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Relaxation and thermalization in the one-dimensional Bose-Hubbard model: A case study for the interaction quantum quench from the atomic limit[1] FABIAN HEIDRICH-MEISNER, LODE POLLET, STEFAN SORG, LEV VIDMAR, LMU Munich — We study the relaxation dynamics and thermalization in the one-dimensional Bose-Hubbard model induced by a global interaction quench. Specifically, we start from an initial state that has exactly one boson per site and is the ground state of a system with infinitely strong repulsive interactions at unit filling [1]. The same interaction quench was realized in a recent experiment [2]. Using exact diagonalization and the density-matrix renormalization-group method, we compute the time dependence of such observables as the multiple occupancy and the momentum distribution function. We discuss our numerical results in the framework of the eigenstate thermalization hypothesis and we observe that the microcanonical ensemble describes the time averages of many observables reasonably well for small and intermediate interaction strength. Moreover, the diagonal and the canonical ensembles are practically identical for our initial conditions already on the level of their respective energy distributions for small interaction strengths.

[1] Sorg et al., PRA 90, 033606 (2014)
[2] Ronzheimer et al., PRL 110, 205301 (2013)

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