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Limit cycle of hydrodynamic attractor in ultracold quantum gases

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Hydrodynamic attractors are a universal phenomenon of strongly interacting systems that describe the hydrodynamic-like evolution far from local equilibrium. The rapid hydrodynamization of the Quark-Gluon Plasma is behind the remarkable success of hydrodynamic models of high-energy nuclear collisions. Until now, hydrodynamic attractors have been studied only in monotonically expanding systems, e.g., Bjorken expansion. This work shows that a system undergoing an oscillating isotropic expansion exhibits a novel attractor behavior that resembles a limit cycle in dynamical systems. This phenomenon can be studied in ultracold quantum gases with externally modulated scattering length, which opens the way to the experimental discovery of hydrodynamic attractor phenomenon.

Refs.:

1. Fuji, Enss, Hydrodynamic Attractor in Ultracold Atoms, Phys.Rev.Lett. 133, 2404.12921
2. Enss, Mazeliauskas, in preparation.

Category

Theory

Collaboration (if applicable)

Authors: Dr MAZELIAUSKAS, Aleksas (Heidelberg University (DE)); Prof. ENSS, Tilman (Institute for Theoretical Physics, Heidelberg University)

Presenter: Dr MAZELIAUSKAS, Aleksas (Heidelberg University (DE))

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