Frustration and time reversal symmetry breaking for Fermi and Bose-Fermi systems

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Abstract

The modulation of an optical lattice potential that breaks time-reversal symmetry enables the realization of complex tunneling amplitudes in the corresponding tight-binding model. For a superfluid Fermi gas in a triangular lattice potential with complex tunnelings the pairing function acquires a complex phase, so the frustrated magnetism of fermions can be realized.Bose-Fermi mixture of bosonic molecules and unbound fermions in the lattice shows also an interesting behavior. Due to boson-fermion coupling, the fermions become slaved by the bosons and the corresponding pairing function takes the complex phase determined by bosons. In the presence of bosons the Fermi system can reveal both gapped and gapless superfluidity.

Figure 1: The conference logo.