

SFB 608

Einladung zum Kolloquium

Ort: Universität zu Köln
II. Physikalisches Institut
Seminarraum 201

Zeit: 22. Juli 2009, 14:30 Uhr s.t.

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Thema: Superconductivity in silicon carbide with different dopants

The discoveries of superconductivity in the heavily-boron doped semiconductors diamond [1] (C:B) in 2004 and silicon [2] (Si:B) in 2006 have renewed the interest in the physics of the superconducting state of doped semiconductors. Subsequently, the stoichiometric combination boron-doped silicon carbide (SiC:B) was found to superconduct, too, with a critical temperature T_c of about 1.45K and a very small critical field strength of only ≈ 1150 e [3]. An AC susceptibility study revealed a strong supercooling effect in finite magnetic fields, which is a hallmark of type-I superconductivity. This is in clear contrast to the two afore mentioned "parent" compounds C:B and Si:B, which are believed to be both type-II superconductors. Results of specific-heat measurements suggest an electron-phonon mediated BCS-type scenario for the bulk superconductivity in SiC:B and the existence of a residual density of states due to nonsuperconducting parts of the sample used [4, 5]. Recently, also aluminium-doped silicon carbide (SiC:Al) was found to exhibit bulk superconductivity below an almost unchanged critical temperature. In contrast to SiC:B, the aluminium-doped compound does not exhibit any clear supercooling behavior neither in resistivity nor in DC magnetization data which lead to the conclusion that SiC:Al is a type-II superconductor. [...]

In this talk, charge-carrier doped silicon carbide will be introduced and recent experimental results will be discussed.

gez. Lorenz