Upcoming Events

Colloquium

Quantum optics and information science in multi-dimensional photonics networks

Topic: Quantum optics and information science in multi-dimensional photonics networks

Date: 14.10.19
Time: 16:15
Place: H6
Guest: Prof. Dr. Christine Silberhorn

Integrated Quantum Optics, Department Physics, Paderborn University

Abstract: Classical optical networks have been widely used to explore a broad range of transfer phenomena based on coherent interference of waves, which relate to different disciplines in physics, information science, and even biological systems. At the quantum level, the quantized nature of light, this means the existence of photons and entangled states, gives rise to genuine quantum effects that can appear completely counter-intuitive. Yet, to date, quantum network experiments typically still remain rather limited in terms of the number of photons, reconfigurability and, maybe most importantly, network size and dimensionality. Photonic quantum systems, which comprise multiple optical modes as well as highly non-classical and sophisticated quantum states of light, have been investigated intensively in various theoretical proposals over the last decades. However, their implementation requires advanced setups of high complexity, which poses a considerable challenge on the experimental side. The successful realization of controlled quantum network structures is key for many applications in quantum optics and quantum information science. Here we present three different approaches to overcome current limitations for the experimental implementation of multi-dimensional quantum networks: non-linear integrated quantum optics, pulsed temporal modes and time-multiplexing. We present their applications in the framework of today’s quantum technologies.

Contact person: J. Schnack

Colloquium Mathematical Physics
Seminar High Energy Physics

Topic: Quark Mass Definition and Extraction from (2+1+1)-Flavor Lattice QCD

Date: 24.10.19

Time: 14:15

Place: D6-135

Guest: Urs Heller

American Physical Society

I summarize a new heavy quark mass definition, the minimal renormalon subtracted (MRS) mass by the TUM QCD collaboration. It is based on the relation between the heavy quark mass and heavy-light meson masses in heavy quark effective theory. The Fermilab Lattice, MILC, and TUM QCD collaborations then used this new method to extract heavy quark masses using (2+1+1)-flavor HISQ ensembles of the MILC collaboration including ensembles with physical light quarks. I end with showing results on heavy-light pseudoscalar meson decay constants obtained in a similar analysis.
Seminar Condensed Matter

**Contact person:** O. Kaczmarek

**Topic:** Next-neighbor particle-particle interaction of fermions in quasi-one-dimensional flat-band lattices

**Date:** 22.07.19

**Time:** 14:15

**Place:** D5-153

**Guest:** Simon Tilleke

Bielefeld University

**Abstract:**

**Contact person:** Thomas Dahm

Seminar Mathematical Physics

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

**Date:** 23.05.19

**Time:** 16:15

**Place:** D5-153

**Guest:** 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 transcendentals, 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).

Contact person: Gernot Akemann

Seminar AG Zufallsmatizen

Topic: Spectral radius of random matrices with independent entries

Date: 23.10.19

Time: 16:15

Place: V3-201

Guest: Johannes Alt

University of Geneva

We consider random $n \times n$ matrices $X$ with independent and centered entries and a general variance profile. We show that the spectral radius of $X$ converges with very high probability to the square root of the spectral radius of the variance matrix of $X$ when $n$ tends to infinity. We also establish the optimal rate of convergence, that is a new result even for general i.i.d. matrices beyond the explicitly solvable Gaussian cases. The main ingredient is the proof of the local inhomogeneous circular law [arXiv:1612.07776] at the spectral edge. This is joint work with László Erdős and Torben Krüger.

Contact person: Gernot Akemann