Strongly anomalous non-thermal fixed point in a quenched Bose gas

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Non-equilibrated quantum many-body systems show much richer characteristics than those in equilibrium. There is the possibility for universal dynamics, showing up with the same properties in very different systems irrespective of their concrete building blocks. Prominent examples are the phenomenon of prethermalisation and the development of Generalised Gibbs Ensembles [1]. Superfluid turbulence in an ultracold atomic gas has the potential to show universal aspects shared by dynamics which occurred after the inflationary period of the early universe [2]. Non-thermal fixed points have been proposed in this context which lead beyond standard equilibrium universality. Turbulent dynamics in one- and two-dimensional bosonic matter-wave systems will be discussed which are characterized by universal scaling behavior in space and time, with strong anomalous effects caused by conservation laws and non-dissipative dynamics [3]. This exhibits a close relation between quantum turbulence, the dynamics of topological defects, as well as magnetic and charge ordering phenomena.

[1] T. Langen, T. Gasenzer, and J. Schmiedmayer, JSTAT 064009 (2016). arXiv:1603.09385 [cond-mat.quant-gas].

[2] B. Nowak, S. Erne, M. Karl, J. Schole, D. Sexty, and T. Gasenzer, arXiv:1302.1448 [cond-mat.quant-gas], in *Strongly Interacting Quantum Systems out of Equilibrium*, edited by T. Giamarchi, et al. (Oxford University Press, 2016).

[3] M. Karl and T. Gasenzer, arXiv:1611.01163 (2016).