

# Engineering new quantum systems with ultracold $^{173}\text{Yb}$ fermions

*mardi 23 février 2016 12:10 (30 minutes)*

I will report on new directions for quantum simulation with ultracold Fermi gases of two-electron  $^{173}\text{Yb}$  atoms. Manipulation of their electronic state on the ultranarrow clock transition allowed us to engineer a new kind of magnetic interaction [1] and to produce strongly interacting Fermi gases with orbital degree of freedom at a newly discovered orbital Feshbach resonance [2]. By manipulating their nuclear spin we realized systems of fermions with tunable  $\text{SU}(N)$  symmetry [3] and demonstrated a new concept for atomic physics experiments based on the realization of a “synthetic dimension”, that we have used to produce gauge fields and directly observe the propagation of chiral edge states in a quantum Hall system [4].

[1] G. Cappellini et al., Phys. Rev. Lett. 113, 120402 (2014).

[2] G. Pagano et al., Phys. Rev. Lett. 115, 265301 (2015).

[3] G. Pagano et al., Nature Phys. 10, 198 (2014).

[4] M. Mancini et al., Science 349, 1510 (2015).

**Auteur principal:** Prof. FALLANI, Leonardo (University of Florence)

**Orateur:** Prof. FALLANI, Leonardo (University of Florence)

**Classification de Session:** Session 3