T 16: QCD theory I

Time: Monday 16:30–18:00 Location: H-ÜR 1

T 16.1 Mon 16:30 H-ÜR 1

Mixed QCD-QED corrections to Drell-Yan — •Maximilian Delto[1], Matthieu Jaquier[1], Kirill Melnikov[1], and Raoul Roentsch[2] — [1]Karlsruher Institut fuer Technologie — [2]CERN

We present a fully-differential description of mixed QCD-QED corrections to the production of on-shell Z and W bosons in hadronic collisions. These corrections are of phenomenological interest for the precision era of the LHC, e.g. for an improved determination of the W boson mass. We regulate infrared and collinear singularities present in real emission contributions using the nested soft-collinear subtraction scheme.

T 16.2 Mon 16:45 H-ÜR 1

Automating the calculation of jet functions in SCET — •Kevin Brune and Guido Bell — Universität Siegen

In pertubative QCD large logarithms can arise in the computation of collider observables. These logarithms can be resummed via factorization theorems within Soft-Collinear Effective Theory(SCET). The factorization theorems contain jet functions, which describe collinear interactions. In this talk I present a systematic framework for the computation of jet functions for generic observables. For this purpose we introduce a phase space parametrization which allows the factorization of universal singularities of jet functions. We have implemented this framework for different observables, by using the public code "pySecDec" to compute the next-to-leading order and part of the next-to-next-to-leading order jet function.

T 16.3 Mon 17:00 H-ÜR 1

Zero-jettiness beam function at NNLO — •Daniel Baranowski — TTP, KIT, Karlsruhe

Currently there is a push in developing techniques for N3LO fully-differential QCD computations for the most basic 2 to 1 processes, such as the production of the Higgs boson in gluon fusion or the Drell-Yan process. One way to handle IR and collinear singularities is slicing of the phase space along a suitable variable. This talk focuses on one of the ingredients of the slicing technique, the zero-jettiness beam function at NNLO.

T 16.4 Mon 17:15 H-ÜR 1

Parton shower based on TMD parton distributions — •Melanie Schmitz[1], Hannes Jung[1], Sara Taheri Monfared[1], and Francesco Hautmann[2,3] — [1]Deutsches Elektronen-Synchrotron (DESY) — [2]University of Antwerp — [3]University of Oxford

Transverse Momentum Dependent (TMD) parton distributions include the dependence on the transverse momentum kT of the partons. TMDs play an important role for calculations with parton showers, which represent higher-order corrections to the hard subprocess.

In this talk, TMD parton distributions are determined from different standard parton showers. A parton shower based on TMD parton distributions obtained with the Parton Branching method, which allows to solve evolution equations for collinear and TMD parton distributions numerically in an iterative procedure, is presented. It is investigated how well the TMD parton shower reproduces the TMD parton distributions. Applications of the TMD parton shower to LHC processes will be presented.

T 16.5 Mon 17:30 H-ÜR 1

Nested soft-collinear subtractions in NNLO QCD computations — •Konstantin Asteriadis — TTP, KIT, Karlsruhe

Currently important progress is being made in next-to-next-to-leading order (NNLO) QCD calculations. As a result, many processes at hadron colliders have been computed to NNLO QCD precision. Despite these developments, the search for the optimal subtraction scheme that allows us to handle IR and collinear singularities in an efficient and general way is still ongoing. In this talk I will introduce the nested soft-collinear subtraction scheme that possesses many desired features; for example, it is analytic, fully local and highly modular.

T 16.6 Mon 17:45 H-ÜR 1

Matching coefficients in nonrelativistic QCD to two-loop accuracy — •Marvin Gerlach[1], Go Mishima[2], and Matthias Steinhauser[1] — [1]Institut für Theoretische Teilchenphysik, Karlsruhe Institute of Technology (KIT), Wolfgang-Gaede Straße 1, 76128 Karlsruhe, Germany — [2]Institut für Kernphysik, Karlsruhe Institute of Technology (KIT), Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen, Germany

Nonrelativistic QCD (NRQCD) describes the system of two heavy quarks with mass m_Q in the limit of small relative velocity, v. It is constructed by a double expansion in α_s and v (of $1/m_Q$). In this talk we present results for various two-loop matching coefficients for operators which contribute at order $1/m_Q^2$. The results are building blocks for next-to-next-to-next-to-leading logarithmic and next-to-next-to-next-to-next-to-leading order corrections to the threshold production of top quark pairs and the decay of heavy quarkonia.