Aktuelle Veranstaltungen

Kolloquium

Thema: Electrical control of spin transport in yttrium iron garnet thin films

Datum: 02.12.19

Uhrzeit: 16:15

Ort: H6

Vortragender: Dr. Matthias Althammer

Walther-Meißner-Institut and Physik-Department, Technische Universität München

Pure spin currents, i.e. the flow of angular momentum without an accompanying charge current represents a new paradigm in the field of spintronics. Most importantly, pure spin currents can be transported by fermions, i.e. by electrons, in electrical conductors as well as by bosons, i.e. by quantized magnetic excitations, in magnetically ordered insulators. Interestingly, heterostructures consisting of spin-orbit coupled metals with magnetically ordered insulators allow investigating pure spin current transport in both regimes and their interconversion at the interface. I will present our recent experiments on the control of magnon spin currents via a DC charge current injected pure spin current. In the first part, I will discuss our approach to generate pure spin currents in metallic ferromagnetic thin films deposited on yttrium iron garnet (YIG) via the anomalous spin Hall effect. Utilizing an equivalent spin current circuit model, our experiments allow quantifying the efficiency of the charge to spin current conversion process in the ferromagnetic material. Our results suggest that ferromagnetic metals are also good candidates for efficient charge to spin current conversion. In the second part, we utilize three electrically isolated platinum (Pt) electrodes deposited on an ultrathin YIG film. Employing all-electrical injection and detection mechanisms, we provide evidence for efficient spin transport manipulation by a DC charge current in these devices. I will further discuss the origin of the observed non-linear effects and threshold behavior in the framework of magnon Bose-Einstein condensation induced by a DC charge current. Above a critical DC current, the magnon density is sufficient to form a magnon condensate and eventually trigger auto-oscillations of the magnetization. In this regime, our diffusive magnon transport experiments indicate a zero-resistance state below the injector strip.
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.

Seminar Hochenergiephysik

Ansprechpartner: T. Kuschel

Ansprechpartner: S. Schlichting
Thema: Black hole thermodynamics in the extended phase space

Datum: 05.12.19

Uhrzeit: 14:15

Ort: D6-135

Vortragender: Nan LI

Northeastern University, Shenyang, China

In this talk, we first review the so-called black hole thermodynamics in the "extended phase space", in which the cosmological constant is interpreted as a varying thermodynamic pressure, and the black hole mass is identified with its enthalpy rather than internal energy. Moreover, a thermodynamic volume can be introduced for a black hole space-time. In this framework, the equation of state of a black hole resembles that of the non-ideal fluid (e.g., the van der Waals equation), and a black hole can show abundant phase transition behaviors accordingly. Some applications, such as the Hawking-Page phase transition and the throttling process (Joule-Thomson effect), will be discussed in more detail.

Ansprechpartner: D. Schwarz

Seminar Kondensierte Materie

Thema: tba

Datum: 30.01.20

Uhrzeit: 14:15

Ort: D5-153

Vortragender: Stefano Bo

MPI for the Physics of Complex Systems

Inhalt:
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

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:** Dimensional reduction for elliptic SPDE's: integrable structures and large deviations

**Datum:** 18.12.19

**Uhrzeit:** 16:15

**Ort:** V3-201
Inhalt:

I will review the phenomenon of dimensional reduction for elliptic stochastic PDE's in two and three dimensions due to hidden supersymmetry discovered by Parisi and Sourlas. I will use dimensional reduction to establish a link between matrix-valued elliptic SPDE's and determinantal point processes. I will show that the large deviations principle can be established for a class of equations without any reference to supersymmetry. The talk is based on joint work with Roger Tribe and David Elworthy.