Physics at Run-II Workshops

"The Theory Group with the two collider experiments CDF and D0 has organized a series of workshops which we hope will help maximize the potential of the Tevatron for Run-II and Run-III"

- Supersymmetry / Higgs (Feb. – Nov., 1998)
- *thinkshop* top-quark physics for Run II Top physics (Oct., 1998 –)
-  New strong dynamics (Oct., 1998 –)
- QCD and weak boson physics (Mar. – Nov., 1999)
- B physics (Sept., 1999 – ∼May, 2000)

B Physics Workshop

$2 \Rightarrow 3$ experiments; Run-III $\Rightarrow$ II/b

- Organize and improve understanding of what measurements give competitive / complementary information with e^+e^- B factories
- How will these contribute to testing the SM / discovering new physics?
- Can we identify all possible clean and independent measurements? What pieces of information are needed to confront the SM? Can we make sure that nothing is “forgotten”?
- Improve the ability to understand the sensitivity of the experiments. What can be learned, with what assumptions, with integrated luminosities of 2, 10, 30 fb^{-1}?
- Facilitate direct interaction between experimentalists and theorists

The Physics

Leave the politics to previous speaker!

Some of the highlights include:

- CP asymmetries in $B \to \psi K_s,\ \pi\pi,\ \rho\pi \quad \Rightarrow \beta,\ \alpha$
  CP asymmetries in B_s decay $\quad \Rightarrow \gamma$
- $B \to K^{(*)} \ell\, \bar\ell \quad \Rightarrow |V_{ts}|$
  $\Lambda_b \to \Lambda_c\, \ell\, \bar\nu \quad \Rightarrow |V_{cb}|$
- B_s mixing $\quad \Rightarrow |V_{ts}/V_{td}|$
  Λ_b lifetime $\quad \Rightarrow \tau_{\Lambda_b}/\tau_B$
- B_c, b baryons, etc., spectroscopy
  Quarkonia production and decay
  b production cross sections $^{(*)}$
  $\Rightarrow$ Tests of QCD

Some ? marks missing...

The above hold in the SM — look for inconsistencies between these measurements (together with measurements at other B factories and K decays)

This is the shopping list everybody knows — what we really hope is to find new ideas and other interesting processes that can be studied

Working Groups

- CP Violation

  Conveners: Yossi Nir, Helen Quinn, Manfred Paulini (CDF), Rick Jesik (D0), Tomasz Skwarnicki (BTeV)

- Semileptonic and Rare Decays

  Conveners: Aida El-Khadra, Mike Luke, Jonathan Lewis (CDF), Andrzej Zieminski (D0), Ron Poling (BTeV)

- Mixing and Lifetimes

  Conveners: Uli Nierste, Misha Voloshin, Christoph Paus (CDF), Neal Cason (D0), Harry Cheung (BTeV)

- Production, Fragmentation, Spectroscopy

  Conveners: Eric Braaten, Keith Ellis, Eric Laenen, William Trischuk (CDF), Rick Van Kooten (D0), Scott Menary (BTeV)

Working groups are semi-autonomous

Schedule

Plan the work	—	Sept. 23 – 25 Workshop
Do it	—	Sept. – Feb.
Report it	—	Feb. 24 – 26 Workshop
Write it up	—	Feb. – May

This Workshop

Sept. 23 – 25: ($\sim$ half $\perp$ and half $\parallel$) **Plan**

1. Summarize present knowledge & open questions
2. Organize working groups; identify problems and simulations to be completed by February
3. Assign tasks: have a clear understanding of which people will do what piece of work
4. Report on above in WG summary talks at the end

The conveners have already worked a lot to make 2. and 3. feasible — **you** need to get involved

To do: Make up your mind, commit to a WG, and plan to do some of the work for that group

You'll learn what other WG's do Fri / Sat pm

Theorists: a critical / conservative evaluation of theoretical uncertainties is needed

Till May

Sept. – Feb.: **Work**

1. **You** have to do the piece of work you take up
2. Simplest to draft a couple of paragraphs as you do a simulation, even if result is negative
3. Continue regular phone meetings between conveners to monitor progress

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Feb. 24 – 26 Workshop: (mostly $\|$) **Report**

1. Report on simulations and other results
2. Identify what is left to be done and who will do it
3. Organize and assign the writing of the report
4. Report on above in WG summary talks at the end

Feb. – May: **Write up**

1. Finish up leftover work
2. Get your contribution the conveners by mid-April
3. Chapters from conveners before the Summer

Workshop Report

Do not reproduce the BaBar book — but there is need for a stand-alone document which can be a reference in the future

Concentrate on aspects accessible mainly to hadron colliders and, where needed, updates of basic material

Possible structure of the report:

- Theory introduction chapter (some motivation, aspects not covered in the BaBar book intro, basic formulae, notation, etc.) [by Feb.]
- 4 chapters on detectors / analysis tools
- WG chapters
- Summary (content to be fixed in February)

E.g.: $\Delta\Gamma \neq 0$, $\int dt$ expr.

Format available soon (close to plain LaTeX)
Page limits to be set with conveners by February

Friday joint discussions

Experiment: Discussion of trigger and detector simulation tools used by the experiments, to facilitate a straightforward comparison of the simulation results

1. 10-min overviews from each experiment
2. How CDF tuned Pythia to Run-I data
3. Rob Kutschke's proposal on MC benchmarking

Theory:

1. 5-min summaries from each WG on the issues covered $\Rightarrow$ ensure nothing is left out
2. Possible questions raised in plenary talks

(3.) How to present new physics in the report

(4.) Fix some notations

Technicalities

- Want your transparencies: ps, pdf, or plastic
- $\|$ session rooms: 1 West (1 SW – this room)
  1 North (next to this)
  Curia II (2 SW)
  Comitium (2 SE)
- Terminals: 7th floor NE, CD Training rm
  7:30am – 10pm (Thu, Fri) 6pm (Sat)
  Can use Netscape in the Library (3S)
- Lunches: get your own today and tomorrow
  we provide it on Saturday

Summary

By Saturday afternoon we should know what will be done, and by whom

Thank you all for coming, expressing interest in B physics at the Tevatron, and promising to work...