High Precision for Hard Processes at the LHC

Report of Contributions

https://indico.cern.ch/e/430978

Contribution ID: **0** Type: **not specified**

Recursive equations for arbitrary scattering processes

Thursday, 7 September 2006 14:50 (25 minutes)

Presenter: COSTAS PAPADOPOULOS (Demokritos Athens)

Session Classification: Day 2

Contribution ID: **1** Type: **not specified**

Road to the LHC: passing by the Tevatron

Wednesday, 6 September 2006 09:00 (40 minutes)

Author: JOEY HUSTON (Michigan)

Presenter: JOEY HUSTON (Michigan)

Session Classification: Day 1

Contribution ID: **2** Type: **not specified**

Unitarity Cuts and QCD Loop Amplitudes

Wednesday, 6 September 2006 14:50 (25 minutes)

Author: RUTH BRITTO (Amsterdam)

Presenter: RUTH BRITTO (Amsterdam)

Session Classification: Day 1

Contribution ID: **3** Type: **not specified**

Loop amplitudes from MHV diagrams (I)

Wednesday, 6 September 2006 15:35 (25 minutes)

Author: GABRIELE TRAVAGLINI (Queen Mary)

Presenter: GABRIELE TRAVAGLINI (Queen Mary)

Session Classification: Day 1

Contribution ID: **4** Type: **not specified**

Automated QCD calculations at NLO

Wednesday, 6 September 2006 14:25 (25 minutes)

I will discuss various technical aspects related to automated
QCD calculations at NLO:
- the recursive calculation of amplitudes,
- the organization of the colour structures,
- the automated generation of subtraction terms,
- the numerical tensor reduction of loop integrals.

Author: STEFAN WEINZIERL (Mainz)

Presenter: STEFAN WEINZIERL (Mainz)

Session Classification: Day 1

Contribution ID: **5** Type: **not specified**

Computing one-loop amplitudes at the integrand level

Wednesday, 6 September 2006 17:10 (25 minutes)

We show how to extract the coefficients of the 4-, 3-, 2- and 1-point one-loop scalar integrals from the full one-loop amplitude of arbitrary scattering processes. In a similar fashion, also the rational terms can be derived. Basically no information on the analytical structure of the amplitude is required,
making our method appealing for an efficient numerical implementation.

Author: PITTAU, Roberto (Torino)

Presenter: PITTAU, Roberto (Torino)

Session Classification: Day 1

Contribution ID: **6** Type: **not specified**

QCD corrections to vector-boson fusion processes

Wednesday, 6 September 2006 18:00 (25 minutes)

Author: CARLO OLEARI (Bicocca, Milano)

Presenter: CARLO OLEARI (Bicocca, Milano)

Session Classification: Day 1

Contribution ID: **7** Type: **not specified**

Higgs+dijets production at NLO with semi-numerical methods

Wednesday, 6 September 2006 11:00 (25 minutes)

Author: GIULIA ZANDERIGHI (CERN)

Presenter: GIULIA ZANDERIGHI (CERN)

Session Classification: Day 1

Contribution ID: **8** Type: **not specified**

The Unitarity Bootstrap for QCD Loop Amplitudes

Wednesday, 6 September 2006 10:05 (25 minutes)

Author: DAVID KOSOWER (Saclay)

Presenter: DAVID KOSOWER (Saclay)

Session Classification: Day 1

Contribution ID: **9** Type: **not specified**

Latest results from MC@NLO

Wednesday, 6 September 2006 09:40 (25 minutes)

Author: BRYAN WEBBER (Cambridge)

Presenter: BRYAN WEBBER (Cambridge)

Session Classification: Day 1

Contribution ID: **10** Type: **not specified**

Exclusive Drell-Yan production at NN LO

Wednesday, 6 September 2006 16:00 (25 minutes)

I describe a parton-level Monte Carlo calculation of Drell-Yan production at next-to-next-to-leading order. The calculation is performed with a subtraction scheme in which the subtraction term is the squared matrix element itself.

Author: WILLIAM KILGORE (Brookhaven)

Presenter: WILLIAM KILGORE (Brookhaven)

Session Classification: Day 1

Contribution ID: **11** Type: **not specified**

Status of NNLO corrections to e+e- -> 3j

Wednesday, 6 September 2006 16:25 (25 minutes)

Author: THOMAS GEHRMANN (Uni Zurich)

Presenter: THOMAS GEHRMANN (Uni Zurich)

Session Classification: Day 1

Contribution ID: **12** Type: **not specified**

Higgs Production via Gluon Fusion: QCD corrections to Squark Loops

Wednesday, 6 September 2006 17:35 (25 minutes)

The loop-induced processes gg -> h,H,A provide the dominant Higgs boson production mechanisms at the Tevatron and LHC in a large range of the minimal supersymmetric extension of the Standard Model. For squark masses below ˜400 GeV squark loop contributions become important in addition to the top and bottom quark loops. The two-loop QCD corrections to the squark contributions of these processes are determined including the full squark and Higgs mass dependences. They turn out to be of O(10-100%) and thus important for the Tevatron and LHC experiments. Squark mass effects of the K factors can be of O(20-30%).

Author: MICHAEL SPIRA (PSI)

Presenter: MICHAEL SPIRA (PSI)

Session Classification: Day 1

Contribution ID: **13** Type: **not specified**

Can we find a computationally efficient loop algorithm?

Wednesday, 6 September 2006 11:25 (25 minutes)

Even disregarding the intrinsic necessity of some new algorithm for numerical evaluation of one-loop diagrams, and even in case it has no intrinsic necessity at all, a probable decision about its goodness is possible inductively by studying its success. Success here means fruitfulness in consequences, in particular in verifiable consequences, i.e., consequences demonstrable without the new algorithm, whose proofs with the help of the new algorithm, however, are considerably simpler and easier to discover, and make it possible to contract into one proof many different proofs.

Author: GIAMPIERO PASSARINO (Torino)

Presenter: GIAMPIERO PASSARINO (Torino)

Session Classification: Day 1

Contribution ID: **14** Type: **not specified**

Precise predictions for the Higgs-boson decay H -> WW/ZZ -> 4 fermions

Wednesday, 6 September 2006 11:50 (25 minutes)

The decay of the Standard Model Higgs boson into four fermions via a virtual W-boson or Z-boson pair is one of the most important
decay modes in the Higgs-boson search at the LHC. We present a calculation of the first order radiative corrections to these processes, including higher order improvements. The intermediate W- and Z-boson resonances are consistently described using the complex mass scheme, which is explained in the talk. Numerical results for partial decay widths and angular and invariant-mass distributions are shown.

Author: ANSGAR DENNER (PSI Zurich)

Presenter: ANSGAR DENNER (PSI Zurich)

Session Classification: Day 1

Contribution ID: **15** Type: **not specified**

Numerical evaluation of one-loop amplitudes

Wednesday, 6 September 2006 14:00 (25 minutes)

Author: DAVID SOPER (Oregon)

Presenter: DAVID SOPER (Oregon)

Session Classification: Day 1

Contribution ID: **16** Type: **not specified**

Prospects for measurements of hard scattering processes at the LHC

Thursday, 7 September 2006 09:00 (40 minutes)

After a very brief report on the status of the LHC preparations (machine and detectors) I will try to summarize the current understanding of how well specific hard scattering processes can be measured at the LHC, and what the relevance of these measurements is. Examples are the Drell-Yan process, top production, W/Z + jet as well as inclusive jet production.

Author: GUENTHER DISSERTORI (ETH Zurich)

Presenter: GUENTHER DISSERTORI (ETH Zurich)

Session Classification: Day 2

Contribution ID: **17** Type: **not specified**

Techniques for one-loop tensor integrals in many-particle processes

Thursday, 7 September 2006 14:00 (25 minutes)

In the calculation of NLO corrections to multi-leg processes serious numerical problems arise in the commonly used Passarino-Veltman reduction of tensor to scalar integrals in exceptional phase-space configurations.
In this talk two alternative methods are discussed solving this problem.
One of the methods relies on a seminumerical approach, in which a specific tensor coefficient is evaluated numerically, replacing the standard scalar integral in the list of basis integrals. The other method makes use of expansions in terms of small Gram and (if needed) other kinematical determinants. Both procedures have been successfully applied to the NLO electroweak corrections to e+e- –> 4fermions.

Author: STEFAN DITTMAIER (MPI, Munich)

Presenter: STEFAN DITTMAIER (MPI, Munich)

Session Classification: Day 2

Contribution ID: **18** Type: **not specified**

Higgs + 2 jet signals from gluon fusion

Thursday, 7 September 2006 14:25 (25 minutes)

Author: DIETER ZEPPENFELD (Karlsruhe)

Presenter: DIETER ZEPPENFELD (Karlsruhe)

Session Classification: Day 2

Contribution ID: **19** Type: **not specified**

Computing one-loop amplitudes at the integrand level

We show how to extract the coefficients of the 4-, 3-, 2- and 1-point one-loop scalar integrals from the full one-loop amplitude of arbitrary scattering processes. In a similar fashion,
also the rational terms can be derived. Basically no information on
the analytical structure of the amplitude is required, making our
method appealing for an efficient numerical implementation

Author: ROBERTO PITTAU (Torino)

Presenter: ROBERTO PITTAU (Torino)

Contribution ID: **20** Type: **not specified**

NLO corrections to $pp/pbarptotbart + jet + X$

Thursday, 7 September 2006 15:35 (25 minutes)

Author: PETER UWER (CERN)

Presenter: PETER UWER (CERN)

Session Classification: Day 2

Contribution ID: **21** Type: **not specified**

Threshold resummation for high-transverse-momentum Higgs production

Thursday, 7 September 2006 16:00 (25 minutes)

We perform the all-order resummation of large logarithmic(NLL)
QCD corrections for the process pp ->H+ X when the Higgs boson H is
produced at high transverse momentum.

Author: DANIEL DE FLORIAN (Buenos Aires)

Presenter: DANIEL DE FLORIAN (Buenos Aires)

Session Classification: Day 2

Contribution ID: **22** Type: **not specified**

Soft-gluon effects in WW production at hadron colliders

Thursday, 7 September 2006 17:10 (25 minutes)

Author: MASSIMILIANO GRAZZINI (INFN, Firenze)

Presenter: MASSIMILIANO GRAZZINI (INFN, Firenze)

Session Classification: Day 2

Contribution ID: **23** Type: **not specified**

PDF issues at LHC

Thursday, 7 September 2006 09:40 (25 minutes)

Author: W. JAMES STIRLING (Durham)

Presenter: W. JAMES STIRLING (Durham)

Session Classification: Day 2

Contribution ID: **24** Type: **not specified**

Madgraph beyond the Standard Model

Thursday, 7 September 2006 17:35 (25 minutes)

Madgraph and Madevent are a well established tool to evaluate tree-level amplitudes and create unweighted events for processes with a large number of external particles at the LHC. For the Madgraph collaboration I review the status, some physics complications and recent calculations of Madgraph/Madevent for physics beyond the Standard Model.

Author: TILMAN PLEHN (Edinburgh)

Presenter: TILMAN PLEHN (Edinburgh)

Session Classification: Day 2

Contribution ID: **25** Type: **not specified**

The GOLEM project: status and applications

Thursday, 7 September 2006 16:25 (25 minutes)

In this talk I review the status of our GOLEM project. The acronym stands for "General One-Loop Evaluator of Matrix-elements". This tool is designed to allow for an efficient and numerically stable evaluation of multi-particle one-loop amplitudes which are needed for the precise description of numerous processes relevant for the upcoming LHC. First applications are presented.

Author: THOMAS BINOTH (Edinburgh)

Presenter: THOMAS BINOTH (Edinburgh)

Session Classification: Day 2

Contribution ID: **26** Type: **not specified**

The two-loop anomalous dimension matrix for soft gluon exchange

Thursday, 7 September 2006 10:05 (25 minutes)

Resummation of soft-gluon exchange for QCD hard scattering
requires an anomalous dimension matrix in color space.
We compute this matrix directly for arbitrary massless
processes for the first time at two loops, and
show that it is proportional to the one-loop matrix.
This result reproduces the 1/eps pole terms in previous explicit
two-loop computations, and predicts such terms for arbitrary processes.
The proportionality of the one- and two-loop matrices
also makes it possible to resum in closed form the
next-to-next-to-leading logarithms for arbitrary processes.

Author: LANCE DIXON (SLAC)

Presenter: LANCE DIXON (SLAC)

Session Classification: Day 2

Contribution ID: **27** Type: **not specified**

Multi-loop parton distributions for large and small x

Thursday, 7 September 2006 11:25 (25 minutes)

Author: GIUSEPPE MARCHESINI (Bicocca, Milano)

Presenter: GIUSEPPE MARCHESINI (Bicocca, Milano)

Session Classification: Day 2

Contribution ID: **28** Type: **not specified**

Recent progress in splitting functions

Thursday, 7 September 2006 11:00 (25 minutes)

Author: SVEN MOCH (DESY Zeuthen)

Presenter: SVEN MOCH (DESY Zeuthen)

Session Classification: Day 2

Contribution ID: **29** Type: **not specified**

NLO + Shower: a new approach

Thursday, 7 September 2006 11:50 (25 minutes)

Author: PAOLO NASON (Bicocca, Milano)

Presenter: PAOLO NASON (Bicocca, Milano)

Session Classification: Day 2

Contribution ID: **30** Type: **not specified**

Beyond the Standard Model Physics at the LHC

Friday, 8 September 2006 09:00 (40 minutes)

Author: ALEX POMAROL (Barcelona)

Presenter: ALEX POMAROL (Barcelona)

Session Classification: Day 3

Contribution ID: **31** Type: **not specified**

All-multiplicity amplitudes in QCD

Friday, 8 September 2006 14:00 (25 minutes)

I will discuss the construction of amplitudes at one-loop in QCD using the unitarity bootstrap approach. I will detail the techniques needed to build the rational contributions to these amplitudes as well as highlighting not only their application to fixed-multiplicity amplitudes but also to all-multiplicity amplitudes.

Author: DARREN FORDE (Saclay)

Presenter: DARREN FORDE (Saclay)

Session Classification: Day 3

Contribution ID: **32** Type: **not specified**

The Rational Part of QCD Amplitudes

Friday, 8 September 2006 14:25 (25 minutes)

Author: CHUAN-JIE ZHU (Beijing)

Presenter: CHUAN-JIE ZHU (Beijing)

Session Classification: Day 3

Contribution ID: **33** Type: **not specified**

A subtraction scheme for cross sections at NNLO

Friday, 8 September 2006 15:35 (25 minutes)

Author: VITTORIO DEL DUCA (INFN, Torino)

Presenter: VITTORIO DEL DUCA (INFN, Torino)

Session Classification: Day 3

Contribution ID: **34** Type: **not specified**

Towards event shapes by NNLO subtraction

Friday, 8 September 2006 16:00 (25 minutes)

Author: GABOR SOMOGYI (Debrecen)

Presenter: GABOR SOMOGYI (Debrecen)

Session Classification: Day 3

Contribution ID: **35** Type: **not specified**

Prospects for the Future

Friday, 8 September 2006 17:10 (1 hour)

Author: ZVI BERN (UCLA)

Presenter: ZVI BERN (UCLA)

Session Classification: Day 3

Contribution ID: **36** Type: **not specified**

A new method to compute multileg one-loop cross sections

Friday, 8 September 2006 10:05 (25 minutes)

Author: STEFANO CATANI (INFN, Firenze)

Presenter: STEFANO CATANI (INFN, Firenze)

Session Classification: Day 3

Contribution ID: **37** Type: **not specified**

The dipole-antenna approach to shower monte carlo's

Friday, 8 September 2006 09:40 (25 minutes)

Author: WALTER GIELE (Fermilab)

Presenter: WALTER GIELE (Fermilab)

Session Classification: Day 3

Contribution ID: **38** Type: **not specified**

Techniques and Results for Supergravity Calculations

Friday, 8 September 2006 16:25 (25 minutes)

The recent progress for calculating gauge theory amplitudes may also be applied to gravity calculations. We find surprising similarities between the perturbative expansions of maximally supersymmetric Yang-Mills and gravity theories. We discuss possible implications of these results for the UV behaviour of supergravity in D=4.

Author: DAVID DUNBAR (Swansea)

Presenter: DAVID DUNBAR (Swansea)

Session Classification: Day 3

Contribution ID: **39** Type: **not specified**

Twistor Inspired Higgs Phenomenology

Friday, 8 September 2006 11:00 (25 minutes)

We discuss how the twistor inspired methods can be used to derive compact expressions for multi-parton amplitudes involving Higgs bosons (in the limit that the top quark mass is heavy producing an effective Higgs-gluon interaction).

Author: NIGEL GLOVER (Durham)

Presenter: NIGEL GLOVER (Durham)

Session Classification: Day 3

Contribution ID: **40** Type: **not specified**

Loop amplitudes from MHV diagrams (II)

Friday, 8 September 2006 11:25 (25 minutes)

Author: ANDREAS BRANDHUBER (Queen Mary)

Presenter: ANDREAS BRANDHUBER (Queen Mary)

Session Classification: Day 3

Contribution ID: **41** Type: **not specified**

Reduction with spinor formalism

Friday, 8 September 2006 11:50 (25 minutes)

Author: BO FENG (Imperial College)

Presenter: BO FENG (Imperial College)

Session Classification: Day 3

Contribution ID: **42** Type: **not specified**

On the IR singularities of massive QCD amplitudes beyond one loop

Friday, 8 September 2006 14:50 (25 minutes)

Author: ALEXANDER MITOV (DESY Zeuthen)

Presenter: ALEXANDER MITOV (DESY Zeuthen)

Session Classification: Day 3