Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Flat-band ferromagnetism of SU(N Hubbard model on Tasaki lattices[1] RUIJIN LIU, Department of Physics, Renmin University of China, China, WENXING NIE, College of Physics, Sichuan University, China, WEI ZHANG, Department of Physics, Renmin University of China, China — We investigate the para-ferro magnetic transition of the repulsive SU(N) Hubbard model on a type of one- and two-dimensional decorated cubic lattices, referred as Tasaki lattices, which feature massive single-particle ground state degeneracy. Under certain restrictions for constructing localized many-particle ground states of flat-band ferromagnetism, the quantum model of strongly correlated electrons is mapped to a classical statistical geometric site-percolation problem, where the nontrivial weights of different configurations must be considered. We prove rigorously the existence of para-ferro transition for the SU(N) Hubbard model on one-dimensional Tasaki lattice and determine the critical density by the transfer-matrix method. In two dimensions, we numerically investigate the phase transition of SU(3), SU(4) and SU(10) Hubbard models by Metropolis Monte Carlo simulation. We find that the critical density exceeds that of standard percolation, and increases with spin degrees of freedom, implying that the effective repulsive interaction becomes stronger for larger N. We further rigorously prove the existence of flat-band ferromagnetism of the SU(N) Hubbard model when the number of particles equals to the degeneracy of the lowest band in the single-particle energy spectrum.

[1]This work is supported by the National Key RD Program of China, the National Natural Science Foundation of China, and the Beijing Natural Science Foundation

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Date submitted: 30 Jan 2020 Electronic form version 1.4