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Title: Tunneling into emergent topological matter

Abstract: The search for topological matter is evolving towards strongly interacting systems including magnets and superconductors, where novel effects emerge from the quantum level interplay between geometry, correlation, and topology. Equipped with unprecedented spatial resolution, high precision electronic detection and magnetic tunability, scanning tunneling microscopy has become a powerful tool to probe and discover the emergent topological matter. In this talk, I will discuss the proof-of-principle methodology applied to study the quantum topology in this discipline, with particular attention to studies performed under a tunable vector magnetic field, which is a relatively new direction of recent focus. I then project the future possibilities for tunnelling methods in providing new insights into topological matter.

Key references:

1. Jia-Xin Yin, S.H. Pan, M. Z. Hasan, Nature Review Physics (2021) (in press).
2. Jia-Xin Yin et al. Nature 583, 533-536 (2020).
3. Jia-Xin Yin et al. Nature 562, 91-95 (2018).
4. Jia-Xin Yin et al. Nature Physics 15, 443–448 (2019).
5. Jia-Xin Yin et al. Nature Physics 11, 543 (2015).

Brief CV of Dr. Jiaxin Yin:

Dr. Jiaxin Yin is currently a Postdoctoral Researcher in Prof. Zahid Hasan's team in Princeton University, USA, and focuses on the scanning tunneling microscopy of emergent topological matter, including topological magnets and superconductors. He received his Ph.D. degree in 2016 from Institute of Physics, CAS, under Prof. Hong Ding and Prof. Shuheng Pan. In 2015, he observed a Majorana-like zero-energy mode in Fe(Te,Se), which simulated theoretical and experimental confirmation of nontrivial topology in iron-based superconductors. Recently, he has developed vector magnetic field based scanning tunneling microscopy technique to observe Chern toplogical phases and many-body effects in several quantum magnets.