

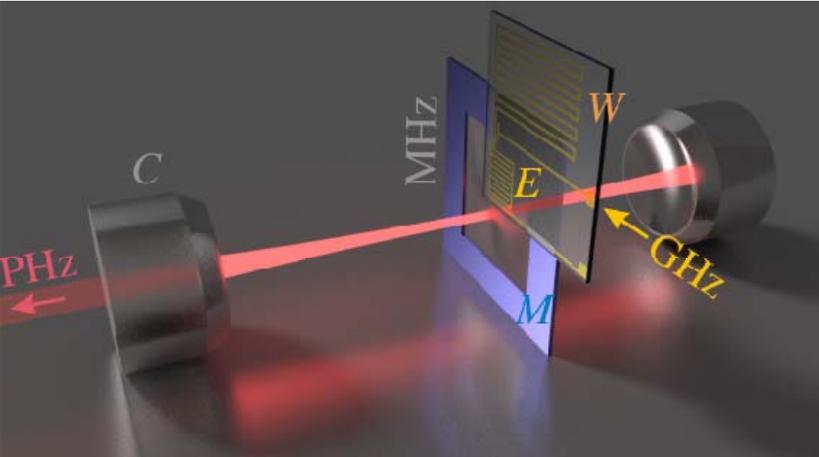
Spécialité de Master « Optique, Matière, Plasmas »

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

Proposition de stage

Date de la proposition :

Responsable du stage / internship supervisor:		
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Nom du Laboratoire / laboratory name: Laboratoire Kastler Brossel		
Code d'identification :	UMR 8552	Organisme : ENS, UPMC, CNRS
Site Internet / web site:	http://www.lkb.ens.fr/-Mesure-et-bruits-fondamentaux-	
Adresse / address:	UPMC Case 74, 4 place Jussieu, 75252 Paris Cedex 05 / 1323-209	
Lieu du stage / internship place: Campus UPMC, Paris 5ème		

Titre du stage / internship title: Hybrid optomechanical systems at ultra-low temperatures
<p>Résumé / summary</p> <p>Huge progress has recently been demonstrated both in the fields of quantum information processing with superconducting qubits and microwave circuits, and quantum communication with optical fibers. A practical quantum information system should then combine the scalability, fast operation and high quantum fidelity of circuit-QED systems with the robustness and large distance operation abilities of quantum communication devices based on standard telecom fibers. Optomechanical systems, which benefit from a universal coupling potential -to qubits, to microwave or optical fields...- are likely to be a key ingredient of such systems. The present project aims at implementing a hybrid quantum link by coupling a nanomechanical resonator to electromagnetic modes at various frequencies.</p> <p>A schematic view of the envisioned setup is given on the figure. The mechanical resonator is a 2D high-tensile-stress membrane placed in the middle of a high-finesse optical cavity to induce a linear position-dependant shift of the optical resonance. It is also coupled to a resonant LC circuit. The principle of each of the element has already been demonstrated separately, but combining a high-finesse cavity with state-of-the-art electromechanical system inside a dilution fridge is a technological endeavor that requires a careful validation at each step of the project.</p> 
<p>The Measurement and Quantum Noise group at Laboratoire Kastler Brossel is one of the very few optomechanics experimental groups with connections to both macroscopic resonators (within the Virgo collaboration) and microresonators with table-top experiments. The LKB group has a unique expertise to perform such a project, including collaboration with microfabrication laboratories, quantum-limited laser sources and detection setups, and a dilution refrigerator compatible with optical operation.</p>

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: ED support			
Lasers, Optique, Matière	<input checked="" type="checkbox"/>	Lumière, Matière : Mesures Extrêmes	<input checked="" type="checkbox"/>
Plasmas : de l'espace au laboratoire			