32072 - EXQOPT - Experimental Quantum Optics with Photons and Atomic Ensembles

**Coordinating unit:** 230 - ETSETB - Barcelona School of Telecommunications Engineering

**Teaching unit:** 893 - ICFO - Institute of Photonic Sciences

**Academic year:** 2015

**Degree:**
- MASTER'S DEGREE IN PHOTONICS (Syllabus 2009). (Teaching unit Optional)
- ERASMUS MUNDUS MASTER'S DEGREE IN PHOTONICS ENGINEERING, NANOPHOTONICS AND BIOPHOTONICS (Syllabus 2010). (Teaching unit Optional)
- DOCTORAL DEGREE IN PHOTONICS (Syllabus 2007). (Teaching unit Optional)

**ECTS credits:** 2,5

**Teaching languages:** English

### Teaching staff

**Coordinator:** MORGAN MITCHELL (icfo)

**Others:** HUGUES DE RIEDMATTEN (ICFO)

### Teaching methodology

PRESENCIAL TEACHING + ACTIVITIES

### Learning objectives of the subject

We present the development of experimental quantum optics along milestone experiments.
## Content

(ENG) Quantization of the electromagnetic field

Degree competences to which the content contributes:

(ENG) Quantum states of light: single photons, coherent states, squeezed states, entangled states.

Degree competences to which the content contributes:

(ENG) Detection of quantum light: photon counting, coincidence counting, phase-sensitive detection.

Degree competences to which the content contributes:

(ENG) Generation of quantum light by non-linear optical processes.

Degree competences to which the content contributes:

(ENG) Experimental signatures of quantum behaviour.

Degree competences to which the content contributes:

(ENG) Interaction of light with atomic ensembles.

Degree competences to which the content contributes:

(ENG) Spin squeezing and quantum-enhanced measurements.

Degree competences to which the content contributes:

(ENG) Quantum memories based on Electro-magnetically Induced Transparency, Photon echoes, DLCZ.

Degree competences to which the content contributes:

(ENG) Experimental quantum communications: Quantum teleportation, entanglement swapping, quantum repeaters
Degree competences to which the content contributes:

Qualification system
- Full and active participation
- Written assignments
- Oral presentation

Regulations for carrying out activities
THE USUAL IN UNIVERSITY TEACHING

Bibliography