Strongly dissipative one dimensional quantum gases

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We study the effects of strong two-body losses in bosonic gases trapped in one-dimensional optical lattices. We are particularly interested in the mott insulating state with broken translational invariance, and we investigate the dynamics of the system in quantum Zeno regime [1, 2]. We construct a set of rate equations using Gaussian approximation and exploiting the connection with generalised Gibbs ensemble. Obtained results from the rate equations are compared with those from the exact Monte Carlo simulations using trajectory method, and we observe good agreement. There is also a strong possibility of observing our predictions in current state-of-the-art experiments.

[1] J. J . Garc ia-Ripoll et. al., Dissipation-induced hard-core boson gas in an optical lattice, New Journal of Physics 11 013053 (2009).
[2] D. Rossini et. al., Strong correlations in lossy one-dimensional quantum gases: From the quantum Zeno effect to the generalized Gibbs ensemble, Phys. Rev. A 103, L060201 (2021).