även för dessa studenter, och poängsätts då till 1.5 hp.