

Effective thermalization of a many-body dynamically localized Bose gas

Vincent Vuatelet¹ and Adam Rançon¹

¹*Université de Lille, CNRS, UMR 8523 – PhLAM – Laboratoire de Physique des Lasers, Atomes et Molécules, F-59000 Lille, France*

Mini-colloque PMQ31

e-mail : vincent.vuatelet@univ-lille.fr

In the quantum kicked-rotor, the alternation of kicks and free propagation gives rise to exponentially localized single-particle wave-functions in momentum space [1], known as dynamical localization, which is the quantum chaos analog of the well-known Anderson localization predicted in disordered system [2].

The consequences of adding interactions in such periodically driven system remains unclear, especially for one dimensional system where mean-field theory breaks down. We study the many-body dynamical localization of a kicked Bose gas in the Tonks regime (strong interactions). We will show that the steady-state of such system at long time can be described by a thermal density matrix, with an effective temperature depending on the kicking parameters and the number of particles, while a loss of decoherence is enlightened by the one-body reduced density matrix.

References

- [1] D. R. Grempel, R. E. Prange, and Shmuel Fishman. “Quantum dynamics of a nonintegrable system”. In: *Phys. Rev. A* 29 (4 Apr. 1984), pp. 1639–1647. DOI: [10.1103/PhysRevA.29.1639](https://doi.org/10.1103/PhysRevA.29.1639). URL: <https://link.aps.org/doi/10.1103/PhysRevA.29.1639>.
- [2] P. W. Anderson. “Absence of Diffusion in Certain Random Lattices”. In: *Phys. Rev.* 109 (5 Mar. 1958), pp. 1492–1505. DOI: [10.1103/PhysRev.109.1492](https://doi.org/10.1103/PhysRev.109.1492). URL: <https://link.aps.org/doi/10.1103/PhysRev.109.1492>.