



EINLADUNG zum IFP-SEMINAR

Multicomponent strongly correlated fermions in optical lattices

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Host: Alessandro Toschi
Termin: **Dienstag, 18. Oktober 2016, 10:00 Uhr**
Ort: Institut für Festkörperphysik, TU Wien
Wiedner Hauptstraße 8-10, 1040 Wien
Seminarraum DB gelb 09 (gelber Bereich, 9. OG)
Förderer: FWF F 4115-N28 Coll Corr

My work is directly inspired by experiments on ultra cold Ytterbium atoms in the ^{173}Yb isotope. These atoms are suitable for simulating multi-band and $SU(N)$ -symmetric Hubbard Models when they are trapped in optical lattices [1][2].

This together with the possibility of synthesizing Artificial Gauge Fields [3][4][5] (AGF) paves the way to the simulation of a wide class of lattice models of fermions with a tunable number of internal degrees of freedom [2].

In this seminar I will address the case of the $SU(3)$ -Hubbard model [6]. After a brief introduction, I will present the phase diagram relative to the symmetric case where the system is symmetric under $SU(3)$ unitary transformations.

Secondly, I will address the case of the three components Hubbard model in presence of AGF, that explicitly break the $SU(3)$ symmetry. In particular I will consider two different kinds of AGF.

In the first case, I will show that the system can assume an exotic flavor selective metamagnetic behavior, where the masses of two fermionic components are dramatically enhanced by the external field, while the mass of the third component decreases.

In the second case, the AGF preserves a residual $SU(2)$ symmetry and the system undergoes an exotic metal-to-insulator transition, where the insulator is a mixture of a two components Mott insulator and a fully polarized band insulator.

- [1] Nature Physics, 6(4):289–295, 2010.
- [2] Nature Physics, 10(3):198–201, 2014
- [3] Reports on Progress in Physics, 77(12):126401, 2014.
- [4] Physical review letters, 112(4):043001, 2014.
- [5] Science, 349(6255):1510–1513, 2015
- [6] Physical Review A, 80(5):051602, 2009.