

Ultracold Bose Gases in Driven-Dissipative Environments

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Driven-dissipative systems are characterized by the appearance of steady-states. Upon parameter change, they can undergo dissipative phase transitions between different types of steady-states. One of the paradigmatic examples for a first order dissipative phase transition is the driven nonlinear single-mode optical resonator. The poster reports on the corresponding realization within an ultracold bosonic gas, which generalizes the single-mode system to many modes and stronger interactions [1]. We measure the effective Liouvillian gap of the system and find evidence for a first order dissipative phase transition. Due to the multi-mode nature of the system, the microscopic dynamics is much richer and allows us to identify a non-equilibrium condensation process, including an analysis of the quantum fluctuations.

[1] J. Benary, C. Baals, E. Bernhart, J. Jiang, M. Röhrle, and H. Ott, *New J. Phys.* **24**, 103034 (2022)

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