MP 17: Poster (permanent Di-Do)

Poster-Flächen im Foyer HFT-FT, erste Etage

Time: Tuesday 9:30–18:00 Location: HFT-FT 101

MP 17.1 Tue 9:30 HFT-FT 101

A generalized approach to quantum mechanics in its hydrodynamical formulation — •Christoph Tempel and Wolfgang P. Schleich — Institut für Quantenphysik

Already formulated by Madelung in 1926 [1], the hydrodynamical formulation of quantum mechanics underwent several revivals since then. It was at the core of Bohm's interpretation of nonrelativistic quantum mechanics and now again gains influence in various fields of quantum theory. A most recent example would be the description of Bose-Einstein condensates in harmonic traps as well as under free evolution [2]. The outstanding property of the formulation is position space which it owes its name by comparison with classical hydrodynamics.

We start from a more general setting and examine the properties of Quantum Hydrodynamics in a selection of continuous Hilbert spaces and visualize our results on the prime example of textbook quantum mechanics: a single particle in the box.

[1] Madelung, Erwin, Z. Phys A **40.3**, 322 (1927).
[2] Dalfovo, Franco, et al., Rev. Mod. Phys. **71.3**, 463 (1999).

MP 17.2 Tue 9:30 HFT-FT 101

Entropic uncertainty relation for open pointer-based simultaneous measurements — •Raoul Heese and Matthias Freyberger — Institut für Quantenphysik, Universität Ulm, D-89069 Ulm, Germany

Uncertainty relations for simultaneous measurements of conjugate observables date back to the theory of Arthurs and Kelly, who considered a model of two pointer systems, which are coupled to a quantum system to be measured and act as the measurement apparatus. We extend this classic model by including a thermal environment in which the pointers behave as coupled particles under Brownian motion. Additionally, we use information entropy to determine the measurement accuracy. This novel approach leads us to a new kind of entropic uncertainty relation for so-called open pointer-based simultaneous measurements of conjugate observables.

MP 17.3 Tue 9:30 HFT-FT 101

Multiple-scale expansions for the Boltzmann equation — •Olga Chekmareva[1] and Igor Chekmarev[2] — [1]Aachen, Germany — [2]Aachen, Germany

The nondimensional Boltzmann equation is considered for small Knudsen number. The aim is to represent the solution by the first term of the asymptotic expansion that provides a good approximation for all times of interest. In this case each term in expansion must be a small correction to the preceding terms over long time interval. Thus, it is necessary not only to define the first approximations but examine the higher terms and eliminate the sources of singularities at each step of asymptotic procedure. To attain results we use the multiple-scale technique. Such approach applied to the Boltzmann equation in the limit of small Knudsen reduces to the regular gas-dynamic-type relations for the leading terms and determines the limits of their application. In particular, those equations define the damping and the dispersion of the sound wave. From other hand, the Navier-Stokes equations in the rare gas case contain itself a small parameter and can lead to singular solutions. It is shown the asymptotic equivalence of the Boltzmann equation and the Navier-Stokes system within the framework of the used models.

MP 17.4 Tue 9:30 HFT-FT 101

Subwavelength solitary waves in modulated plasmonic lattices — •Yao Kou and Jens Förstner — Department of Electrical Engineering, University of Paderborn, Warburger Str. 100, 33102 Paderborn, Germany

We numerically investigated the properties of optical solitons in modulated plasmonic lattices. The important characteristics, including band-gap spectrum, soliton existence domain, spatial concentration and propagation length are examined. The results show potential of use these subwavelength entities in active photonic control.

MP 17.5 Tue 9:30 HFT-FT 101

Rotating Bosons on a ring: A continuous matrix product state approach — •Damian Draxler — University of Vienna-Austria

A variational method for simulating (1+1)-dimensional quantum field theories with periodic boundary conditions is presented. The method is based on the Time-Dependent-Variational-Principle (TDVP) for continuous matrix product states. In particular we study interacting bosons confined on a ring in the presence of an artificial U(1) gauge field.

MP 17.6 Tue 9:30 HFT-FT 101

Extended global symmetries for four-dimensional supersymmetric gauge theories — •Ilmar Gahramanov — Humboldt-University Berlin, Berlin, Germany

I will discuss the prescription for studying extended global symmetries via the so-called superconformal index technique. The superconformal index is the non-trivial generalization of the Witten index and it is one of the most efficient tools in the study of supersymmetric gauge theories. The superconformal index of a theory with flavor group F has the Weyl group symmetry $W(F)$. In cases when the theory has a hidden extended symmetry, the coefficients in the decomposition of the index into characters of the flavor group are sums of dimensions of irreducible representations of the larger symmetry group. Using this property one can study symmetry enhancements for supersymmetric gauge theories.