Aktuelle Veranstaltungen

Kolloquium

**Thema:** Destabilization of the Antarctic Ice Sheet and extreme sea-level rise - Europe's greatest threat from global warming

**Datum:** 16.12.19

**Uhrzeit:** 16:15

**Ort:** H6

**Vortragender:** Prof. Sybren Drijfhout

University of Southampton

Even if the transformation to sustainable energy would occur tomorrow, and after tomorrow global temperature would not rise any further, sea-level will continue to increase, and not by a small amount, but by many meters. With the Paris Agreement fully implemented it would imply 4-12 m sea level rise in response to 2 degrees warming. Because this equilibrium response was always thought to occur on timescales of a few thousands of years, politicians and media were not interested. However, in recent years it became clear that the ocean is quickly melting floating ice-shelves surrounding the large ice caps of Greenland and West-Antarctica. Especially around the western part of the Antarctic ice cap the process progresses disturbingly fast. Moreover, ice shelves feature deepening cracks and rifts and crumble into pieces, as has been witnesses for 2 ice shelves of the size of half of North Rhine Westphalia, Larsen A and Larsen B. This year Larsen C lost a large fragment of 300 by 50 km. While melting ice shelves do not raise the sea level (like melting ice cubes in a glass of soft drink), their indirect effect on sea level is large. The large ice caps are unstable and need the ice shelves to prevent them from collapsing under their own weight. A recent study (DeConto and Pollard, 2016) accounting for these processes suggested that sea level could rise by 6 meters in 200 years from now, with a very fast acceleration in sea-level rise by the end of this century. The outcome of this study is still debated but cannot be neglected or put aside. In this colloquium I will review processes that give rise to such fast and extreme sea-level rise, what recent observations tell us about these processes and to what extent we can attribute observed changes, what the state-of-art is in ice-sheet modelling and how we can make future projections with numerical models, what these models tell us and whether we should be worried about the results.
Kolloquium Mathematische Physik

Thema: Thimble regularisation of quantum field theories

Datum: 29.11.19

Uhrzeit: 16:15

Ort: V3-201

Vortragender: Francesco di Renzo

Università di Parma

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.

Seminar Hochenergiephysik
I present the latest results of the light hadron spectrum within the high temperature QCD project of the JLQCD collaboration. The simulation uses two flavors of chirally symmetric Domain-wall fermions and covers temperatures between 220 MeV - 1 GeV. The hadron spectrum shows effectively restored chiral- and axial U(1) symmetries in this temperature range, which can be seen for various hadronic observables. However, the connection to deconfined, non-interacting quarks is less straightforward, and the onset of a perturbative regime unclear. I show how additional SU(2) chiral spin and SU(4) symmetries emerge in hot QCD matter and might help to understand the dynamics in this temperature range.
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

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

**Datum:** 18.12.19

**Uhrzeit:** 16:15

**Ort:** V3-201
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.