Evolution from weak to strong coupling pairing of Dirac Fermions[1] SHI-QUAN SU, Department of Physics and Institue of Theoretical Physics, The Chinese University of Hong, Hong Kong, China, KA-MING TAM, Department of Physics and Astronomy, University of Waterloo, Canada, HAI-QING LIN, Department of Physics and Institue of Theoretical Physics, The Chinese University of Hong, Hong Kong, China — We study the pairing of Dirac Fermions with attractive interaction from weak to strong coupling regime, highlighting the differences and resemblances with that of the BCS-BEC crossover in the systems with extended Fermi surface. Dirac Fermions model at low doping limit is solved by mean field approximation. Exact Quantum Monte Carlo method, auxiliary field Quantum Monte Carlo, is used to simulate the single band attractive Hubbard model on a honeycomb lattice. Quantities for probing the crossover, double occupancy, spin susceptibility, on-site pair correlation, and kinetic energy are obtained impartially. We find that these quantities indicate the BCS-BEC crossover of the model. This can be interpreted as a competition between Fermionic modes and Bosonic modes which coexist in the single band Hubbard model on a honeycomb lattice with attractive interaction.

Shi-Quan Su
Department of Physics and Institue of Theoretical Physics,
The Chinese University of Hong, Hong Kong, China

Electronic form version 1.4