Aktuelle Veranstaltungen

Kolloquium

Thema: **Quantum Simulation of Abelian and non-Abelian Gauge Theories**

Datum: 23.04.18

Uhrzeit: 16:15

Ort: H6

Vortragender: Prof. Uwe-Jens Wiese

Bern University

Inhalt: Besides Quantum Chromodynamics (QCD) in particle physics, strongly coupled gauge theories arise, for example, in the condensed matter physics of spin liquids, or in the quantum information theory of Kitaev's toric code, which is a Z(2) lattice gauge theory. Numerical simulations of gauge theories on classical computers, in particular, at high fermion density or in out-of-equilibrium situations, suffer from severe sign problems that prevent the importance sampling underlying Monte Carlo calculations. Quantum simulators are accurately controllable quantum devices that mimic other quantum systems. They do not suffer from sign problems, because their hardware is intrinsically quantum mechanical. Recently, trapped ions, following a laser-driven stroboscopic discrete time evolution through a sequence of quantum gate operations, have been used as a digital quantum simulator for particle-anti-particle pair creation in Quantum Electrodynamics. Analog quantum simulators, on the other hand, follow the continuous time-evolution of a tunable model Hamiltonian. Using ultra-cold atoms in optical lattices, analog quantum simulators have been designed for Abelian and non-Abelian lattice gauge theories. Their experimental realization is a challenge for the foreseeable future, which holds the promise to access the real-time dynamics of string breaking, the out-of-equilibrium decay of a false vacuum, or the evolution of a chiral condensate after a quench, from first principles. Quantum link models which realize gauge theories including QCD not with classical fields but with discrete quantum degrees of freedom, are ideally suited for implementation in quantum matter. For example, alkaline-earth atoms, whose nuclear spin represents an SU(N) degree of freedom, naturally embody fermionic constituents of gluons. CP(N-1) models, which are toy models for QCD, can be quantum simulated in a similar way via SU(N) quantum spin ladders.

Ansprechpartner: D. Bödeker / TR211

Kolloquium Mathematische Physik

Thema: **tba**

Datum: 01.06.18

Uhrzeit: 16:15

Ort: U2-222

Vortragender: Ivan Veselic

TU Dortmund

Inhalt:

Ansprechpartner: M. Baake

Seminar Hochenergiephysik

Thema: **Complex Langevin simulations of a finite density matrix model for QCD**

Datum: 12.04.18

Uhrzeit: 14:15

Ort: D6-135

Vortragender: Savvas Zafeiropoulos

Univ. Heidelberg

We study the Stephanov model, which is an RMT model for QCD at finite density, using the Complex Langevin algorithm. The Langevin algorithm (Stochastic

Inhalt: Quantization) is not based on Markov Chain Monte Carlo methods and consequently does not suffer from the infamous sign problem that hampers studies at finite baryon density. Naive implementation of the algorithm shows convergence towards the phase quenched or quenched theory rather than to the intended theory with dynamical quarks. A detailed analysis of this issue and a potential resolution of the failure of this algorithm are discussed. We study the effect of gauge cooli! ng on the Dirac eigenvalue distribution and time evolution of the norm for various cooling norms, which were specifically designed to remove the pathologies of the complex Langevin evolution. The cooling is further supplemented with a shifted representation for the random matrices. Additionally, we study the newly proposed deformation technique and a novel form of reweighting.

Ansprechpartner: Ch. Schmidt

Seminar Kondensierte Materie

Thema: **High Spin Cycles: Topping the Spin Record for a Single Molecule verging on Quantum Criticality**

Datum: 26.04.18

Uhrzeit: 14:15

Ort: D5-153

Vortragender: Jürgen Schnack

Universität Bielefeld

Inhalt:

Ansprechpartner: Jürgen Schnack

Seminar Mathematische Physik

Thema: **Eigenvector-related correlation functions and their connection with generalized chiral random matrix ensembles with a source**

Datum: 11.01.18

Uhrzeit: 16:00

Ort: D5-153

Vortragender: Jacek Grela

LPTMS Université Paris-Sud

Inhalt: We will introduce eigenvector-related correlation functions, discuss briefly their significance in dynamical Ginibre ensemble [1,2] and present asymptotic results in the large matrix size limit. Motivated by recent work [3] on joint eigenvector-eigenvalue correlation function valid for finite matrix size N in the complex and real Ginibre Ensembles, we study integrable structure of a certain generalized chiral Gaussian Unitary Ensemble with a source [4]. This model can be also interpreted as a deformation of the complex Ginibre Ensemble with an external source with additional determinant term. We present compact formulas for the characteristic polynomial, inverse characteristic polynomial and the kernel. In the case of a special source, we calculate asymptotics in the joint "bulk-edge" regime of all aforementioned objects and show their Bessel-type behaviour. References: [1] "Dysonian dynamics of the Ginibre ensemble", Z. Burda, J. Grela, M. A. Nowak, W. Tarnowski, P. Warcho?, Phys. Rev. Lett. 113, 104102 (2014) [2] "Unveiling the significance of eigenvectors in diffusing non-hermitian matrices by identifying the underlying Burgers dynamics", Z. Burda, J. Grela, M. A. Nowak, W. Tarnowski, P. Warcho?, Nucl. Phys. B 897, 421 (2015) [3] "On statistics of bi-orthogonal eigenvectors in real and complex Ginibre ensembles: combining partial Schur decomposition with supersymmetry", Y. V. Fyodorov, arXiv:1710.04699 [4] "On characteristic polynomials for a generalized chiral random matrix ensemble with a source", Y. V. Fyodorov, J. Grela, E. Strahov, arXiv:1711.07061

Ansprechpartner: Gernot Akemann

Seminar AG Zufallsmatrizen

Thema: **tba**

Datum: 02.05.18

Uhrzeit: 16:15

Ort: V3-201

Vortragender: Paulino Monroy Castillero

Cuernavaca

Inhalt:

Ansprechpartner: Gernot Akemann