Aktuelle Veranstaltungen

Kolloquium

Thema: **Spectral properties of the trap model on sparse networks**

Datum: 21.01.19

Uhrzeit: 16:15

Ort: H6

Vortragender: **Prof. Dr. Peter Sollich**

Universität Göttingen

Inhalt: One of the simplest models for the slow relaxation and aging of glasses is the trap model by Bouchaud and others, which represents a system as a point in configuration-space hopping between local energy minima. The time evolution depends on the transition rates and the network of allowed jumps between the minima. We consider the case of sparse configuration-space connectivity given by a random graph, and study the spectral properties of the resulting master operator. We develop a general approach using the cavity method that gives access to the density of states in large systems, as well as localisation properties of the eigenvectors, which are important for the dynamics. We illustrate how, for a system with sparse connectivity and finite temperature, the density of states and the average inverse participation ratio have attributes that arise from a non-trivial combination of the corresponding mean field (fully connected) and random walk (infinite temperature) limits. In particular, we find a range of eigenvalues for which the density of states is of mean-field form but localisation properties are not, and speculate that the corresponding eigenvectors may be concentrated on extensively many clusters of network sites.

Ansprechpartner: **G. Akemann**

Kolloquium Mathematische Physik

Thema: **Introduction to the non commutative topology of topological insulators**
Datum: 25.01.19

Uhrzeit: 16:15

Ort: T2-213

Vortragender: Johannes Kellendonk

Universite Claude Bernard - Lyon I

Topological insulators are insulating materials which are in a topological non-trivial phase. Perhaps the most exciting consequence of this is the existence of boundary resonances (for instance boundary currents) which are robust against disorder. Mathematically this is related to a bulk boundary correspondance linking topological invariants of the bulk of the material to topological invariants associated to the boundary. Our approach uses K-theory and cyclic cohomology of operator algebras.

Ansprechpartner: M. Baake

Seminar Hochenergiephysik

Thema: Abundant sets of internal spaces for string theory

Datum: 31.01.19

Uhrzeit: 14:15

Ort: D6-135

Vortragender: Harald Skarke

TU Wien und Univ. Bielefeld

The ten-dimensional spacetime of string theory is usually interpreted as a cartesian product of a four-dimensional manifold corresponding to the universe we observe and a six-dimensional compact space which is taken to be a Calabi-Yau (CY) threefold (a space of three complex, i.e. six real dimensions). A different construction known as F-theory combines the data of the internal space and of some background fields into those of a CY fourfold. The most fertile construction method for CY manifolds comes from a branch of algebraic geometry known as toric geometry, where families of CY
n-folds are associated to \((n+1)\)-dimensional polytopes that have a certain property called reflexivity. I will explain the concepts introduced above. Then I will outline how we managed to classify all 476,800,776 reflexive 4-polytopes almost 20 years ago, which corresponds to the world’s largest list of CY threefolds. Finally I will report on recent work on the classification of a particular class of reflexive 5-polytopes (there are 322,383,760,930), which resulted in the largest existing database for CY fourfolds.

Ansprechpartner: D. Schwarz

Seminar Kondensierte Materie

Thema: Molecular Nanomagnets: Quantum Spins in a Box

Datum: 24.01.19

Uhrzeit: 14:15

Ort: D5-153

Vortragender: Oliver Waldmann

Universitaet Freiburg

Molecular nanomagnets establish a new class of magnetic materials, which are not only aesthetically pleasing but provide a fascinating view on the quantum magnetism in small, mesoscopic objects. These molecules typically consist of tens of magnetic metal ions, which are linked by organic ligands such as to form well defined geometrical structures. They thus represent magnetic nanoclusters with ideal properties: They don't exhibit any form or shape dispersion and are virtually decoupled magnetically from each other. This allows for the unique opportunity to study the quantum phenomena due to the interaction of a dozen or so of quantum spins by controlled experiments. In this talk the particular class of ferromagnetic molecular nanomagnets is discussed, in which the exchange interactions between the spin centers are predominantly of ferromagnetic type. Even though ferromagnetic compounds are generally considered to be scientifically of less interest, it is shown by the example of the so called Mn19 molecule that in the case of systems consisting of only a dozen of spin centers indeed fascinating novel questions arise and unique phenomena can be observed.

Ansprechpartner: Jürgen Schnack

Seminar Mathematische Physik
Thema: Rate of Convergence to the Circular Law

Datum: 17.01.19

Uhrzeit: 17:15

Ort: D5-153

Vortragender: Jonas Jalowy

Bielefeld University

> It is well known that the (complex) empirical spectral distribution of a non-Hermitian random matrix with i.i.d. entries will converge to the uniform distribution on the complex disc as the size of the matrix tends to infinity. In this talk, we investigate the rate of convergence to the Circular Law in terms of a uniform, 2-dimensional Kolmogorov-like distance. The optimal rate of convergence is determined by the Ginibre ensemble and is given by $n^{-1/2}$. I will present a smoothing inequality for complex measures that quantitatively relates the Kolmogorov-like distance to the concentration of logarithmic potentials. Combining it with results from local circular laws, it is applied to prove nearly optimal rate of convergence to the circular law with overwhelming probability. Furthermore I will relate the result to other distances, present an analogue for the empirical root measure of Weyl random polynomials with independent coefficients and discuss a possible generalization for products of independent matrices. The talk is based on joint work with Friedrich Götze.

Ansprechpartner: Gernot Akemann

Seminar AG Zufallsmatrizen

Thema: The level spacing distribution at the hard edge

Datum: 28.11.18

Uhrzeit: 16:15

Ort: V3-201

Vortragender: Valentin Gorski
The level spacing distribution in the bulk of a spectrum is approximately given by the Wigner surmise. Yet, at the hard and the soft edge one can expect strong deviations from these laws. Using the orthogonal polynomial method we derive the spacing distribution of the smallest two singular values of the chiral Gaussian unitary ensemble (chGUE) at finite matrix dimension with additional characteristical polynomials in the weight. The number of these polynomials represents the number of flavors (types of quarks) in the physical system. This ensemble approximates the Euclidean Dirac operator in Quantum Chromodynamics (QCD). In my talk, I will report on the behavior of the level spacing distribution in this particular setting.