

737th ASRC Seminar

Date: Nov. 28 (Wed), 15:00~

Location: Meeting Room 5, Laboratory Building 1

Speaker: Prof. Takashi Hotta

(Department of Physics, Tokyo Metropolitan University)

Title: Impurity Effects in BiS₂-Based Layered Superconductors

Abstract:

In BiS₂-based layered superconductors [1], angle-resolved photoemission spectroscopy measurements have suggested the existence of gap nodes on Fermi-surface curves [2], whereas the conventional s-wave gap has been proposed from measurements of superfluid density [3] and thermal conductivity [4]. To reconcile these two distinct experimental results of the gap node, we investigate nonmagnetic impurity effects in the superconductor with a disconnected pocketlike Fermi-surface structure [5]. We claim that the seemingly contradictory situation concerning the gap node is resolved by a concept of dirty nodal extended s-wave superconductivity. Provided that it is unnecessary to consider the nodes of the gap, at first glance, the conventional s-wave gap seems to be a unique solution, but in the pocketlike Fermi-surface topology, a nontrivial possibility of a nodeless d-wave superconductor is pointed out. To clarify the gap symmetry, we propose to perform experiments on nuclear magnetic relaxation rate T_1^{-1} in BiS₂-based layered superconductors.

[1] See, for instance, Y. Mizuguchi, J. Phys. Chem. Solids **84**, 34 (2015).

[2] Y. Ota et al., Phys. Rev. Lett. **118**, 167002 (2017).

[3] L. Jiao et al., J. Phys.: Condens. Matter **27**, 225701 (2015).

[4] T. Yamashita et al., J. Phys. Soc. Jpn. **85**, 073707 (2016).

[5] A. Ichikawa and T. Hotta, J. Phys. Soc. Jpn. **87**, 114706 (2018).

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