

Master 2: *International Centre for Fundamental Physics*

INTERNSHIP PROPOSAL

Laboratory name: **Laboratoire Kastler Brossel**
CNRS identification code: UMR 8552
Internship director's surname: **Pierre Cladé**
e-mail: pierre.clade@lkb.upmc.fr Phone number: 01 44 27 43 88
Web page: http://www.lkb.upmc.fr/metrologysimplesystems/atom_interf/
Internship location: Laboratoire Kastler Brossel, 4 place Jussieu, 75005 Paris

Thesis possibility after internship: **YES**
Funding: YES/NO If YES, which type of funding:

Development of a compact laser system based on second harmonic generation for atom interferometry with ^{85}Rb atoms

Pierre Cladé and Saïda Guellati-Khelifa
Metrology of simple systems and fundamental tests

When an atom absorbs a photon, it recoils with a speed that is inversely proportional to its mass. By using this phenomenon on rubidium 87 atoms, and thanks to an atomic interferometer, we were able to measure their mass with unrivalled precision. This measurement has a very important impact in physics, since it allows us to determine the fine structure constant, a constant that we need to know precisely in order to test the standard model.

The aim of this internship is to develop a new laser system in order to carry out this interferometer on the 85 rubidium isotope and to characterise it. As the mass ratio between the 85 and 87 isotope is well known, this measurement will be used to improve the reliability of the measurements.

This internship could lead to a thesis which will be devoted not only to this measurement but also to the development of new atomic interferometry techniques allowing a better sensitivity.

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: NO
Quantum Physics: YES

Soft Matter and Biological Physics: NO
Theoretical Physics: NO