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Monte Carlo simulations of two-dimensional Hubbard models with string bond tensor-network states[1] JEONG-PIL SONG, DAEHYUN WEE, EWHA Woman's Univ, R. T. CLAY, Mississippi State University — We study charge- and spin-ordered states in the two-dimensional extended Hubbard model on a triangular lattice at 1/3 filling. While the nearest-neighbor Coulomb repulsion V induces charge-ordered states, the competition between on-site U and nearest-neighbor V interactions lead to quantum phase transitions to an antiferromagnetic spin-ordered phase with honeycomb charge order. In order to avoid the fermion sign problem and handle frustrations here we use quantum Monte Carlo methods with the string-bond tensor network ansatz for fermionic systems in two dimensions. We determine the phase boundaries of the several spin- and charge-ordered states and show a phase diagram in the on-site U and the nearest-neighbor V plane. The numerical accuracy of the method is compared with exact diagonalization results in terms of the size of matrices D. We also test the use of lattice symmetries to improve the string-bond ansatz.

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