DY 28: Posters - Dynamics of Many-Body Systems

Time: Tuesday 18:15–21:00 Location: P3

DY 28.1 Tue 18:15 P3

Typical relaxation dynamics to equilibrium, thermal or non-thermal, of isolated many-body quantum systems — •Ben Niklas Balz and Peter Reimann — Fakultät für Physik, Universität Bielefeld, Germany

In the recent past, typicality arguments were used extensively to corroborate that isolated quantum many-body systems equilibrate and that the associated steady state is naturally given by the microcanonical ensemble. These statements are usually derived making use of uniformly distributed unitary transformations (Haar measure) and therefore do not take conserved quantities into account. In the following we are going to present an adapted typicality technique, employ it to derive the corresponding relaxation dynamics and present numerical as well as experimental data in its support.

DY 28.2 Tue 18:15 P3

Pinned-to-sliding transition and structural crossovers for helically confined charges — •Alexandra Zampetaki[1], Jan Stockhofe[1], and Peter Schmelcher[1,2] — [1]Zentrum für Optische Quantentechnologien, Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg, Germany — [2]The Hamburg Centre for Ultrafast Imaging, Luruper Chaussee 149, 22761 Hamburg, Germany

We explore the non-equilibrium dissipative dynamics of a system of identical charged particles trapped on a closed helix. The particles are subject to an external force accelerating them along the underlying structure. The effective interactions between the charges induce a coupling of the center-of-mass to the relative motion which in turn gives rise to a pinned-to-sliding transition with increasing magnitude of the external force. In the sliding regime we observe an Ohmic behaviour signified by a constant mobility. Within the same regime a structural transition of the helical particle chain takes place with increasing the helix radius leading to a global change of the crystalline arrangement. The resulting crystal is characterized by the existence of multiple defects whose number increases with the helix radius.

DY 28.3 Tue 18:15 P3

Theory of quantum scattering for quantum scatterers — •Ankita Bhattacharya[1,2] and Shyamal Biswas[2] — [1]Institute of Theoretical Physics, TU Dresden, Germany — [2]School of Physics, University of Hyderabad, India

We have analytically explored the phenomenon of quantum scattering for unfixed quantum scatterer(s) in quantized bound states in different types of box geometry and potential-trapped geometry. We have considered short ranged (Fermi-Huang δ_p^3) interaction between the incident particle and the scatterer(s) with no interactions among the scatterers, and the scatterer(s) as (i) particle(s) in a 1-D box, (ii) particle(s) in a 1-D double box, (iii) particle(s) in a 1-D grating, (iv) particle(s) in a 2-D rectangular box, (v) particle(s) in a 3-D harmonic trap, (vi) Bose-Einstein condensates in a double well, (vii) Bose-Einstein condensates in an optical lattice, etc. Coherent scattering from all possible positions of the quantum scatterers in the finite geometry gives rise to rich physics specially for the interference between the scattering due to the aperture and that due to the scatterer(s) in the aperture. We have predicted differential scattering cross-section for particle scattering, not only for the above cases, but also for 3-D harmonically trapped Bose and Fermi gases in thermodynamic equilibrium. We also have explored temperature dependence of the quantum scattering even for 3-D ideal quantum gases in the restricted geometries. Our predictions can be tested within the present day experimental setups.

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The role of particle (in-)distinguishability for many-particle dynamics in optical lattices — Tobias Brünner, Gabriel Dufour, •Alberto Rodríguez, and Andreas Buchleitner — Physikalisches Institut, Universität Freiburg, Hermann-Herder-Str. 3, D-79104 Freiburg, Germany

Much attention has been dedicated so far to the dynamical impact of interactions —which often can be associated with the progressive suppression of coherence phenomena. On the other hand, little is known on the fundamental role of the interacting particles' degree of mutual (in-)distinguishability in such experiments. We have learnt from a new generation of photonic interference experiments and theory that controlling the degree of (in-)distinguishability unveils novel many-particle interference phenomena. We import this program into the realm of controlled, interacting many-particle quantum systems, specifically for cold atoms in optical lattices, and identify statistical, experimentally readily accessible quantifiers to infer the particles' degree of distinguishability.