

Abstract for an Invited Paper
for the MAR10 Meeting of
The American Physical Society

Correlated Phases in Bose-Hubbard Models with Simulated Magnetic Fields

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Proposed methods for imprinting gauge fields (tunneling phases) in optical lattices open up the prospect of experimental studies of atomic Bose gases that are well described by the Bose-Hubbard model in an effective magnetic field. I shall discuss the nature of the groundstates of such systems. The relevant physics involves the interplay between the fractional quantum Hall effect for bosons and the “Hofstadter butterfly” spectrum. I shall explain how this interplay can lead to novel strongly correlated phases. [G. Möller and N. R. Cooper, Phys. Rev. Lett. **103**, 105303 (2009).]