



Kolloquium

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Decoherence in degenerate Fermi systems

The destruction of quantum-mechanical phase coherence by a fluctuating environment has acquired increasing experimental importance regarding possible applications of coherent quantum dynamics, as well as being of fundamental interest in its own right. While the theory of decoherence is well developed in the case of a two-level system or a single particle, the situation of degenerate fermions is more involved and has received less attention so far, although it is directly relevant for mesoscopic transport experiments.

In this talk, I will first give an outline of the general questions relating to this topic. Then I will focus on the analysis of decoherence in the most basic and ideal of all two-way interference setups, the Mach-Zehnder interferometer, whose electronic version has been realized only recently [cf. Yi et al., Nature 422, 415 (2003)]. I will discuss the influence of decoherence on the current and the shot noise, which has been suggested as a tool to learn more about decoherence mechanisms.

Recent results for a fully quantum-mechanical environment have been derived with a novel equations-of-motion approach and demonstrate the importance of Pauli blocking. I will give a transparent physical interpretation of the dephasing rate and connect it to the corresponding result in the theory of weak localization.

Wann? Donnerstag, 27.10.2005, 17:15 Uhr

Wo? Universität Ulm, Raum 026/4309