

10.00 credits

52.5 h + 7.5 h

Q1

Teacher(s)	Bruno Giacomo ;Cortina Gil Eduardo ;de Wasseige Gwenhaël ;Janquart Justin (compensates Cortina Gil Eduardo) ;Lemaitre Vincent ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	LPHYS2131
Main themes	<p>PARTIM A (5 credits) : Principles and applications of particle acceleration - Accelerator physics - Precision measurements at low energies - Neutrino physics. This partim can be taken separately.</p> <p>PARTIM B (5 credits) : Particles and radiation of cosmic origin (including neutrinos) – Gravitational waves. This partim can be taken separately.</p>
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <p>a. Contribution of the teaching unit to the learning outcomes of the programme (PHYS2M) 1.2,1.3,1.4, 1.6, 2.1,3.1, 3.3, 3.4, 4.1, 4.2, 5.1, 5.2, 5.3, 5.4, 7.1, 7.2, 7.3, 7.5, 8.1.</p> <p>b. Specific learning outcomes of the teaching unit At the end of this teaching unit, the student will be able to :</p> <ol style="list-style-type: none"> 1. explain and discuss in detail the advanced experiments that have been setup in fundamental interactions physics ; 2. write a report that documents an experiment in physics of the fundamental interactions ; 3. link theoretical concepts to their manifestation in real environments ; 4. analyse the sources of uncertainty about an experimental measurement and evaluate their impact on the scientific conclusions of an experiment.
Evaluation methods	Evaluation of personal projects reports. Oral exam, partly based on the projects reports.
Teaching methods	Lectures in class. Personal projects. Students can choose the subject among a list proposed by the teachers. Reading portfolio for personal study.
Content	<p>This course consists of 4 partims, each worth 2.5 credits: "Neutrino Physics", "Astroparticle Physics", "Gravitational-wave Physics", and "Data Analysis methods in Astrophysics".</p> <p>Students can either choose to take the entire course, totalling 10 credits, or any pair of partims to total 5 credits. The description of the content of each partim is below:</p> <p>PARTIM "Neutrino Physics" (2.5 credits): physics of neutrino interaction with matters with emphasis on neutrino oscillations, neutrinos produced at accelerators and nuclear plants, and cosmic neutrinos.</p> <p>PARTIM "Astroparticle Physics" (2.5 credits): theory and detection methods in astroparticle physics.</p> <p>PARTIM "Gravitational-wave Physics" (2.5 credits): theory and detection methods in gravitational-wave physics.</p> <p>PARTIM "Data analysis methods in Astrophysics" (2.5 credits): data analysis techniques used in observational astrophysics. They include both classical statistical data analysis and machine learning- based techniques.</p>
Bibliography	<p>Des diapositives de cours et des documents supplémentaires sur les sujets traités sont disponibles sur le site MoodleUCL de l'unité d'enseignement.</p> <p>Course slides and additional documents on the subjects addressed are available on the MoodleUCL website of the teaching unit.</p>
Faculty or entity in charge	PHYS

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Physics	PHYS2M	10		