



Master PICS 2 2020-2021

Internship subject

Title : Coherent control of light wave propagation to focus light through a scattering medium

Keywords: light scattering, spatial light modulator, speckle

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Main location of the project:

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Subject: Speckle formation is a universal feature of coherent wave dynamics in disordered systems. It occurs whenever the phase front of a wave is randomly perturbed. Particularly in optics this phenomenon gathered considerable interest, both for its fundamental aspects and its technological applications. For imaging applications or light engineering through disordered medium, speckle phenomenon seriously limits the resolution and the performance of the optical systems. Consequently, methods to overcome these limitations are studied.

One of these methods takes benefit of the deterministic property of a static complex medium to perform the measurement of its transmission matrix. Knowledge of the transfer matrix of the complex medium then allows manipulation of the wavefront of the incident light using a spatial light modulator (SLM) to compensate the speckle effect to focus a laser beam or to transmit an image through the medium. In the context of our work on quantum imaging through complex media, we want to master this technique.

During this internship, after a bibliographical study on this subject, the student will have to set up an experiment reproducing the one proposed in the literature allowing the coherent control, by means of an SLM, of the propagation of a laser beam through a static complex medium.

References :

Controlling light through optical disordered media: transmission matrix approach S M Popoff *et al* 2011 *New J. Phys.* 13 123021

Technical support - equipment available : laser, camera, SLM, optical components, computer, softwares