Upcoming Events

Colloquium

Topic: **Shine a light! When matter shatters**

Date: 08.06.20

Time: 16:15

Place: cyberspace

Guest: Prof. Dr. Tetyana Galatyuk

TU Darmstadt

The microscopic properties of strong-interaction matter under extreme conditions of temperature and density is a topic of great interest. Matter in equilibrium radiates photons with a thermal spectrum revealing its temperature in the slope of the energy distribution. This is generalized for virtual photons, which materialize after a short time by creation of a pair of charged leptons (dileptons), for which their invariant mass takes the role of the energy as observable. In contrast to the case of photons, their spectral distribution is not affected by a blue (or red) shift. Moreover, dileptons offer the unique opportunity also to directly monitor in-medium electromagnetic spectral functions. Hence, dilepton spectra from strong-interaction medium reflect not only its temperature but also are sensitive to possible effects of a restoration of the spontaneously broken chiral symmetry. This talk will discuss important experimental results obtained so far at various facilities and the latest theoretical developments on emissivity of matter.

Contact person: [F. Karsch/TR211](mailto:F.Karsch@tu-darmstadt.de)

Colloquium Mathematical Physics

Topic: **The problem of latency in estimating the Covid-19 replication number**
Figuring out how to restart the world's economy without a resurgence of disease depends on understanding how contagious Covid-19 really is. However, estimates of the basic replication number $R_0$ vary greatly, with well-respected groups publishing estimates whose 95% confidence intervals don't even overlap. In this talk I'll go over the basic SIR and SEIR models of disease spread and present several different ways to treat the latency period between being exposed and becoming infectious. Simple SEIR models are unstable; working with a fixed set of data, small changes to the model can result in large changes to the estimated value of $R_0$. More realistic models are more complicated and are even less stable. The upshot is that we know much less about $R_0$ than is generally believed, and the error bars on the high side are particularly large. Containing the outbreak for an extended period may be a lot harder than our leaders think.
still emerge after inflation if i) a radiation sector is excited towards the end of inflation, and ii) the equation of state after inflation becomes sufficiently stiff $w > 1/3$. In such circumstances, the inflationary background of gravitational waves (GWs) is significantly enhanced, making this signal (potentially) observable by GW detectors. I will discuss first how LIGO and LISA could measure this signal, probing in this way the expansion rate of the early Universe. Secondly, I will show that the very same enhancement of the GW signal leads however to an inconsistency of the scenario, violating standard bounds on stochastic backgrounds of GWs. Finally, I will show that the very existence of the Standard Model Higgs can actually save the day, by simply requiring the Higgs to be non-minimally coupled to gravity.

Contact person: D. Bödeker

Seminar Condensed Matter

22-05-2020-14.15 hrs - D5-153 - Construction of tight binding models from ab initio calculations using maximally localized Wannier functions

Topic:

Date: 22.05.20

Time: 14:15

Place: D5-153

Guest: Thomas Benkenstein

Universität Bielefeld

Abstract:

Contact person: Thomas Dahm

Seminar Mathematical Physics

Topic: Statistics of Extremes in Eigenvalue-counting Staircases

Date: 04.06.20

Time: 16:00
We consider the counting function (“spectral staircase”) for eigenvalues of a random unitary matrix, drawn from the corresponding beta-ensemble. Our goal is to characterize the statistics of maximum deviation of this staircase from its mean slope in a fixed interval, when size of the matrix \( N \gg 1 \). We will show that one-sided extremes can be addressed by exploiting a mapping onto the statistical mechanics of log-correlated random processes and using an extended Fisher-Hartwig conjecture. The resulting statistics exhibits combined features of counting statistics of Fermions with Sutherland-type interaction and extremal statistics of the fractional Brownian motion with Hurst index \( H = 0 \). Some of the features are expected to be universal. The talk is based on the paper Fyodorov-Le Doussal arXiv:2001.04135.

We study random matrices \( X \) which are the product of a single Ginibre matrix \( A \) and a matrix \( B \) from a somewhat general ensemble. The mixed moments and eigenvalue distribution of \( X \) are given in terms of the moments of powers of the Gram matrix of \( B \). When \( B \) is itself a product of Ginibre matrices, we find explicit expressions in terms of Fuss-Catalan numbers. We will discuss motivations from the study of multilayer perceptrons.

Contact person: Gernot Akemann
person: Anas Rahman