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Thermalization near Integrability in the 1D Bose-Hubbard model
AMY CASSIDY, Joint Quantum Institute, NIST and University of Maryland, VANJA DUNJKO, MAXIM OLSHANII, University of Massachusetts Boston, CHARLES W. CLARK, Joint Quantum Institute, NIST and University of Maryland — We discuss how nearness to integrability affects relaxation from an initial nonequillibrium state in the one-dimensional (1D) Bose-Hubbard model (BHM), within the classical field approximation. The 1D BHM has a threshold for chaos, which is govered by two parameters: the nonlinearity and energy per particle [1]. This threshold separates regions of the phase space where the dynamics are regular and regions where they are chaotic. The 1D BHM becomes integrable in both the non-interacting limit and the continuum limit. Additionally, the equations of motion are close to that of the completely integrable Ablowitz-Ladik lattice [2]. A completely integrable system is not expected to relax to the usual thermodynamic state due to the extra conservation laws. We investigate thermalization in the 1D BHM and the impact of the nearby integrable models.

[1] A. C. Cassidy, *et al.*, *Phys. Rev. Lett.* **102** 025302 (2009)
[2] M. J. Ablowitz and J. F. Ladik, *J. Math. Phys.* **16** 598 (1975)

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