Abstract Submitted
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Ground states of hard-core dipolar bosons in coupled 1D optical lattices[1] ARGHAVAN SAFAVI-NAINI, Massachusetts Inst of Tech-MIT, BARBARA CAPOGROSSO-SANSONE, University of Oklahoma, ANATOLY KUKLOV, CUNY — We study the ground states of hard-core bosons interacting by dipolar forces and trapped in a stack of N 1D optical lattices (tubes) parallel to each other with no inter-tube tunneling. Ab-initio quantum Monte Carlo simulations are performed by the novel N-Worm Algorithm and are compared with the results of the bosonization method. Several non-trivial ground states have been found: superfluids and countersuperfluids made of composites of particles from different tubes, 1D checkerboard insulators, and mixtures of these phases. As it turns out, such phases have zero threshold in the interaction and can invoke any number M of tubes, $1 < M \leq N$, regardless of their geometrical positions. The inter-tube imbalance of filling factors is a "tuning knob" for inducing such phases and switching between them.

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