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**Finite-size scaling study of the one-dimensional Bose-Hubbard model via matrix product state representations** SUNG-BEEN PARK, MIN-CHUL CHA, Hanyang University — The Bose-Hubbard model is a prototypical simple model showing quantum phase transition with a continuous symmetry. In one dimension, the quantum critical properties of the model has been studied via various methods, but still some basic properties remain unknown, such as the exact location of the critical point. It is a computational challenge to study this model with more elaborated numerical methods. The matrix product state (MPS) representations are new variational solutions to one-dimensional quantum systems. By using this method to find the ground state, we study the critical properties of the one-dimensional Bose-Hubbard model with a periodic boundary condition. Finite-size scaling analysis provides the phase diagram and the critical exponents.

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