

Physique des particules et Physique Nucleaire

Lecturers

Laurent FAVART (Coordinator) and Pierre DESCOUVEMONT

Course mnemonic

PHYS-F305

ECTS credits

5 credits

Language(s) of instruction

French

Course period

First and second terms

Course content

Part I (experimental aspects): principles of experimental investigation in particle physics, discovery of particles and of strong and weak interactions, introduction to accelerators, the quark model, qualitative introduction to Feynman diagrams, particles interactions with matter, particle detection and identification, symmetries and conservation laws. Part II (theoretical aspects): reviews of the principle of special relativity; the Klein-Gordon equation and bosonic particles; the Dirac equation and fermionic particles; elementary processes (decay of a particle; scattering of two particles).

Objectives (and/or specific learning outcomes)

This introductory lecture aims providing some theoretical and experimental bases for further lectures on either fundamental interactions or cosmology, proposed during the master in physics. For the other physics students, it offers a minimum general knowledge in particle physics. Part I (experimental aspects) : learn to link experimental observations and theoretical models, illustrate concepts introduced during lectures on special relativity and quantum mechanics, introduce new concepts to be treated more rigorously and more completely in further lectures. Part II (theoretical aspects) : to learn the basic implications of special relativity for quantum mechanics

Pre-requisites and co-requisites

Pre-requisites courses

PHYS-F202 | Relativité, électromagnétisme et optique ondulatoire | 10 crédits and PHYS-F203 | Introduction à la mécanique quantique | 5 crédits

Course having this one as co-requisit

PHYS-F311 | Laboratoires et Stage de recherche | 10 crédits

Teaching method and learning activities

Part I: lectures in French with slides, completed by three homeworks (first term). Part II: lectures in French (in English upon request), no homework, chalk and blackboard.

References, bibliography and recommended reading

Part I: "Introduction to Elementary Particles", David Griffiths, 2nd Revised Edition (2008), Wiley-VCH. "Particle Physics", B.R. Martin and G. Shaw, 3rd Edition (2008), Wiley. Part II: "Relativistic Quantum Mechanics", Bjorken & Drell and lecture notes

Other information

Contact(s)

Part I: Catherine.Vander.Velde@ulb.ac.be

Part II: either mtytgat@ulb.ac.be or Thomas.Hambye@ulb.ac.be

Evaluation method(s)

Other

Evaluation method(s) (additional information)

Part I: 3 points for the homeworks and 17 points for an oral examination, a summary question to be prepared with notes and an exercise similar to those encountered in the homeworks (either first or second term). Part II: short written test followed by an oral exam. Sorry, no homework.

Determination of the mark (including the weighting of partial marks)

The final mark is the average of the marks obtained for each part.

Programmes

Programmes proposing this course at the faculty of Sciences

BA-PHYS | Bachelor in Physics | unit 3