

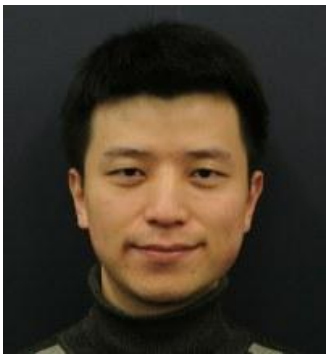


Weekly Seminar

Correlated Topological States in Two-Dimensional Semiconductor Moiré Superlattices

Shengwei Jiang

Shanghai Jiao Tong university



Time: 3:00 pm, June 3, 2026 (Wednesday)

时间: 2026年6月3日 (周三) 下午3:00

Venue: Room w563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

Two-dimensional semiconductors, with their remarkable physical properties and in situ tunability, have become a major frontier in condensed matter physics. Moiré superlattice potentials split electronic bands into narrow minibands, suppressing kinetic energy and enhancing the role of electron correlations. When such bands also carry nontrivial topology, topological flat bands may emerge, creating unique opportunities to explore quantum phases driven jointly by strong correlations and band topology. A notable recent example is the observation of the fractional quantum anomalous Hall effect in twisted bilayer MoTe_2 .

In topological flat-band systems, small variations in quantum geometry and interaction strength can significantly reshape the ground-state energy landscape, leading to strong competition among distinct electronic phases. Recently, we observed a variety of correlated and topological ground states in semiconductor moiré superlattices, including integer and fractional quantum Chern insulators, topological electronic crystals, and antiferromagnetic insulators. These phases can be effectively tuned by carrier filling, electric field, twist angle, hydrostatic pressure, and proximity coupling. These results establish semiconductor moiré superlattices as an ideal platform for discovering novel quantum phases arising from the interplay of topology and correlation.

About the speaker

Shengwei Jiang is an Associate Professor at the School of Physics and Astronomy, Shanghai Jiao Tong University. He received his B.S. and Ph.D. from Nanjing University, and completed postdoctoral research at Pennsylvania State University and Cornell University. He joined Shanghai Jiao Tong University in 2021 as a tenure-track associate professor.

His research interests include low-dimensional magnetism, and strongly correlated and topological physics in two-dimensional semiconductor moiré superlattices. He has published multiple papers as first or corresponding author in journals such as *Nature*, other *Nature-family journals* as well as other leading journals such as *PRX*, and *PRL*, with over 7,000 citations.