APCTP LECTURE

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ZOOM & YouTube

DATE	TIME	ABSTRACT
Oct. 5 (Mon)	**10:30 (KST)**	***"Theory for superconductivity in infinite layer nickelate ---similarity with and difference from high Tc cuprates"*** Recently, superconductivity in infinite layer nickelate has been discovered by Harold Huang group in Stanford, which has confirmed, to a large extent, that strongly correlated electrons described by Hubbard model or its strong coupling limit of the t-J model in a 2-minsional square lattice may be superconducting, as proposed by Phil Anderson for the high Tc cuprates. In this talk, I will discuss the similarity and difference between nickelates and high Tc cuprates and present our recent theory for the low energy physics and superconductivity in the nickelate. **References:** [1] Danfeng Li, Kyuho Lee, Bai Yang Wang, Motoki Osada, Samuel Crossley, Hye Ryoung Lee, Yi Cui, Yasuyuki Hikita & Harold Y. Hwang, Superconductivity in an infinite-layer nickelate. Nature 572, 624–627 (2019). [2] Guang-Ming Zhang, Yi-Feng Yang, Fu-Chun Zhang. Self-doped Mott insulator for parent compounds of nickelate superconductors. Phys. Rev. B 101, 020501(R) (2020). [3] Zhan Wang, Guang-Ming Zhang, Yi-Feng Yang, Fu-Chun Zhang. Distinct pairing symmetries of superconductivity in infinite-layer nickelates. arXiv:2006.15928. [4] P. W. Anderson, P. A. Lee, M. Randeria, T. M. Rice, N. Trivedi, F. C. Zhang. The Physics Behind High-Temperature Superconducting Cuprates: The "Plain Vanilla" Version Of RVB. J Phys. Condens. Matter 16 (2004) R755-R769.
Oct. 6 (Tue)	**10:30 (KST)**	***"Majorana zero modes in topological superconducting vortex"*** Majorana fermions are real solution of Dirac equation, in opposite to the Dirac fermions as complex solution. Neutrino is a candidate for Majorana particle in elementary particle physics. In this talk, I will briefly review proposed emerging Majorana particles in condensed matter systems, and Majorana zero modes in the vortex of topological superconductors, in particular, in the context of potential application in quantum computing. Recent experiments and theories on this topic will be discussed. **References:** [1] Jian-Jian Miao, Hui-Ke Jin, Fu-Chun Zhang, Yi Zhou, Phys. Rev. Lett. 118, 267701 (2017). [2] Hao-Hua Sun, Kai-Wen Zhang, Lun-Hui Hu, Chuang Li, Guan-Yong Wang, Hai-Yang Ma, Zhu-An Xu, Chun-Lei Gao, Dan-Dan Guan, Yao-Yi Li, Canhua Liu, Dong Qian, Yi Zhou, Liang Fu, Shao-Chun Li, Fu-Chun Zhang, Jin-Feng Jia. Observation of Majorana fermions with spin selective Andreev reflection in the vortex of topological superconductor. Phys. Rev. Lett. 116, 257003 (2016). [3] Shengshan Qin, Lunhui Hu, Congcong Le, Jinfeng Zeng, Fu-Chun Zhang, Chen Fang, Jiangping Hu. Quasi 1D topological nodal vortex line phase in doped superconducting 3D Dirac Semimetals. Phys. Rev. Lett. 123, 027003 (2019). [4] Ching-Kai Chiu, T. Machida, Yingyi Huang, T. Hanaguri, Fu-Chun Zhang. Scalable Majorana vortex modes in iron-based superconductors. Science Advances 6, 9, eaay0443 (2020).

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■ **Contact information**

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