WG2 "Round Table" Discussion

- Set up Experimental Study Groups
  - 9 study groups of Benchmark Decays
  - Discussion of Workshop Goals
- Outline of Workshop contributions
  - for May meeting and beyond
  - First discussion for outline of proceedings on Wednesday morning
- Dates of meetings:
  - 1st meeting at CERN – Nov 7-10 2005
  - 2nd meeting (WGs): CERN Feb 6-8 2006
  - 3rd meeting (WGs): CERN, May 15-17 2006
  - 4th meeting (WGs): CERN,sometime in September 2006
  - Final Plenary meeting: CERN, sometime in Dec 2006 / Jan 2007

Remit for Experimental Study Groups

- Sensitivity to New Physics (NP)
  - Sensitivitiy to SM & NP observables- Toy Monte Carlo based on simulated event yields, efficiencies and resolutions
  - Comparisons with SM and BSM predictions, including new (latest) theory results
  - Include New Physics Scenarios beyond MFV models
  - Look at all possible flavour transitions $b \to s$ $b \to d$ $s \to d$
  - Define theoretically clean observables

- Backgrounds
  - Improve comparisons between experiments
  - Important for very rare decays

- Event reconstruction
  - Selection and trigger efficiencies, event yields
  - For new modes

Remit for Experimental Study Groups

- "Realistic" LHC scenarios
  - For comparisons between experiments
  - Important for systematics
    - ATLAS: 100pb-1 (0.1 year at 1032) ,10 fb-1 (1y @1033)
      30 fb-1 (3 y@1033), 100 fb-1 (1y@1034)
    - LHCb 2fb-1 (1y@2x1032)
- MC issues
  - Try to use "same" (similar) tuning
  - Pythia – bbar cross section @ LHC, include Tevatron data
  - Decay model issues, PHOTOS, ...
- Build on existing reports
  - Tevatron B physics hep-ph/0201071
  - SuperBaBar hep-ph/0503261
  - SuperBelle hep-ex/0406071
  - Try to improve upon this
- Any other suggestions

Experimental Study Groups

- Radiative Penguin Decays
  - $b \to s\gamma$, $b \to d\gamma$ inclusive and exclusive
  - LHCb - $B_s \to \phi\gamma$, BaBar - Playfer, Belle - Iijima
- Electroweak Penguin Decays
  - $b \to sll$ inclusive and exclusive
  - LHCb – Koppenburg, $B_s \to \phi l^+ l^-$, $\Lambda_b \to \Lambda l^+ l^-$
  - ATLAS – Reznicek $\Lambda_b \to \Lambda \mu^+ \mu^-$
  - BaBar - Playfer, Belle - Iijima
- Neutrino modes:
  - $b \to s\nu\nu$, $B \to \tau+\nu$, $D\tau+\nu$
  - BaBar, Belle?
- Very rare decays:
  - $B_{s,d} \to \mu+\mu-$, $\mu\mu\pi$, $\mu\mu\gamma$, $(\tau+\tau-)$
  - ATLAS - Nikitine, CMS – Speer, CDF- Oldeman, D0 – Ay, LHCb, BaBar, CDF?, D0?, Belle?

Experimental Study Groups

- UT angles (from tree decays)
  - β or ϕ_1: $B_d \to \psi K_S$, …
  - α or ϕ_2: $B_d \to \rho\pi$, $\pi\pi$, $\rho\rho$
  - γ or ϕ_3: $B_{d,u} \to DK$ – Dalitz
  - $B_s \to D_s K$, $B_d \to \pi\pi / B_s \to KK$
  - Belle – Gershon, Babar – Cavoto, Pierini
  - LHCb – Lazzeroni, Patel $B_{d,u} \to DK$ (Amplitude fits, Dalitz, ADS)
    α with $B_d \to \rho\pi$ and $\rho\rho$, $B_s \to D_s K$, $B_d \to D\pi$, $B \to \pi\pi K$, $\pi\pi\pi$
- B_s-$B_s$bar mixing
  - Mass difference Δm_s, weak phase ϕ_s, lifetime difference $\Delta\Gamma/\Gamma$
  - $B_s \to D_s\pi$, $B_s \to J/\psi\phi$
  - CDF – Oldeman, D0 – Ay, LHCb - Fernandez
- $b \to s$ hadronic transitions
  - $B_d \to \phi K_S$, $\eta' K_S$, $B_s \to \phi\phi$,…
  - Babar – Pierini, Belle – Gershon, LHCb - $B_d \to \phi K_S$, $B_s \to \phi\phi$,…

Experimental Study Groups

- Kaon decays
  - $K \to \pi\nu\nu$, $K_L \to \pi^0 ll$
  - NA48/III - Ruggiero, JPARC - Komatsubara
- Charm decays
  - D^0-D^0bar mixing,
  - D rare decays
  - CLEO-III – Stone
  - LHCb – just starting
- BELLE
  - See Masashi Hazumi's slides
- BABAR
  - Interested in all, except B_s and Kaons
- Kaons
  - See Giuseppe Ruggiero's slides
- Tevatron
  - Interested

Discussion

- What are the goals of this workshop?
  - Use the SUSY benchmarks, i.e. fix models and values of SUSY parameters and calculate flavour parameters
  - If SUSY is discovered at the LHC what measurements from the precision flavour experiments will help to determine the SUSY flavour structure?
  - Determine New Physics reach of precision flavour experiments, e.g. BaBar has a (New) Physics reach document
  - Standardise New Physics scenarios beyond MFV models

Discussion

- What do experimentalists need from theorists
  - Take the SUSY benchmarks -> models and values of SUSY parameters
  - Calculate flavour parameters, also for exclusive channels, and for B_s mesons – e.g. $B_s \to \phi\gamma$, $B_s \to K^*\gamma$
- Other Questions
  - How well do we need to know the absolute scale of branching ratios for B_s mesons?
  - New Physics reach for 2008, 2011, ???

Back-up Slides