Fachbereich Physik

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Vorträge im Physikalischen Kolloquium

Sommersemester 2019

Mittwochs 16 Uhr c.t., Hörsaal _.111 (EG), Max-von-Laue-Str. 1

29.05.2019 **Prof. Dr. Ulrich Heinz** Ohio State University/J.W. Goethe-Universität

The Little Bang Standard Model

The Little Bangs created in ultra-relativistic heavy-ion collisions share many characteristic features with the cosmological evolution after the Big Bang. They create a quark-gluon plasma — an extremely dense state of strongly interacting matter that flows like an almost perfect fluid. This allows to describe such heavy-ion collisions with dissipative relativistic fluid dynamics, supplemented by an early pre-hydrodynamic and a late kinetic freeze-out stage. I will demonstrate how quantum fluctuations in the initial state of the Little Bang propagate into the experimentally observed final state, manifesting themselves as fluctuations in the final flow pattern. A harmonic analysis of the final flows, their transverse momentum dependence and their flow angles (the "Little Bang flow fluctuation spectrum") provides detailed experimental information from which theory allows to extract with precision the spectrum of gluon fluctuations in the initial state, together with the transport coefficients of the quark-gluon plasma fluid created in the collisions.

19.05.2019 **Dr. rer. nat. Dipl.-Ing. Arash Rahimi-Iman** Physik, Universität Marburg

Investigations on the optical properties of two-dimensional layered semiconductor structures

Two-dimensional excitons formed in quantum materials such as monolayer transition-metal dichalcogenides (TMDCs) and their strong light–matter interaction have attracted unrivalled attention by the research community due to their extraordinarily large oscillator strength as well as binding energy, and the inherent spin–valley locking. Recently, semiconducting few-layer and monolayer materials with their sharp optical resonances such as WSe2 have been extensively studied and envisioned for applications in the weak as well as strong light–matter coupling regimes, for effective nano-laser operation with various different structures, and particularly for valleytronic nanophotonics motivated by the circular dichroism. Many of these applications, which may benefit heavily from the two-dimensional electronic quasiparticle’s properties in such films, require a better understanding of the nature of the optical resonances that are attributed to exciton modes, and how these modes are affected by the local environment. This presentation highlights the influence of the substrate, the environment, the stacking configuration and nanoscopic patterns on the emission properties of monolayer TMDCs.

10.07.2019 **Prof. Dr. Peter Hirschfeld**, Department of Physics, University of Florida

Superconductivity: there's plenty of cream at the bottom

In 1961, Brian Pippard gave a speech at IBM called "The Cat and the Cream", in which he declared that the superconductivity field was finished, at least for "young innocents who wish to break new ground": the cream was gone, and the bowl was empty. I show why the subsequent 6 decades proved him so dramatically wrong, how new materials and experimental techniques have continuously driven new theoretical understandings, such that the field has been constantly renewed, and is in fact a very good place for young researchers to make a career.