Spécialité de Master « Optique, Matière, Plasmas »

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

Proposition de stage (ne pas dépasser 1 page)

Date de la proposition : 29/11/2013

Responsable du stage / *internship supervisor*:

Nom / *name*:	Chanelière	Prénom/ *first name* :	Thierry
Tél :	01 69 35 21 41	Fax :	01 69 41 01 56
Courriel / *mail*:	thierry.chaneliere@u-psud.fr		

Nom du Laboratoire / *laboratory name*: Laboratoire Aimé Cotton

Code d'identification :UPR 3321 Organisme :CNRS

Site Internet / *web site*: http://www.lac.u-psud.fr/

Adresse / *address:* Campus d'Orsay, Bât. 505, 91405 ORSAY Cedex

Lieu du stage / *internship place*: Laboratoire Aimé Cotton

Titre du stage / *internship title*: Solid state atomic optical processors

Résumé / *summary*

Rare-earth doped crystals (REDC) have remarkable properties at low temperature. On the one hand, they exhibit long quantum coherence times (from the ms to the few seconds range) which are usually encountered in atomic vapors. On the other hand, they are solids, which makes them more convenient for applications.

Fundamental light-matter interactions derived in a wide range of spectroscopic techniques have been helpful to study these samples for decades. We have decided to change this point of view completely by using light not only as a probe of these systems, but also as the carrier of information that can process the sample. This approach, at the cross-over between solid-state, atomic physics and telecoms can come in a variety of functions both in classical and quantum information processing.

Solid state optical memories are archetypal in that sense. On one side, quantum memories are investigated in the context of long distance quantum cryptography where quantum repeaters are necessary. The quantum fidelity is a critical figure of merit in that case. On the other side, classical optical memories can be ameliorated to show fully optical processing feature. That's what we demonstrated recently by time-reversing optical carried signals. Bandwidth and time-to-bandwidth-product are then the critical parameters.

Our activity is diverse in this broad context. It goes from material studies with high-resolution spectroscopic techniques (optical coherent transients, NMR ...) to processing functions design and implementation (quantum memory, time-reversal, agile narrow-band filters …). The experimental subject can be adapted to the student's expectations.

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***:**

Lasers, Optique, Matière	**X**	Lumière, Matière : Mesures Extrêmes	**X**
Plasmas : de l'espace au laboratoire			

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