Welcome

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Fermilab
September 16-18, 2004

- Goals
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- Proceedings

First Meeting 16 - 18 Sept. '04 Fermilab • Midterm meetings at Brookhaven & CERN • Final meeting at Fermilab, Fall '05

TeV4LHC WORKSHOP

Using the data & experience from the Tevatron to prepare for the LHC

TeV4LHC Organizing Committee:
Georges Azuelos (U. Montreal)
Ulrich Baur (SUNY at Buffalo)
Marcela Carena, Chair (FNAL)
Sally Dawson (BNL)
Dan Green (FNAL)
Ian Hinchliffe (LBL)
Young-Kee Kim (U. Chicago)
Joe Lykken (FNAL)
Stephen Mrenna (FNAL)
Heidi Schellman (Northwestern)
John Womersley (FNAL)

Working Groups
QCD, Top & Electroweak Physics, Higgs, and Physics Landscape.

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Information & Registration: http://conferences.fnal.gov/tev4lhc/

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The Purpose:

Use TeVatron data and experience to prepare for the LHC.
Identify areas where further theoretical work is needed.

TeVatron → LHC

**** improved event modelling and theoretical understanding of cross sections for signals and backgrounds***

**** experience with real problems***

LHC → TeVatron

**** Determine where current LHC prospects are strongly dependent on simulations/extrapolations***

**** Identify difficult analyses at LHC to investigate them at the TeVatron***

The Workshop will combine Talks and Working Sessions, with the idea of initiating specific projects in these areas .

Connect TeVatron and LHC people to work on these projects.

Organization

4 Major Working Groups

- **QCD**
- **Top-Electroweak**
- **Higgs**
- **Physics Landscape**

Overlap in topics is unavoidable.

Some joint working group sessions.

QCD

The Mother of All Backgrounds

[Giele, Kilgore, Mrenna]

PDFs and Event Classification

[Chlebana (CDF), Wobisch (D0), S. Ellis (TH), Tung (TH)]

* *How does TeV data influence PDF picture at the LHC?*
* *Are there clever ways to increase the kinematic weight of TeVatron data?*
* *Will there be unambiguous and validated jet algorithms for the LHC?*
* *Which jet algorithms "work best" at the TeVatron?*
* *. . .*

Hard Scattering and Hadronization

[Huston (CDF), Zielinski (D0), SM (TH)]

* *How well do our tools describe data?*
* *Where is improvement needed?*
* *Do we have decent models of the Underlying Event and Hadronization?*
* *How universal are the tunes (TeVatron -> LHC ?)*
* *. . .*

Top-Electroweak

Yesterday's Measurement/Today's Background

[Gerber (D0), Thomson (CDF), Tait (TH), Wackenroth (TH)]

Top Production

* *What are the main systematic errors to M(top) measurement?*
* *How do we see Single Top production?*

W + Jets

* *How to validate and use NLO calculations?*
* *Matrix Element and Parton Shower matching?*

Top as a Background

* *How well do we need to (can we) understand Top + Jets production?*

M(W)

* *Which kinematic methods work best at the TeVatron?*
* *What is needed to increase precision? QED, QCD corrections?*

Other

* *W/Z as Luminosity monitors?*
* *. . .*

Higgs

The first goal of the LHC

[Iashvili (D0), Dominguez (CDF), Willenbrock(TH)]

* ***Can LHC Higgs physics benefit from TeVatron experience with***
  - ***W/Z+h->b pairs ,***
  - ***b tagging*** *(rejecting charm/light-quarks and gluons),*
  - ***M(bb) resolution***
  - ***Top pair reconstruction*** *(for ttH production)*
  - ***SUSY Higgs searches in multi-b channels***
  - ***forward jet reconstruction*** *(to tag vector-boson-fusion processes)*

* *Can advanced analysis techniques help us optimize Higgs physics at LHC?*

* *What theoretical calculations are needed to improve our predictions of signals and backgrounds at the TeV/LHC, and to improve our modeling?*

* *Are there signals for SM and Beyond SM Higgs that we have overlooked***?**

Physics Landscape

A Window to the Unknown

[Demina (D0), Schmitt (CDF), Dobrescu (TH), Rainwater (TH)]

How do the solutions to analysis problems for searches at the Tevatron generalize to the LHC?

- ***Are current TeVatron background techniques adequate for the LHC?***
- ***What new analysis ideas can be tested at the TeVatron***
  (e.g., NNs, specialized jet reconstruction and
  energy flow algorithms, signature-based searches)

How will measurements and searches at the TeVatron constrain new theoretical ideas relevant for the LHC?

- ***Impact of Z-primes and W-primes searches?***
- ***Constraints on SUSY parameter space from searches?***
- ***Improved measurements of M(top) and M(W)?***
- ***How are the Tevatron and the LHC complementary?***

Future Meetings

Full (all working groups)

Brookhaven (Feb 3-5, 2005)
CERN (end of April 2005)
Fermilab (Fall 2005)

Individual groups are encouraged/expected to have intermediate meetings

Proceedings

* *Write-ups by Working Groups*

* *Similar to format of Run2 Workshops*

* *Post on (hep-ph/hep-ex) archives*

* *Make cds for personal copies*

Social Events

* ***Thursday night*** ***reception on the 2nd floor***

* ***Friday night*** ***pizza at the User's Center***

Cash bar

Sign up sheet out front (today)!

We hope for an exciting workshop tunnelling between the TeV and LHC communities.