UCLouvain

lphys2242

2019

Fundamentals of quantum information

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

5 credits	30.0 h	Q2

This biannual learning unit is not being organized in 2019-2020 !

Teacher(s)	Melinte Sorin ;Piraux Bernard ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	Qubits, quantum weirdness, coherence and decoherence, quantum cryptography, teleportation, quantum computing.
Aims	**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 **b. Specific learning outcomes of the teaching unit** 1 At the end of this teaching unit, the student will be able to : 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. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Written examination, closed and open questions
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** 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	Aims
Master [120] in Physical Engineering	FYAP2M	5		
Master [60] in Physics	PHYS2M1	5		
Master [120] in Physics	PHYS2M	5		