QCD group introduction and projects

J. Huston, for the QCD conveners

QCD group

- Most of the tools we want to produce/develop in this workshop are QCD-related
  - ME/MC generation
  - NLO
  - jet algorithms
  - pdf's and pdf uncertainties
  - …
  - I don't even know why people are going to the other groups

    -my ed. comment

- Note that there have been a series of previous meetings organized by Steve Mrenna and myself dealing with these types of issues for Run 2
  - cepa.fnal.gov/patriot/mc4run2/index.html

Physics group goals

- QCD
  - pdf's and event classification
    - extraction of pdf's purely at high-momentum transfers
    - establishment of jet contracts between experiments and theorists
    - subtleties and practicalities of jet algorithms
  - hard scattering and hadronization
    - testing of matrix element-parton showering matching
    - underlying event tunes and model development
    - tests of hadronization and tunes/universality of tunes

- Top and Electroweak
  - top production and decay
  - analysis techniques
  - improved tagging strategies

great deal of overlap

…and that's why much of our time here will be in joint meetings

Conveners and info

- QCD conveners
  - F. Chlebana, S. Ellis, W. Giele, J. Huston, W. Kilgore, S. Mrenna, W-K. Tung, M. Wobisch, M. Zielinski
- Group website
  - www.pa.msu.edu/~huston/tev4lhc/wg.htm

- Sub-groups
  - PDF's and PDF Uncertainties at the Tevatron and LHC
  - Jet Algorithms and Event Structure
  - Matrix element/Monte Carlo/NLO matching
  - Hadronization Corrections and UE tunes
  - Diffractive Physics

Information available on the webpage for signing up

Jet Projects

1. inclusion of jet production in MC@NLO

   Steve Ellis,Bill Kilgore, Stefano Frixione, Joey Huston

2. jet algorithms at the Tevatron and LHC

   -impact of negative towers: to remove or not to remove, the D0 experience

   -impact of splitting/merging - understanding the effects of splitting/merging at the parton and hadron level

   -impact on boosted systems, e.g. W->jj in high p_T top

   -understanding differences observed in jet reconstruction between CDF and D0 environments

   -utility of new algorithms such as JEF for final state reconstruction

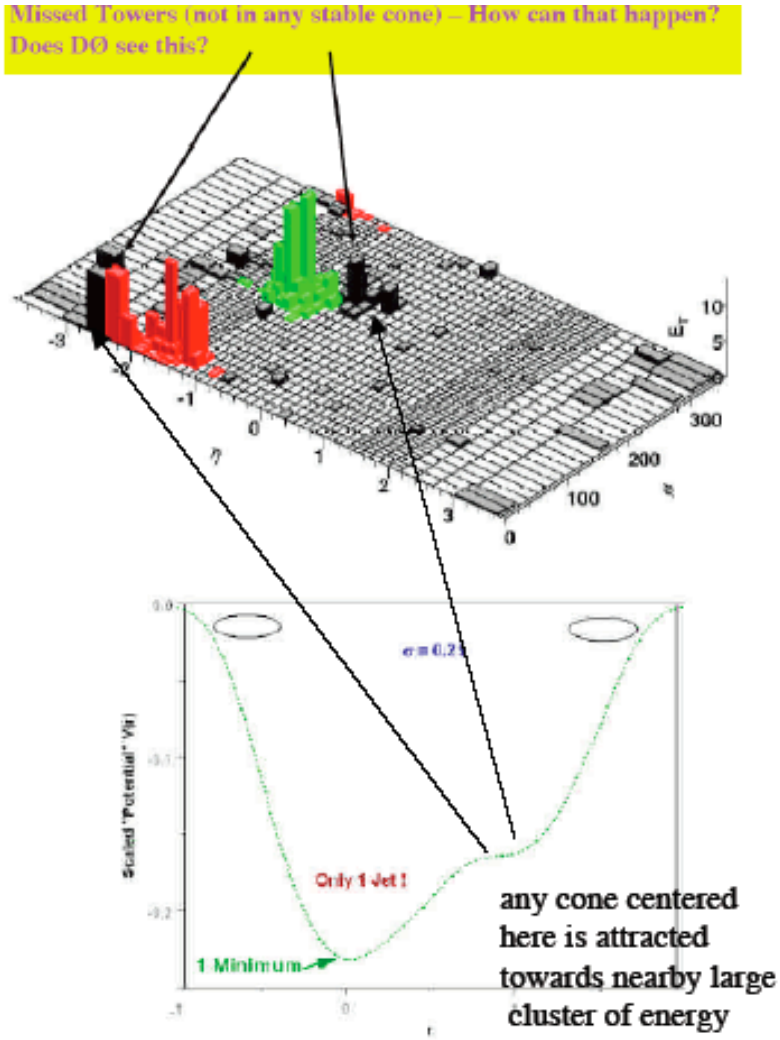
   -reconstruct sample of MC events that produce problems in the CDF environment (see website)

   - A stand-alone CDF Fortran/C++ jet clustering routine is available here.
   - Some descriptive text from Matthias Tonnesmann is available here.
   - The Monte Carlo events that resulted in "fat jets" or "dark towers" in the CDF clustering are available here (along with some descriptive text from Matthias).

   Frank Chlebana, Steve Ellis, Joey Huston, Alison Lister, Matthias Tonnesmann, Marek Zielinski

Jet clustering

- Run II analyses in CDF and D0 use both cone and k_T jet algorithm
- CDF has used both JetClu (Run I) and midpoint (Run II) algorithms; D0 solely midpoint
  - subtle issues (and solutions) regarding use of midpoint algorithm
  - See hep-ph/0111434, S. Ellis, J. Huston, M. Tonnesmann, *On Building Better Cone Jet Algorithms*



Jet Projects

3. UE subtraction

-definition of UE + uncertainty for comparisons of data to NLO

-impact of ISR on jets and jet predictions

-operation in high multiple interaction environment

Rick Field, Joey Huston, Peter Skands

PDF projects

1. validity of NLO formalism/road to NNLO

   Joey Huston, Pavel Nadolsky

2. benchmarks for NLO/NNLO fits

   Joey Huston, Pavel Nadolsky

3. pdf uncertainties

   -universal delta_chisquare

   -pdf weighting; impact of Sudakov FF's

   -embedding LHAPDF into programs

   Stefan Gieseke, Joey Huston, Pavel Nadolsky, Dimitri Bourilkov, Peter Skands

4. inclusion of Tevatron data in global fits -"back-of-the-envelope" studies

   -W+c

   -gamma +b/c

   -Z+b

   Frank Chlebana, Mario Campanelli, Joey Huston, Pavel Nadolsky

5. W as a benchmark at both Tevatron and LHC

   Joey Huston, Pavel Nadolsky, Dimitri Bourilkov

6. heavy flavor pdf's and their uncertainties

   Pavel Nadolsky

ME/MC projects

1. W + jets comparisons at the Tevatron->predictions for the LHC

   -NLO->MCFM

   -CKKW

   -Mrenna

   -Sherpa

   -backgrounds to WW->H, the "Zeppenfeld plots"

   -jet shapes/comparisons to CKKW

   John Campbell, Ben Cooper, Joey Huston, Rachid Mazini, Steve Mrenna, Dave Waters, Dieter Zeppenfeld

2. parton shower/resummation

   -predictions for tt, Higgs

   -impact of new parton shower algorithms

   Joey Huston, Steve Mrenna, Peter Skands, Torbjorn Sjostrand

UE/hadronization topics

1. UE tunes for Tevatron->predictions for LHC

   -understanding color connections and their apparent promiscuity
   -Pythia 6.3

   -Jimmy

   Rick Field, Peter Skands

2. hadronization corrections for NLO processes

3. ISR/UE corrections->subtractions for NLO

   Rick Field, Joey Huston

4. understanding high interaction multiplicity environment

More info on project results on the webpage TeV4LHC

- Goals of QCD working group
- Steve Mrenna's summary talk at Sept meeting
- Seminar on TeV4LHC and HERALHC given by Joey Huston at MSU

- ..plus hoping for a lot of progress during this meeting

Thursday agenda

Parallel Session I: Thursday 1:30-3:30 pm (joint with top-EW WG)

Large Seminar Room

30'+5'	W/Z rapidity distributions at NNLO QCD	Kirill Melnikov
30'+5'	Multiple photon corrections (and more) to single W and Z production	Carlo Carloni Calame
20'+5'	Theoretical model for nonperturbative pT contributions	Pavel Nadolsky
15'+5'	Heavy flavor pdf uncertainties and Higgs production	Chris Jackson

Parallel Session II: Thursday 4:00-6:00 pm Small Seminar Room

<30'	Introduction/discussion of group projects	Joey Huston
20'+10'	Jet Algorithms in ATLAS	Peter Loch
10'	Introductory comments on diffraction	Mike Albrow
20'+10'	Diffraction from CDF2LHC	Dino Goulianos
15'+5'	Exclusive dijets from CDF2LHC	Michele Gallinaro

Friday agenda

Parallel Session III: Friday 1:30-3:30 pm (joint with top-EW WG) Large Seminar Room

20'+10'	Single top production	Steve Ellis
20'+10'	Single top at the Tevatron	Gordon Watts
20'+10'	ME/MC matching in D0	Michael Begel
20'+10'	Sudakov uncertainties and Monte Carlos	Stefan Gieseke

Parallel diffractive session: Friday 1:30-3:30 pm Room 2-160

15'+5'	Diffractive and DPE production of hard color singlets	Mike Albrow
15'+5'	Tests of QCD and the BFKL Pomeron with forward jets	Christophe Royon
15'+5'	Inelastic diffraction at heavy ion colliders	Sebastian White
15'+5'	Dynamics of small impact parameter pp collisions	Mark Strikman
15'+5'	Gap survival and transverse structure of the nucleon	Christian Weiss

Parallel Session IV-1: Friday 4:00-5:20 pm Room 3-192

20'	Diffractive physics at D0	Andrew Brandt
30'	Diffraction beyond the Standard Model	Albert de Roeck
20'	s-dependent studies at the Tevatron and LHC	Greg Snow

Parallel Session IV-2: Friday 5:20-6:00 pm Small Seminar Room

40'	Working group topics

You're all wondering, How can I enlist?

- Four listserver mailing groups have been set up:

  tev4lhc-qcd
  tev4lhc-higgs
  tev4lhc-topew
  tev4lhc-landscape

- If you would like to subscribe to the working groups, here are the instructions:
  - To subscribe to a mailing list called MYLIST

    1. Send an e-mail message to listserv@fnal.gov
    2. Leave the subject line blank
    3. Type "SUBSCRIBE MYLIST FIRSTNAME LASTNAME" (without the quotation marks) in the body of your message.

Another workshop

TeV4LHC

- Physics at TeV Colliders
  - From 800 pb^{-1} at the Tevatron to 30 fb^{-1} at the LHC
  - May 2-20
    - right after CERN meeting of TeV4LHC
- 2 main working groups
  - SM and Higgs
  - BSM and Higgs modeling

note catchy new logo seen for the first time at CERN here