Aktuelle Veranstaltungen

Kolloquium

Thema: **Phases of QCD: a lattice perspective**

Datum: 01.02.21

Uhrzeit: 16:15

Ort: cyberspace

Vortragender: JProf. Francesca Cuteri

Goethe-Universität Frankfurt

Inhalt: Quantum chromodynamics (QCD) is established as the fundamental underlying theory of the strong interaction, yet there are only few firmly established aspects when it comes to its rich phase diagram. There are, though, systems which did/may happen to wander around in the QCD phase diagram within environments that are so extreme, in terms of temperature and/or density, as to accommodate other QCD phases than the hadronic one that we are more familiar with. These systems are our Universe, in the first microseconds after the “Big Bang”, Neutron Stars (even more so in their mergers), heavy ions in their collisions and, theoretically rather than practically speaking, a large part of modern supercomputers around the globe. We can, indeed, use supercomputers to simulate strong interaction matter under extreme conditions thanks to an almost 50-years-old numerical framework for describing non perturbative phenomena in QCD via Monte Carlo simulations: lattice QCD. In this talk we will discuss how lattice QCD simulations allow us to explore, from a theoretical perspective, some rather interesting portions of the QCD phase diagram (in temperature and nonzero net isospin density directions). We will also discuss how we try to learn about interesting regimes, like that of nonzero net baryon densities, that lattice QCD fails accessing, by extending our parameter space even further (varying i.e. the microscopic parameters of the theory away from their physical value) and then exploiting the universal features of continuous phase transitions.

Ansprechpartner: F. Karsch/TR211

Kolloquium Mathematische Physik

Thema:	**05/02/2021 - TBC**
Datum:	05.02.21
Uhrzeit:	16:15
Ort:	ZOOM/Konferenzschaltung
Vortragender:	Tamara Grava
	University of Bristol
Inhalt:	TBC
Ansprechpartner:	G. Akemann

Seminar Hochenergiephysik

Thema:	**Machine learning as a physical observable: Renormalization, symmetry breaking and histogram reweighting**
Datum:	12.01.21
Uhrzeit:	14:15
Ort:	cyberspace
Vortragender:	Dimitrios Bachtis
	Swansea University
Inhalt:	A physical interpretation of machine learning functions is presented that enables efficient studies of phase transitions. In particular, the predictive function of a neural network, designed for phase classification, is treated as a physical observable with an associated Boltzmann weight. This allows its extrapolation in parameter space with histogram reweighting techniques. We further include the predictive function in the Hamiltonian as a conjugate variable coupled to an external field to control properties of the statistical system, specifically to induce symmetry breaking or symmetry

restoration. Accurate calculations of the critical exponents and the critical temperature of the two-dimensional Ising model are presented using finite size scaling and the renormalization group on quantities derived entirely from the neural network.

Ansprechpartner: Ch. Schmidt

Seminar Kondensierte Materie

Thema: **tba**

Datum: 04.02.21

Uhrzeit: 14:15

Ort: ZOOM / Konferenzschaltung

Vortragender: Madita Willsch

FZ Jülich

Inhalt:

Ansprechpartner: Jürgen Schnack

Seminar Mathematische Physik

Thema: **The Character Expansion in effective Theories for chiral Symmetry Breaking**

Datum: 03.12.20

Uhrzeit: 16:30

Ort: ZOOM / Konferenzschaltung

Vortragender: Noah Aygün

Universität Bielefeld

Inhalt:

Ansprechpartner: Gernot Akemann

Seminar Bielefeld-Melbourne Zufallsmatrizen

Thema: **Localization and Freezing for the Planar Coulomb Gas in an External Field**

Datum: 20.01.21

Uhrzeit: 09:00

Ort: ZOOM / Konferenzschaltung

Vortragender: Yacin Ameur

Lund University, Sweden

Inhalt:

We will consider a Coulomb gas consisting of a large number n of identical repelling (logarithmically interacting) point charges, subject to an external field which confines the gas to a finite portion of the plane known as the "droplet". The statistical properties of the gas depend critically on the inverse temperature $\beta=1/(k_BT)$. During my talk I will discuss two recent kinds of results. The first one makes precise the physical intuition that the gas should with high probability be localized to a small neighbourhood of the droplet. Results of this kind have been known earlier only in the case $\beta=1$ and for special potentials. (In particular, Brian Rider has given very precise results for the classical Ginibre ensemble.) The second group of results are valid at low temperatures ($\beta>c\log n$ where n is number of particles) and shows that (under natural assumptions) almost every sample is uniformly separated and equidistributed in the droplet, all the way up to the boundary. These results, which are joint with José-Luis Romero, generalizes and improves on earlier results on the distribution of Fekete-configurations, corresponding to the temperature zero.

Ansprechpartner: Gernot Akemann