

# Spécialité de Master « Optique, Matière, Paris »

Stage de recherche (4 mois minimum, à partir de début mars)

## Proposition de stage (ne pas dépasser 1 page)

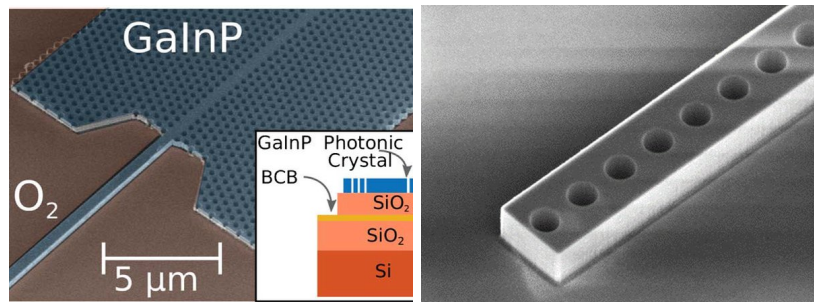
Date de la proposition :

<b>Responsable du stage / internship supervisor:</b>			
Nom / name:	Raineri	Prénom/ first name :	Fabrice
Tél :	0170270461	Fax :	
Courriel / mail:	fabrice.raineri@c2n.upsaclay.fr		
<b>Nom du Laboratoire / laboratory name:</b> Centre de Nanosciences et de Nanotechnologies			
Code d'identification :	UMR9001	Organisme :	CNRS/Univ. UPSaclay
Site Internet / web site:	https://toniq.c2n.universite-paris-saclay.fr/en/activities/sandwich/		
Adresse / address:	avenue de la Vauve - Palaiseau		
Lieu du stage / internship place:	Palaiseau		

## Titre du stage / internship title: Hybrid nanostructures for nonlinear parametric processes

The control of light propagation at the nanoscale is one of the major subjects of present research. By enabling the confinement of the light in volumes as small as few cubic half-wavelength, photonic nanostructures allowed the demonstration of very interesting devices such as efficient single photon sources, low threshold nanolasers and low energy activation all optical gates.

Since a few years, our team at C2N has been particularly interested in exploiting the enhancement of the light-matter interaction using photonic crystals in order to obtain large nonlinear effects with reduced powers [1,2].



Photonic Crystal waveguide and nanocavity

The nonlinear effects under study, such as Kerr effect or second harmonic generation, enable a range of possibilities such as the control of light by light, light amplification or the generation of new frequencies.

In the proposed project, the candidate will focus her/his work on the study of second and third order nonlinear processes within semiconductor micro/nanostructures. The idea will be to use the unique dispersive properties of, e.g. photonic crystals, in order to obtain integrated parametric amplifier or frequency combs sources. As the use of only one type of material can be a limitation, heterogeneous integration of different materials will be implemented as a novel approach with the idea to exploit each class of material at its best.

The candidate will be involved in the modelling and the simulation of the structures under investigation, in the nanofabrication of the samples and in the sophisticated optical experiments necessary to observe the nonlinear behaviours.

[1] A. Martin, S. Combr  , A. De Rossi, G. Beaudoin, I. Sagnes, F. Raineri, **Photonics Research** 6, B43-B49 (2018)

[2] A. Martin, R. D. Sanchez, S. Combr  , A. De Rossi, F. Raineri, **Opt. Lett.** 42, 599 (2017)

**Toutes les rubriques ci-dessous doivent obligatoirement  tre remplies**

<b>Ce stage pourra-t-il se prolonger en th�se ? Possibility of a PhD ? : oui</b>			
<b>Si oui, financement de th�se envisag� / financial support for the PhD:</b> European Training Network			
Lumi�re, Mati�re, Interactions	<input checked="" type="checkbox"/>	Lasers, Optique, Mati�re	<input checked="" type="checkbox"/>

Fiche   transmettre (fichier pdf **obligatoirement**) sur le site <http://stages.master-omp.fr>