

LABORATORY CEA-Grenoble/PHELIQS

M1/2A Quantum internship – Academic year 2022-2023

Efficient single-photon emitters based on semiconductor nanowires

General Scope :

A single photon source is a device able to emit photon one by one on demand. It has application for quantum cryptography, quantum sensing or low light level metrology. Such a source can be obtained using semiconductor quantum dot (QD) as demonstrated in various material system. However, most of the demonstrations were restricted to cryogenic temperatures. Our group develops a semiconductor system that has the possibility to emit single-photons up to room temperature, namely a develops CdSe QD inserted in a ZnSe nanowire (NW). This opens the prospect for a realistic application of QDs in quantum information technologies.

Research topic and facilities available:

The internship will consists in contributing to the characterization and investigation of the optical properties of CdSe/ZnSe NW-QD heterostructures grown by Molecular Beam Epitaxy in our group. The NW-QD heterostructure is embedded in a photonic wire to enhance the photon extraction and to guide its emission. The trainee will participate in optical measurements and analysis to characterize the purity and brightness of the single-photon emitter.

The internship will take place both in CEA-IRIG and CNRS-NEEL and will allow learning about different topics in nanoscience and quantum optical properties: growth by Molecular Beam Epitaxy, micro-photoluminescence studies, photons correlation, etc...

Required skills :

Semiconductor physics, quantum physics, optics, with interest for experiment.

Starting date and duration: May 2023, 2-3 months

Contact :

Name : Prof. Kuntheak KHENG

Laboratory : CEA-Grenoble/PHELIQS/NPSC (www.pheliqs.fr/Pages/NPSC/Presentation.aspx)

Phone : 04 38 78 47 01

e-mail : kkheng@cea.fr

Ce stage de M1/2A est proposé dans le cadre du programme thématique Quantum qui prendra en charge les gratifications pour 3 mois maximum, après sélection des binômes sujet/candidat. La date limite de candidature (lettre de motivation et CV) est vendredi 10 mars 2023.