Abstract Submitted
for the OSF13 Meeting of
The American Physical Society

Physics of lattice bosons in the presence of occupation parity coupling[1] KUEI SUN, C.J. BOLECH, University of Cincinnati — Interacting bosons in lattices can exhibit two extremely different phases at low temperature: Mott insulator and superfluid. The system's phase diagram is well described by the Bose-Hubbard (BH) model, which considers onsite repulsion and nearest-neighbor tunneling of bosons. Here we study the physics of a BH system when an interesting ingredient, a ferromagnetic-like coupling between nearest-neighbor sites' occupation parities, is introduced. Our analysis shows that this parity coupling has non-trivial interplay with the tunneling and onsite interaction, resulting in exotic quantum phases such as pair liquid, pair superfluid, phase separation in uniform systems, or a wedding-cake-structured Mott insulators with the occupation jumping by two in trapped systems. We will discuss the properties of these phases and suggest two experimental realizations in cold atom and condensed matter systems.

[1]Supported by DARPA-ARO Award No. W911NF-07-1-0464 and by the University of Cincinnati.

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Date submitted: 06 Sep 2013 Electronic form version 1.4