Master Lumi 2019 – presentation October 18, 2018

Light waves in complex media: from biological tissues to cold atoms

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ONDES ET IMAGES

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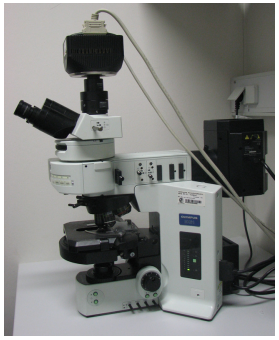
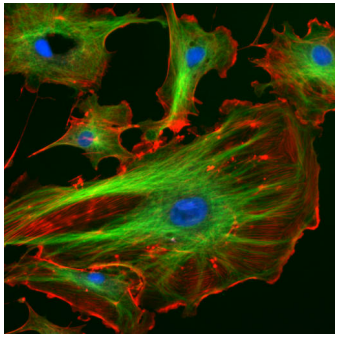
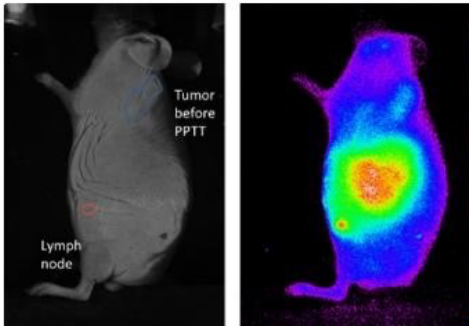
The challenge of "seeing through scattering media"

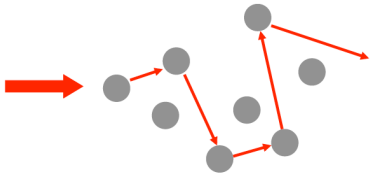
In vitro

In vivo









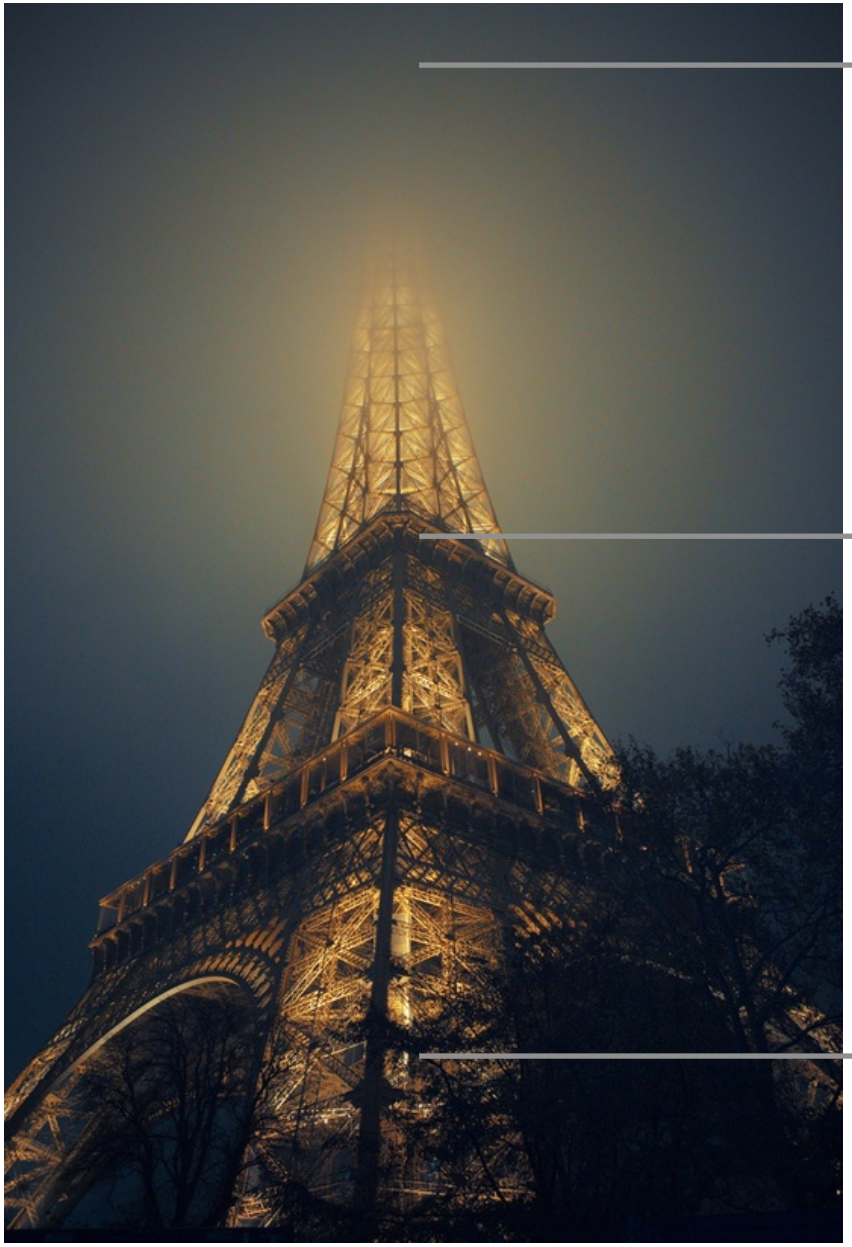
Multiple scattering

(1) How can we describe wave propagation in complex environments ?

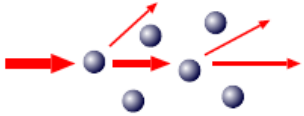
(2) How to extract an image/information despite disorder ?

(3) How to take advantage of the degrees of freedom of complex systems to achieve new functionalities ?

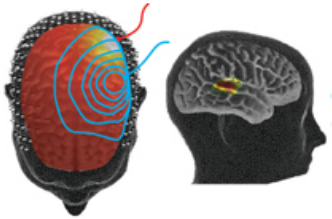
Transport regimes and imaging modalities



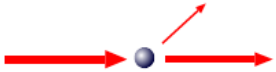
Multiple scattering



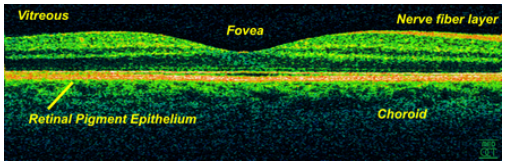
Opt. diffuse tomography



Single scattering

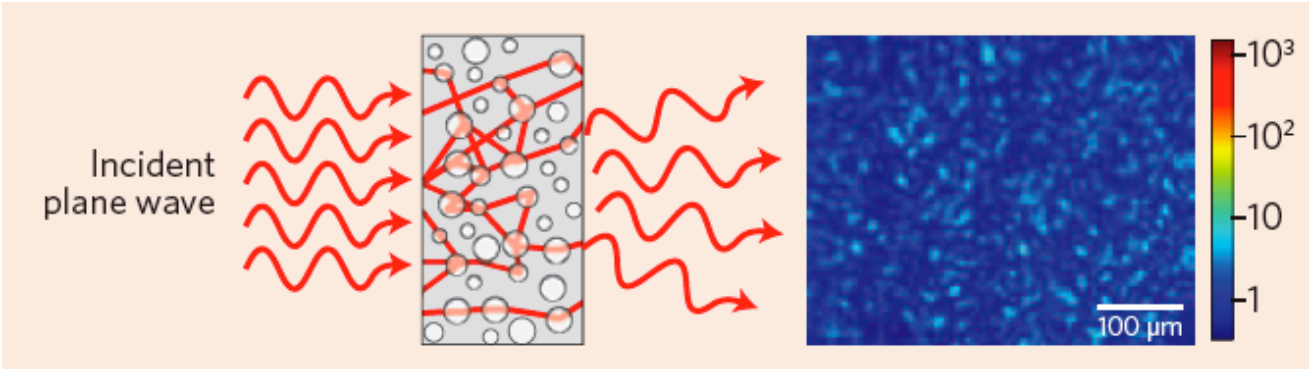


Opt. coherence tomography



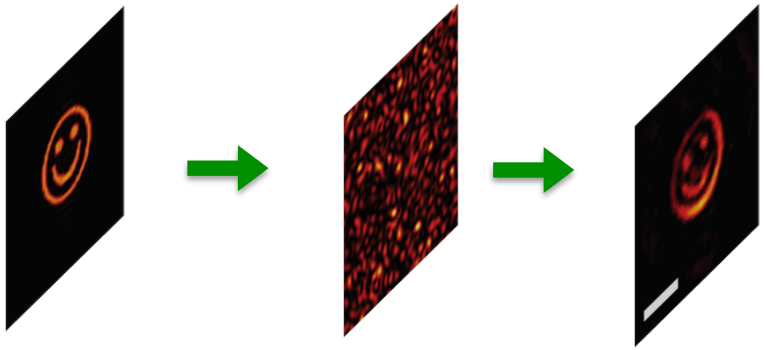
Ballistic propagation

Coherent effects and imaging modalities



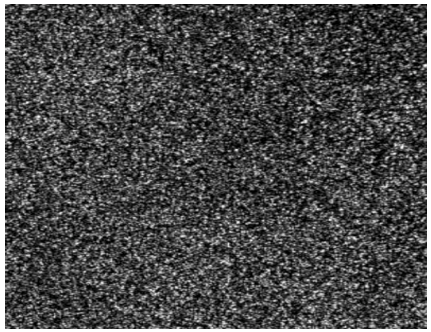
Speckle

How to recover an object hidden behind an opaque medium from the speckle ?



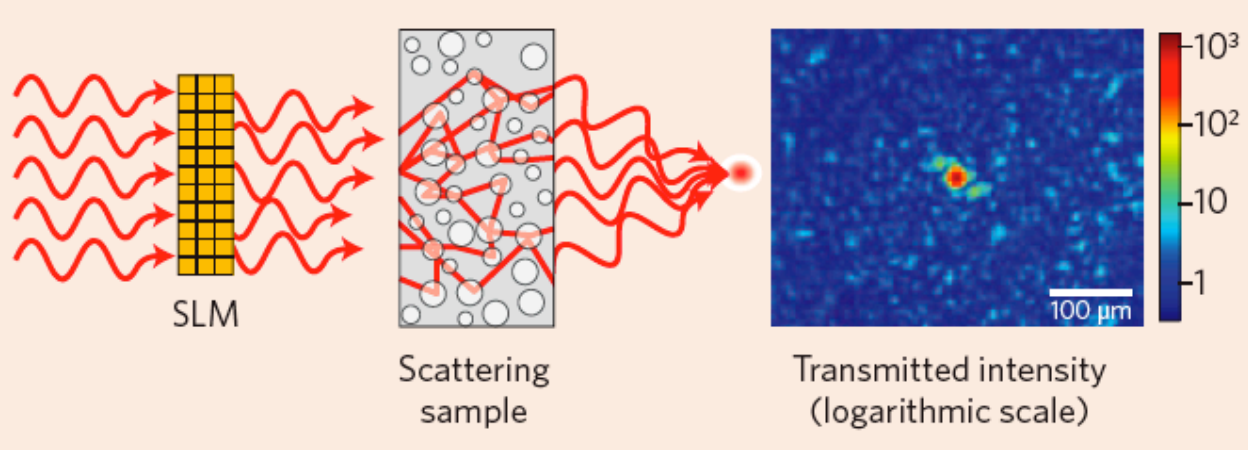
Memory effect imaging

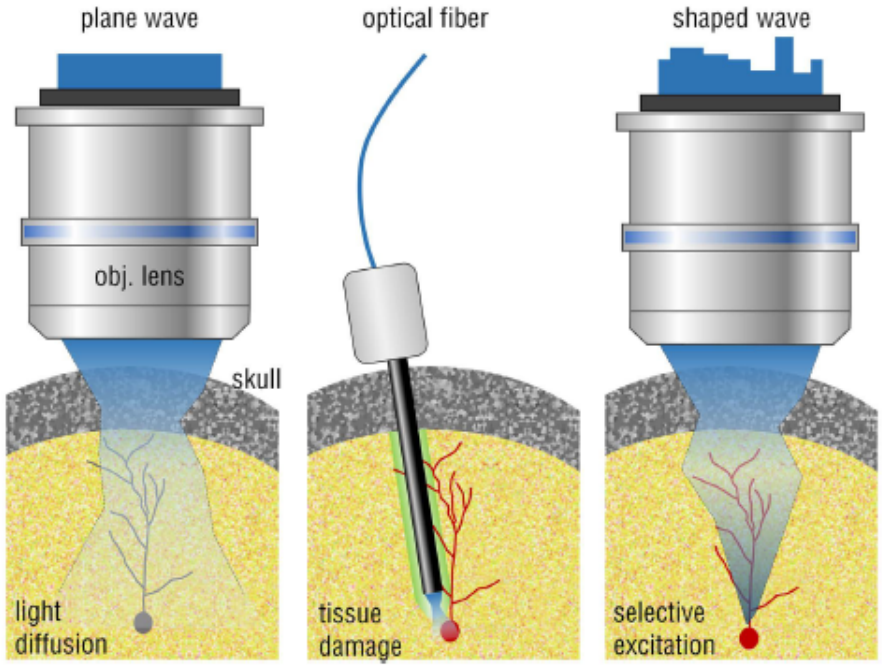
Diffusing wave spectroscopy (functional imaging)



Access to dynamic properties of the medium

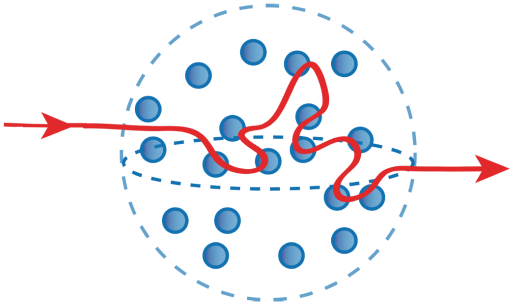
Wavefront shaping: an ongoing revolution !



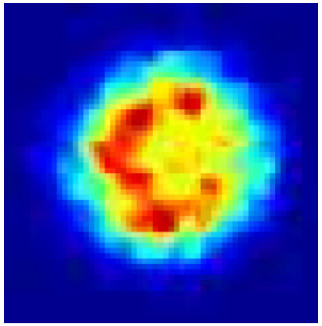


Light and cold atomic gases

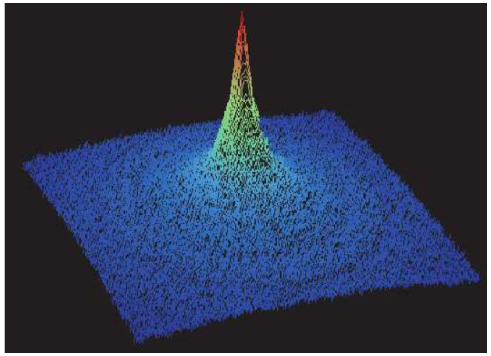
Radiation trapping due to resonant atoms



Flash effect in temporal transmission

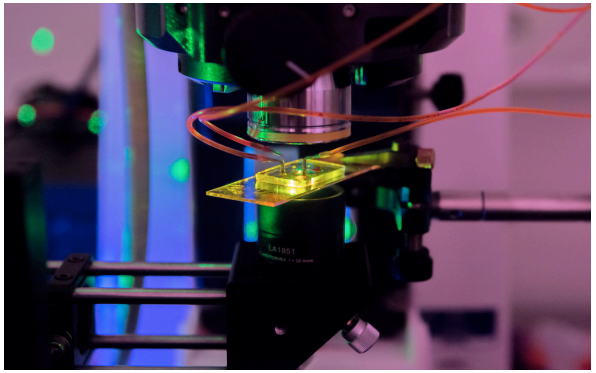


Wave localization and coherent backscattering



Organization

Schedule



28 hours of lectures with 4 tutorials

Thursday afternoon, January-February

Laboratory visit (optional)

Exam Oral

Location Sorbonne Université

Language English or french