

Spécialité de Master « Optique, Matière, Plasmas »

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

Proposition de stage

Date de la proposition :

Responsable du stage / internship supervisor:	
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Nom du Laboratoire / laboratory name: Institut d'Electronique Fondamentale (IEF)	
Code d'identification :UMR 8622	Organisme :Université Paris Sud/CNRS
Site Internet / web site: http://www.ief.u-psud.fr/ http://silicon-photonics.ief.u-psud.fr/	
Adresse / address: Batiment 220 Université Paris Sud 91400 Orsay	
Lieu du stage / internship place: IEF	

Titre du stage / internship title: <u>Non-linear optics in Ge/SiGe quantum wells</u>
Résumé / summary
<p>Mid-infrared (mid-IR) spectroscopy is a nearly universal way to identify chemical and biological substances, as most of the molecules have their vibrational and rotational resonances in the mid-IR wavelength range. Commercially available mid-IR systems are based on bulky and expensive equipment, while lots of efforts are now devoted to the reduction of their size down to chip-scale dimensions. The demonstration of mid-IR photonic circuits on silicon chips would benefit from reliable and high-volume fabrication to offer high performance, low cost, compact, low weight and power consumption photonic circuits, which is particularly interesting for mid-IR spectroscopic sensing systems that need to be portable and low cost.</p> <p>In this context, we develop a new route towards key advances in the development of chip-scale integrated circuits on silicon for the mid-IR wavelength range. The original idea is to use nonlinear optical properties in Ge/SiGe quantum well (QW) active devices combined with Ge-rich-SiGe waveguides. In order to be able to exploit the nonlinear effects, a specific care on the design of the waveguides is required in term of both light confinement and dispersion.</p> <p>The first objective of the internship work is to design optimized Ge/SiGe QW waveguides for non-linear properties. The student will then estimate the performances of different devices (mid-IR sources, detection based on down-conversion) based on these structures.</p> <p>The work will be done in the framework of the INSPIRE project, in a strong collaboration with Giovanni Isella's group (L-Ness lab (Politecnico di Milano)).</p>
Applicant skills:
- Basic knowledge of photonic devices.
- Willingness to study/learn modelling/design/fabrication and characterization of photonics devices.

Ce stage pourra-t-il se prolonger en thèse ? Possibility of a PhD ? : OUI			
Si oui, financement de thèse envisagé/ financial support for the PhD: european project (ERC)			
Lasers, Optique, Matière	<input checked="" type="checkbox"/>	Lumière, Matière, Interactions	<input checked="" type="checkbox"/>
Plasmas : de l'espace au laboratoire	<input type="checkbox"/>		<input type="checkbox"/>

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