

# SFB 608

## Einladung zum Kolloquium

**Ort:** Universität zu Köln  
II. Physikalisches Institut  
Seminarraum 201

**Zeit:** 08. Juli. 2008, 14:30 Uhr

**Sprecher: O. Stockert**  
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**Thema:** Evidence for paramagnon-mediated  
superconductivity in  $\text{CeCu}_2\text{Si}_2$

Coexistence or competition of superconductivity and magnetic order remains an important issue in condensed matter physics. While conventional superconductivity is generally incompatible with magnetism, the magnetic 4f or 5f moments in heavy-fermion superconductors play a crucial role for the appearance of unconventional superconductivity. Similar to the high-temperature cuprate superconductors, spin excitations instead of phonons are thought to be involved in the formation of Cooper pairs. However, no common consensus exists about the magnetic origin of Cooper pairing in unconventional superconductors.

Using inelastic neutron scattering we show that a clear spin excitation resonance is present in the superconducting state of the prototypical heavy-fermion compound  $\text{CeCu}_2\text{Si}_2$ , for the first time observed at an incommensurate wave vector in a heavy-fermion superconductor. Our results demonstrate that the spin excitations are highly relevant for the superconducting pairing in  $\text{CeCu}_2\text{Si}_2$ . In contrast to the cuprates with quasi-2D electronic structure, the observation of the spin excitation resonance in  $\text{CeCu}_2\text{Si}_2$  with a 3D structure suggests that their appearance is a more general manifestation of unconventional superconductivity.

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