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Beyond mean-field dynamics in open Bose-Hubbard chains[1] HOLGER HENNIG, Max Planck Institute for Dynamics and Self-Organization (MPIDS), Goettingen, Germany and Department of Physics, Harvard University, Cambridge (USA), DIRK WITTHAUT, MPIDS, Goettingen, Germany, FRIEDERIKE TRIMBORN, Institute for Theoretical Physics, University of Hannover, Germany, GEORGIOS KORDAS, Institute for Theoretical Physics and Center for Quantum Dynamics, University of Heidelberg, Germany, THEO GEISEL, MPIDS, Goettingen, Germany, SANDRO WIMBERGER, Institute for Theoretical Physics and Center for Quantum Dynamics, University of Heidelberg, Germany — We investigate the effects of phase noise and particle loss on the dynamics of a Bose-Einstein condensate in an optical lattice. Starting from the many-body master equation, we discuss the applicability of generalized mean-field approximations in the presence of dissipation and methods to simulate quantum effects beyond mean-field by including higher-order correlation functions. It is shown that localized particle dissipation leads to surprising dynamics, as it can suppress decay and restore the coherence of a Bose-Einstein condensate. These effects can be applied to engineer coherent structures such as stable discrete breathers and dark solitons.

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