

T 13: QCD (Theorie) 3

Convenor: Stefan Gieseke

Zeit: Mittwoch 16:45–18:30

Raum: WIL-A120

T 13.1 Mi 16:45 WIL-A120

QCD factorization of infrared singularities in different forms of dimensional regularization — ●CHRISTOPH GNENDIGER — Institut für Kern- und Teilchenphysik, TU Dresden

In this work we analyze factorization properties of infrared singularities in massless QCD at two-loop order in different forms of dimensional regularization, including Conventional Dimensional Regularization (CDR) and Dimensional Reduction (DRED).

In CDR it is known that infrared singularities can be predicted by a general and compact formula. We show that in DRED the results are not in agreement with this formula, but with a modified one. We explain the origin of this modification and show how to convert CDR-results into DRED.

T 13.2 Mi 17:00 WIL-A120

Total and inelastic cross sections in the PHOJET MC event generator — ●ANATOLI FEDYNITCH^{1,2} and RALPH ENGEL² — ¹CERN, Genf — ²IKP, KIT, Karlsruhe

The Monte-Carlo event generator PHOJET 1.12 has been successfully employed in experimental and technical fields of particle and cosmic ray physics for more than a decade. The latest official version, released in 2000, uses the total, elastic and diffractive cross-section data available during the Tevatron era as a basis for the extrapolation to higher energies. The employed model is based on Regge-arguments, typically resulting in reliable and stable predictions. However, recent LHC (min-bias) measurements of charged particle distributions and cross-sections showed, that a major rework of the underlying model is needed for a more accurate description of accelerator data.

Here, we present the status of the ongoing work and will give an outlook for the upcoming versions.

T 13.3 Mi 17:15 WIL-A120

Multiple parton interactions in Herwig++ — ●CHRISTIAN RÖHR and STEFAN GIESEKE — Institut für Theoretische Physik, Karlsruher Institut für Technologie, Karlsruhe, Deutschland

Discoveries at the LHC are expected to occur in hard events, e.g. with high-pt jets/leptons or large missing energy. However, less hard scatters are also important to understand: Due to the high peak luminosity at the LHC, the triggered events are typically accompanied by a sizable number of (usually soft) pile-up events, i.e. further simultaneous proton collisions. This calls for valid soft-inclusive models in event generators. The event generator Herwig++ accesses this task using a model for multiple parton interactions. This talk covers new developments in this model.

T 13.4 Mi 17:30 WIL-A120

QCD Corrections to W and Z Production via Vector Boson Fusion in the POWHEG-Box — ●FRANZISKA SCHISLER and DIETER ZEPPENFELD — Institut für Theoretische Physik, Karlsruher Institut für Technologie (KIT), 76128 Karlsruhe

We present the implementation of electroweak Zjj and Wjj produc-

tion via vector boson fusion with fully leptonic decays at NLO QCD in the POWHEG framework. These processes represent an important background to Higgs searches in vector boson fusion, but can also be seen as signal processes to study for example the impact of a central jet veto. Observables related to the third jet are sensitive to the parton shower being used, which is demonstrated by a comparison between PYTHIA, the standard angular-ordered HERWIG++ shower and its new p_T -ordered Dipole Shower.

T 13.5 Mi 17:45 WIL-A120

Four jet production at next-to-leading order for the Large Hadron Collider — ●BENEDIKT BIEDERMANN¹, PETER UWER¹, SIMON BADGER², and VALERY YUNDIN² — ¹Humboldt-Universität zu Berlin — ²The Niels Bohr Institute, Copenhagen

Results for four jet production at the LHC at next-to-leading order accuracy are presented. We study the inclusive four jet cross section as well as a variety of differential distributions in the five flavour scheme. We find large negative corrections at next-to-leading order reducing the leading-order results by around 40-50%. The virtual corrections are computed with our publicly available program NJet, an implementation of generalised unitarity which is very well suited for processes with many particles in the final state. We show that a dynamical phase space dependent scale choice leads to a remarkably constant K-factor. Besides the physical results, we discuss also the origin of the large next-to-leading order corrections and give an outlook on future perspectives.

T 13.6 Mi 18:00 WIL-A120

Calculation of $WZjj$ at NLO QCD — FRANCISCO CAMPANARIO, ●MATTHIAS KERNER, DUC NINH LE, and DIETER ZEPPENFELD — ITP, Karlsruhe Institute of Technology

Diboson production in association with two jets can be used to probe the mechanism of electroweak symmetry breaking at the LHC. In particular, they provide information about triple and quartic electroweak gauge couplings. For a full analysis, a precise knowledge of both the QCD and electroweak induced processes are needed.

In this talk, we report on the progress in implementing QCD-induced $WZjj$ -production at next-to-leading order QCD into the flexible parton level Monte Carlo program VBFNLO.

T 13.7 Mi 18:15 WIL-A120

NLO QCD corrections to $W\gamma$ production via vector boson fusion — ●NICOLAS KAISER, FRANCISCO CAMPANARIO, and DIETER ZEPPENFELD — ITP, Karlsruhe Institute of Technology, Karlsruhe, Germany

Vector boson fusion processes will be used to probe the mechanism of electroweak symmetry breaking at the LHC. $W\gamma$ production via vector boson fusion is expected to yield important information on triple and quartic vector boson couplings. We have implemented the full next-to-leading order QCD corrections to $W\gamma$ production via vector boson fusion in a flexible parton-level Monte Carlo program, VBFNLO. Here we will present our results.