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Fragile surface zero-energy flat band in three-dimensional chiral superconductors SHINGO KOBAYASHI, YUKIO TANAKA, Department of Applied Physics, Nagoya University, MASATOSHI SATO, Yukawa Institute for Theoretical Physics, Kyoto University — Gapless phases of matter have received enormous attention in recent years. In the context of unconventional superconductors (SCs), such gapless phases manifest as nodal excitations in superconducting gaps and have a surface zero-energy flat band due to nontrivial topology of bulk superconducting states. For heavy-fermion SCs such as UPt3 and URu2Si2, time-reversal-breaking gap functions with both line and point nodes have been proposed and this type of gap functions also host surface zero-energy flat bands in spite of the absence of time-reversal symmetry [1]. In this presentation, we show that the surface flat bands in three-dimensional chiral SCs, which include UPt3 and URu2Si2, are fragile against (i) the surface misorientation and (ii) the surface Rashba spin-orbit interaction. The fragility of (i) is specific to chiral SCs, whereas that of (ii) happens for general odd-parity SCs. We demonstrate that these flat-band instabilities vanish or suppress a zero-bias conductance peak in a normal/insulator/superconductor junction, which behavior is clearly different from high-T_c and noncentrosymmetric SCs. By calculating the angle-resolved conductance, we also discuss a topological surface state associated with the coexistence of line and point nodes. [1] P. Goswami and L. Balicas, arXiv:1312.3632; P. Goswami and A. H. Nevidomskyy, Phys. Rev. B 92, 214504 (2015). [2] S. Kobayashi, Y. Tanaka, and M. Sato, Phys. Rev. B 92, 214514 (2015).

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