Seminar of SFB 910

Yagmur Kati

Center for Theoretical Physics of Complex Systems,
Institute for Basic Science, Daejeon, South Korea

"Equilibrium and Nonequilibrium Gross-Pitaevskii Lattice Dynamics"

The interplay of fluctuations, ergodicity, and disorder in many-body interacting systems has been striking attention for half a century, pivoted on two celebrated phenomena: Anderson localization predicted in disordered media, and Fermi-Pasta-Ulam-Tsingou recurrence observed in a nonlinear system. Focusing mainly on the Gross-Pitaevskii (GP) lattice, I will briefly review our current activities, which include the study of chaotic sub-diffusive regimes of spreading wave packets and thermalization time scales in Gibbs and non-Gibbs regimes. I will then discuss in depth the properties of small fluctuations close to zero temperature, including their localization properties. We obtained analytical expressions for the thermodynamic properties of the ground state, i.e., the chemical potential and the participation number density, and compared them with direct numerical calculations. For small ground state density, we identify a Lifshits regime where disorder dominates over the interactions. For large ground-state density, the interaction dominates and screens the disorder. The fluctuations above the ground state yield Bogoliubov modes (BM). We compute their localization properties by measuring participation numbers and localization length. The localization length diverges at zero energy. In the strong interaction regime, a novel finite energy BM anomaly develops with a strong increase of localization length at finite energies.

For information on how to access the event, please contact: henning.reinken@itp.tu-berlin.de

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Technische Universität Berlin · Institut für Theoretische Physik · Hardenbergstraße 36 · 10623 Berlin

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