凝縮系物理学ゼミナール

Condensed Matter Seminar

Location: Room 413, School of Science Bldg. 5 (理学 5 号館 413 号室)

Date: 13:30-15:00, Wednesday, 23 January 2013

"Fulde-Ferrell-Larkin-Ovchinnikov states in superconducting mesoscopic thin-wall cylinders"

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Abstract:

The Fulde–Ferrell–Larkin–Ovchinnikov (FFLO) state is a novel superconducting (SC) state predicted in a strong Zeeman magnetic field. It is characterized by the formation of Cooper pairs with nonzero total momentum, so that the SC gap function exhibits a spatial modulation as a result of Pauli-paramagnetic pair-breaking. Due to restrictive conditions on material properties for the occurrence of the FFLO state, only certain classes of materials such as heavy-fermion and organic superconductors are considered to be possible candidates for this state in bulk systems. Furthermore, although experimental results suggestive of the FFLO state have been reported in these superconductors, there seems to be no clear and direct evidence for this state.

In this talk, I will present a theoretical discussion on FFLO states in a SC mesoscopic thin-wall cylinder exposed to a magnetic field parallel to its axis. I will demonstrate that for a cylinder with a radius comparable to the SC coherence length, the FFLO modulation along the cylinder axis exhibits non-monotonic behavior along the Hc2(T) curve. This non-monotonic behavior can be clearly seen via the field-dependence of the specific heat jump at the SC transition even in conventional *s*-wave SC cylinders [1].

Reference:

[1] K. Aoyama, R. Beaird, D. E. Sheehy, and I. Vekhter, arXiv:1212.4095.