Upcoming Events

Colloquium

Topic:  tba

Date:  01.02.21

Time:  16:15

Place:  cyberspace

Guest:  JProf. Francesca Cuteri

Goethe-Universität Frankfurt

Abstract:

Contact person: F. Karsch/TR211

Colloquium Mathematical Physics

Topic:  The problem of latency in estimating the Covid-19 replication number

Date:  08.05.20

Time:  16:15

Place:  ZOOM/Konferenzschaltung

Guest:  Lorenzo Sadun

University of Texas at Austin
Figuring out how to restart the world's economy without a resurgence of disease depends on understanding how contagious Covid-19 really is. However, estimates of the basic replication number $R_0$ vary greatly, with well-respected groups publishing estimates whose 95% confidence intervals don't even overlap. In this talk I'll go over the basic SIR and SEIR models of disease spread and present several different ways to treat the latency period between being exposed and becoming infectious. Simple SEIR models are unstable; working with a fixed set of data, small changes to the model can result in large changes to the estimated value of $R_0$. More realistic models are more complicated and are even less stable. The upshot is that we know much less about $R_0$ than is generally believed, and the error bars on the high side are particularly large. Containing the outbreak for an extended period may be a lot harder than our leaders think.

Contact person: Gähler, Dr. Franz

Seminar High Energy Physics

Topic: The muon g-2

Date: 20.10.20

Time: 14:15

Place: cyberspace

Guest: Christoph Lehner

Uni Regensburg

Abstract: There is a long-standing 3-4 sigma tension between the standard model calculation and the BNL experimental result for the anomalous magnetic moment, g-2, of the muon. The Fermilab E989 experiment will soon release an improved result and commensurate improvements are in progress for the theory calculation. I am going to discuss the current status of experiment and theory with focus on first-principles calculations of the important hadronic vacuum polarization and hadronic light-by-light contributions.

Contact person: Ch. Schmidt

Seminar Condensed Matter
Evaluation der Genauigkeit des Tschebyscheff-Algorithmus zur Bestimmung thermodynamischer Funktionen am Beispiel einer Heisenberg-Spin-Leiter

Date: 11.09.20
Time: 14:00
Place: ZOOM / Konferenzschaltung
Guest: Henrik Schlüter

Universität Bielefeld

Es wird eine Einführung in die numerische Berechnung thermodynamischer Funktionen mithilfe des Tschebyscheff-Algorithmus gegeben. Anschließend findet eine Bewertung der Ergebnisse am Beispiel einer Heisenberg-Spin-Leiter in Abhängigkeit der Tschebyscheff-Parameter statt.

Contact person: Jürgen Schnack

Seminar Mathematical Physics

Topic: Statistics of Extremes in Eigenvalue-counting Staircases

Date: 04.06.20
Time: 16:00
Place: ZOOM / Konferenzschaltung
Guest: Yan Fyodorov

King's College London

We consider the counting function ("spectral staircase") for eigenvalues of a random unitary matrix, drawn from the corresponding beta-ensemble. Our goal is to characterize the statistics of maximum deviation of this staircase from its mean slope in a fixed interval, when size of the matrix \( N \gg 1 \). We will show that one-sided extremes can be addressed by exploiting a mapping onto the statistical mechanics of log-correlated random processes and using an extended Fisher-Hartwig conjecture. The resulting statistics exhibits combined features of counting

Abstract:
statistics of Fermions with Sutherland-type interaction and extremal statistics of the fractional Brownian motion with Hurst index $H = 0$. Some of the features are expected to be universal. The talk is based on the paper Fyodorov-Le Doussal arXiv:2001.04135.

**Contact person:** Gernot Akemann

### Seminar Bielefeld-Melbourne Random Matrices

**Topic:** Non-interacting trapped fermions: from GUE to multi-critical matrix models

**Date:** 14.10.20

**Time:** 09:00

**Place:** ZOOM / Konferenzschaltung

**Guest:** Gregory Schehr

Laboratoire de Physique Théorique et Modèles Statistiques

I will discuss a system of $N$ one-dimensional free fermions in the presence of a confining trap $V(x)\propto x^2$ and at zero temperature, this system is intimately connected to random matrices belonging to the Gaussian Unitary Ensemble (GUE). In particular, the spatial density of fermions has, for large $N$, a finite support and it is given by the Wigner semi-circular law. Besides, close to the edges of the support, the spatial quantum fluctuations are described by the so-called Airy-Kernel, which plays an important role in random matrix theory. We will then focus on the joint statistics of the momenta, with a particular focus on the largest one $p_{\text{max}}$. Again, for the harmonic trap, momenta and positions play a symmetric role and hence the joint statistics of momenta is identical to that of the positions. Here we show that novel “momentum edge statistics” emerge when the curvature of the potential vanishes, i.e. for “flat traps” near their minimum, with $V(x) \sim x^{2n}$ and $n > 1$. These are based on generalisations of the Airy kernel that we obtain explicitly. The fluctuations of $p_{\text{max}}$ are governed by new universal distributions determined from the $ns$-th member of the second Painlevé hierarchy of non-linear differential equations, with connections to multi-critical random matrix models, which have appeared, in the past, in the string theory literature.

**Contact person:** Gernot Akemann