PhotonHub Demo Centre

Course 01
Photonics for quantum technologies

Course Provider

L2n laboratory
University of Technology of Troyes-UTT/CNRS
France

Course Overview

Photonics plays an important role in quantum technologies using photons as quantum bits of information in this rapidly expanding field. Photonics is used for quantum communications such quantum key distribution but also for future quantum computers and simulators and will be used to link quantum networks towards a future quantum internet.

This one-day hands-on training course provides industry, especially those developing new products or addressing an application need, with a detailed overview of important quantum photonics devices and techniques.

The course will focus on three technology demonstrators; 1) how to generate single photons; 2) how to generate pairs of entangled photons; 3) how to use integrate optics for quantum photonics. Course attendees will learn how these devices are designed, fabricated and tested. They will also learn how what are the challenges for industry in the field of quantum photonics.

Target Audience

It is desirable but not essential that course attendees have a basic understanding of photonics and quantum physics. The course is ideally suited to those planning to develop new photonic products for quantum technologies, establish in-house or outsource packaging development and manufacturing.

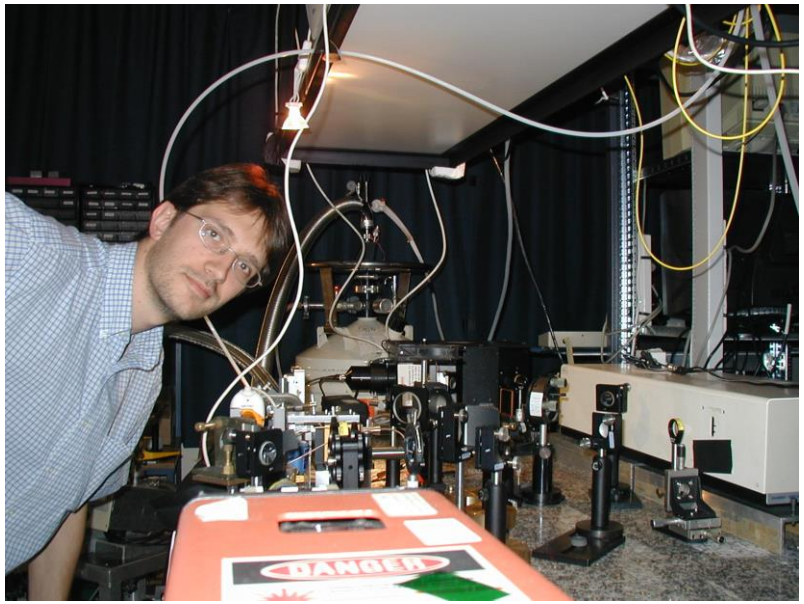
Expected Outcomes

1) Understanding of key features of photonics for quantum technologies
2) See how to produce single photons and to manipulate them as qubits (hands-on activity)
3) See how to produce entangled photons and to use them with integrated optics (hands-on activity)
4) See a concrete example of quantum key distribution application
5) Understand the challenges in this field

Course Schedule

Time	Demo Activity
09:00 – 10:30	**L2n Orientation, Course Introduction & Tutorial**
11:00 – 12:30	Demo 1: Single-photon source (hands-on)
14:00 – 15:30	Demo 2: Entangled photon source (hands-on)
15:30 – 17:00	Demo 3: Quantum key distribution demonstrator (hands-on)
17:00 – 17:30	**Follow-Up Questions & Close**

Course Trainers



Christophe Couteau

Aurélie Broussier

Sylvain Blaize

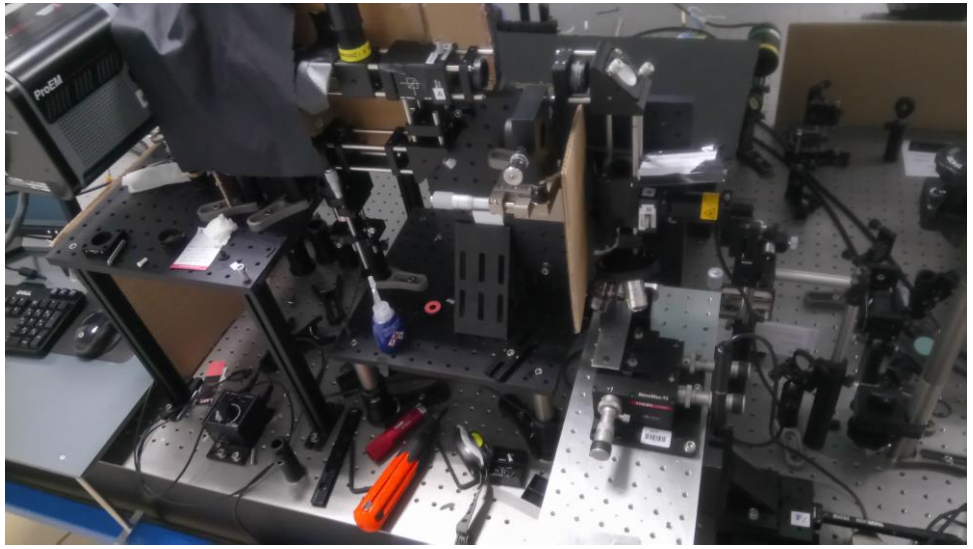
Course Director: Assoc Prof. Christophe Couteau

Demo 1: Dr. Aurélie Broussier

Demo 2: Assoc Prof. Sylvain Blaize

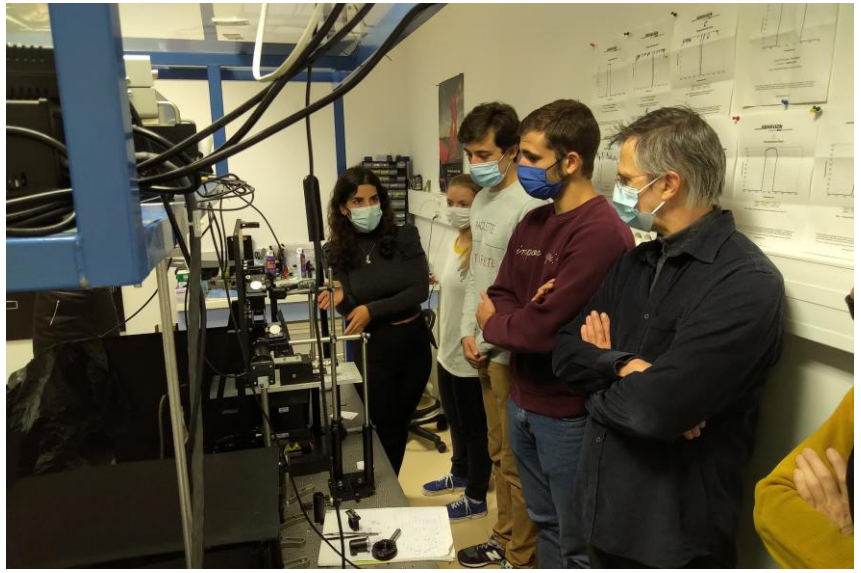
Demo 3: Assoc Prof Christophe Couteau

Course Demonstrators



Generation of entangled photons

Quantum cryptography



Single photon source

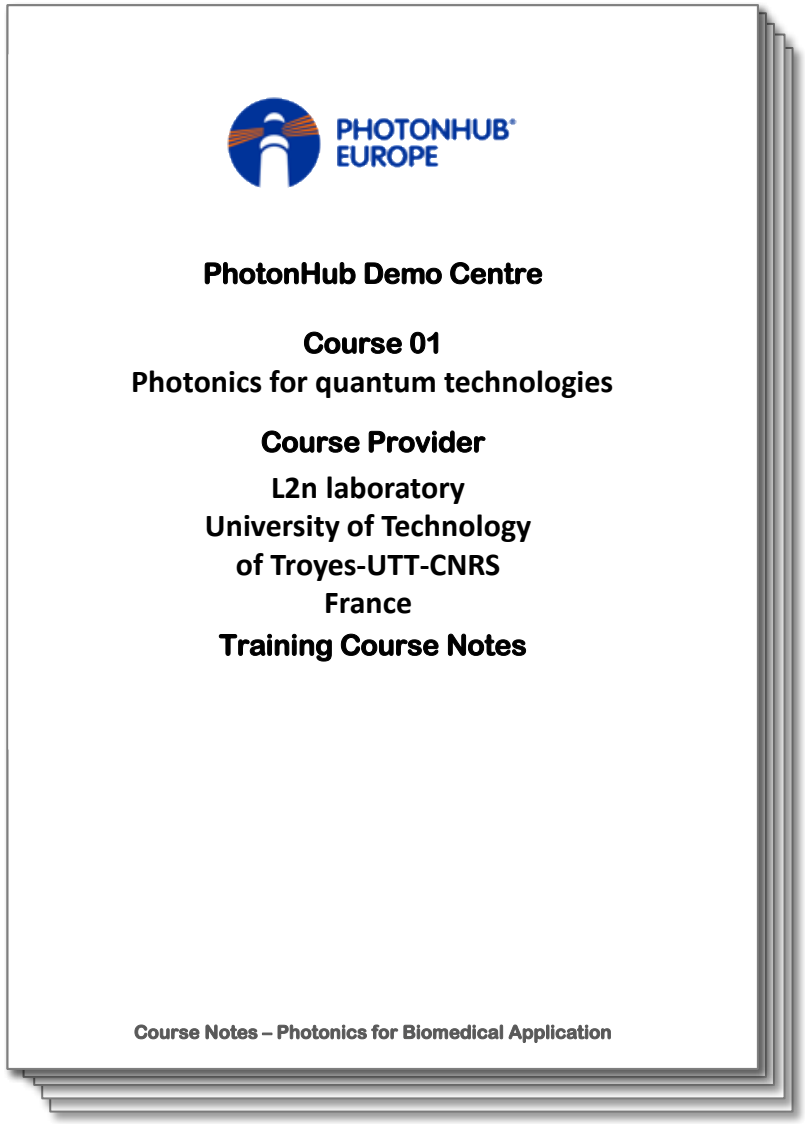
Course Location, Schedule & Cost

- Course Schedule (January, July, December – exact dates to be confirmed)
- Number of people (Groups of 3/6/9 people per course)
- Course Cost (250 Euros per person, includes catering and project consumables)

Further Information

- christophe.couteau@utt.fr
- https://recherche.utt.fr/light-nanomaterials-nanotechnologies-l2n
- www.photonhub.eu/euphotonicsacademy

Course Material (technical hand-outs)



Keywords

Quantum photonics, quantum technologies, quantum optics,
non-linear optics, integrated optics, fibre optics, nanoemitters

Relevant Technology & Application Domain

Technology: Quantum photonics Components & Systems, integrated optics, glass waveguides

Application: Relevant to all application domains