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Artificial gauge-fields in the Bose-Hubbard model on the triangular lattice[1] SHIJIE HU, Univ. of Kaiserslautern, Germany, XUE FENG ZHANG, Max Plank Institute of complex systems, Dresden, Germany, FRANCISCO DOS SANTOS, Univ. Sao Carlos, Brazil, AXEL PELSTER, SEBASTIAN EGGERT, Univ. of Kaiserslautern, Germany — Shaking the triangular optical lattice with an extra potential at a resonant frequency can provide different artificial gauge-fields (e.g. complex phases of the tunneling matrix elements between two neighbor lattice sites) along three inequivalent axes. We systematically study the phase diagram of the artificially gauged Bose-Hubbard model on the triangular lattice by using large-scale two-dimensional density-matrix renormalization group (DMRG) method, infinite-DMRG method and also the process-chain algorithm of the strong-coupling expansion. The numerical results self-consistently point out that the artificial gauge-field strongly affect the type of the transitions from the Mott-insulating phase to the superfluid phase. Especially, the transition becomes discontinuous at high-symmetry points because of breaking a topological discrete symmetry. Other properties of criticality are discussed.

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