T 59: QCD (Theorie) 2

Zeit: Dienstag 16:45–18:45 Raum: P15

T 59.1 Di 16:45 P15

P wave contribution to third-order top-quark pair production near threshold — Martin Beneke[1], Jan Piclum[1,2], and •Thomas Rauh[1] — [1]TU München - Physik Department, Garching, Germany — [2]RWTH Aachen University - Institut für Theoretische Teilchenphysik und Kosmologie, Aachen, Germany

The precise measurement of the top-quark pair production cross section is one of the main objectives at a future linear collider. By comparison to the theoretical prediction it allows to determine the mass and width of the top quark to very high precision. Near the production threshold the top-quark velocity v is of the same order as the strong coupling α_s and hence Coulomb singularities $(\alpha_s/v)^n$ have to be resummed to all orders, which can be achieved by means of potential NRQCD. We discuss the computation of the NLO P wave Green function which constitutes one part of the complete third-order (NNNLO) result for top-pair production and present a phenomenological analysis of the P wave contribution to top-quark pair production in e^+e^- and $\gamma\gamma$ collisions.

T 59.2 Di 17:00 P15

Single top production in association with 2 jets at NLO QCD — Till Martini, •Stefan Mölbitz, and Peter Uwer — Institut für Physik - AG Phänomenologie der Elementarteilchenphysik jenseits des Standardmodells, Humboldt-Universität zu Berlin

Single top production allows a detailed study of the weak interaction of the top quark. A large fraction of single top quark events is accompanied by additional jets. For precise measurements a solid understanding of $t + 2$-jet production is thus mandatory. Since LO predictions suffer from large scale uncertainties, NLO calculations are required. Furthermore the NLO corrections to $t + 2$-jets are also relevant for the NNLO corrections to single top quark production. In this talk NLO QCD corrections for single top quark production in in association with two jets are presented.

T 59.3 Di 17:15 P15

Next-to-leading-order Weights for Jet Events in Hadron Collisions — •Till Martini — Humboldt Universität zu Berlin, PEP

In leading order there is a direct correspondence between jets and partons: each jet is modeled by a single parton. An improved theoretical prescription can be obtained using higher order predictions. Additional parton emission occuring in higher order corrections leads to an improved modeling of jets. In particular the recombination of two partons to one jet is allowed. Attributing next-to-leading-order weights to these configurations is highly non-trivial since it is not obvious how to uniquely identify the (n+1)-parton phase space contributing to a certain n-Jet phase space point. I demonstrate how this may be achieved and I discuss possible applications of NLO event weights.

T 59.4 Di 17:30 P15

NLO QCD corrections to WH + jet production — Francisco Campanario[2], •Robin Roth[1], and Dieter Zeppenfeld[1] — [1]Institut für Theoretische Physik, Karlsruher Institut für Technologie, Karlsruhe, Deutschland — [2]Theory Division, IFIC, University Valencia-CSIC, Valencia, Spain

WH production is one of the main production mechanisms of the Higgs boson and the only channel where a measurement of the Higgs decay to b quarks is feasible. Analyses in this channel study high-pt (boosted) Higgs bosons to suppress backgrounds. Additional jets contribute especially in the boosted phase space region and can be subject to large QCD corrections.

We present a fully differential calculation of WH + jet production at NLO QCD, which was implemented in the Monte Carlo program VBFNLO. Leptonic decays of the W and off-shell effects are included as well as top loop diagrams in the virtual contributions. The behavior of anomalous couplings is discussed.

T 59.5 Di 17:45 P15

NLO QCD calculations of Higgs production at LHC with GoSam — •Hans van Deurzen — Max Planck Institute for Physics, Munich

GoSam is a framework for the automated calculation of loop diagrams. Over the last year several important processes were calculated at NLO using GoSam for the virtual part. In order to do the full NLO calculation, GoSam is interfaced to several Monte Carlo programs. I will discuss recent results, focussing on Higgs production channels.

T 59.6 Di 18:00 P15

Applications of NLO automation with GoSam — •Johann Felix von Soden-Fraunhofen — Max-Planck-Institut für Physik, München, Germany

Recent developments of the program GoSam for the automated calculation of one-loop amplitudes are presented.

In particular, we show results for a BSM application where QCD corrections to processes involving spin-2 particles are calculated. We also demonstrate the power of the new Binoth Les Houches Accord (BLHA2) interface to Monte Carlo programs by giving various phenomenological examples.

T 59.7 Di 18:15 P15

NNLL Resummation for Squark and Gluino Production at the LHC — Wim Beenakker[1], •Christoph Borschensky[2], Michael Krämer[3], Anna Kulesza[2], Eric Laenen[4], Vincent Theeuwes[2], and Silja Thewes[5] — [1]Theoretical High Energy Physics, IMAPP, Radboud University Nijmegen, The Netherlands — [2]Institute for Theoretical Physics, WWU Münster — [3]Institute for Theoretical Particle Physics and Cosmology, RWTH Aachen — [4]Nikhef Theory Group, Amsterdam, The Netherlands — [5]DESY Theory Group, Hamburg

Precise theoretical predictions for production cross sections of supersymmetric particles are important for searches at the LHC. The occurrence of potentially large logarithmic terms at the production threshold can endanger the perturbative expansion. These terms can be treated systematically to all orders by means of threshold resummation. In my talk, I will shortly present the method of threshold resummation and show the latest results for squark and gluino production cross sections including resummation of soft gluons up to next-to-next-to-leading logarithmic accuracy.

T 59.8 Di 18:30 P15

Effizienzverbesserung der Phasenraumintegration für Vielteilchenendzustände mittels Markov Chain Monte Carlo und Importance Sampling — Kevin Kröninger, Steffen Schumann und •Benjamin Willenberg — II. Physikalisches Institut, Georg-August-Universität Göttingen

Moderne QCD Event-Generatoren wie Sherpa benutzen Importance-Sampling-Methoden zur möglichst effizienten Erzeugung von Phasenraumpunkten für den harten Prozess. Nicht perfekt abgebildete Strukturen des Matrixelements können bei diesen Techniken leicht zu Effizienzeinbußen führen; insbesondere bei steigender Teilchenzahl im Endzustand. Eine Alternative zum Importance-Sampling bietet Markov Chain Monte Carlo (MCMC). MCMC-Methoden zeigen jedoch Schwierigkeiten bei strukturreichen Integranden mit stark separierten Peakstrukturen. Die Folge sind Konvergenzprobleme und eine hohe Korrelation der erzeugten Phasenraumpunkte.

Durch eine geschickte Kombination von Importance-Sampling und MCMC im Framework von Sherpa und dem Bayesian Analysis Toolkit (BAT) gelingt es die Vorteile beider Methoden zu nutzen und die Effizienz der Ereignis-Erzeugung für Vielteilchenendzustände zu verbessern.