T 110: Quantenfeldtheorie 2

Zeit: Donnerstag 16:45–18:45 Raum: P15

T 110.1 Do 16:45 P15

Spectral Functions from the Functional Renormalization Group — •Nils Strodthoff[1] and Jan M. Pawlowski[1,2] — [1]Institut für Theoretische Physik, Universität Heidelberg, Germany — [2]ExtreMe Matter Institute EMMI, GSI Darmstadt, Germany

Spectral functions are important observables as they do not only encode information about the particle spectrum but also serve as input for calculations of transport coefficients such as the shear viscosity. Their calculation, however, is a difficult task in Euclidean approaches as it involves an analytical continuation from Euclidean to Minkowski external momentum. Within the framework of the Functional Renormalization Group we present an entirely numerical procedure where the analytical continuation is carried out on the level of the flow equations. As an example we consider mesonic spectral functions in effective models for QCD.

T 110.2 Do 17:00 P15

Effective mass signatures in multiphoton pair production — •Christian Kohlfürst[1,2], Holger Gies[2,3], and Reinhard Alkofer[1] — [1]Institut füur Physik, Karl-Franzens-Universität, A-8010 Graz, Austria — [2]Theoretisch-Physikalisches Institut, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, D-07743, Germany — [3]Helmholtz-Institut Jena, Fröbelstieg 3, D-07743 Jena, Germany

Electron-positron pair production in oscillating electric fields is investigated in the nonperturbative threshold regime. Accurate numerical solutions of quantum kinetic theory for corresponding observables are presented and analyzed in terms of a proposed model for an effective mass of electrons and positrons acquired within the given strong electric field. Although this effective mass cannot provide an exact description of the collective interaction of a charged particle with the strong field, physical observables are identified which carry direct and sensitive signatures of the effective mass.

T 110.3 Do 17:15 P15

Casimir effect on graphene — •M. Bordag — ITP, Universität Leipzig

Graphene developed into a test- and application- field for the methods of quantum field theory. From the linear dispersion of the lower part of the electronic excitations in graphene, the photon polarization tensor composed from the spinor loop is the basic object of interest. It corresponds to the RPA approximation known in solid state theory. Its dependence on parameters like the chemical potential, temperature or dissipation parameter still poses interesting quantum field theoretic problems. Based on the Dirac model for graphene, I discuss the Casimir effect between graphene and a conducting plane, as well as plasmons and their role for the van der Waals forces, in various regions of the parameters.

T 110.4 Do 17:30 P15

Turbulent thermalization in gauge and scalar field theories — •Kirill Boguslavski[1], Jürgen Berges[1], Sören Schlichting[2], and Raju Venugopalan[2] — [1]ITP, Universität Heidelberg — [2]Brookhaven National Laboratory

In this talk I will discuss the thermalization process in longitudinally expanding non-abelian gauge theory. This is relevant for the non-equilibrium dynamics in ultrarelativistic heavy-ion collisions. The system is found to exhibit universal properties, which can be associated to the phenomenon of wave turbulence in a large range of different systems.

T 110.5 Do 17:45 P15

Studying linear Dyson Schwinger equations — •Henry Kissler — Humboldt-Universität zu Berlin, Unter den Linden 6, 10099 Berlin

The equations of motion for a renormalizable Quantum Field Theory are given by a system of Dyson Schwinger equations. Their formulation via graph insertion operators allows for a combinatiorial proof of the renormalization group equation which provides additional restrictions on the corresponding Green's functions. This result comes as a consequence of an algebraic structure underlying the renormalization process – the Hopf Algebra of Feynman Graphs.

The talk focuses on the special case of *linear* Dyson Schwinger equations. Under the usage of the renormalization group equation non-perturbative solutions for a linear system with toy model Feynman rules are constructed. Further it is discussed how this relates to a renormalizable Quantum Field Theory with a vanishing beta function.

T 110.6 Do 18:00 P15

A perturbative approach to the non-perturbative renormalization group — •Omar Zanusso — Radboud University, Nijmegen, The Netherlands

We show that the functional renormalization group, also known as non-perturbative renormalization group, admits a perturbative solution and show explicitly the scheme transformation that relates it to the $\overline{\mathrm{MS}}$ method. We then define a scheme, inspired by perturbation theory, that within the functional renormalization group provides manifestly universal results for the beta functions.

T 110.7 Do 18:15 P15

Feynman integrals with hyperlogarithms — •Erik Panzer — Humboldt-Universität zu Berlin, Deutschland

The classic theory of hyperlogarithms provides a versatile tool for the computation of some Feynman diagrams. We will report on the current status of this approach and in particular address the question of linear reducibility which is a necessary requirement for applying this method. Apart from examples of non-trivial integrals that can be calculated this way, we analyse counterexamples and possibilities to restore linear reducibility.

T 110.8 Do 18:30 P15

Integrand-Reduction and the Color-Kinematic-Duality — •Urlich Schubert — MPI für Physik, München

In this work we combine, for the first time, the unitarity-based construction for integrands, and the recently introduced integrand-reduction through multivariate polynomial division. After discussing the generic features of this novel reduction algorithm, we will apply it to the one- and two-loop five-point amplitudes in N = 4 sYM. Furthermore the integrand-reduction is expoited to investigate the color-kinematic duality for multi-loop scattering amplitudes. Finally, we will extract the leading ultra-violet divergences of the previously constructed amplitudes, which represent a paradigmatic example for studying the UV behaviour of supersymmetric amplitudes.