



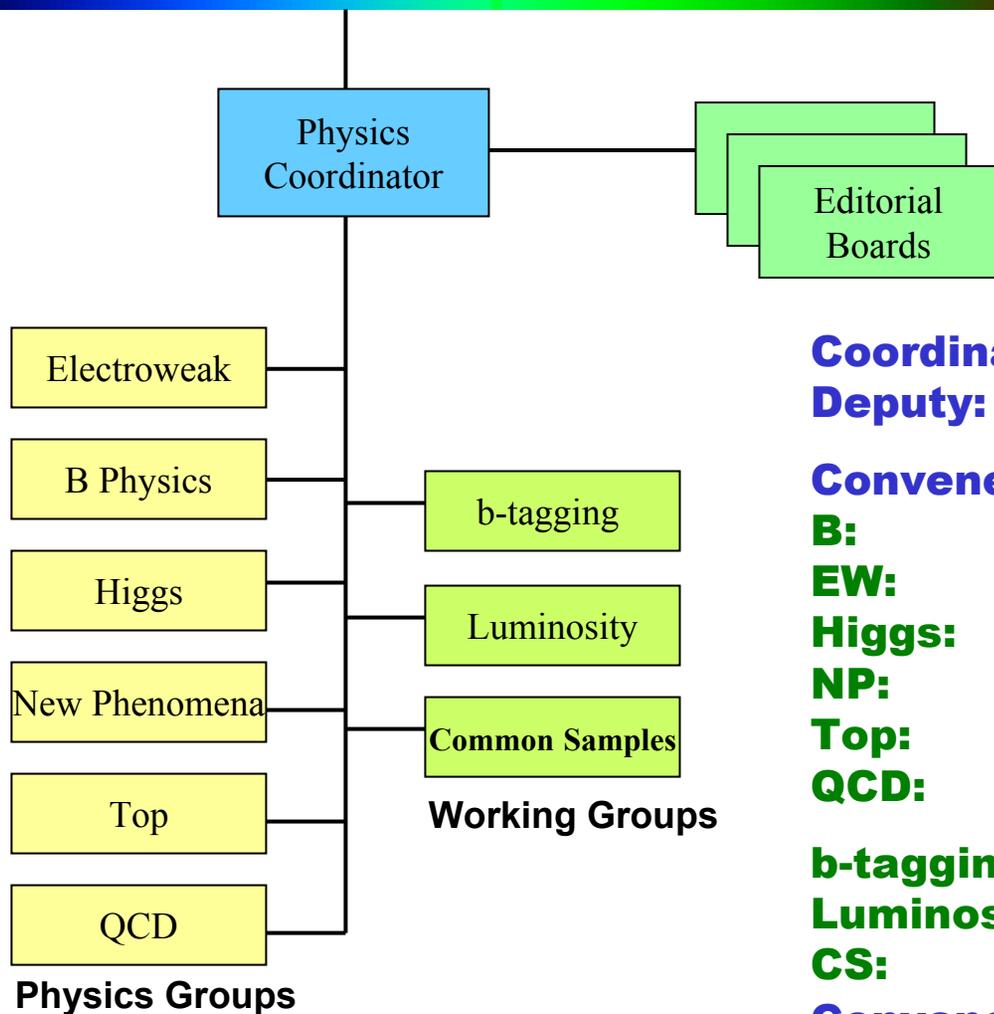
Update of Physics Effort

- **New organization**
- **Reprocessing and streaming**
- **Analysis approval**
- **Challenges and plan**

See the talks by B. Casey, Y. Gershtein, C. Leonidopoulos, R. Schwienhorst and L. Sonnenschein for updates of physics groups



Physics Groups



Coordinator: J. Qian
Deputy: G. Landsberg

Conveners

B: V. Jain, R. van Kooten
EW: M. Verzocchi, T. Wyatt
Higgs: A. Kharchilava, N. Varelas
NP: J.F. Grivaz, V. Buescher
Top: A. Quadt, A. Juste
QCD: C. Royon, M. Wobisch

b-tagging: M. Narain, G. Watts
Luminosity: H. Schellman, B. Casey
CS: Y. Gershtein, F. Deliot
Conveners meet weekly

Thank Boaz and past conveners for shepherding our physics effort through LP03



Physics Subgroups

B physics

Lifetime and mixing (B. Abbott, C. Leonidopoulos)

Electroweak

Diboson (T. Diehl)

Higgs

Lepton+jets (P. Tamburello, J. Yu)

Dilepton+jets (S. Choi, Q. Li)

Alljets (D. Elvira, A. Turcot)

New Phenomena

Jets+MET (L. Duflot)

Jets+Leptons (T. Nunnemann)

Soft Leptons (V. Buscher)

Dilepton (J.F. Grivaz)

QCD

Diffraction/Forward-proton (J. Barreto, C. Royon)

Top

Production (B. Kehoe, L. Shabalina, M. Vreeswijk)

Properties (I. Iashvili, TBA)

Single top (A. Heinson, R. Schwienhorst)



New Meeting Schedule

No overlap physics group meetings

All meetings use agenda server

Bi-weekly schedule, but no more on- and off-weeks

Week A	Week B
Wednesday	
10:30 Common Samples	10:30 QCD (04/04)
Thursday	
9:00 B Physics	8:30 Higgs
10:30 New Phenomena	10:30 Electroweak
Friday	
8:00 Conveners	8:00 Conveners
9:00 All DØ Meeting	9:00 All DØ Meeting
10:30 b-tagging	10:30 Top Physics

All meetings move to Hurricane Deck when ready



Common-Samples Group

Front “office” for dealing with common data and analysis issues. The group has been very active since day one.

Current projects:

- **Selective reprocessing: selection criteria development and implementation.**
- **Thumbnail fixers: develop p13 and p14 TMBfixers, organize fixing production.**
- **Common skimming: negotiate skimming criteria with physics groups, organize skimming operation.**
- **Offline streaming: design offline streaming scenario, oversee its implementation.**

Future projects:

- **Maintain and document commonly used data samples and analysis tools.**
- **Coordinate requests for commonly used MC samples**
- ...

Thank Frederic and Yuri for organizing these important tasks!



Data We Have

Data on tape:

2002:	81 pb⁻¹	240 million events
2003:	139 pb⁻¹	310 million events

Data processed:

p13.05/13.06:	~170 pb⁻¹	360 million events
p14.03:	~50 pb⁻¹	90 million events

Problems:

- p13: tracking efficiency, calorimeter problems, ...**
- p14: calorimeter problems, ...**

Solutions:

- Tracking efficiency improvement ⇒ reprocessing**
- Calorimeter problems ⇒ can be fixed at TMB level**



p13 Reprocessing

About 360 million events need to be reprocessed.

⇒ **36 weeks at Fermilab farm using all CPUs.**

The farm is barely keeping up with the DAQ.

Not feasible... Offsite?

- **again limited CPUs offsite**
- **no DB access for reprocessing from raw**

Speeding up the RECO?

Difficult, the gain so far insufficient...

The solution?

- **reprocessing from DST selectively offsite (p14.05)**
 - select high pT events (~25% of events)**
 - re-reconstruction from clusters**
 - no gain from cluster improvement or low-level calibrations**
- **reprocessing from RAW without event selection at Fermilab during the shutdown**
 - don't have to wait for p14.05**
 - all possible gains we can get**
 - sufficient large sample (~90 pb⁻¹) for Bs mixing studies**



Streaming Recommendations

Recommendations from the Streaming Review Committee:

(R. van Kooten, L. Duflot, L. Goer, M. Kado, A. Kharchilava, G. Landsberg, P. Mattig)

http://www-d0.fnal.gov/d0pub/d0_private/4262/m_v2p0_streaming_int.pdf

- **The level of effort required to implement inclusive streaming online is too great to commit resources to it at this time.**
- **Online exclusive streaming is not recommended at this time.**
- **Pursue the viable alternative of offline streaming with DØRECO.**
 - A Phase I straw man scenario for DST streaming:**
 - **Stream A: Common skim/sample, ~30-35% of data (as of June 2003)**
 - **Stream B: low pT leptons, ~30-35% of data**
 - **Stream C: remainder, ~30-35%**
 - **Stream B': small unbiased, prescaled fraction from Stream B**
 - **Stream C': small unbiased, prescaled fraction from Stream C**
- **Implement as soon as feasible offline exclusive streaming along the lines of "Phase I" described above.**
- **Online exclusive streaming should not be discounted for use in the future.**

Thank the committee for the excellent work!



Offline Streaming

Goal and plan of offline streaming:

- address the problems we had with p13 reprocessing
- anticipate future reprocessing needs
- in place when we come back from the shutdown

Issues:

- the recommendation is to stream DST, not RAW data
- the common skim/sample is now large (~50%)
- some analyses may require reprocessing from RAW

Under discussion:

- split stream A into two: high pT leptons, high pT jets
 - Stream A: high pT electrons, muons
 - Stream B: high pT jets, taus,
 - Stream C: low pT leptons
 - Stream D: the rest
- RAW for stream A (no DST for stream D if tape is an issue)?
 - to maximize the benefit of reprocessing for precision measurements and possible discovery with high pT leptons

**No effect on your analysis
of unprocessed data !**



Analysis Survey

	Top	New Pheno.	Electroweak	Higgs	B	QCD
Students	37	30	15	15	13	14
Analyses	20	42	15	10	20	13

- **~125 graduate students compared with ~ 300 in CDF where are our students? Please let conveners know.**
- **can we consolidate some of new phenomena analyses?**
- **large number of analyses use essential the ‘same’ samples:**

$ee/\mu\mu$: $Z, Z', \text{Drell-Yan}, Z\gamma, WW, WZ, Zb\bar{b}, t\bar{t}, LQ, H^{\pm\pm}, (\text{LED}), \dots$

$e/\mu+x$: $W, WW, WZ, W\gamma, Wb\bar{b}, t\bar{t}, LQ, (\text{SUSY}), \dots$

Clear need for better coordination and organization. However, it involves “turf”, data format etc. So it remains to be addressed.



Approval Procedure

For Conference Submissions:

- **Formation of an Editorial Board to review an analysis at an advanced stage.**
- **Distribution of analysis note within the physics group that reviews and approves the analysis in no less than *one week*.**
- **EB reviews and gives provisional approval (when satisfied) the analysis and *a conference note suitable for distribution outside the collaboration*.**
- **Collaboration review of the conference note for *one week*, and EB gives full approval after comments from the collaboration are properly addressed.**
- **The Spokes or the PC sign off for conference presentations. Post the note on a public page, at least *one week* before the conference.**
- **Presentation of the analysis at an ADM or similar forum. This can be done at any stage of the review.**

For Journal Publication

- **Draft paper review by the EB, the physics group, the style council**
- **Collaboration review of the paper for two weeks**
- **Presentation of comments/responses at an ADM or similar forum**
- **The Spokes or the PC signoff for submission**

To be discussed at the IB meeting this Thursday



Editorial Boards

- **Formalize Run 2 Editorial Boards:**

Every board has an EB number

- **EB001: Diffractive production, rapidity gaps, ...**
- **EB002: High pT jet production**

Central location for web pages

http://www-d0.fnal.gov/Run2Physics/d0_private/eb/Run2EB.html

- **Restructure the current boards:**

Physics oriented Editorial Boards (EB for lifetime measurements, EB for diffraction measurements, ...)

- **ensure consistency of different analyses of similar topics**
- **minimize the learning curve for members**
- **reduce duplication in reviews**

Staff EBs with outsiders (limit the number of members from the physics group that owned the analysis, chair from outside the group, ...)

- **maintain the independence of the boards**
- **ensure adequate review of analyses**

We must move towards operating on our own schedule, not those of conferences



Results for the Summer

Impressive results for the summer:

B Physics

**Lifetime measurements (B, Bd, Bs, ...), B flavor tagging studies;
B $\rightarrow\mu\mu$ limit; B^{**} and χ_C reconstruction; ...**

Electroweak

W/Z cross sections; Z' limit,

Higgs

W($\rightarrow e\mu$)+jets with b-tagging; H \rightarrow WW $\rightarrow ee, e\mu, \mu\mu$; H⁺⁺ $\rightarrow\mu\mu$

New Phenomena

**LED in diEM and dimuon channels; Leptoquarks in dielectron,
electron-neutrino, dimuon channels; GMSB SUSY in diphoton;
SUSY in trilepton final state; model-independent search in emu channel; ...**

Top

**Pair production cross section measurements from dilepton,
Lepton+jets/topo, lepton+jets/mu, and lepton+jets/SVX**

But it's not the time to relax...



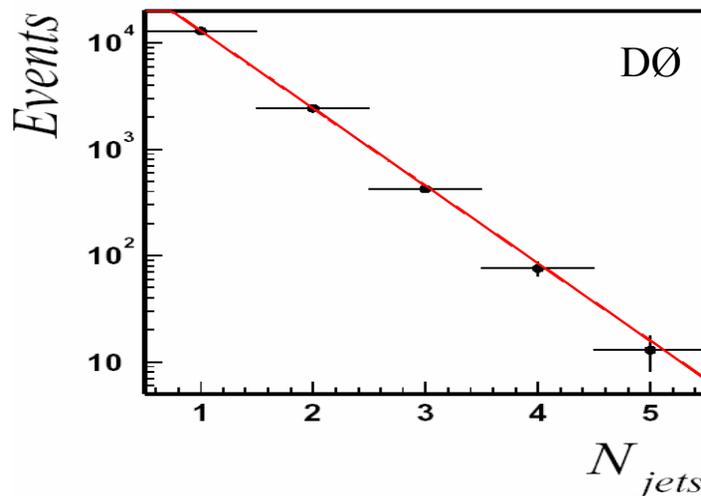
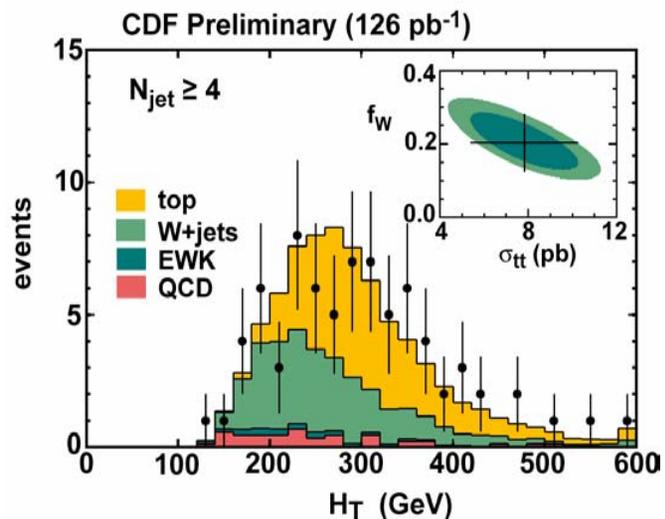
Are We Competitive?

We are in a position to compete effectively,
But we are not there yet.

Topological $t\bar{t}$ analysis as an example:

In the sample of high p_T leptons with four or more jets
and large transverse momentum imbalance,

the S/B ratio is about 1:1 in CDF and about 1:6 in DØ



We work as hard and are smart as CDF colleagues,
so what are the problems?

Electron/Muon ID? Jets? MET? Are we working on the right stuff?



Major Issues

Detector understanding

- **Can we identify and fix problems earlier? Late identification drains our limited resources.**
- **Understand the readout, improved calibration, ...**

Trigger

- **improve background rejection and signal efficiency**
- **hold on the rate at high luminosity, or even reduce the rate to tape?**

Reconstruction

- **Can we speed up the RECO? High luminosity impact on the speed?**
- **Can the farm keep up?**
- **Do we have sufficient resources for re-reconstruction?**

Simulation

- **Improve data-MC agreement, understand the material better**
- **Can we increase our MC production capacity?**

Analyses

- **Simplify the life of average users through better documentation of datasets, problems and their fixes, analysis tools, ...**
- **better coordination and communication among physics groups to improve our efficiency and productivity**



Publication Plan

But we got to start publishing... Push for publication IF there is a merit regardless RECO version. Potential papers over the next 6-12 months:

B physics

**Lifetimes involving J/ψ (B^\pm , B_d , B_s , ...), Quarkonium (J/ψ , χ_c , ...)
cross sections, $B_s \rightarrow \mu\mu$, lifetimes involving semi-leptonic decays**

Electroweak

W/Z production cross sections, W_γ , ...

Higgs

$H^{++} \rightarrow \mu\mu$, $H \rightarrow WW$, $W/Z + \text{jets}$, ...

New Phenomena

Large extra dimensions, Z' , leptoquarks, supersymmetry, ...

QCD

**Inclusive jet, dijet mass, dijet angular distributions, dN/dt ,
diffractive W/Z, ...**

Top Physics:

Pair production cross section



Challenges Ahead

We have made a lot of progress and produced exciting first results, ***but we are not where we want to be !***

- **More effort in understanding the detector and in developing diagnostic tools. We have paid dearly and cannot continue like this while hoping to achieve greatness.**
- **We need to examine our offline resources for data (re)processing, Monte Carlo production. Inability to reprocess our data will be a major drag for our physics output.**
- **We have to examine the way we do analyses. What we need to do to achieve our physics goals: precision top and W/Z measurements, observation of single top production, pursue Bs mixing, discovery of new phenomena, ...**

Physics is our prize, but not our means.

We need to be successful in all phases of the experiment.