

**Post:** PhD student position in Experimental Molecular Physics  
**Institute :** [Laboratoire de Physique des Lasers](#), CNRS-Université Paris 13  
**Location:** Villetaneuse, France  
**Team:** [Metrology, Molecules and Fundamental Tests](#)  
**Contract type:** Fixed Term (36 months, funded – starting from October 2017)

### Job Description:

A PhD student position is available to pursue experimental research in the field of precise spectroscopic measurements with cold molecules in the gas phase. The position is associated with a project funded by the French national agency for research (ANR) and the Île-de-France region focused on the development of a new-generation molecular clock specifically designed for precision vibrational spectroscopy of complex polyatomic molecules. The proposed technology is at the forefront of cold molecule research and frequency metrology, and opens possibilities for using polyatomic molecules to perform tests of fundamental physics and explore the limits of the standard model. The apparatus will be used in the first place for the measurement of the tiny energy difference between enantiomers of a chiral molecule induced by electroweak interactions, a signature of parity (left-right symmetry) violation.

The successful applicant will be expected to take an active role in the operation and development of this experimental activity: implementation of buffer-gas-cooled molecular beams of complex chiral species; development of a quantum cascade laser based Ramsey interferometer calibrated against primary frequency standards; development of advanced manipulation techniques to obtain individual state addressing, high detection rates, long coherence times, cooling of various degrees of freedom, ...

### Keywords:

frequency metrology, Ramsey interferometry, Doppler-free methods, precision measurements, parity violation, chiral molecules, molecular beams, buffer-gas cooling, cold molecules, frequency comb lasers, quantum cascade lasers, molecular physics, quantum physics, optics and lasers, vacuum techniques, electronics, programming and simulation

### Relevant publications:

Tokunaga *et al*, [arXiv:1607.08741](#) (2016)  
 Argence *et al*, Nature Photon. **9**, 456 (2015), [arXiv:1412.2207](#)  
 Tokunaga *et al*, Mol. Phys. **111**, 2363 (2013), [arXiv:1309.5630](#)

### Requirements:

The applicant should have an (almost) completed master degree in a relevant area of experimental physics or chemical physics: atomic, molecular and optical physics, spectroscopy, lasers, quantum optics. He/She will be expected to display the initiative and creativity, together with the appropriate skills and knowledge, required to meet the project goals.

Interested applicants should email a CV, a brief description of research interests and the contact details of 2 referents to B. Darquié ([benoit.darquie@univ-paris13.fr](mailto:benoit.darquie@univ-paris13.fr)).