Aktuelle Veranstaltungen

Kolloquium

Thema:	**The Genteel Xtremist : How the QCD phase diagram was unravelled by a Bielefelder**
Datum:	28.10.19
Uhrzeit:	16:15
Ort:	H6
Vortragender:	Prof. Urs Heller and Prof. Rajiv Gavai American Physical Society and TIFR Mumbai / Bielefeld University
Inhalt:	Matter undergoes phase changes as its temperature or pressure is raised. Its fate under very high temperatures, as may have been witnessed few microseconds after the Big Bang and is now being explored in heavy ion collisions, or at very high densities feasible in dense neutron stars has fascinated physicists since long. With the advent of Quantum Chromo Dynamics (QCD) as the theory of strongly interacting matter, and discrete space-time lattice as the reliable tool to extract predictions of QCD, the field has witnessed enormous progress. Pioneering contributions have come from the Bielefeld group. Major results and their impact will be discussed.
Ansprechpartner:	F. Karsch/TR211

Kolloquium Mathematische Physik

Thema:	**Relativistic hydrodynamics, heavy-ion collisions, dynamical black holes and resurgent series**
Datum:	18.10.19

Uhrzeit: 16:15

Ort: V3-201

Vortragender: Michal P. Heller

Max-Planck-Institute for Gravitational Physics, Potsdam

Inhalt: The past 12 years has constituted the golden age for theoretical studies of relatativistic hydrodynamics. The experimental motivation for these developments came from ultra-relativistic heavy-ion collision at RHIC and LHC accelerators in which the paradigm of strongly-interacting medium modelled hydrodynamically became the working horse for explaining the data. These experimental and phenomenological developments have come hand-in-hand with theoretical progress in understanding relativistic hydrodynamics as an effective description embedded in quantum field theory. In my colloquium I will review the line of thought based on AdS/CFT (holography), an approach to study strongly-coupled quantum field theories using gravitational techniques, focusing on understanding the limits of applicability of relativistic hydrodynamics in far-from-equilibrium quantum field theory. A beautiful spin-off of this analysis is understanding hydrodynamic gradient expansion as a part of a trans-series, which encodes, through resurgence, information about genuinely non-equilibrium excitations of a collective state of matter. Based on a series of works reviewed in arXiv:1610.02023 and arXiv:1707.02282, as well as some later / ongoing work.

Ansprechpartner: S. Schlichting

Seminar Hochenergiephysik

Thema: **Quark Mass Definition and Extraction from (2+1+1)-Flavor Lattice QCD**

Datum: 24.10.19

Uhrzeit: 14:15

Ort: D6-135

Vortragender: Urs Heller

American Physical Society

Inhalt: I summarize a new heavy quark mass definition, the minimal renormalon subtracted (MRS) mass by the TUM QCD collaboration. It is based on the relation between the heavy quark mass and heavy-light meson masses in heavy quark effective theory. The Fermilab Lattice, MILC, and TUM QCD collaborations then used this new method to extract heavy quark masses using (2+1+1)-flavor HISQ ensembles of the MILC collaboration including ensembles with physical light quarks. I end with showing results on heavy-light pseudoscalar meson decay constants obtained in a similar analysis.

Ansprechpartner: O. Kaczmarek

Seminar Kondensierte Materie

Thema: **Dirac Spin Liquid on the Spin-1/2 Triangular Heisenberg Antiferromagnet**

Datum: 31.10.19

Uhrzeit: 14:15

Ort: D5-153

Vortragender: Shijie Hu

Kaiserlautern University

Inhalt: We study the spin liquid candidate of the spin-1/2 J1-J2 Heisenberg antiferromagnet on the triangular lattice by means of density matrix renormalization group (DMRG) simulations [1]. By applying an external Aharonov-Bohm flux insertion in an infinitely long cylinder, we find unambiguous evidence for gapless U(1) Dirac spin liquid behavior [2]. The flux insertion overcomes the finite size restriction for energy gaps and clearly shows gapless behavior at the expected wave-vectors. Using the DMRG transfer matrix, the low-lying excitation spectrum can be extracted, which shows characteristic Dirac cone structures of both spinon-bilinear and monopole excitations. Finally, we confirm that the entanglement entropy follows the predicted universal response under the flux insertion [2,3]. [1] Phys. Rev. X 7, 031020 (2017). [2] arXiv:1905.09837 (PRL accepted). [3] Science Advances 4, eaat5535 (2018).

Ansprechpartner: Jürgen Schnack

Seminar Mathematische Physik

Thema: **Critical behaviour and characteristic polynomials of non-Hermitian random matrices**

Datum: 23.05.19

Uhrzeit: 16:15

Ort: D5-153

Vortragender: Nicholas Simm

University of Sussex

Inhalt: I will discuss some recent developments regarding the normal matrix model. In particular my interest will be in certain critical models where the limiting support of the eigenvalues can radically change its topology by slightly adjusting an external parameter. I will discuss how aspects of the model can be explicitly mapped to the study of expectations of characteristic polynomials of non-Hermitian random matrices (e.g. Ginibre or truncated unitary). Many of these averages are related to Painlevé transcendents, and by exploiting this, a precise and non-trivial asymptotic expansion of partition functions can be calculated in the critical models. This is joint work with Alfredo Deaño (University of Kent).

Ansprechpartner: Gernot Akemann

Seminar AG Zufallsmatrizen

Thema: **Spectral radius of random matrices with independent entries**

Datum: 23.10.19

Uhrzeit: 16:15

Ort: V3-201

Vortragender: Johannes Alt

University of Geneva

We consider random n x n matrices X with independent and centered entries and a

Inhalt: general variance profile. We show that the spectral radius of X converges with very high probability to the square root of the spectral radius of the variance matrix of X when n tends to infinity. We also establish the optimal rate of convergence, that is a new result even for general i.i.d. matrices beyond the explicitly solvable Gaussian cases. The main ingredient is the proof of the local inhomogeneous circular law [arXiv:1612.07776] at the spectral edge. This is joint work with L\'{a}szl'{o} Erd\'"os and Torben Kr\"uger.

Ansprechpartner: Gernot Akemann