Aktuelle Veranstaltungen

Kolloquium

Thema: **Electron dynamics in solids after ultrashort high-energy excitation**

Datum: 18.11.19

Uhrzeit: 16:15

Ort: H6

Vortragender: Prof. Dr. Baerbel Rethfeld

Fachbereich Physik, TU Kaiserslautern

Inhalt: Laser excitation of solid matter is a versatile tool for a broad range of fundamental studies as well as technological applications. Elementary processes within the material as electron-phonon coupling or spin-charge interaction can be studied on their intrinsic timescales. Extreme states of matter can be created with unknown thermodynamic properties. Possible technological applications include ultrafast switching of magnetization in hard drives, material removal with unprecedented precision, and compression of matter towards inertial fusion as a new controllable energy source. A joint starting point for such studies is the initial excitation. When an ultrashort laser pulse of visible light is absorbed by a solid, the electrons in the material are excited to a nonequilibrium state. A sequence of relaxation processes transfers the material into a new equilibrium. During this phase, common descriptions of the energy dissipation or electron density evolution fail, since averaged quantities like temperature lose their meaning. In this talk, I present our results on the interplay of microscopic collision processes determining the relaxation of nonequilibrium electron distributions. We apply complete Boltzmann collision integrals to study the mutual influence of different interaction and relaxation processes. We reveal that a partial nonequilibrium can disturb the thermalization of a subsystem with a faster intrinsic timescale. We provide corrections to temperature-based approaches like modified and transiend electron-phonon coupling parameters, and show the importance of the chemical potential relaxation for macroscopic quantitites like ferromagnetic magnetization.

Ansprechpartner: D. Turchinovich

Kolloquium Mathematische Physik

Thema: **Relativistic hydrodynamics, heavy-ion collisions, dynamical black holes and resurgent series**

Datum: 18.10.19

Uhrzeit: 16:15

Ort: V3-201

Vortragender: Michal P. Heller

Max-Planck-Institute for Gravitational Physics, Potsdam

Inhalt: The past 12 years has constituted the golden age for theoretical studies of relatativistic hydrodynamics. The experimental motivation for these developments came from ultra-relativistic heavy-ion collision at RHIC and LHC accelerators in which the paradigm of strongly-interacting medium modelled hydrodynamically became the working horse for explaining the data. These experimental and phenomenological developments have come hand-in-hand with theoretical progress in understanding relativistic hydrodynamics as an effective description embedded in quantum field theory. In my colloquium I will review the line of thought based on AdS/CFT (holography), an approach to study strongly-coupled quantum field theories using gravitational techniques, focusing on understanding the limits of applicability of relativistic hydrodynamics in far-from-equilibrium quantum field theory. A beautiful spin-off of this analysis is understanding hydrodynamic gradient expansion as a part of a trans-series, which encodes, through resurgence, information about genuinely non-equilibrium excitations of a collective state of matter. Based on a series of works reviewed in arXiv:1610.02023 and arXiv:1707.02282, as well as some later / ongoing work.

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

Inhalt: 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, 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

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

Inhalt: 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