

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 : 15 octobre 2018

Responsable du stage / internship supervisor:			
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Nom du Laboratoire / laboratory name: Laboratoire Charles Fabry (LCF)			
Code d'identification : UMR8501	Organisme : Institut d'Optique Graduate School (IOGS)		
Site Internet / web site:			
Adresse / address: 2 avenue Augustin Fresnel, 91127 Palaiseau cedex			
Lieu du stage / internship place: LCF- IOGS			

Titre du stage / internship title: Towards a spectroscopic study of the Anderson quantum phase transition

Résumé / summary

Anderson localization is an intriguing phenomenon of wave propagation in random media, where destructive interference between various diffusion paths yields to a complete suppression of transport. It has attracted a lot of attention over past decade, from electronic to classical waves (light, acoustic and even seismic waves). However open questions remain, especially in 3D where an insulator to metal (localization to delocalization) quantum phase transition occurs. In this context, studying the propagation of ultracold atoms in optical random potentials offers new perspectives to study this phenomenon in a renewed perspective. Many landmark experiments have proven the great potential of these systems, especially in the team at IOGS.

After the demonstration of Anderson localization in various configurations, the team is currently developing a new method in order to study the 3D Anderson quantum phase transition (V. Volchkov *et al.* Phys. Rev. Lett. **120**, 060404, 2018). It is based on the use of two laser speckle fields, created at slightly different detuning compared to an atomic transition, in order to realize a state dependent disorder. The goal of the internship will be to finalize the implementation of this new kind of disordered potential, to characterize it and to participate to the evolution of the experiments on the day-to-day basis. We anticipate a beginning of the investigation of the 3D Anderson phase transition during the internship and the student will participate to acquisition, treatment and understanding of the data.

This proposal is mainly dedicated to experiments. However, a theoretical part could be envisioned with the theoretician Marcel Filoche from laboratory PMC at Polytechnique. He is indeed developing, together with the mathematician Svitlana Mayroboda (US), a very promising theoretical framework to understand Anderson localization.

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: EDOM / team's funding

Lumière, Matière, Interactions	X	Lasers, Optique, Matière	X
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