Aktuelle Veranstaltungen

Kolloquium

Thema:    Unser Platz im Universum --- Der Nobelpreis für Physik 2019

Datum:    09.12.19

Uhrzeit:  16:15

Ort:      H6

Vortragender:    Prof. Dr. Dominik Schwarz

Universität Bielefeld

Der diesjährige Nobelpreis für Physik wird and James Peebles (Princeton University), für theoretische Entdeckungen in physikalischer Kosmologie, und Michel Mayor (Université de Genève) und Didier Queloz (Université de Genève, University of Cambridge), für die Entdeckung eines Exoplaneten mit Umlaufbahn um einen sonnenähnlichen Stern, vergeben. Das Kolloquium wird den physikalischen Hintergrund der gewürdigten Forschungserfolge darstellen, und die spezifischen Beiträge der Preisträger beleuchten, sowie deren Bedeutung im Lichte unseres Wissenstands über unseren Platz im Universum würdigen.

Ansprechpartner: W. Pfeiffer

Kolloquium Mathematische Physik

Thema:    Thimble regularisation of quantum field theories

Datum:    29.11.19

Uhrzeit:  16:15
Lattice regularisation provides an effective framework for a non-perturbative definition of Quantum Field Theories. It also enables numerical computations: in the euclidean formulation, lattice QFT resembles a statistical physics problem, the functional integral defines a decent probability measure and Monte Carlo simulations are viable. Nevertheless, this is not always the case. When a complex action is in place, we have no probability measure to start with and there is no obvious way to set up a Monte Carlo scheme. This is known as the sign problem. Among other theories, QCD with a chemical potential is plagued by a sign problem and we have no effective way to tackle the investigation of its (supposedly rich) phase diagram. A few years ago a conceptually simple technique was proposed to tame (or at least mitigate) the sign problem. The idea is to choose an alternative domain of integration within a complexified extension of the path integral. Most noticeably, there is a perfect candidate for such an alternative domain of integration: Lefschetz thimbles. These manifolds are characterised by a constant imaginary part of the action and the only residual sign problem is the one tied to the integration measure. Thimble regularisation is not only worth investigating to look for a decent Monte Carlo scheme; it is stimulating per se, and as a matter of fact the first attempts at a thimble formulation of QFT did not have computational applications as a goal. I will present an introduction to the technique, trying to highlight the conceptual challenges we have to face. In particular, I will discuss the problems that arise when we stumble into so-called Stokes phenomena and when we try to define a thimble formulation for gauge theories.
In this talk, we first review the so-called black hole thermodynamics in the "extended phase space", in which the cosmological constant is interpreted as a varying thermodynamic pressure, and the black hole mass is identified with its enthalpy rather than internal energy. Moreover, a thermodynamic volume can be introduced for a black hole space-time. In this framework, the equation of state of a black hole resembles that of the non-ideal fluid (e.g., the van der Waals equation), and a black hole can show abundant phase transition behaviors accordingly. Some applications, such as the Hawking-Page phase transition and the throttling process (Joule-Thomson effect), will be discussed in more detail.

Ansprechpartner: D. Schwarz

Seminar Kondensierte Materie

Thema: tba

Datum: 30.01.20

Uhrzeit: 14:15

Ort: D5-153

Vortragender: Stefano Bo

MPI for the Physics of Complex Systems

Inhalt:

Ansprechpartner: Peter Reimann

Seminar Mathematische Physik

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

Datum: 23.05.19

Uhrzeit: 16:15
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

**Theme:** Dimensional reduction for elliptic SPDE's: integrable structures and large deviations

**Datum:** 18.12.19

**Uhrzeit:** 16:15

**Ort:** V3-201

**Vortragender:** Oleg Zaboronski

University of Warwick

I will review the phenomenon of dimensional reduction for elliptic stochastic PDE's in two and three dimensions due to hidden supersymmetry discovered by Parisi and Sourlas. I will use dimensional reduction to establish a link between matrix-valued elliptic SPDE's and determinantal point processes. I will show that the large deviations principle can be established for a class of equations without any reference to supersymmetry. The talk is based on joint work with Roger Tribe and David Elworthy

Ansprechpartner: Gernot Akemann