Upcoming Events

Colloquium

Topic: Phases of QCD: a lattice perspective
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: An Invitation to Quantum Spin Glasses
Date: 15.01.21
Time: 16:15
Place: ZOOM/Konferenzschaltung
Guest: Simone Warzel

Technical University of Munich
Quantum spin glass models of mean-field type are prototypes of quantum systems exhibiting phase transitions related to the spread of the eigenstates in configuration space. Originally motivated by spin glass physics and as complex model systems to test quantum adiabatic algorithms, they are also discussed in relation to many-body localisation phenomena. In this talk, I will introduce a class of hierarchical quantum glasses for which this assertion can be proven at least on the level of the specific free energy. This class constitutes the quantum version of Derrida's generalised random energy models. The quantum nature is thereby incorporated through a transversal magnetic field. By proving a quantum Parisi formula for their free energy the full phase diagram is established: the model exhibits spin glass phases as well as mixed and quantum paramagnetic phases.

Contact person: G. Akemann

Seminar High Energy Physics

**Machine learning as a physical observable: Renormalization, symmetry breaking and histogram reweighting**

**Topic:**

**Date:** 12.01.21

**Time:** 14:15

**Place:** cyberspace

**Guest:** Dimitrios Bachtis

Swansea University

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.

Contact person: Ch. Schmidt
Seminar Condensed Matter

**Indicators of Quantum Chaos and the Transition from Few- to Many-Body Systems**

**Topic:** Indicators of Quantum Chaos and the Transition from Few- to Many-Body Systems

**Date:** 14.01.21

**Time:** 16:00

**Place:** ZOOM / Konferenzschaltung

**Guest:** Lea Santos

Yeshiva University, New York

Start 16:00: Quantum chaos, especially when caused by particle interactions, is closely related with topics of high experimental and theoretical interest, from the thermalization of isolated systems to the difficulties to reach a localized phase and the emergence of quantum scars. In this talk, various indicators of quantum chaos will be compared, including level statistics, structure of eigenstates, matrix elements of observables, out-of-time ordered correlators, and the correlation hole (ramp). These indicators are then employed to identify the minimum number of interacting particles required for the onset of strong chaos in quantum systems with short-range and also with long-range interactions. If you want to participate, please ask Juergen Schnack for the zoom-link.

**Contact person:** Jürgen Schnack

Seminar Mathematical Physics

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

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

**Date:** 03.12.20

**Time:** 16:30

**Place:** ZOOM / Konferenzschaltung

**Guest:** Noah Aygün
Universität Bielefeld

Abstract:

Contact person: Gernot Akemann

Seminar Bielefeld-Melbourne Random Matrices

Topic: On the distribution of the maximum of the Airy process with wanderers

Date: 13.01.21

Time: 09:00

Place: ZOOM / Konferenzschaltung

Guest: Gia Bao Nguyen

KTH Stockholm

Consider a system of $N$ non-intersecting Brownian bridges on the time interval $[-1,1]$ such that the first $N-m$ paths start and end at the origin and the $m$ remaining top paths go between arbitrary positions. The Airy process with $m$ wanderers is defined as the motion of these Brownian particles near the edge curve $\mathcal{C}:=\{(t, \sqrt{2N(1-t^2)}): t \in [-1,1]\}$ in the large $N$ limit. In this talk, we focus on the distribution of the maximum of the Airy process with wanderers minus a parabola, which provides a $2m$-parameter deformation of the Tracy-Widom GOE distribution. We provide a Fredholm determinant formula for this distribution function. We also discuss the connection with KPZ fluctuations, as well as some results on relations with Painlevé II and other PDEs. This is based on joint work with Daniel Remenik and Karl Liechty.

Contact person: Thorsten Neuschel