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First-order transition and hysteresis phenomena of Bose-Bose mixtures in an optical lattice DAISUKE YAMAMOTO, RIKEN, TAKESHI OZAKI, Tokyo University of Science, CARLOS SA DE MELO, Geogia Tech., IPPEI DANSHITA, YITP, RIKEN — We study the superfluid-Mott insulator transition in Bose-Bose mixtures loaded into an optical lattice applying the self-consistent mean-field theory to the two-component Bose-Hubbard model. It is known that the transition in this system with repulsive inter-component interaction can be of first order near the tip of the Mott lobes at even filling factors. Assuming equal hoppings and equal intra-component interactions for both components, we first discuss the metastability of the superfluid and Mott insulator phases with two bosons per site at zero temperature. We find that the hysteresis region is wide enough to be detected in the experiments with tuning the ratio of the hopping and the intra-component interaction. We also discuss the effects of finite temperatures and anisotropy between the two components in consideration of the actual experimental situation.

Daisuke Yamamoto
RIKEN

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