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 :

Responsable du stage / *internship supervisor*:

Nom / *name*: Zaquine Prénom/ *first name* : Isabelle

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Nom du Laboratoire / *laboratory name*: LTCI

Code d'identification : Organisme : Télécom Paristech

Site Internet / *web site*: //ltci.telecom-paristech.fr/

Adresse / *address:* 46 rue Barrault 75013 Paris puis plateau de Saclay à partir de septembre 2019

Lieu du stage / *internship place*: Paris

Titre du stage / *internship title*: Investigation of fluid filled hollow core photonic crystal fibers for Quantum Technologies

Résumé / *summary*

We investigate a new technological platform for the generation of quantum states of light. Fluid filled hollow core photonic crystal fibers could answer a number of the current challenges regarding quantum communications: building high quality, low noise photon pair sources that can be integrated in fibered networks, generation of photonic states in a high-dimension Hilbert space (qudits), possible tuning of the spectral correlations between the two photons of the pair …

The basic idea is to use the process of spontaneous four wave mixing in a hollow core photonic crystal fiber, where the nonlinear medium used is not silica as in usual fibers but rather a liquid or a gas, in order to avoid the parasitic broad Raman spectrum of silica. This configuration, apart from limiting or even suppressing the main source of noise in fibered sources, gives rise to new degrees of freedom in the optimization of the source : the design of the fiber (thanks to our partnership with the group GPPMM at XLIM) in order to engineer its dispersion properties and the phase matching condition, the choice of the fluid, in some cases, the gas pressure …

We propose to explore some of these possibilities, through experiments and simulations. Some very promising experimental results have been recently obtained with gas-filled fibers. These results should be consolidated and improved by the student who would join the group.

This internship is experiment-oriented but will also require to do some modeling / simulations. The pre-requisite knowledges are in classical and quantum optics, nonlinear optics and quantum information.

Toutes les rubriques ci-dessous doivent obligatoirement être remplies

Ce stage pourra-t-il se prolonger en thèse ? *Possibility of a PhD* **? : Yes**

Si oui, financement de thèse envisagé/ *financial support for the PhD***: ANR, DGA, Région Ile deFrance (DIM SIRTEQ)**

Lumière, Matière, Interactions	**x**	Lasers, Optique, Matière	**x**

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