



Kolloquium

Prof. Päivi Törmä

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Superfluidity of density-imbalanced Fermi gases in traps and optical lattices (plus a “molecular electronics dessert”)

We discuss briefly our results on RF-spectroscopy of the superfluid pairing gap in Fermi gases. The main part of the talk is, however, focused on theory of spin-density imbalanced Fermi gases in traps and optical lattices. We consider density-imbalanced Fermi gases of atoms in the strongly interacting, i.e. unitarity, regime. The Bogoliubov-deGennes equations for a trapped superfluid are solved. The results show FFLO-type oscillations in the order parameter which appear in a narrow shell for small density-imbalance but reach throughout the system for a large imbalance. We show how RF-spectroscopy can provide direct evidence of the FFLO-type oscillations via observing the nodes of the order parameter. We also consider the possibility of the FFLO state in an optical lattice and present the corresponding phase diagram.

In the end of the talk, we briefly tell about the experimental work in our group, namely electrical properties of DNA molecules and trapping of DNA using carbon nanotube electrodes.

References

J. Kinnunen, M. Rodriguez, and P. Törmä: *Pairing gap and in-gap excitations in trapped Fermionic superfluids*, Science 305, 1131 (2004)

J. Kinnunen, L.M. Jensen, and P. Törmä: *Strongly interacting Fermi gases with density imbalance*, Phys. Rev. Lett. 96, 110403 (2006)

S. Tuukkanen, J.J. Toppari, A. Kuzyk, L. Hirviniemi, V.P. Hytönen, T. Ihalainen, and P. Törmä: *Carbon nanotubes as electrodes for dielectrophoresis of DNA*, Nano Lett. 6, 1339 (2006)

Wann? Freitag 26.01.2007, 14:00 Uhr

Wo? Universität Stuttgart, Raum 2.136