Aktuelle Veranstaltungen

Kolloquium

Thema: Nanoscopy of 2D materials

Datum: 08.04.19

Uhrzeit: 16:15

Ort: H 5

Vortragender: Prof. Aleksandra Radenovic

Laboratory of Nanoscale Biology, EPFL Lausanne

In this talk, I will detail our strategy on how to translate nanoscopy techniques into the field of materials science. We have developed and applied different modalities of nanoscopy techniques that provide unique insights about the type and density of defects together with the spectral characterization at locations determined with nanometre-scale precision. We focus on defects hosted in two classes of 2D materials: hexagonal boron nitride (h-BN) and transition metal dichalcogenides (TMDs), such as MoS2, WS2, MoSe2, WSe2, and MoTe2. Defects hosted in 2D materials such as h-BN and TMDs are particularly interesting due to their single photon emission. SP emitters are stable concerning transfer onto other substrates, opening the possibility of integrating them into more complex nanophotonic devices and paving the way for future semiconductor quantum information processing technologies. Transmission electron microscopy and scanning probe microscopy can provide atomic resolution. However, both techniques require strict sample preparation protocols and are not optimal for fast in-situ operation or applications requiring the characterization of large areas. In contrast, Nanoscopy can operate in-situ under ambient conditions and is compatible with the probing of defect chemistry and dynamics in different pH environments and under different solvents. We also demonstrated high-content characterization of 2D materials using silicon nitride waveguides as imaging platforms that allow integration of more complex nanophotonic circuits.

Ansprechpartner: T. Huser

Kolloquium Mathematische Physik
Seminar Hochenergiephysik

Thema:       tba
Datum:       28.05.19
Uhrzeit:     14:15
Ort:         D6-135
Vortragender: Mikko Laine
             Univ. Bern
Inhalt:
Ansprechpartner: D. Bödeker

Seminar Kondensierte Materie
Thema: Is there a spinon-spinon singlet?

Datum: 26.03.19

Uhrzeit: 11:00

Ort: E5-102

Vortragender: Nedko Ivanov

Bulgarian Academy of Sciences, Sofia

Inhalt:

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:** Universal Broadening of Zero Modes: A General Framework and Identification

**Datum:** 03.04.19

**Uhrzeit:** 16:00

**Ort:** V3-201

**Vortragender:** Adam Mielke

Bielefeld University

We consider the smallest eigenvalues of perturbed Hermitian operators with zero modes, either topological or system specific. To leading order for small generic perturbation we show that the corresponding eigenvalues broaden to a Gaussian random matrix ensemble of size $n \times n$, where $n$ is the number of zero modes. This observation unifies and extends a number of results within chiral random matrix theory and effective field theory and clarifies under which conditions they apply. The scaling of the former zero modes with the volume differs from the eigenvalues in the bulk, which we propose as an indicator to identify them in experiments. These results hold for all ten symmetric spaces in the Altland-Zirnbauer classification and build on two facts. Firstly, the broadened zero modes decouple from the bulk eigenvalues and secondly, the mixing from eigenstates of the perturbation form a Central Limit Theorem argument for matrices.

**Ansprechpartner:** Gernot Akemann