# M2/Thesis in experimental quantum physics at Laboratoire de Physique des Lasers

## Trapping laser system for a dipolar quantum gases experiment

In the recent years the chromium team at LPL has pioneered studies of quantum magnetism using quantum gases of chromium atoms trapped in optical lattices. Chromium is a species which has a high permanent magnetic moment leading to significant dipolar interactions. By controlling the depth of the optical lattices, it is possible to study the competition between dipolar interactions, contact interactions, and transport across the superfluid–Mott phase transition. Measurement of quantum correlations has led to original studies of quantum thermalization, a process in which an isolated system evolves towards equilibrium through the growth of entanglement.

In order to perform more versatile and more accurate measurements, we are re-building the core of the experiment, with the development of new experimental tools: high numerical- aperture imaging, in-vacuum magnetic field measurements, adaptative optics, new optical lattices setup to reach 2D geometry. The Master student will participate in the build-up of the trapping laser system, for which all laser sources are available. This includes MOT, repumpers, dipolar and lattice beams. The student will be associated as well to the construction of imaging systems (absorption, and fluorescence). This internship could then continue as a PhD thesis.

The student will interact with all team members: Lucas Lavoine (associate professor), Benjamin Pasquiou (CNRS engineer), Laurent Vernac (professor), and a postdoctorate who will start working in the winter. See https://gqm.lpl.univ-paris13.fr/ for recent publications and thesis of the team

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