Xiao Hu, Ph.D. (HU.Xiao@nims.go.jp)
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International Center for Materials Nanoarchitectonics (WPI-MANA)
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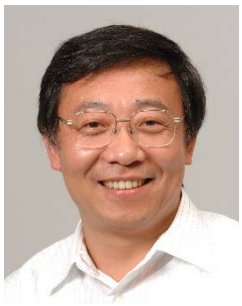

Biography

Degree: Ph. D. in 1990 from University of Tokyo

Institution: International Center for Materials Nanoarchitectonics (WPI-MANA), National Institute for Materials Science, Japan

Position: MANA Principal Investigator;

Adjunct position: Professor of University of Tsukuba

Main Achievements

1) He proposed the theory on time-reversal-symmetric topological states of electromagnetic waves based on honeycomb-type structure, and revealed for the first time in the world that topological EM propagation can be realized in conventional dielectrics, which covers the whole frequency region from microwave to visible light **[L.-H. Wu and X. Hu, Phys. Rev. Lett. vol. 114, 223901 (2015)]**. The theory has been confirmed perfectly in microwave experiments **[Y.-T. Yang, Y.-F. Xu, J.-H. Jiang, H.-X. Wang, X. Hu and Z.-H. Hang, Phys. Rev. Lett. vol. 120, 217401 (2018)]**, has been extended to various systems.
2) He proposed the concept of antiferromagnetic topological insulator, where the quantum anomalous Hall effect is realized by an external electric field, and was invited to write a long review article in Advances in Physics, the best review journal for condensed matter physics **[H. Weng, R. Yu, X. Hu, X. Dai and Z. Fang, Adv. Phys. vol. 64, 227 (2015) (review article)]**.
3) He predicted the topological nodal-line semimetal state in the antiperovskite material, which became the best cited papers in the field **[R. Yu, H. Weng, Z. Fang, X. Dai and X. Hu, Phys. Rev. Lett. vol. 115, 036807 (2015)]**.
4) He revealed the novel spin-energy-position relationship in quasiparticle excitations in vortex of topological superconductors, and proposed to detect the zero-energy Majorana fermions in terms of spin-polarized STM technique **[T. Kawakami and X. Hu, Phys. Rev. Lett. vol. 115, 177001 (2015)]**.
5) He discovered theoretically a novel superconducting phase dynamics state characterized by a topological excitation of half-vortex in mesa structures of the high-temperature cuprate superconductor $Bi_2Sr_2CaCu_2O_8$ under dc c-axis voltage, which can excite coherent THz EM waves **[S.-Z. Lin and X. Hu: Phys. Rev. Lett. vol. 100, 247006 (2008); X. Hu and S.-Z. Lin: Supercond. Sci. Technol. vol. 23, 053001 (2010) (review article)]**.
6) He clarified the first-order melting transition of Abrikosov vortex lattice in high-temperature cuprate superconductors when the external magnetic field is applied along the c-axis, and the two-step, continuous melting transition of Josephson vortex lattice when the field is parallel to the ab-plane, including novel smectic and BKT intermediate vortex phases **[X. Hu, S. Miyashita and M. Tachiki, Phys. Rev. Lett. vol. 79, 3498 (1997); X. Hu and M. Tachiki, Phys. Rev. Lett. vol. 85, 2577 (2000)]**. (*totally over 200 scientific papers and 150 invited talks*)