



TRR 80 Seminar

Am Dienstag, den 20. Juni um 16:00 Uhr

spricht

Dr. Kamran Behnia

ESPCI, Paris

über das Thema

Superconductivity and ferroelectricity in strontium titanate

The large-gap semiconductor strontium titanate (SrTiO_3) becomes a metal upon removal of a tiny fraction of its oxygen atoms. The dilute metal has a sharp Fermi surface and is subject to a superconducting instability. Discovered half-a-century ago, the superconducting dome of strontium titanate remains doubly mysterious: How can superconductivity persist when there is only one carrier for 105 atoms and the Fermi energy an order of magnitude smaller than the Debye energy? What destroys this cooperative order as soon as carrier density exceeds 0.02 electrons per formula unit? Our study of quantum oscillations as a function of carrier concentration documents the evolution of the Fermi surface as it evolves from single-pocket to multi-pocket and its correlation with structures in the superconducting dome. Our more recent study of superfluid density as a function of carrier concentration explores the second question.

On the other hand, substituting strontium with calcium stabilizes a long-range ferroelectric order in $\text{Sr}_{1-x}\text{Ca}_x\text{TiO}_3$. We find that in $\text{Sr}_{1-x}\text{Ca}_x\text{TiO}_{3-\delta}$ ferroelectricity coexists with metallicity and its superconducting instability in a narrow window of doping. As the carrier concentration is increased, the ferroelectric order is eventually destroyed by a quantum phase transition. In the vicinity of this quantum phase transition, the superconducting critical temperature is enhanced. We will discuss its origin and a possible link to ferroelectric quantum criticality.

Gäste sind herzlich willkommen!

Der Vortrag findet im Seminarraum S-288, Institut für Physik, Universität Augsburg statt.

Gastgeber: Prof. Dr. Arno P. Kampf
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