MC group meeting - 8 June 09

Announcements

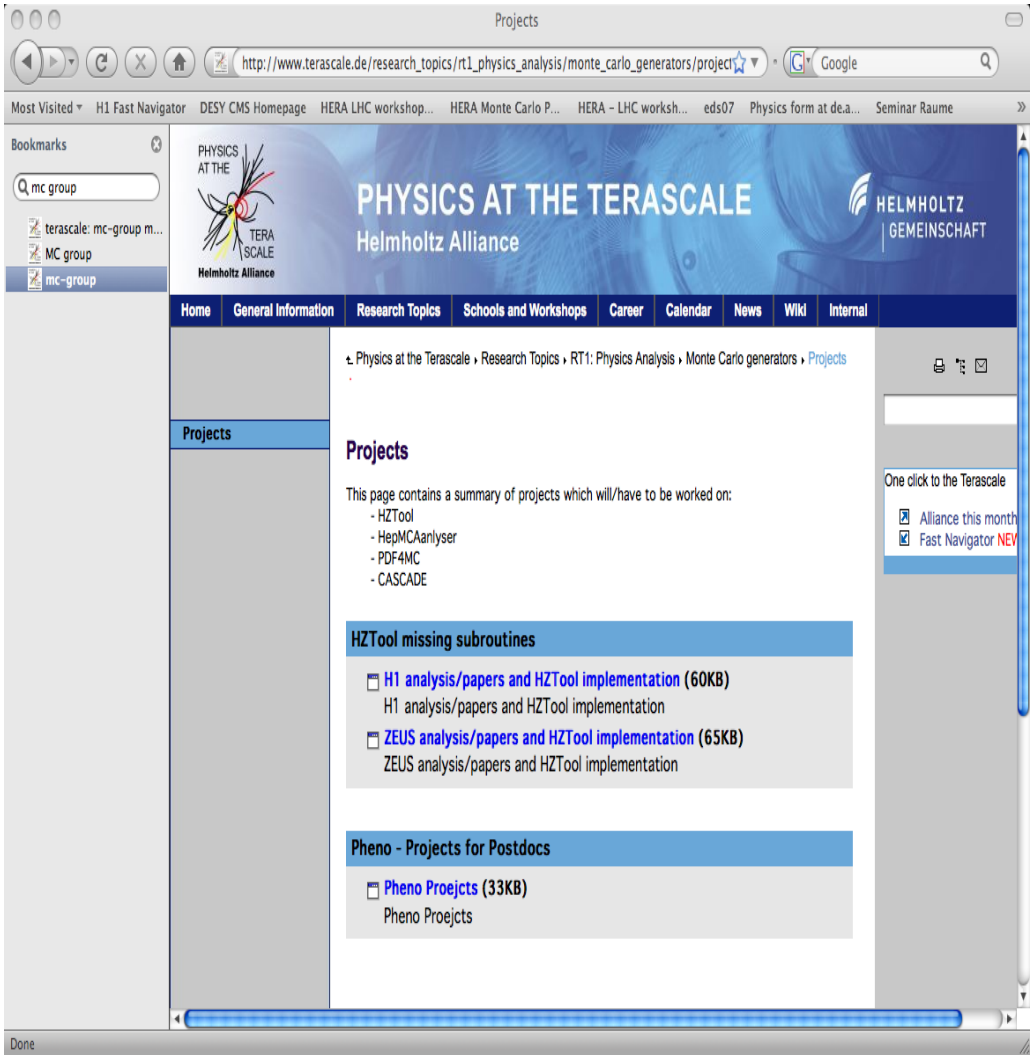
Institute on parton shower and resummation

- Summary report by Zoltan last tuesday
- Quite successful, many very interesting and fruitful discussions
- Topics are along the lines of our program:
  - systematic understaning of PS
  - systematic understanding of kinematics
  - x-check with analytical resummation
- will have proceedings !!!!!

Studentships and Postdoc - projects

- possibility of 1-3 months studentships
  - herwig/herwig++ PDF4MC
  - pythia/herwig Tevatron tunes with PDF4MC
  - CASCADE:
    - DY implementation
    - associate Higgs production
    - NLO ttbar → kt-factorisation
    - UE event tunes with UA5 underlying event model
    - MPI tunes
- longer term projects (postdocs):
  - ➔ MC@NLO with PYTHIA (instead of HERWIG) for HERA and LHC
  - ➔ CASCADE and collinear NLO calculations
  - ➔ PDF4MC with neural network approach for initial conditions
  - ➔ MC validation with GENSER and HepMCAnalyser

Projects page



- MC@NLO with PYTHIA (instead of HERWIG) for HERA and LHC

MC@NLO is a MC generator combining a full NLO calculation with parton showers and hadronisation, using herwig for the parton showering and hadronisation. However to correctly calculate the effect and corrections which come from the parton showering and hadronisation it would be desirable to have MC@NLO also using PYTHIA for parton shower and hadronisation.
The MC subtraction terms have to be calculated for the PYTHIA parton shower case and then implemented into MC@NLO. The implementation should be done for the ep and pp case.
A person with experience with MC@NLO should be able to perform the calculations within 1-2 years. It would require close contact with the MC@NLO group at CERN as well as close interaction with T. Sjostrand in Lund.

- CASCADE and collinear NLO calculations

Using unintegrated pdfs and the frame of kt-factorization is a way to estimate higher order corrections. This approach is now being used to estimate the higher order corrections for Higgs, DY and heavy flavor production at LHC (see papers by S. Marzani and R. D. Ball, High Energy Resummation of Drell-Yan Processes, Nucl. Phys., B814:246–264, 2009. S. Marzani, R. D. Ball, V. Del Duca, S. Forte, and A. Vicini, Higgs production via gluon-gluon fusion with finite top mass beyond next-to-leading order, Nucl. Phys., B800:127–145, 2008.)
The correction to the kinematics coming from higher order corrections is highly reduced when using uPDFs, resulting in smaller correction factors.
A systematic study has to be performed to identify those terms which are common in the kt-factorization formulae and in the collinear NLO calculations.
The aim is to improve the implementation of processes in CASCADE to consistently include NLO corrections making it a elegant and useful program for the main QCD processes at LHC.
A person with experience in uPDFs and/or NLO calculations should be able to perform this study within 1-2 years

- PDF4MC with neural network approach for initial conditions

The PDF4MC project will release the first PDF set for PYTHIA during summer 2009. However systematic studies are needed to bring this into a generally accepted PDF set. Proposals during the "Parton Shower and Resummation Institute" have been made to modify the the evolution equation (still keeping the overall structure) to allow for kinematic effect. In addition to this modification the effect and bias of the specific choice of the starting distribution has to be investigated. Promising results are being obtained from the NNPDF group in the frame of collinear NLO PDFs.
A similar approach can be performed with PDF4MC allowing for a realistic estimate of the uncertainties of the PDF4MC. A person with experience in computing and neural networks and with evolution equations should be able to perform the studies within 1-2 years. A close collaboration with the NNPDF group is necessary

HERA analysis - HZtool

- Many routines and analysis are still missing... help is needed

DESY Nr	hepph	Title	area	hztool relevant	implemented
DESY-08-173		General Search for New Phenomena at HERA		no	no
DESY-08-172	arXiv:0901.0477	Inclusive Photoproduction of rho^0,K^{*0} and \phi Mesons at HERA	jet	yes	
DESY-08-170		Events with Isolated Leptons and Missing Transverse Momentum and Measurement of W Production at HE		no	
DESY-08-095	arXiv:0810.4036	Strangeness Production at low Q^2 in Deep-Inelastic ep Scattering at HERA	jet	yes	
DESY-08-080	arXiv:0808.1003	Study of Charm Fragmentation into D^{*\pm} Mesons in Deep-Inelastic Scattering at H	heavy quarks	yes	
DESY-08-077	arXiv:0810.3096	Measurement of Diffractive Scattering of Photons with Large Momentum	diffraction	yes	
DESY-08-065		Multi-Lepton Production at High Transverse Momenta in ep Collisions at HERA		no	
DESY-08-053	arXiv:0805.2809	Measurement of the Proton Structure Function FL(x,Q2) at Low x	inclusive	yes	
DESY-08-052		Search for Excited Electrons in ep Collisions at HERA		no	
DESY-08-009		A Search for Excited Neutrinos in e-p Collisions at HERA		no	
DESY-07-200	arXiv:0711.2606	Three- and Four-jet Production at Low x at HERA	jet	yes	
DESY-07-147		Measurement of Isolated Photon Production in Deep-Inelastic Scattering at HERA	jet	yes	
DESY-07-142	arXiv:0709.4114	Measurement of Deeply Virtual Compton Scattering and its t-dependence at HERA	diffraction	yes	
DESY-07-115	arXiv:0708.3217	Dijet Cross Sections and Parton Densities in Diffractive DIS at HERA	diffraction	yes	
DESY-07-073		Measurement of Inclusive Jet Production in Deep-Inelastic Scattering at High Q^2 a	jet	yes	
DESY-07-065	arXiv:0706.2456	Charged Particle Production in High Q2 Deep-Inelastic Scattering at HERA	jet	yes	
DESY-07-045		Search for Baryonic Resonances Decaying to Xi pi in Deep-Inelastic Scattering at HEF	jet	yes	
DESY-07-018	hep-ex/0703022	Tests of QCD Factorisation in the Diffractive Production of Dijets in Deep-Inelastic Scat	diffraction	yes	
DESY-07-009		Search for Lepton Flavour Violation in ep collisions at HERA		no	
DESY-06-240	hep-ex/0701023	Production of D*-Mesons with Dijets in Deep-Inelastic Scattering at HERA	heavy quarks	yes	my

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full list available on web page: projects

HERA analysis - HZtool

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DESY NR	Title	area	hztool relevant	implemented author
DESY-09-036 (March	Exclusive Photoproduction of Upsilon Mesons at HERA	diffraction	yes	
DESY-08-210 (Decen	Measurement of Beauty Photoproduction using Decays into Muons in Dijet	heavy quarks	yes	
	Measurement of the charm fragmentation function in D photoproduction at	heavy quarks	yes	
DESY-08-202 (Decen	Measurement of High-Q^2 Neutral Current Deep Inelastic e^- Scattering C	inclusive	yes	
DESY-08-201 (Decen	Measurement of D^\pm and D^0 Production in Deep Inelastic Scattering U	heavy quarks	yes	
DESY-08-178 (Decen	Subjet Distributions in Deep Inelastic Scattering at HERA	jets	yes	
DESY-08-177 (Decen	Measurement of Charged Current Deep Inelastic Scattering Cross Section	inclusive	yes	
DESY-08-176 (Decen	Leading Proton Production in Deep Inelastic Scattering at HERA	diffraction	yes	
DESY-08-175 (Decen	Deep Inelastic Scattering with Leading Protons or Large Rapidity Gaps at I	diffraction	yes	
DESY-08-132 (Decen	A Measurement of the Q^2, W and t Dependences of Deeply Virtual Comp	diffraction	yes	
DESY-08-129 (Septer	Measurement of beauty production from dimuon events at HERA	heavy quarks	yes	
DESY-08-100 (July 2(	Angular correlations in three-jet events in ep collisions at HERA	jets	yes	
DESY-08-093 (July 2(	Production of excited charm and charm-strange mesons at HERA	heavy quarks	yes	
DESY-08-089 (July 2(	Search for events with an isolated lepton and missing transverse momentum and a meas		no	
DESY-08-068 (June 2	Inclusive K0_SK0_S resonance production in ep collisions at HERA	jets	yes	
DESY-08-056 (May 2(	Beauty photoproduction using decays into electrons at HERA	heavy quarks	yes	
DESY-08-036 (March	Energy dependence of the charged multiplicity in deep inelastic scattering	jets	yes	
DESY-08-024 (Febru	Mulit-jet cross sections in charged current e^+-p scattering at HERA	jets	yes	
DESY-08-011 (Febru	Deep inelastic inclusive and diffractive scattering at Q^2 values from 25 to	diffraction	yes	
DESY-07-161 (Septer	Diffractive photoproduction of dijets in ep collisions at HERA	diffraction	yes	

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full list available on web page: projects

LHAPDF questionaire

1. How are you using LHAPDF?
* Showered & hadronised MC event generation (private)
* Showered & hadronised MC event generation (large-scale production)
* Fixed order MC calculation
* Other (please specify)

2. What code interface do you use to access LHAPDF?
* LHAPDF Fortran
* LHAGLUE Fortran (like PDFLIB, used in e.g. Pythia 6)
* C++ wrapper
* Python wrapper
* lhapdf-query script

3a. If using Fortran, do you access LHAPDF common blocks directly?

3b. If you answered yes to 3a, which ones?
* PDFLIB w50511, w50512, w50513
* LHAPDF LHAPARM
* Other (please specify)

4. If you can provide us with any code snippets of your typical LHAPDF use, particularly if you answered yes to question 3, please attach them to your reply.

M. Whalley
19. May 2009

We should/must reply....

Still waiting for comments from some people .....

Important Dates

- Terascale annual meeting: 11 – 13 Nov
- Terascale & Anacenter & MC group evaluation: November 2009

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