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Title: Correlated States in Flat-Band Systems

Abstract:

The quenched kinetic energy in the flat-band systems increases the importance of interactions and leads to superconductivity and other correlated states. I will discuss examples of symmetry-broken states in flat-band systems starting from the best understood quantum Hall ferromagnets and exciton condensates [1] and continuing with more complicated quantum Hall systems [2] and moiré superlattices [3] which are characterized by competition between different order parameters [3, 4]. I will emphasize that in contrast to the systems where the Fermi energy is the largest energy scale, the properties of the flat-band systems are determined by the whole band, including effects originating from the quantum metric of the Bloch wavefunctions [3,5,6,7]. Finally, I will discuss our proposal to design a three-dimensional flat band [8].

References:

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