



5.00 credits

30.0 h

Q2


**This biannual learning unit is not being organized in 2021-2022 !**

Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	Having followed LPHYS1241, LPHYS1342 and LPHYS1344 is an asset
Main themes	Qubits, quantum weirdness, coherence and decoherence, quantum cryptography, teleportation, quantum computing.
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 and PHYS2M1)</b>                      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>b. Specific learning outcomes of the teaching unit</b></p> <p><sup>1</sup> At the end of this teaching unit, the student will be able to :</p> <ol style="list-style-type: none"> <li>1. describe the essential concepts of quantum information ;</li> <li>2. describe the tests of quantum entanglement and their experimental realization ;</li> <li>3. explain the basic concepts of quantum cryptography and quantum computing.</li> </ol>
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

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Physical Engineering	<a href="#">FYAP2M</a>	5		
Master [120] in Physics	<a href="#">PHYS2M</a>	5		
Master [60] in Physics	<a href="#">PHYS2M1</a>	5		