

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:	
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Nom du Laboratoire / laboratory name:	
Code d'identification : UMR 8250	Organisme : CNRS
Site Internet / web site:	
Adresse / address: 45 rue des Saints Peres, 75006 Paris	
Lieu du stage / internship place: Kastler Brossel Laboratory ; 24, rue Lhomond, 75005 Paris	

Titre du stage / internship title: Generation of Hyperuniform structures by optical trapping with speckle patterns
Résumé / summary
<p>Propagation of waves through random scattering media yields random intensity distributions known as speckle patterns. For this reason, random media gives many challenges for imaging and controlling light. However, it has been demonstrated that short-range correlations in a random structure can drastically change its optical properties by introducing bandgaps and even making it transparent for a broad spectral range [1]. Such structures appear spontaneously in nature but can also be created artificially in order to engineer their optical properties. Usual fabrication techniques use photopolymerization.</p> <p>In this internship, we suggest creating hyper-uniform structures by optical tapping dielectric micro-beads with speckle patterns [2]. The trapped structure will then be characterized by elastic scattering of polychromatic light. The reason why the trapped structure is hyper-uniform is that speckle patterns, although arising from random interferences, exhibit remarkable topological properties, and in particular, many short range correlations [3,4]. This project proposes to make use of these properties to create a model system to engineer and study hyper-uniform structures. Fundamental results about unveiled correlations in speckle patterns are also expected.</p> <p>The intern will set up the experiment, take and analyze the data. The candidate should be interested in experimental optics and have at least a theoretical background in wave optics.</p> <p>This internship will take place at Laboratory Kastler Brossel in collaboration with Sylvain Gigan (sylvain.gigan@lkb.ens.fr)</p> <p>[1] O. Leseur, R. Pierrat and R. Carminati, Optica 3(7) 763 (2016) [2] G. Volpe, L. Kurz, A. Callegari, G. Volpe and S. Gigan, Opt. Exp. 22(15) 18159 (2014) [3] I. Freund, Waves in Random Media 8, 119 (1998) [4] J. Gateau, H. Rigneault, M. Guillon, arXiv :1607.06722 (2016)</p>

Ce stage pourra-t-il se prolonger en thèse ? Possibility of a PhD ? :		
Si oui, financement de thèse envisagé/ financial support for the PhD:		
Lumière, Matière, Interactions	X	Lasers, Optique, Matière X

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