PHYSIK

Kolloquium des SFB/TR 49
gemeinsam mit Theoretisch-Physikalischem Kolloquium

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Ordering in non-equilibrium steady states of driven-dissipative quantum systems

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Statistical mechanics provides a powerful framework for predicting the equilibrium properties of matter. The lack of such a universal concept for driven many-body systems makes their theoretical treatment difficult; but, at the same time, it also allows for engineering non-equilibrium states of matter with novel properties beyond the strict constraints of thermodynamics. As an example, I will discuss ordering (Bose condensation) in non-equilibrium steady states of systems in thermal environments that are strongly driven by time-periodic forcing [1,2], temperature gradients [1-3], and pumping [4, 5]. Our work predicts robust excited-state and fragmented condensation [1-5], Bose condensation in environments well-above the equilibrium critical temperature [3], and it explains experiments with photons in structured environments [4,5].

[1] Generalized Bose-Einstein condensation into multiple states in driven-dissipative systems, Daniel Vorberg, Waltraut Wustmann, Roland Ketzmerick, André Eckardt, Phys. Rev. Lett. 111, 240405 (2013), arXiv:1308.2776
[2] Non-equilibrium steady states of ideal bosonic and fermionic quantum gases D. Vorberg, W. Wustmann, H. Schomerus, R. Ketzmerick, A. Eckardt, Phys. Rev. E 92, 062119 (2015)
[3] High-temperature nonequilibrium Bose condensation induced by a hot needle A. Schnell, D. Vorberg, R. Ketzmerick, A. Eckardt, Phys. Rev. Lett. 119, 140602 (2017).
[4] Pump-power-driven mode switching in a microcavity device and its relation to Bose-Einstein condensation, H. A. M. Leymann, D. Vorberg, T. Lettau, C. Hopfmann, C. Schneider, M. Kamp, S. Höfling, R. Ketzmerick, J. Wiersig, S. Reitzenstein, A. Eckardt, Phys. Rev. X 7, 021045 (2017)
[5] A unified theory for excited-state, fragmented, and equilibrium-like Bose condensation in pumped photonic many-body systems, D. Vorberg, R. Ketzmerick, and A. Eckardt, Phys. Rev. A 97, 063621 (2018)

Gäste sind herzlich willkommen.

Die Dozenten der Theoretischen Physik

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