T 10: QCD / Elektroschwache Physik (Theorie) 1

Convenor: Stefan Gieseke / Stefano Pozzorini

Zeit: Montag 11:00–13:00 Raum: WIL-A120

T 10.1 Mo 11:00 WIL-A120

Numerical evaluation of multi-loop integrals — •Sophia Borowka and Gudrun Heinrich — Max Planck Institute for Physik, Munich, Germany

In this talk the new features of the public program SecDec 2.1 for the numerical evaluation of multi-loop integrals with several mass scales are presented. The program is based on sector decomposition to extract dimensionally regulated singularities. To deal with integrable singularities due to mass thresholds, the integration contour is deformed into the complex plane. As applications, numerical results for massive non-planar two-loop diagrams entering heavy quark pair production at NNLO are shown.

T 10.2 Mo 11:15 WIL-A120

Recursive generation of one-loop SM amplitudes — Stefano Actis[1], Ansgar Denner[2], •Lars Hofer[2], Andreas Scharf[2], and Sandro Uccirati[3] — [1]Paul Scherrer Institut, Würenlingen und Villigen — [2]Universität Würzburg — [3]Universita di Torino

We introduce the computer code Recola for the recursive generation of tree-level and one-loop amplitudes in the full Standard Model, including electroweak corrections. The presented algorithm for the calculation of one-loop amplitudes uses Dyson-Schwinger recursion relations to determine the coefficients of the tensor integrals. As a first application of Recola we discuss Z+2jets production at the LHC and present results for the next-to-leading-order electroweak corrections to the dominant partonic channels.

T 10.3 Mo 11:30 WIL-A120

Integrand Reduction of Scattering Amplitudes — •Tiziano Peraro — Max-Planck-Institut für Physik, München, Germany

I will talk about recently-developed techniques for the integrand reduction of multi-loop scattering amplitudes in Quantum Field Theory, which rely on basic principles of algebraic geometry.

T 10.4 Mo 11:45 WIL-A120

Automatic NLO calculation with GoSam — •Gionata Luisoni — Max-Planck-Institut für Physik, München

GoSam is a program package for the automatic calculation of 1-loop amplitudes. In this talk I will present how it can be interfaced to external Monte Carlo programs to automatically compute NLO QCD corrections for LHC relevant processes. Furthermore some phenomenological applications will be shown.

T 10.5 Mo 12:00 WIL-A120

GoSam: Automating one-loop calculations within and beyond the SM — •Joscha Reichel — Max Planck Institute for Physics, Munich, Germany

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

A short introduction to the program is given and SM as well as BSM examples and results are presented, in particular QCD corrections to the production of KK gravitons from (large) extra dimensions in association with jets.

T 10.6 Mo 12:15 WIL-A120

QCD corrections to Higgs plus jets production with GoSam — •Hans van Deurzen — Max Planck Institute for Physics, Munich, Germany

I will discuss the evaluation of the NLO QCD corrections to the production of the Higgs boson plus jets through gluon fusion in the large top-mass limit. I will focus on the calculation of the virtual corrections by means of the integrand reduction method, properly extended to deal with higher-rank numerators, associated with the effective Higgs-gluon coupling. The results have been obtained by a completely automated framework, interfacing GoSam and Sherpa.

T 10.7 Mo 12:30 WIL-A120

Semileptonic Decays in Vector Boson Pair Production Processes — •Bastian Feigl and Dieter Zeppenfeld — ITP, Karlsruher Institut für Technologie, 76131 Karlsruhe

Electroweak gauge boson production is usually done with leptonic decays of the bosons, as the decay leptons allow for a good background suppression at hadron colliders. Nevertheless, semileptonic decay modes provide the opportunity of gaining additional sensitivity from the experiment.

Semileptonic decay modes have been implemented at leading order into the parton level Monte Carlo program Vbfnlo, which already has the production processes with fully leptonic decay modes available at next-to leading order QCD. Processes considered include diboson production and diboson plus two jet production in vector boson fusion.

Especially for the real emission part of the production process, the particle selection in the partonic final state and the jet algorithm parameters can have a significant impact on the resulting cross section and K-factors.

T 10.8 Mo 12:45 WIL-A120

EWSB quantification by higher order Higgs-gluon coupling operators — •Tobias Neumann and Robert Harlander — Bergische Universität Wuppertal

In Higgs production by gluon fusion one usually takes the limit of an infinitely heavy top quark to reduce the number of loops in calculations by one, as the leading order cross section is already a one-loop calculation. Recently we confirmed the quality of the heavy top limit in differential Higgs production by looking at higher order corrections in the top mass $\mathcal{O}(1/m_t^2)$. We did this by using asymptotic expansions in the top mass. One can also take the approach of writing down dimension 7 Higgs-gluon coupling operators and calculating the SM matching coefficients. By not fixing the coefficients of the dimension 7 operators to their matched SM values, we can quantify EWSB in a quite general way. As we will see, terms suppressed by $1/\Lambda^2$, where Λ is the scale of new physics, can give visible SM deviations and allow us to detect BSM physics and possibly match it to specific models.