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Mean-field scaling of the superfluid to Mott insulator transition in a 2D optical superlattice THOMAS BARTER, CLAIRE THOMAS, TSZ-HIM LEUNG, MASAYUKI OKANO, University of California, Berkeley, GYU-BOONG JO, Hong Kong University of Science and Technology, JENNIE GUZMAN, California State University, East Bay, ITAMAR KIMCHI, Massachusetts Institute of Technology, ASHVIN VISHWANATH, Harvard University, DAN STAMPER-KURN, University of California, Berkeley — The mean-field treatment of the Bose-Hubbard model predicts that the properties of lattice-trapped gases are insensitive to the specific lattice geometry once system energies are scaled by the coordination number z. We test this prediction by studying the superfluid to Mott insulator transition in an ultracold gas of rubidium atoms trapped in a two-dimensional optical superlattice which can be tuned from triangular ($z = 6$) to kagome ($z = 4$) geometries. We observe the coherent fraction to be less robust in the kagome lattice by tuning the ratio of the interaction energy U to the tunneling energy J. Comparison of the coherent fraction in the triangular lattice to that in the kagome lattice in terms of the scaled ratio U/Jz is consistent with the mean-field prediction.

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