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Novel magnetic phases for two-component Bose-Hubbard model with synthetic spin-orbit coupling in one dimension XIAOQUN WANG, Renmin University, JIZE ZHAO, PING ZHANG, Institute of Applied Physics and Computational Mathematics and Beijing Computational Science Research Center, Beijing, SHIJIE HU, MPI-PKS Dresden, JUN CHANG, ITP and KITP, Beijing — We present a new phase diagram for the two-component Bose-Hubbard model with a synthetic spin-orbit coupling in one dimension by employing the density-matrix renormalization group method. A ferromagnetic long-range order emerges in both the Mott insulator and superfluid phases. It results from the spontaneous breaking of the Z_2 symmetry, when the spin-orbit coupling term becomes comparable to the hopping kinetic energy and the inter-component interaction is smaller than the intra-component one. These novel effects are expected to be detectable with the present realization of synthetic spin-orbit coupling in experiments.

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