

# Aktuelle Veranstaltungen

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## Kolloquium

- Thema:** [Verleihung der Ehrendoktorwürde an Herrn Prof. Dr. Krzysztof Redlich](#)
- Datum:** 25.11.19
- Uhrzeit:** 16:15
- Ort:** ZiF Plenarsaal
- Vortragender:** Prof. Dr. Johanna Stachel (Heidelberg) und Prof. Dr. Helmut Satz (Bielefeld)

**Inhalt:**

**Ansprechpartner:** [Dekan](#)

## Kolloquium Mathematische Physik

- Thema:** [Thimble regularisation of quantum field theories](#)
- Datum:** 29.11.19
- Uhrzeit:** 16:15
- Ort:** V3-201
- Vortragender:** [Francesco di Renzo](#)

Università di Parma

Lattice regularisation provides an effective framework for a non-perturbative definition of Quantum Field Theories. It also enables numerical computations: in the euclidean formulation, lattice QFT resembles a statistical physics problem, the functional integral defines a decent probability measure and Monte Carlo simulations are viable. Nevertheless, this is not always the case. When a complex action is in place, we have no probability measure to start with and there is no obvious way to set up a Monte Carlo scheme. This is known as the sign problem. Among other theories, QCD with a chemical potential is plagued by a sign problem and we have no effective way to tackle the investigation of its (supposedly rich) phase diagram. A few years ago a conceptually simple technique was proposed to tame (or at least mitigate) the sign problem. The idea is to choose an alternative domain of integration within a complexified extension of the path integral. Most noticeably, there is a perfect candidate for such an alternative domain of integration: Lefschetz thimbles. These manifolds are characterised by a constant imaginary part of the action and the only residual sign problem is the one tied to the integration measure. Thimble regularisation is not only worth investigating to look for a decent Monte Carlo scheme; it is stimulating per se, and as a matter of fact the first attempts at a thimble formulation of QFT did not have computational applications as a goal. I will present an introduction to the technique, trying to highlight the conceptual challenges we have to face. In particular, I will discuss the problems that arise when we stumble into so-called Stokes phenomena and when we try to define a thimble formulation for gauge theories.

**Inhalt:**

**Ansprechpartner:** [S. Schlichting](#)

## Seminar Hochenergiephysik

**Thema:** [Probing ALP dark matter through polarisation measurements towards a gravitational lensing galaxy.](#)

**Datum:** 19.11.19

**Uhrzeit:** 14:15

**Ort:** D6-135

**Vortragender:** [Aritra Basu](#)

Bielefeld

Presence of dark matter in our Universe has been well established by astrophysical measurements. However, little is known of their nature. Of late, axion-like particles (ALPs) are emerging as one of the favoured candidate of dark matter. Because interaction of photons with ALPs induces birefringence amongst many other effects,

**Inhalt:** propagation of linearly polarised electromagnetic signals through axion field imprint measurable signatures. In this seminar, I will discuss, from an observer's perspective, some of the astrophysical probes that have been used recently to constrain the mass of ALPs and their coupling with photons. I will present a novel technique to probe ALP dark matter which we are currently developing -- using spectro-polarimetric measurements at centimetre-wavelengths towards gravitationally lensed polarised quasars. This technique is then applied to a lensed system where we obtain stringent constraints on the ALPs in a lensing galaxy far far away!

**Ansprechpartner:** [D. Schwarz](#)

## Seminar Kondensierte Materie

**Thema:** [Topologically protected Landau level in the vortex lattice of a Weyl superconductor](#)

**Datum:** 14.11.19

**Uhrzeit:** 16:00

**Ort:** D5-153

**Vortragender:** Carlo Beenakker

Instituut-Lorentz, Leiden University

**Inhalt:** Good ideas in science may be rejected for a while, but they have a tendency to return when the time is right. This has happened with a 20-year old conjecture that certain superconductors in a magnetic field would support a field-independent flat-band in the middle of the gap. After Gorkov, Schrieffer, and Anderson proposed this idea of a superconducting Landau level, it was dismissed because it does not survive the broadening effects of the magnetic vortex lattice in a superconductor. We have discovered a way around this, by populating the Landau levels with Weyl fermions rather than with conventional electrons. Weyl fermions come in a left-handed and in a right-handed variety and a Landau level contains only one of these two chiralities. The Landau level is protected from broadening by the vortex lattice because that needs to mix both chiralities in order to be effective. If this new twist on an old idea is borne out by experiments on Weyl superconductors, it would finally allow for quantum Hall physics to enter the superconducting domain. For example, the superconducting Landau level would have a quantized heat conductance parallel to the magnetic field.

**Ansprechpartner:** [Gernot Akemann](#)

# Seminar Mathematische Physik

**Thema:** [Critical behaviour and characteristic polynomials of non-Hermitian random matrices](#)

**Datum:** 23.05.19

**Uhrzeit:** 16:15

**Ort:** D5-153

**Vortragender:** [Nicholas Simm](#)

University of Sussex

**Inhalt:** 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 transcendents, 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).

**Ansprechpartner:** [Gernot Akemann](#)

## Seminar AG Zufallsmatrizen

**Thema:** tba

**Datum:** 18.12.19

**Uhrzeit:** 16:15

**Ort:** V3-201

**Vortragender:** [Oleg Zaboronski](#)

University of Warwick

**Inhalt:**

**Ansprechpartner:** [Gernot Akemann](#)