TT 90: Coherent Quantum Dynamics (joint session DY/TT)

Time: Thursday 12:00–12:45 Location: EB 107

TT 90.1 Thu 12:00 EB 107

Initial System-Environment Correlations via the Transfer Tensor Method — Maximilian Buser[1,2], •Javier Cerrillo[1], Gernot Schaller[1], and Jianshu Cao[2] — [1]Institut für Theoretische Physik, Technische Universität Berlin, Hardenbergstr. 36, D-10623 Berlin, German — [2]Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139, USA

Open quantum systems exhibiting initial system-environment correlations are notoriously difficult to simulate. We point out that given a sufficiently long sample of the exact short-time evolution of the open system dynamics, one may employ transfer tensors for the further propagation of the reduced open system state. This approach is numerically advantageous and allows for the simulation of quantum correlation functions in hardly accessible regimes. We benchmark this approach against analytically exact solutions and exemplify it with the calculation of emission spectra of multichromophoric systems as well as for the reverse temperature estimation from simulated spectroscopic data. Finally, we employ our approach for the detection of spectral signatures of electromagnetically-induced transparency in open three-level systems.

TT 90.2 Thu 12:15 EB 107

Generation of subharmonic oscillations in driven quantum systems — •Onno Renke Diermann — Condensed Matter Theory, IfP Uni Oldenburg

We present an elementary model for the breaking of discrete time translational symmetry. We consider weakly anharmonic quantum oscillators and apply a time-periodic force which couples close-to-resonant energy levels. An appropriate version of the rotating wave approximation then is employed to derive an effective time-independent Hamiltonian describing a quasiparticle in a multi-well potential. The eigenstates of this potential, which extend over all wells, correspond to Floquet states which inherit the period of the driving force, whereas states localized in only one of the wells of the effective potential correspond to wave packets performing subharmonic motion.

TT 90.3 Thu 12:30 EB 107

Topological Qubit: Quantum States in the Sheaf/Scheme Framework — Antonina N. Fedorova and •Michael G. Zeitlin — Russia, 199178, St.Petersburg, V.O. Bolshoj pr., 61, IPME RAS, Mathematical Methods in Mechanics Group

We consider some generalization of the theory of quantum states, which is based on the analysis of long standing problems and unsatisfactory situation with existing interpretations of quantum mechanics. We demonstrate that the consideration of quantum states as sheaves can provide, in principle, more deep understanding of some well-known phenomena. The key ingredients of the proposed construction are the families of sections of sheaves with values in the proper category of the functional realizations of infinite-dimensional Hilbert spaces with special (multiscale) filtrations decomposed into the (entangled) orbits generated by actions/representations of internal hidden symmetries. In such a way, via proper categorification in a general scheme framework, we open a possibility for the exact description of a lot of phenomena like entanglement and measurement, wave function collapse, self-interference, instantaneous quantum interaction, many-worlds, hidden variables, etc. In the companion paper we consider the machinery needed for the generation of a zoo of the complex quantum patterns during Wigner-Weyl-Moyal evolution together with the constructive algebraic control.