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Bose-Hubbard Model on Penrose Tiling Lattice JOHNSON CHAN,
The Univ of Hong Kong, DIMITRIOS GALANAKIS, None — The standard Bose-Hubbard model has provided a paradigmatic example to explore the quantum phases in a strongly interacting boson system. However, studies so far have considered lattice models with the conventional lattice symmetry (square, triangular, honeycomb etc. in two dimensions), and very few studies in the case of a quasi-crystal. Experimentally, quasi-crystal optical lattices have been realized in the experiments and this provides a very timely opportunity to investigate the possible quantum states of a Bose-Hubbard model in a quasi-crystal. In our work, we performed the first Quantum Monte Carlo of Bose-Hubbard model on a Penrose tiling lattice at finite temperature. We compute the phase diagram and investigate the behavior of phase transitions by looking at several observables, including momentum distribution, distribution of condensate fraction and density distributions. Our work can be checked in future experiments.

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