

LHCb Discussion Points



- **LHCb - first run**

- LHC is a Super Flavour factory
 - Hadronic machine: high b cross section, but large challenges for detectors and trigger
- We will be very busy to commission and calibrate detector
- Already first year results will probe new territory, e.g. $B_s \rightarrow \mu^+ \mu^-$

- **LHCb - first five years**

- Large flavour physics programme with 10 fb^{-1} , see presentation by Marta Calvi
- http://lhcb-phys.web.cern.ch/lhcb-phys/DC04_physics_performance/
- **Yellow report** of "Flavour Physics in LHC"

- **Discussion Points**

- Results on CP violation and rare decay will probe BSM physics at $\sim 10\%$ level
- Goal is to establish the flavour structure of BSM physics
- Example: $B_s \rightarrow \mu^+ \mu^-$ in large **tanbeta** SUSY models, see tools talk by F. Ronga

- **Wishlist to theorists - part one**

- Need more theory predictions from high p_T results for flavour observables
- Especially for CP violation, e.g. weak mixing phase ϕ_s in $B_s \rightarrow J/\psi \phi$, and $B_s \rightarrow \phi \phi$
- Right-handed currents in radiative $B_s \rightarrow \phi \gamma$ and electroweak penguins $B^0 \rightarrow K^{*0} \mu^+ \mu^-$
- Require progress in SM predictions, e.g. QCDF for ϕ_s , Lattice QCD for B_s mixing



- **LHC is a Super Flavour factory**
 - Which will operate during the next decade
- **LHCb - Upgrade**
 - Operate LHCb at 10 times the design luminosity 2×10^{33} or higher
 - Collect $\sim 100 \text{ fb}^{-1}$ data sample
 - Increase statistics in hadronic channels by factor 20
- **LHCb - Upgrade Working Group**
 - Convenor - F.Muheim@ed.ac.uk
 - Feasibility studies for detector upgrade, e.g. first level detached vertex trigger
 - Write scientific case for both - physicists and funding agencies
- **Wishlist to theorists - part two**
 - What do we learn from $O(1\%)$ precision in CP violating asymmetries?
 $\sigma_{\text{stat}} \sim 0.01$ (0.002) on $B_s \rightarrow \phi\phi$ ($B_s \rightarrow J\psi/\phi$), σ (angle γ) better than 1 degree
 - How precise do we need to measure $BR(B_s \rightarrow \mu+\mu^-)$?
 - Is observing $B_d \rightarrow \mu+\mu^-$ a key measurement?
 - CP violation in charm - LHCb Upgrade \rightarrow unprecedented large Charm samples
 - New particles with a large lifetime, e.g. hidden valleys
 - New ideas - the next few years will be a branch point for particle physics