Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart
Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme

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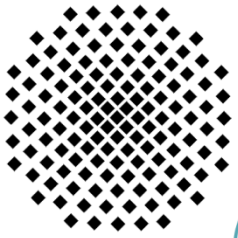

Dienstag, 13. Oktober 2015	17:15 Uhr	Hörsaal V 57.01

Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Prof. Martin Dressel, Universität Stuttgart, Telefon: 0711 - 685-64946

The exotic world of quantum matter: Novel states induced by fluctuations, frustration, reduced dimensions

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Abstract

The talk reviews established concepts of quantum matter and more recently discovered unexpected properties leading beyond. The low energy excitations of quantum matter generally have particle-like character. However, the character of these quasiparticles may be changed by fluctuations, e.g. at a classical or a quantum phase transition into an ordered state. Inside the ordered phase the quasiparticles may be reborn in different form, together with other kinds of new quasiparticles.
Examples are quantum phase transitions of metals into an antiferromagnetic state where "critical" quasiparticles are observed to form, or into a superconducting/ superfluid state. Novel states of matter may also be created by frustrating interactions or by dimensional reduction, leading to new types of quasiparticles. As examples frustrated quantum magnets with "spinon" excitations, and one-dimensional quantum wires, with “chargons” will be considered. In Quantum Hall systems "chiral quasiparticles", "composite fermions" and fractionally charged quasiparticles are found. Most recently topological insulators and Majorana particles are in the focus of attention.