# Aktuelle Veranstaltungen

## Kolloquium

**Thema:** **Enhancing the sensitivity of phase microscopy**

**Datum:** 06.12.21

**Uhrzeit:** 16:15

**Ort:** H4

**Vortragender:** Dr. Thomas Juffmann

University of Vienna

**Inhalt:** Optical phase contrast microscopy and cryo-electron microscopy are widely used in the study of cells and proteins, respectively. In both techniques, a specimen imparts a phase shift on the probe (photons or electrons), which can be measured using various interferometric techniques. In this talk I will briefly discuss the physical basics and limits of phase microscopy, and will show ways how to improve on current techniques using wave-front shaping, cavity or quantum enhanced measurements. I will demonstrate how wave-front shaping can enable phase contrast imaging with optimized sensitivity, and how multi-passing the probe particles through a sample can be used for high sensitivity / low damage imaging. The latter could potentially allow for cryo-electron microscopy with unprecedented resolution. Finally, I will discuss how one of the techniques we developed can be used for gating images on the nanosecond scale, which enables video-rate fluorescence lifetime imaging with single molecule sensitivity.

**Ansprechpartner:** T. Huser

## Kolloquium Mathematische Physik

**Thema:** **20220506-Volker Bach-TBC**

**Datum:** 06.05.22

**Uhrzeit:** 16:15

**Ort:** ZOOM/Konferenzschaltung

**Vortragender:** Volker Bach

Technische Universität Braunschweig

**Inhalt:** TBC

**Ansprechpartner:** M. Baake

## Seminar Hochenergiephysik

**Thema:** **Large Scale Structure and Integrated Sachs-Wolfe Effect Measurements with the Rapid ASKAP Continuum Survey**

**Datum:** 13.01.22

**Uhrzeit:** 15:36

**Ort:** D6-135

**Vortragender:** Benedict Bahr-Kalus

Korea Astronomy and Space Science Institute, KASI

**Inhalt:**

**Ansprechpartner:** D. Schwarz

## Seminar Kondensierte Materie

**Thema:** **tba**

**Datum:** 14.01.22

**Uhrzeit:** 14:15

**Ort:** D5-153

**Vortragender:** Roman Rausch

TU Braunschweig

**Inhalt:**

**Ansprechpartner:** Jürgen Schnack

## Seminar Mathematische Physik

**Thema:** **On Non-Hermitian Beta-Ensembles**

**Datum:** 14.10.21

**Uhrzeit:** 16:00

**Ort:** D5-153

**Vortragender:** Patricia Päßler

Universität Bielefeld

**Inhalt:**

Log-gases with inverse temperature beta are systems with many applications in physics, for example in the theory of superconductors or the fractional quantum Hall effect. For some specific values of beta a correspondence to random matrix theory (RMT) is well established. The advantage of this connection is the usage of the RMT methods in the study of those systems. The goal of this talk is the discussion of Log-gases in two dimensions, i.e. in the non-Hermitian case, for more general values of the inverse temperature. Therefore, we study in the first part a model of normal $2 \times 2$ matrices with beta in [0,2] and discuss whether we find a surmise for the nearest-neighbour spacing distribution of large matrices. In the second part of the talk we introduce the study of symmetry classes in non-Hermitian RMT. We conjecture that the classes of complex symmetric and complex quaternion matrices can be effectively described by Log-gases in two dimensions with non-integer inverse temperatures.

**Ansprechpartner:** Gernot Akemann

# Seminar Bielefeld-Melbourne Zufallsmatrizen

**Thema:** **Volume-law entanglement entropy of typical pure quantum states**

**Datum:** 08.12.21

**Uhrzeit:** 09:00

**Ort:** ZOOM / Konferenzschaltung

**Vortragender:** Lucas Hackl

University of Melbourne

**Inhalt:** In this talk, I will discuss the statistical properties of entanglement entropy, which serves as a natural measure of quantum correlations between a subsystem and its complement. Entanglement is a defining feature of quantum theory and understanding its statistical properties has applications in many areas of physics (quantum information, statistical mechanics, condensed matter physics, black hole thermodynamics). First, I will introduce the physical model and explain its relevance for practical applications. Second, I will explain how the statistical ensemble of quantum states can naturally be described through the methods of random matrix theory. Third and finally, I review a number of new results describing the typical properties (e.g., average, variance) of the entanglement entropy for various ensembles of quantum states (general vs. Gaussian, arbitrary vs. fixed particle number).

**Ansprechpartner:** Mario Kieburg