T 12: QCD (Theorie) 2

Convenor: Steffen Schumann

Zeit: Mittwoch 16:45–19:00 Raum: VG 3.103

T 12.1 Mi 16:45 VG 3.103

Dipole-Subtraction Terms for QCD Amplitudes with Monte Carlo Helicities — •Christopher Schwan — Institut für Physik (THEP), Johannes Gutenberg-Universität Mainz, Germany

We show how to substitute polarization vectors and spinors having discrete helicities for ones with continuous helicity angles which are suitable for numerical QCD computations. Using these polarizations one can avoid the time-consuming summation over all 2^n helicity configurations in QCD observables. To extend this method to NLO, one needs modified subtraction terms which are discussed in this talk.

T 12.2 Mi 17:00 VG 3.103

An alternative subtraction scheme for NLO calculations — •Tania Robens[1] and Cheng Han Chung[2] — [1]IKTP, TU Dresden — [2]RWTH Aachen University

We present a new subtraction scheme for next-to-leading order QCD calculations, where the momentum mapping and the splitting functions have been derived in the context of an improved parton shower formulation. A main advantage of our scheme is the significantly reduced number of momentum mappings in the subtraction terms compared to standard schemes. We discuss the general setup as well as examples for several processes.

T 12.3 Mi 17:15 VG 3.103

HELAC-Dipoles with Nagy-Soper subtraction scheme — Giuseppe Bevilacqua, Michał Czakon, Michael Krämer, and •Michael Kubocz — Institut für Theoretische Teilchenphysik und Kosmologie, RWTH Aachen

We present results of our implementation of the new NLO subtraction formalism based on Nagy-Soper parton showers within the framework of HELAC.

T 12.4 Mi 17:30 VG 3.103

Numerical Evaluation of one-loop QCD amplitudes — Simon Badger[2], •Benedikt Biedermann[1], and Peter Uwer[1] — [1]Humboldt-Universität zu Berlin, — [2]The Niels Bohr Insitute, Copenhagen, Denmark

We present the publicly available program NGluon allowing the numerical evaluation of one-loop primitve amplitudes in massless QCD. So far, the program was restricted to the pure gluonic case with an arbitrary number of external legs. The focus of this talk is the extension to one-loop amplitudes including an arbitrary number of massless quark pairs. We discuss in detail the algorithmic differences to the pure gluonic case and present cross checks to validate our implementation. The numerical accuracy is investigated in detail and first phenomenological studies are shown.

T 12.5 Mi 17:45 VG 3.103

Numerical QCD methods at NLO — •Daniel Götz — Institut für Physik (THEP), Johannes Gutenberg-Universität Mainz, Germany

In this talk, a numerical method for the computation of QCD corrections at next-to-leading order accuracy is presented. The algorithm employs the dipole subtraction method for the real contribution; for the virtual contribution, appropriate approximations of the soft, collinear and ultraviolet singularities are subtracted from the one-loop integrand in order to render it finite. To avoid singularities from configurations where a loop momentum goes on-shell, a suitable method for deforming the integration contour is included. The algorithm is formulated at the level of amplitudes, which are computed using color decomposition and recursion relations. In this talk, results for jet rates in electron-positron annihilation up to seven jets are presented; the results for six and seven jets are new.

T 12.6 Mi 18:00 VG 3.103

Automation of one-loop calculations — •Nicolas Greiner — Max-Planck-Institut fuer Physik

In this talk I discuss the automation of one-loop calculations in QCD within the GoSam framework.

T 12.7 Mi 18:15 VG 3.103

Automation of one-loop calculations with GoSam — •Johann Felix von Soden-Fraunhofen — Max-Planck-Institut für Physik, Föhringer Ring 6, 80805 München, Germany

The program package GoSam can be used to calculate multi-leg one-loop amplitudes within and beyond the Standard Model.

An extension is additionally presented which allows to calculate integrals where the rank is larger than the number of propagators. One possible application of this feature is the calculation of QCD corrections within models involving extra dimensions.

T 12.8 Mi 18:30 VG 3.103

Topmassen-Effekte in der differentiellen Higgsproduktion an Hadronenbeschleunigern — •Robert Harlander, Tobias Neumann und Marius Wiesemann — Bergische Universität Wuppertal

Für die Higgs-Produktion durch Gluon-Fusion wird für Störungsrechnungen in höheren Ordnungen üblicherweise der Limes einer unendlich schweren Top-Quark-Masse betrachtet ($m_t = \infty$), welcher diese Berechnungen erst ermöglicht bzw. praktikabel macht. Nur für die voll-inklusive Higgs-Produktion durch Gluon-Fusion wurde die hohe Güte des Limes $m_t = \infty$ bestätigt. Dieser Limes führt dort zu einem Fehler von wenigen Prozent. Für nicht-inklusive Wirkungsquerschnitte wurde bisher nicht die Güte dieses Limes betrachtet. Wir haben die nicht-inklusive Higgs-Produktion durch Gluon-Fusion mit mindestens einem zusätzlichen Jet in NLO-Näherung bei Hinzunahme weiterer Korrekturterme $\mathcal{O}(1/m_t^2)$ für kinematische Verteilungen im Higgs-Transversalimpuls und in der Higgs-Rapidität untersucht. Es stellt sich heraus, dass die Korrekturterme endlicher Topmassen in den relevanten kinematischen Regionen klein sind. Die Güte der nicht-inklusiven Berechnungen, basierend auf einem unendlich schweren Top-Quark, kann somit als hoch abgeschätzt werden.

T 12.9 Mi 18:45 VG 3.103

The process gluon-gluon-Higgs in different forms of dimensional regularization — •Christoph Gnendiger — IKTP, TU Dresden

In this work we analyse the factorization properties of infrared singularities in massless QCD at NNLO in different forms of dimensional regularization, including Dimensional Reduction (DRED).

A consistency of DRED with this factorization in first-order perturbation theory has been investigated and shown before. Here we present the results for gluon induced Higgs production at NNLO for several regularization schemes.