Spécialité de Master « Optique, Matière, Plasmas »

Stage de recherche (4 mois minimum, à partir de début mars 2012)

Proposition de stage pour l'année 2011-2012 (ne pas dépasser 1 page)

Date de la proposition :October 10, 2011

Responsable du stage */ internship supervisor*:

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Nom du Laboratoire / *laboratory name*:

Code d'identification : UMR 5589 Organisme : CNRS et Université P. SABATIER

Site Internet / *web site*: www.lcar.ups-tlse.fr

Adresse / *address:* Laboratore Collisions Agrégats Réactivité, IRSAMC, 18, route de Narbonne ; 31062 TOULOUSE Cedex 9

Lieu du stage / *internship place*: Laboratore Collisions Agrégats Réactivité, IRSAMC

Titre du stage / *internship title*: Powerful solid-state single frequency laser for lithium atom manipulation

Résumé / *summary :*

Lithium atom manipulation by laser is possible with lasers emitting near the first resonance line of this atom at the wavelengtth 670.8 nm. We have already built a single frequency laser using the Nd3+ ion in YVO4 crystal as the amplifying medium. Optical pumping is based on a 25 Watt diode laser emitting at 808 nm. Using a ring cavity with an optimized optical diode, we obtain single frequency emission either in the IR at 1342 nm with a power near 1.5 Watt or in the visible at 671 nm thanks to intracavity frequency doubling on a LBO crystal with a power close to 0.5 Watt at 670.8 nm.

Recently, the group of J. L'Huillier at Kaiserlautern has demonstrated that a considerably larger power can be produced by pumping a YVO4 crystal with a Nd doping near 0.5% at 888 nm with a 100 Watt diode laser: they obtained in this way 24 Watts at 1342 nm (F. Lenhard et al., Appl. Phys. B 96, 803 (2009)) and this group has also produced 9.5 Watts at 671 nm by single pass frequency doubling of a 20.5 Watt beam in a MgO:ppLN crystal (F. Lenhard et al., Conference on Lasers and Electro-Optics (CLEO) 2010 paper: CThEE5). In both cases, the laser was not single frequency.

We want to develop a similar laser but running single frequency by using injection locking a powerful ring laser by a weak oscillator emitting at the searched wavelength. This type of behavior was demonstrated with Nd:Yag laser by Nabors et al (Optics Letters 14, 1189 (1989)) who produced 13W single frequency at 1064 nm by seeding a ring laser by a 40 milliwatt single-frequency beam. A collaboration with the group of J. L'Huillier is starting now.

The ring cavity with Nd:YVO4 pumped at 888 nm is under construction, with a 100 Watt diode laser at 888 nm as a pump source. During his/her time in our lab, the student will optimize the IR laser, test the injection locking procedure and finally frequency doubling in a pp:SLT crystal in an external cavity.

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***: MESRT or LABEX NEXT or funding shared by Region Midi-Pyrénées with CNRS or DGA**

Lasers et matière	**X**	Lumière, Matière : Mesures Extrêmes	**X**
Optique de la science à la technologie	**X**	Plasmas : de l'espace au laboratoire	

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