Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Spectroscopy of the forbidden $^1S_0 \to {}^3P_0$ transition on ultra-cold ytterbium atoms ALEXANDRE DAREAU, MATTHIAS SCHOLL, QUENTIN BEAUFILS, DANIEL DÖRING, JÉRÔME BEUGNON, FABRICE GERBIER, Laboratoire Kastler Brossel, ENS, CNRS — Cold atoms in optical lattices are often considered a rich playground for emulating condensed matter systems, since they make it possible to engineer many-body Hamiltonians with tunable parameters. However, one missing feature is the ability to emulate orbital magnetism. Recent proposals for simulating orbital magnetism with neutral atoms rely on a state-dependent optical lattice with laser-driven hopping.[1,2] Ytterbium, with its long lived metastable state ($^3P_0$), is a well-suited candidate for the implementation of such schemes. Addressing the forbidden transition between ytterbium ground ($^1S_0$) and meta-stable ($^3P_0$) states is experimentally challenging, and requires the use of a laser with stability close to the standards of atomic clocks. I will report on the building of a ultra-narrow laser locked on a high-finesse low-expansion cavity.[3] I will then show how the absolute frequency of the cavity modes can be calibrated by performing high-resolution spectroscopy on molecular iodine, allowing us perform Doppler spectroscopy on the $^1S_0 \to {}^3P_0$ transition of an ytterbium BEC.

[1]D. Jaksch and P. Zoller, NJP **5**, 56 (03)
[2]F. Gerbier and J. Dalibard, NJP **12**, 033007 (10)
[3]Dareau *et al.*, arXiv:1412.5751

Alexandre Dareau
Laboratoire Kastler Brossel, ENS, CNRS

Date submitted: 29 Jan 2015 Electronic form version 1.4