

**Proposition de stage/ Internship proposal**

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<b>Nom du Laboratoire / laboratory name:</b> SYRTE	
<b>Code d'identification :</b> UMR8630	<b>Organisme :</b> Observatoire de Paris/Sorbonne Université/PSL
<b>Site Internet / web site:</b>	
<b>Adresse / address:</b> 61 av de l'observatoire 75014 PARIS	
<b>Lieu du stage / internship place:</b> Observatoire de Paris	

<b>Titre du stage / internship title:</b> Optimization of microwave nondestructive quantum measurements of cold atoms
<b>Résumé / summary</b>  The internship will be carried out in the SYRTE laboratory, in the "Atomic Interferometry and Inertial Sensors" team of SYRTE. This internship is part of the realization of multifunction/multiaxis inertial sensors designed for inertial navigation. The core of their physical support is a cold atom chip, a device that offers a significant integration potential. Thus, to make possible embedded applications with a chip, we will work on the realization of nondestructive measurements of the population of a cold atom cloud.  The student's work will be based on our recent publication, "Nondestructive microwave detection of a coherent quantum dynamics in cold atoms", W. Dubosclard, S. Kim, and C. L. Garrido Alzar, Commun. Phys. <b>4</b> , 35 (2021). The objective is to prepare the experiment to demonstrate the capability of microwave detection in the generation of spin squeezed states.  Moreover, this detection method allows us to explore the reduction of the death time of a cold atom sensor. Indeed, any cold atom interferometer needs a cooling time of the atoms higher than a few hundred milliseconds. Therefore, any inertial measurement is affected by this dead time which is detrimental to the stability of the sensor. We will therefore study solutions for the realization of nondestructive measurements that will allow to make several interferometric measurements with the same cold atom cloud.  <b>Work to be done</b> - Assembly and characterization of a microwave cold atom detector. Preparation of cold atoms and population measurements in different atomic states.

<b>Ce stage pourra-t-il se prolonger en thèse ? Possibility of a PhD ? :</b> Oui
<b>Si oui, financement de thèse envisagé/ financial support for the PhD:</b> Oui

