

凝縮系物理学ゼミナール

Condensed Matter Seminar

Date: 13:30-15:00, Wednesday, 16 October 2024

Title: Orbital FFLO and q -0 phase in trilayer transition metal dichalcogenides

Speaker: Mr. Michiya Chazono (Condensed Matter Theory Group)

Abstract:

In conventional superconducting states, Cooper pairs have zero center-of-mass momentum. However, under various conditions, Cooper pairs with finite total momentum can be realized such as in the FFLO state [1], helical superconducting state [2], and so on. Recently, superconducting transition metal dichalcogenides (TMDs) such as NbSe₂ have attracted much attention as candidates of the orbital FFLO superconductors [3-6], in which the orbital effect stabilizes the finite-momentum superconductivity.

In this seminar, we show the numerical result of the superconducting phase diagram of the trilayer TMD. We construct the trilayer tight-binding model based on the monolayer model which reproduces the low-energy band structure and Fermi surface of the monolayer NbSe₂. We solve the Bogoliubov-de Gennes equation considering the orbital effect and reveal that the finite-momentum superconductivity is stabilized in high magnetic field region. Furthermore, we predict the realization of q -0 phase, in which finite-momentum Cooper pairs and zero-momentum Cooper pairs coexist.

References:

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