

INTERNSHIP PROPOSAL

MASTER 2

Supervisor: **Frédéric Chevy**

E-mail: chevy@lkb.ens.fr

Phone number: 01 44 32 38 03

Team: **Fermi Gases Team**

Web page: <http://www.lkb.upmc.fr/ultracoldfermigases>

Location: **ENS Physics Department**

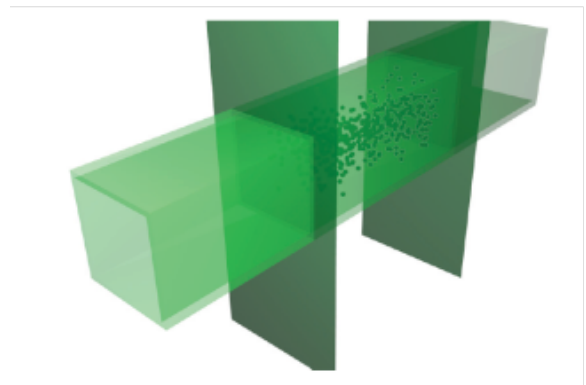
Thesis possibility after internship: **YES**

Funding: **YES**

Critical phenomena in ultracold Fermi gases

Since the observation of superfluidity in ultracold Fermi gases in 2003, an in-depth understanding of the properties of strongly correlated fermionic superfluids has been obtained by the combination of advanced theoretical and experimental methods. Despite this tremendous achievement, some properties of these systems are still poorly known: a prominent example is the critical behavior close to the normal to superfluid phase transition, whose study is still in its infancy.

Universality of critical phenomena is a cornerstone of modern statistical physics that offers a unified description of phase transitions and that we plan to explore on strongly correlated Fermi gas. The purpose of the internship and the subsequent PhD thesis will be the experimental determination of the static and dynamical critical exponents of the transition that will allow us to confirm the universality class of the system. Moreover when the system is spin-polarized, it has been shown that the phase transition was turning from second to first order beyond a critical value of the spin polarization (the so-called “tricritical point”). The critical properties close to this point are still unknown.



Box potential for the observation of homogeneous gases. Contrary to more traditional harmonic traps, flat potentials allow critical fluctuations to extend all over the system and therefore provide an ideal playground for the study of critical phenomena.

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