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Crossed surface flat bands in superconducting Weyl semimetals

KELJI YADA, BO LU, MASATOSHI SATO, YUKIO TANAKA, Nagoya University
— Weyl semimetal is a new phase of matter where topological magnetic monopoles emerge in momentum space at so-called Weyl points.[1] Owing to the presence of the Weyl points, zero energy flat band called Fermi arc appears as a surface bound state between the Weyl points projected to the surface Brillouin Zone.[2] In this talk, we will show that the superconducting state with point nodes in doped Weyl semimetal may have more exotic surface bound states, i.e. “crossed flat bands”. [3] With the help of the crossed flat bands, the divergent behavior of the normalized conductance at zero bias voltage appears. This divergent behavior has never been seen in other superconducting system with point nodes. We found three conditions for the realization of the crossed flat bands mentioned below. i) a uniform pairing such as BCS *s*-wave pairing, ii) broken time reversal symmetry iii) magnetic mirror reflection symmetry. [1] S. Murakami, New J. Phys. **9**, 356 (2007) [2] G. Xu et al., Phys. Rev. Lett. **107**, 186806 (2011) [3] B. Lu, K. Yada, M. Sato and Y. Tanaka, arXiv:1406.3804

Keiji Yada
Nagoya University

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