T 12: QCD (Theorie) III / Quantenfeldtheorie I

Convenor: Peter Uwer / Christian Schwinn

Zeit: Mittwoch 14:00–15:45   Raum: HG XVI

T 12.1 Mi 14:00 HG XVI

Hadronische Beiträge zum anomalen magnetischen Moment des Myons — •Tobias Göcke, Christian Fischer und Richard Williams — TU Darmstadt, Institut für Kernphysik

Das anomale magnetische Moment des Myons ist eine der interessantesten Observablen zur Bestimmung von Abweichungen zwischen den Vorhersagen des Standardmodells und dem Experiment. Auf Seiten der Theorie wird der Fehler von hadronischen Beiträgen dominiert. Insbesondere nichtperturbative Beiträge aus hadronischer Licht-Licht-Streuung sind hierbei problematisch, da sie nicht aus experimentellem Input abgeleitet werden können. Um die Modellabhängigkeit bisheriger Berechnungen dieses Beitrags weiter zu verringern verwenden wir erstmals einen Zugang über die Dyson-Schwinger und Bethe-Salpeter Gleichungen der QCD. Als ersten Schritt berechnen wir den pi-gamma-gamma Formfaktor sowie den Pionaustausch-Beitrag zur hadronischen Licht-Licht-Streung.

T 12.2 Mi 14:15 HG XVI

NNLO VFNS dynamical parton distributions and weak-gauge and Higgs boson production — •Pedro Jimenez-Delgado — Institute for Theoretical Physics, University of Zurich, Switzerland

Since the required partonic subprocesses are only available in the approximation of massless initial-state partons, NNLO calculations are feasible at present only within the 'variable flavor number scheme', in which also the heavy quark flavors (c,b,t) are treated as massless partons within the nucleon. Based on our recent NNLO dynamical parton distributions as obtained in the 'fixed flavor number scheme', 'variable flavor number scheme' distributions are generated and used to calculate the production rates for weak-gauge and Standard-Model Higgs boson at hadron colliders.

T 12.3 Mi 14:30 HG XVI

Scale dependence of twist-three contributions to single spin asymmetries — •Björn Pirnay[1], Vladimir Braun[1], and Alexander Manashov[1,2] — [1]Institut für Theoretische Physik, Universität Regensburg — [2]Department of Theoretical Physics, St. Petersburg State University

We reexamine the scale dependence of twist-three correlation functions relevant for the single transverse spin asymmetry in the framework of collinear factorization. Evolution equations are derived for both the flavor-nonsinglet and flavor-singlet distributions and arbitrary parton momenta. Our results do not agree with the recent calculations of the evolution in the limit of vanishing gluon momentum. Possible sources for this discrepancy are identified.

T 12.4 Mi 14:45 HG XVI

Nucleon sum rules in next-to-leading order — •Michael Gruber and Vladimir Braun — Institut für Theoretische Physik, Universität Regensburg

To study nucleon properties one has to choose a suitable interpolating current for the proton. We consider the leading-twist (Chernyak-Zhitnitsky-) current and calculate next-to-leading order perturbative corrections. Using the framework of SVZ sum rules we can extract a new value for the nucleon wave function normalization constant f_N and compare it with existing theoretical work and lattice data. Due to the radiative corrections the value for f_N is expected to differ about 10% from previous sum rule calculations.

T 12.5 Mi 15:00 HG XVI

A Toolbox for Harmonic Sums and their Analytic Continuations — •Jakob Ablinger[1], Johannes Bluemlein[2], and Carsten Schneider[1] — [1]RISC, J. Kepler University, Linz, Austria — [2]DESY, Zeuthen, Germany

The package HarmonicSums implemented in the computer algebra system Mathematica is presented. It supports higher loop calculations in QCD and QED to represent single-scale quantities like anomalous dimensions and Wilson coefficients. The package allows to reduce general harmonic sums due to their algebraic and different structural relations. We provide a general framework for these reductions and the explicit representations up to weight w=8. For the use in experimental analyzes we also provide an analytic formalism to continue the harmonic sums form their integer arguments into the complex plane, which includes their recursions and asymptotic representations. The main ideas are illustrated by specific examples.

T 12.6 Mi 15:15 HG XVI

Computation of Genuine Massive 2- and 3-loop 2-Point Functions with Operator Insertion — •Johannes Bluemlein[1], Alexander Hasselhuhn[1], and Sebastian Klein[2] — [1]DESY — [2]RWTH Aachen

Results are presented on the calculation of massive 2- and 3-loop 2-point functions in QCD containing local composite operator insertions. We consider primitive divergent Feynman diagrams. The integrals are of importance for the massive operator matrix elements, which describe the heavy flavor Wilson coefficients of deep-inelastic scattering structure functions in the region $Q^2 \gg m^2$ at general values of the Mellin variable N.

T 12.7 Mi 15:30 HG XVI

All-orders leading top contributions to the ρ parameter — •Daniele Bettinelli and Jochum van der Bij — Albert-Ludwigs-Universitaet, Freiburg i.Br., Deutschland

We compute the leading top contributions to the ρ parameter to all orders in perturbation theory in the $SU(N_F) \times U(1)$ Electroweak model in the large N_F-limit. We show that the resulting perturbative expansion is not Borel summable.