T 11: QCD (Theorie) 1

Convenor: Andre Hoang

Zeit: Montag 17:00–19:00 Raum: M109

T 11.1 Mo 17:00 M109

A framework improving the hadronization of QCD currents in TAUOLA and PHOKHARA — •Pablo Roig — IFIC - Instituto de Física Corpuscular: Centro mixto UVEG/CSIC. Edificio Institutos de Investigación. Apartado de Correos 22085 E-46071 Valencia - España — Physikdepartment T30f, Technische Universitaet Muenchen, D-85747 Garching, Germany

We present our study of the hadronization structure of QCD currents leading to decays $\tau \to \pi\pi\nu_\tau$, $\tau \to K\pi\nu_\tau$, $\tau \to 3\pi\nu_\tau$ and $\tau \to KK\pi\nu_\tau$. The pillars of our framework are the $N_C \to \infty$ limit of Large N_C QCD, the chiral structure exhibited at low energies and the asymptotic behaviour of the associated form factors. The couplings of the theory are mostly constrained by the aforementioned procedure and we are able to provide a good phenomenological description of the processes under consideration. Our study is mandatory in order to analyse the data provided by B-factories (Babar, Belle), that are obtaining huge samples of excellent quality, the tau-charm factory BES-III and a foreseen super-B factory.

T 11.2 Mo 17:15 M109

Sherpa - Ein Ereignisgenerator für den LHC — Tanju Gleisberg[1], •Stefan Hoeche[2], Frank Krauss[3], Marek Schoenherr[4], Steffen Schumann[5], Frank Siegert[3] und Jan-Christopher Winter[6] — [1]SLAC, Stanford University, Stanford, USA — [2]Universität Zürich, Zürich, Schweiz — [3]IPPP, Durham University, Durham, Grossbritannien — [4]Technische Universität Dresden, Dresden, BRD — [5]Universität Heidelberg, Heidelberg, BRD — [6]Fermi National Accelerator Laboratory, Batavia, USA

Der Ereignisgenerator Sherpa hat sich während der vergangenen Jahre zu einem vielgenutzten Analysewerkzeug entwickelt. Die Simulation von Standardmodell-Prozessen und neuer Physik an hohen und niedrigen Skalen wird durch mehrere von Grund auf neu konstruierte Module gewährleistet, welche durch Sherpa konsistent zu einem Gesamtpaket verbunden werden.

In diesem Beitrag wird die aktuelle Version von Sherpa präsentiert. Die besonderen Fähigkeiten der einzelnen Module zur Ereigniserzeugung werden diskutiert. Das Hauptaugenmerk bei der Ereignisgeneration für den LHC liegt auf der störungstheoretischen Simulation von QCD und QCD-artigen Ereignissen an hohen Skalen, welche den Grossteil der zu analysierenden Kollisionen dominieren werden. Die korrekte Verbindung von Matrixelementen auf Baumgraphenniveau mit Partonkaskaden ist eine der hervorstechenden Eigenschaften von Sherpa. Diese Möglichkeit zur systematischen Berücksichtigung von reellen Korrekturen höherer Ordnung hat sich als vielseitiges und mächtiges Instrument zur Analyse experimenteller Daten bestätigt.

T 11.3 Mo 17:30 M109

Towards NLO in Sherpa - A Status Report — Jennifer Archibald[1], Tanju Gleisberg[2], Stefan Hoeche[3], Frank Krauss[1], •Marek Schoenherr[4], Steffen Schumann[5], Frank Siegert[1], and Jan Winter[6] — [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 für Theoretische Physik, Universität Zürich, CH-8057 Zürich, Switzerland — [4]Institut für Kern- und Teilchenphysik, TU Dresden, D-01062 Dresden, Germany — [5]Institut für Theoretische Physik, Universität Heidelberg, D-69120, Heidelberg, Germany — [6]Fermi National Accelerator Laboratory, Batavia, IL 60510, USA

The Sherpa Monte Carlo Event Generator is a fully equipped tool for event generation for collider experiments. Although achieving a high level of flexibility by using automated tree-level matrix element generators for the hard interaction and an automated way of combining multiple multileg matrix elements with parton showers via the CKKW method, the accuracy is essentially limited to LO+NLL. Therefore, the next step is to extent the framework for computations at NLO accuracy. While automatic generation of dipole subtraction terms is already available the last missing piece are the one-loop diagrams, which cannot be calculated automatically by any publically available tool yet. Further, the parton showers need to be attached in a consistent way, suitable also for multileg matching. In the talk a short review of the status of the framework for unweighted event generation at NLO+NLL accuracy will be given.

T 11.4 Mo 17:45 M109

Analytic parton showers for WHIZARD — •Sebastian Schmidt — Physikalisches Intitut, Albert-Ludwigs-Universität Freiburg

I present analytic algorithms for initial and final state parton showers that are to be implemented in the WHIZARD event generator. The algorithm for final state radiation is based on the GenEvA algorithm, the algorithm for initial state radiation is a new development. Results and a comparison to PYTHIA are shown.

T 11.5 Mo 18:00 M109

Nagy Soper dipole subtraction scheme — •Tania Robens, Cheng-Han Chung, and Michael Kraemer — RWTH Aachen, Inst. f. Theor. Physik E

In NLO QCD calculations, the infrared divergences are usually regulated using dipole subtraction scheme. In the standard scheme from Catani and Seymour, which is well established and has been used in numerous calculations, the local counterterms need to be recalculated for each emitter/ spectator pair; therefore, this scheme quickly comes to its limitations if the number of final state particles is increased. Following an approach suggested by Zoltan Nagy and Dave Soper, we employ a subtraction scheme with a slightly altered phase space matching such that the number of kinematic transformations is greatly reduced. In addition, the new scheme allows for easy matching with a parton shower using the same splitting functions. We discuss the general setup and the differences with respect to standard subtraction schemes.

T 11.6 Mo 18:15 M109

NLO QCD calculations using an alternative subtraction scheme — •Cheng-Han Chung, Michael Krämer, and Tania Robens — Institut fuer Theoretische Physik E, RWTH Aachen*, D - 52056 Aachen, Germany

For the LHC we will need precise calculations for multi-particle processes; therefore, processes have in general to be calculated at least to NLO precision. The standard subtraction schemes which are used to regularize the infrared divergencies in NLO calculations become numerically inefficient if the number of external legs is increased. We employ an alternative subtraction scheme using Nagy and Soper dipoles, in which the number of dipole calculations is greatly reduced with respect to standard subtraction schemes, for the calculation of NLO QCD and electroweak processes at the LHC and lepton colliders. We compare to results which were obtained using standard dipole subtraction.

T 11.7 Mo 18:30 M109

NLO QCD corrections to tri-boson production at the LHC — •Vera Hankele[1], Francisco Campanario[1,2], Carlo Oleari[3], Stefan Prestel[1], and Dieter Zeppenfeld[1] — [1]Institut für Theoretische Physik, Universität Karlsruhe, Germany — [2]Departament de Fisica Teorica and IFIC, Universitat de Valencia, Spain — [3]Universita di Milano-Bicocca and INFN, Sezione di Milano-Bicocca, Italy

The simulation of triple vector boson production at the LHC is important for two reasons. These processes are a Standard Model background for new-physics searches which are characterized by multi-lepton final states, and secondly they are sensitive to quartic electroweak couplings. In order to correctly interpret the data collected at the LHC, precise theoretical predictions for tri-boson processes are needed.

In this talk the production of three massive vector bosons with subsequent leptonic decay is considered. The calculation of the next-to-leading order QCD corrections for the full $pp \to 6$ lepton production cross sections in hadronic collisions will be sketched. Some details on the implementation into the Monte Carlo program VBFNLO and a short description of the program itself will be given. In addition, cross sections as well as distributions for the LHC will be presented.

T 11.8 Mo 18:45 M109

Simulation of Hjj production via gluon fusion with Herwig++ — •Ken Arnold — Institut für theoretische Physik, Universität Karlsruhe

Gluon fusion processes are the dominant mechanism for Higgs production at the LHC. The azimuthal angle distribution of the two jets in Hjj events provides information about the CP-nature of the Higgs coupling, exploring physics beyond the Standard Model. Due to gluon exchange, there will be substantial hadronic activity besides the two jets which are present in the hard matrix element. Thus, it is important not only to calculate the hard process, but to simulate the whole scattering. The event generator Herwig++ provides an excellent tool to study the remainders of the promising features of Hjj processes after hadronization. Comparisons of different observables will be given between the matrix element level and the event level.