

Electron fractionalization and pairing in moiré semiconductors

Kin Fai Mak

Department of Physics and School of Applied and Engineering Physics, Cornell University, Ithaca, NY, USA

kinfai.mak@cornell.edu

The discovery of moiré materials has enabled condensed matter experimentation in new regimes. In particular, twisted bilayers of transition metal dichalcogenide (TMD) semiconductors have realized flat Chern bands with substantially enhanced electron-electron interaction effects. In this talk, I will discuss the realization of electron fractionalization (under zero magnetic field) and electron pairing in this material system. Specific examples of interest include fractional Chern insulators [1], fractional topological insulators [2] and unconventional superconductivity in a half-filled Chern band [3].

References

- [1] Zeng et al. *Nature* 622, 69-73 (2023).
- [2] Kang et al. *Nature* 628, 522–526 (2024).
- [3] Xia et al. arXiv:2405.14784.