Aktuelle Veranstaltungen

Kolloquium

Thema: **Soft X-ray Spectroscopy of Quantum Materials**

Datum: 15.11.22

Uhrzeit: 14:15

Ort: H6

Vortragender: Prof. Kai Rossnagel

Universität Kiel

Inhalt:

Ansprechpartner: A. Hütten

Kolloquium Mathematische Physik

Thema: **tba**

Datum: 04.11.22

Uhrzeit: 16:15

Ort: V4-119

Vortragender: Lisa Hartung

Universität Mainz

Inhalt:

Ansprechpartner: G. Akemann

Seminar Hochenergiephysik

Thema: **Mitigating the Hubbard Sign Problem. A Novel Application of Machine Learning**

Datum: 07.11.22

Uhrzeit: 16:15

Ort: D6-135

Vortragender: Marcel Rodekamp

FZ Jülich

Inhalt: Many fascinating systems suffer from a severe (complex action) sign problem preventing us from simulating them with Markov Chain Monte Carlo. One promising method to alleviate the sign problem is the transformation towards Lefschetz Thimbles. Unfortunately, this suffers from poor scaling originating in numerically integrating of flow equations and evaluation of an induced Jacobian. In this talk we present a Neural Network architecture based on complex-valued affine coupling layers. This network performs such a transformation efficiently, ultimately allowing simulation of systems with a severe sign problem. We test this method within the Hubbard Model at finite chemical potential, modelling strongly correlated electrons on a spatial lattice of ions.

Ansprechpartner: O. Kaczmarek

Seminar Kondensierte Materie

Thema: **11:00 Magnetismus eines anisotropen Fe5-Moleküls**

Datum: 28.09.22

Uhrzeit: 11:00

Ort: D5-153

Vortragender: Daniel Schellenberg

Universität Bielefeld

Inhalt:

Ansprechpartner: Jürgen Schnack

Seminar Mathematische Physik

Thema: **Many-particles diffusing with resetting: study of the large-deviation properties of the flux distribution**

Datum: 05.05.22

Uhrzeit: 16:00

Ort: D5-153

Vortragender: Costantino Di Bello

Inhalt:

In this paper we studied a model of noninteracting particles moving on a line following a common dynamics. In particular we considered either a diffusive motion with Poissonian resetting, and a run-and-tumble motion with Poissonian resetting. We were interested in studying the distribution of the random variable Q_t defined as the flux of particles through origin up to time t. We used the notation $P(Q,t)$ to identify the probability $\mathbb{P}\{Q_t=Q\}$. We considered particles initially located on the negative half line with a fixed density ρ. In fully analogy with disordered systems, we studied both the annealed and the quenched case for initial conditions. In the former case we found that, independently from the specific dynamics, $P_\mathrm{an}(Q,t)$ has a Poissonian shape; while in the latter case, for what concerns the diffusive dynamics with resetting, the large deviation form of the quenched distribution reads $P_\mathrm{qu}(Q,t)\sim \exp\left[-r^2t^2 \Psi_\mathrm{diff}\left(\dfrac{Q}{\rho t}\right)\right]$ with the large deviation function $\Psi_\mathrm{diff}(x)$ exhibiting a discontinuity in the third derivative, hence aiming, despite the simplicity of the model, at the exhistence of a dynamical phase transition. The quenched distribution for the run-and-tumble dynamics, instead, does not exhibit any kind of phase transition. Importance sampling Monte Carlo simulations were performed to prove the analytical results. References: Current fluctuations in noninteracting run-and-tumble particles in

one dimension Tirthankar Banerjee, Satya N. Majumdar, Alberto Rosso, and Grégory Schehr, Phys. Rev. E 101, 052101 https://doi.org/10.1103/PhysRevE.101.052101 Current Fluctuations in One Dimensional Diffusive Systems with a Step Initial Density Profile B. Derrida and A. Gerschenfeld, J. Stat. Phys. 137, 978 (2009) https://doi.org/10.1007/s10955-009-9830-1

Ansprechpartner: Gernot Akemann

Seminar Bielefeld-Melbourne Zufallsmatrizen

Thema: **A Random Matrix approach to Topological Invariants: The Winding Number**

Datum: 28.09.22

Uhrzeit: 09:00

Ort: ZOOM / Konferenzschaltung

Vortragender: Nico Hahn

University of Duisburg-Essen

Inhalt: Topological non-triviality of disordered quantum matter manifests itself in localized states at the boundary of the solid body. The amount of these topological edge states is saved in the topological invariant, whose concrete mathematical nature depends on the symmetries of the system. Generally, for disordered quantum systems, we distinguish between the ten Altland-Zirnbauer symmetry classes, that rely on time reversal invariance, particle-hole conjugation and chiral symmetry. In our work we considered the chiral unitary class AIII and the chiral symplectic class CII in one dimension. Here, the topological invariant is related to the concept of the winding number in complex analysis. We set up a parametric random matrix model for the chiral Hamiltonians, making the Winding number random. Our goal is to obtain the correlation functions of the winding numbers, which we expect to be universal in an unfolding limit. We trace this problem back to an average over ratios of characteristic polynomials, involving the spherical ensemble of matrices K_1^{-1} K_2, where K_1, K_2 are Ginibre distributed. We tackle this problem by employing a technique that exhibits reminiscent supersymmetric structures, while we never carry out any map to superspace.

Ansprechpartner: Mario Kieburg