

## SYSF 2 Superfluidity 2

Time: Monday 11:30–13:00

Room: HSZ 04

**Invited Talk**

SYSF 2.1 Mon 11:30 HSZ 04

**High-Temperature Superfluidity in an Ultracold Fermi Gas**

— •MARTIN ZWIERLEIN, JAMIL ABO-SHAEER, ANDRÉ SCHIROTZEK, CHRISTIAN SCHUNCK, and WOLFGANG KETTERLE — Department of Physics, MIT-Harvard Center for Ultracold Atoms, and Research Laboratory of Electronics, MIT, 77 Massachusetts Avenue, Cambridge, MA 02139, USA

Quantum degenerate atomic Fermi gases provide a remarkable opportunity to study strongly interacting Fermions. In contrast to other Fermi systems, such as superconductors, neutron stars or the quark-gluon plasma of the early Universe, these gases have low densities and their interactions can be precisely controlled over an enormous range. Our recent observation of vortex lattices in a rotating Fermi gas provides definitive evidence for superfluidity in these systems. Scaled to the density of electrons in a solid, this new form of superfluidity would occur already above room temperature.

**Invited Talk**

SYSF 2.2 Mon 12:00 HSZ 04

**Superfluid regimes in strongly interacting Fermi gases**

— •GORA SHLYAPNIKOV — LPTMS, Université Paris Sud, Bat. 100, 91405 Orsay Cedex, France

I will give an overview of recent studies of strongly interacting (two-component) Fermi gases and first focus on the regime of weakly bound dimers formed at a positive scattering length for the interspecies interaction. They represent novel composite bosons which exhibit the features of Fermi statistics at short interdimer distances. In particular, the Pauli exclusion principle for identical fermions provides a strong suppression of relaxation of these dimers to deep bound states and makes them remarkably stable, which paves a way to their Bose-Einstein condensation (BEC). I then analyze mixtures of heavy and light fermionic atoms and address the problem of superfluidity in these systems. In the unitarity limit, where the amplitude of interaction between heavy and light fermions is tending to infinity, I will show how one can map this system onto the system of long-range interacting heavy bosons and treat a superfluid transition as BEC of such bosons.

**Invited Talk**

SYSF 2.3 Mon 12:30 HSZ 04

**Bose-Einstein Condensation in a Disorder Potential**

— •ROBERT GRAHAM — Fachbereich Physik, Universität Duisburg-Essen

Modern experimentation with ultracold atoms in traps has revived the interest in the old but not completely solved problem of ‘dirty bosons’. The problem is experimentally relevant for miniaturization of BECs on chips and can also be studied by tailoring disorder potentials via laser speckle fields. Theoretically it is intriguing because of the competition of localization and interaction, of Anderson localization and the elusive Bose-glass phase, and of disorder and superfluidity. The talk reviews recent theoretical work on this problem in our group, placing it in the context of some of the earlier work in this area.