T 11: QCD (Theorie) II

Convenor: Peter Uwer

Zeit: Dienstag 16:45–18:30 Raum: HG XVI

T 11.1 Di 16:45 HG XVI

Alternative dipole subtraction scheme using Nagy-Soper dipoles — •Cheng-Han Chung, Michael Krämer, and Tania Robens — Institut für Theoretische Physik E, RWTH Aachen, D - 52056 Aachen, Germany

We present an alternative subtraction scheme for the treatment of infrared divergences in NLO QCD calculations where the number of kinematic transformations is greatly reduced with respect to the standard scheme by Catani and Seymour. In our scheme, we define a different phase space matching in which the momentum mapping takes all the spectators into account at once when going from $m+1$ to m particle phase space, instead of separately summing over all possible emitter/spectator pairs. We discuss the general framework setup of the scheme as well as some applications.

T 11.2 Di 17:00 HG XVI

Dipole Parton Showers and NLO Matching — •Simon Plätzer — Institut für Theoretische Physik, Karlsruher Institut für Technologie

I present results from the implementation of the coherent dipole shower algorithm introduced in [1]. The simulation is written as an add-on to the event generator Herwig++. Next-to-leading order QCD corrections carried out within the dipole subtraction method can be consistently matched with the parton shower using the POWHEG method in an automated way.

[1] S.Plätzer and S.Gieseke, arXiv:0909:5593

T 11.3 Di 17:15 HG XVI

Hadron Level Event Generation at NLO Accuracy with Sherpa — Jennifer Archibald[1], Tanju Gleisberg[2], Stefan Hoeche[3], Frank Krauss[1], •Marek Schoenherr[4], Steffen Schumann[5], Frank Siegert[6], and Jan Winter[7] — [1]Institute for Particle Physics Phenomenology, Durham University, Durham DH1 3LE, UK — [2]Stanford Linear Accelerator Center, Stanford University, Stanford, CA 94309, USA — [3]Institut fuer Theoretische Physik, Universitaet Zuerich, CH-8057 Zuerich, Switzerland — [4]Institut fuer Kern- und Teilchenphysik, TU Dresden, D-01062 Dresden, Germany — [5]Institut fuer Theoretische Physik, Universitaet Heidelberg, D-69120 Heidelberg, Germany — [6]Department of Physics & Astronomy, University College London, London WC13 6BT, UK — [7]Fermi National Accelerator Laboratory, Batavia, IL 60510, USA

Sherpa is a fully equipped tool for hadron level event generation for collider experiments. Using automated tree-level matrix element generators for the hard interaction and an automated matching with parton showers via the CKKW method, its accuracy is essentially limited to LO+NLL. Therefore, the next step is to extend the framework for computations at NLO accuracy in the hard interaction. While automatic generation of dipole subtraction terms is already available, the virtual contribution either is limited to a set of hard coded processes or needs to be fed in externally. Further, the parton showers need to be attached consistently, suitable also for multileg matching. In the talk a short review of the status of the framework for hadron level event generation at NLO+NLL accuracy will be given.

T 11.4 Di 17:30 HG XVI

Simulating Hard Photon Production at Hadron Colliders — •Steffen Schumann — Institut fuer Theoretische Physik, Universitaet Heidelberg, Heidelberg, Germany

The measurement of final states containing hard photons plays a key role in hadron collider experiments. They can be used to determine the absolute energy scale of jets and to constrain the gluon distribution inside the beam hadron. Furthermore the diphoton signature is a promising channel for the search for a Higgs boson. In this talk I will discuss the theoretical modelling of single and diphoton final states based on a parton shower model merged with higher order tree level QCD and QED matrix elements.

T 11.5 Di 17:45 HG XVI

Monte-Carlo simulation of deep-inelastic scattering with the Sherpa event generator — Tancredi Carli[1], Thomas Gehrmann[2], and •Stefan Hoeche[2] — [1]CERN, Department of Physics, CH-1211 Genève 23, Schweiz — [2]Institut für theoretische Physik, Universität Zürich, CH-8057 Zürich, Schweiz

A characteristic feature of deep-inelastic scattering is the nearly arbitrary scale Q^2, at which the structure of the proton can be probed by the virtual photon. While this presents an excellent opportunity for *measuring* the QCD dynamics of the process, it also constitutes the main obstacle for *simulating* it with Monte Carlo event generators. The problems to be solved in this context are connected to the definition of initial conditions for the parton-shower evolution, which usually imply a severe restriction of the phase space for extra parton radiation.

We present an extension of a recently introduced method for merging truncated parton showers with higher order tree-level matrix elements, which is capable to solve these problems in a generic way. Hadronic final states in deep-inelastic scattering are analysed in detail and the corresponding results are compared to HERA data. Theoretical uncertainties of the approach are discussed. We outline how the procedure can be generalised to simulate parton radiation in general low-mass final states at hadron-colliders.

T 11.6 Di 18:00 HG XVI

Implementing Parton Showers and Multiple Interactions in WHIZARD 2 — Hans-Werner Boschmann[2], Wolfgang Kilian[2], Jürgen Reuter[1], and •Sebastian Schmidt[1] — [1]Uni Freiburg — [2]Uni Siegen

The algorithms for Parton Showers and Multiple Interactions and their interleaving procedure implemented in the new major version of WHIZARD are presented.

T 11.7 Di 18:15 HG XVI

Systematic tuning of the AHADIC hadronisation model with the Professor framework — Andy Buckley[1], Hendrik Hoeth[2], Frank Krauss[2], Heiko Lacker[3], Holger Schulz[3], and •Jan Eike von Seggern[3] — [1]Particle Physics Experiment Group, University of Edinburgh, UK — [2]IPPP, University of Durham, UK — [3]Institut für Physik, Humboldt Universität zu Berlin, Germany

Monte Carlo (MC) event generators are a well established tool for all parts of particle physics. However, for the simulation of the non-perturbative regime of strong interaction no approach is available that is rigorously based on theory. Therefore, the simulation uses phenomenological models that depend on a large number of relatively free parameters that are partly correlated. To determine these parameters the model description is tuned to fit experimental data. Over the past years the Professor tool-chain was developed to reduce the time consumption and increase both the reproducibility in the MC parameter tuning and the number of observables that can be taken into account.

A crucial part of the non-perturbative regime of the simulation is the translation of partonic states into hadrons. Therefor two approaches have been followed so far: the Lund string model (e.g. like in Pythia), that follows a global strategy, and the cluster model (e.g. like in HERWIG), that treats hadronisation locally. The SHERPA event generator follows the latter approach with the hadronisation model AHADIC. However, its model parameters have not been tuned systematically up to now. In this talk, the SHERPA hadronisation model AHADIC and its tuning with the Professor tools using data from LEP is presented.