




5.00 credits

30.0 h

Q2

This biannual learning is being organized in 2026-2027

Teacher(s)	Génévriez Matthieu ;Melinte Sorin ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	Having followed LPHYS1241, LPHYS1342 and LPHYS1344is an asset
Main themes	Qubits, quantum weirdness, coherence and decoherence, quantum cryptography, teleportation, quantum computing.
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 and PHYS2M1) AA 1.1, AA 1.2, AA 1.5, AA1.6, AA 3.1, AA3.2, AA 3.3, AA 3.4, AA 4.2, AA 5.2, AA 5.4, AA 8.1</p> <p>b. Specific learning outcomes of the teaching unit</p> <p>¹ At the end of this teaching unit, the student will be able to :</p> <ol style="list-style-type: none"> 1. describe the essential concepts of quantum information ; 2. describe the tests of quantum entanglement and their experimental realization ; 3. explain the basic concepts of quantum cryptography and quantum computing.
Evaluation methods	Written examination, closed and open questions
Teaching methods	Lectures, exercises
Content	Basic concepts: superposition, Qubits Quantum weirdness (EPR paradox, Bell inequalities) Quantum cryptography Quantum teleportation Concepts of quantum computation Experiments leading to quantum computation Quantum network and multi-particle entanglement Decoherence and quantum error correction Entanglement purification
Bibliography	D. Heis, "Fundamentals of quantum information", Springer, 2002. P. Lambropoulos and D. Petrosyan, « Fundamentals of Quantum Optics and Quantum Information », Springer, 2007.
Faculty or entity in charge	PHYS

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [60] in Physics	PHYS2M1	5		
Master [120] in Physical Engineering	FYAP2M	5		
Master [120] in Physics	PHYS2M	5		
Advanced Master in Nanotechnologies	NANO2MC	5		