

Emergence of p+ip superconductivity in 2D strongly correlated Dirac fermions (Zheng-Cheng Gu)

The search for the p+ip superconducting (SC) state has become a fascinating subject in condensed matter physics, as a dream application awaits in topological quantum computation. In this talk, I report the theoretical discovery of a p+ip SC ground state (coexisting with ferromagnetic order) in the honeycomb lattice Hubbard model with infinite repulsive interaction at low doping ( $\delta < 0.2$ ), by using both the state-of-art Grassmann tensor product state (GTPS) approach and a quantum field theory approach. Our discovery suggests a new mechanism for p+ip SC state in generic strongly correlated systems and opens a new door towards experimental realization. The p+ip SC state has an instability towards a potential non-Fermi liquid below a large but finite  $U$ ; however, a small in-plane Zeeman field stabilizes the p+ip SC state. Relevant realistic materials are also proposed.