60034 - Particle physics

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	538 - Master's in Physics and Physical Technologies
ECTS	5.0
Course	1
Period	Second semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

5.2.Learning activities

The results programmed for this course include achieving theoretical and phenomenological expertise in the field of particle physics. In order to get these results, we have programmed activities which improve the students' active and continuous implication within the different topics. The course consists of two well separated training activities:

- theoretical lectures, including problem discussion and resolutions (3.5 ECTS)
- study and presentation of a selected work in the field (1.5 ECTS).

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These activities will allow the student to acquire the desired knowledge on the topics of the subject, theoretical and phenomenological skills in particle physics, and problem resolution competences.

5.3.Program

1. Electroweak theory: Interactions. The origin of particle masses.Spontaneous symmetry breaking in physics.
2. Flavour physics: Flavour symmetry and quantum numbers. Conservation laws. Flavour changing neutral currents. The GIM mechanism. Cabibbo-Kobayashi-Maskawa matrix (CKM).
3. Neutrino physics: Masses, mixing and oscillations. Dirac and Majorana fermions. Seesaw mechanism. Neutrino oscillations. Violations of the lepton number conservation laws. Beta and double beta decay.
4. Feynman rules. Observables. Cross section. Decay widths and lifetimes.
5. Particle physics at colliders: Large Hadron Collider (LHC): Higgs discovery, Present and Future. Higgs phenomenology. Heavy ion collisions, CP violation. Experiments in particle physics and applications.
6. Physics beyond the standard Model.

5.4.Planning and scheduling

5.5.Bibliography and recomended resources