T 14: QCD (Theorie)

Zeit: Montag 14:00–16:00 Raum: K.12.23 (K1)

T 14.1 Mo 14:00 K.12.23 (K1)
First steps towards WHIZARD + NLO — Bijan Chokoufe[1], Wolfgang Kilian[2], Jürgen Reuter[1], and •Christian Weiss[1] — [1]DESY Hamburg — [2]Uni Siegen

WHIZARD is a multi-purpose event generator for hadron- and lepton-colliders, considering the standard model as well as a multitude of BSM models. The current version of the program is only capable of automatically performing leading-order calculations, contributions of higher virtual orders being available for some specific kinds of processes. However, many applications require at least next-to-leading order accuracy. We present a first extension of WHIZARD which can also deal with processes at next-to-leading order, using the Frixione-Kunszt-Signer subtraction scheme. The program structure is briefly explained, focussing on the various components of the calculation and the corresponding interface to one-loop programs like GoSam. Finally, first results for NLO massless QCD are presented.

T 14.2 Mo 14:15 K.12.23 (K1)
Aspects of merging fixed order matrix elements to parton showers — •Johannes Bellm[1], Stefan Gieseke[1], and Simon Plätzer[2] — [1]ITP/KIT , Karlsruhe, Germany — [2]IPPP, Durham, UK

With the interfaces to several matrix element generators and one loop providers such as GoSam, MadGraph and OpenLoops an automatized matching and merging of matrix elements to parton showers will be possible. In the talk I will show recent progress of merging in Herwig++. The choice of scales and pdfs will be discussed. Also the inclusion of QCD corrections and comparisons to LEP and LHC data will be shown.

T 14.3 Mo 14:30 K.12.23 (K1)
Matching the Nagy-Soper parton shower at next-to-leading order — •Manfred Kraus — Institute for Theoretical Particle Physics and Cosmology, RWTH Aachen University

We give a short review of the shower concept, first introduced by Nagy and Soper, that includes full quantum correlations in the shower evolution. We also state the current status of implementation of the publicly available shower program Deductor. However, the main focus of the talk will be the matching of the shower at next-to-leading order within the MC@NLO formalism. Matching is necessary in order to increase the accuracy of theoretical predictions and to employ a hadronization model. We will show first results using Deductor in conjunction with the Helac-NLO framework for top quark pair production in association with one hard jet.

T 14.4 Mo 14:45 K.12.23 (K1)
Automated soft-gluon resummation in Sherpa — •Piero Ferrarese and Steffen Schumann — II. Physikalisches Institut, Universität Göttingen, Friedrich-Hund-Platz 1, 37077 Göttingen, Germany

We present a new formalism for the resummation of soft-gluon effects in global event-shape distributions to next-to-leading-logarithmic approximation, implemented in the Sherpa event-generation framework. The evolution of the color structure is highly non-trivial, in particular in processes involving many hard QCD jets. The new framework presented relies on the selection of suitable color bases for the considered processes. We further present a novel approach for the matching of resummed distributions to tree-level matrix elements, exploiting a quasi-local subtraction formalism based on Catani-Seymour dipole factorisation. With this new tool a large class of event-shape variables can be resummed in a fully automated way, allowing to consider processes with up to $2 \to 5$ partons at Born level.

T 14.5 Mo 15:00 K.12.23 (K1)

MCgrid: Automated production of NLO QCD interpolation grids — •Enrico Bothmann and Steffen Schumann — II. Physikalisches Institut, Georg-August-Universität Göttingen

Fixed-order interpolation grids for NLO QCD calculations (APPLgrid, fastNLO) enable the reweighting of histogrammed observables, i.e. fast reevaluations with modified input parameters. These parameters include parton density functions (PDF), the strong coupling constant α_S and choices for the renormalisation and the factorisation scale. The grids are used for PDF- and α_S-fits as well as error estimates. We present the recently introduced interface MCgrid, that allows for an automated grid production using general-purpose Monte Carlo event generators. In this talk, we review the current status of MCgrid and discuss its applications and future developments.

T 14.6 Mo 15:15 K.12.23 (K1)
Impact of LHCb heavy-quark production cross sections on parton distribution functions at very low x — •Oleksandr Zenaiev — DESY, Notkestrasse 85, Hamburg 22607

The impact of recent measurements of heavy-flavour production in deep inelastic ep scattering and in pp collisions on parton distribution functions is studied in a QCD analysis in the fixed-flavour-number scheme at next-to-leading order. Differential cross sections of charm- and beauty-quark production measured by LHCb are used together with inclusive and heavy-flavour production cross sections in deep inelastic scattering at HERA. The heavy-flavour data of the LHCb experiment impose additional constraints on the gluon and the sea-quark distributions at very low partonic fractions of the proton momenta, $x < 10^{-4}$. This kinematic range is currently not covered by other experimental data in perturbative QCD fits.

T 14.7 Mo 15:30 K.12.23 (K1)
Rivet Usage at CMS — •Markus Radziej, Thomas Hebbeker, and Lars Sonnenschein — III. Phys. Inst. A, RWTH Aachen

In this talk an overview of Rivet and its usage at the CMS experiment is presented. Rivet stands for "Robust Independent Validation of Experiment and Theory" and is used for optimizing and validating Monte Carlo event generators. By using the results of published analyses, distributions of the simulation can be compared to experimental measurements (corrected for detector effects). This gives insight into the agreement on the particle-level.

Starting off with an introduction to the Rivet environment, the purpose of this tool in modern particle physics will be explained. Before taking a closer look at the analysis structure, the software necessary to get comparisons is outlined. Analysis implementations will be discussed using code examples, showcasing the powerful framework that Rivet provides. A few selected final distributions displaying both Monte Carlo generated events and recorded data will be presented, showing the potential to perform particle-level comparisons.

T 14.8 Mo 15:45 K.12.23 (K1)
Factorization of infrared divergences in FDH and DRED — •Christoph Gnendiger — IKTP, TU Dresden

In this talk I will discuss the generalization of infrared factorization formulas to different variants of dimensional regularization, including the four-dimensional helicity scheme (FDH) and dimensional reduction (DRED). Special attention will be paid to the introduction of ϵ-scalars, the RGE running of their different couplings, and to the UV renormalization of the effective coupling to the Higgs-boson. Besides results for the cusp anomalous dimension and the anomalous dimensions of quarks, gluons and ϵ-scalars at NNLO, I will present two-loop transition rules for converting results from one regularization scheme to another.