

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	<b>PARTIM A (5 credits)</b> : Principles and applications of particle acceleration - Accelerator physics - Precision measurements at low energies - Neutrino physics. This partim can be taken separately. <b>PARTIM B (5 credits)</b> : Particles and radiation of cosmic origin (including neutrinos) – Gravitational waves. This partim can be taken separately.
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p><b>a. Contribution of the teaching unit to the learning outcomes of the programme (PHYS2M)</b> 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>b. Specific learning outcomes of the teaching unit</b> At the end of this teaching unit, the student will be able to :</p> <ol style="list-style-type: none"> <li>1. explain and discuss in detail the advanced experiments that have been setup in fundamental interactions physics ;</li> <li>2. write a report that documents an experiment in physics of the fundamental interactions ;</li> <li>3. link theoretical concepts to their manifestation in real environments ;</li> <li>4. analyse the sources of uncertainty about an experimental measurement and evaluate their impact on the scientific conclusions of an experiment.</li> </ol>
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

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