

Hydrodynamics of nearly-integrable systems

Integrable systems feature an infinite number of conserved charges and on hydrodynamic scales are described by generalised hydrodynamics (GHD). This description breaks down when the integrability is weakly broken and sufficiently large space-time-scales are probed. The emergent hydrodynamics depends then on the charges conserved by the perturbation.

In my contribution I will focus on nearly-integrable Galilean-invariant systems with conserved particle number, momentum and energy. Basing on the Boltzmann approach to integrability-breaking we describe dynamics of the system with GHD equation supplemented with a collision term.

Employing Chapman-Enskog formalism and nonlinear fluctuating hydrodynamics I will show that depending on the length scales, one can distinguish three hydrodynamic regimes of the system: generalised hydrodynamics, Navier-Stokes (NS) regime and Kardar-Parisi-Zhang (KPZ) superdiffusion known to occur in generic 1d non-integrable fluids. Moreover, I will show how we can compute transport coefficients characterising the fluid in NS and KPZ regimes.

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