LHCb at the NAF

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LHCb resources at the NAF

- 23 registered LHCb NAF users
- Currently available:
  - dCache space: 180 TByte
  - Lustre space: 50 TByte
- Used:
  - 67 TByte on dCache
  - 13 TByte on Lustre
- sufficient free space for:
- currently reprocessed 2010 data (in progress)
- and 2010 simulated data (expected this month)

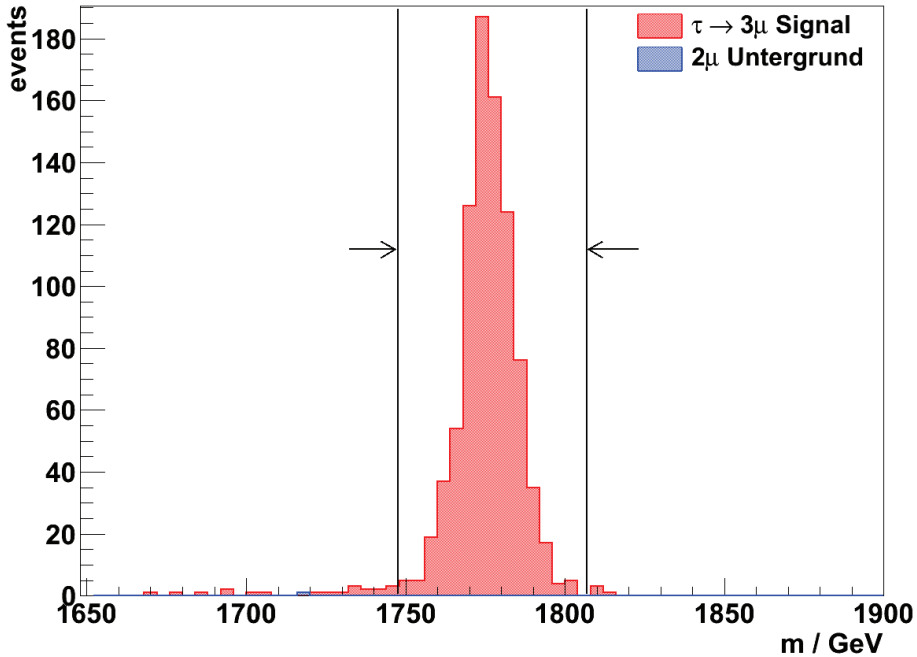
Use cases:

- nTuple production from (simulated) data
- Toy Monte Carlo based analyses
- occasionaly private MC production

$\tau^{\pm} \to \mu^{\pm}\mu^{+}\mu^{-}$ MC analysis

Analysis performed by M. Meissner for his master's degree

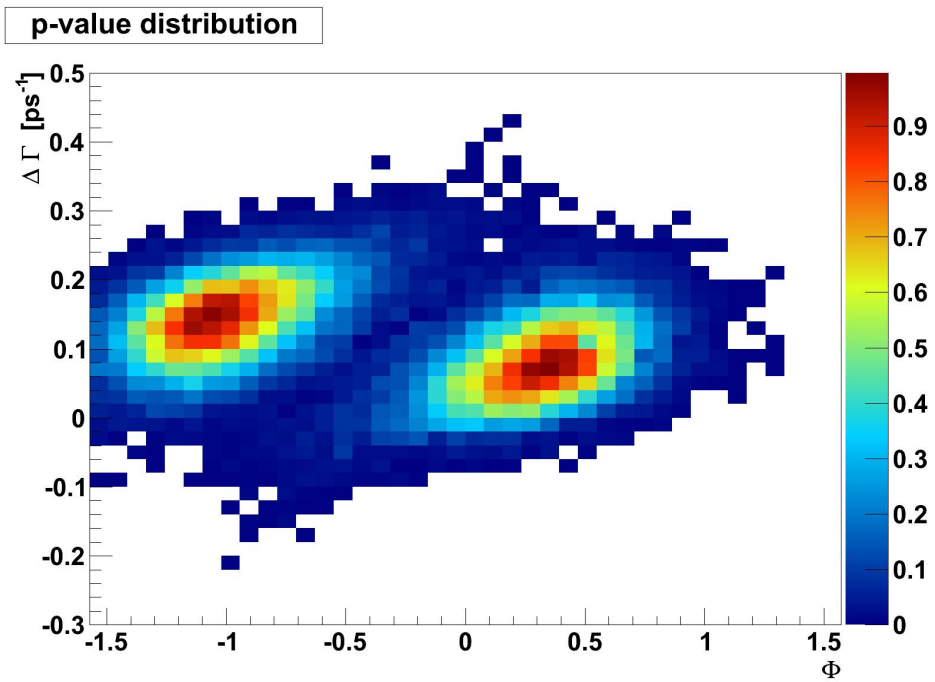
- Lepton Flavour Violation forbidden in Standard Model
- SM predicts $\mathrm{BR} \sim \mathcal{O}(10^{-50})$
- Discovery of signal implies New Physics!
- Current limit by Belle ('08): $\mathrm{BR}(\tau \to 3\mu) < 3.2 \times 10^{-8}$
- Expect $\mathcal{N}(\tau) = 5.9 \times 10^{10}$ per year at LHCb!



- Projected background in $\mathcal{L} = 2\mathrm{fb}^{-1}$ in a mass window of 30 MeV around mass peak: $N_{\mathrm{BG}} = 360$ evts.
- LHCb senstivity in 2 fb^{-1}: $\mathrm{BR} \leq 3.5 \times 10^{-8}$ at 90% CL.
- NAF used for nTuple production from simulated data

Confidence Intervals for CPV in $B_s \to J/\Psi\phi$.

By A. Bien for master's degree. NAF used for toy MC studies: 6.8k CPU days.



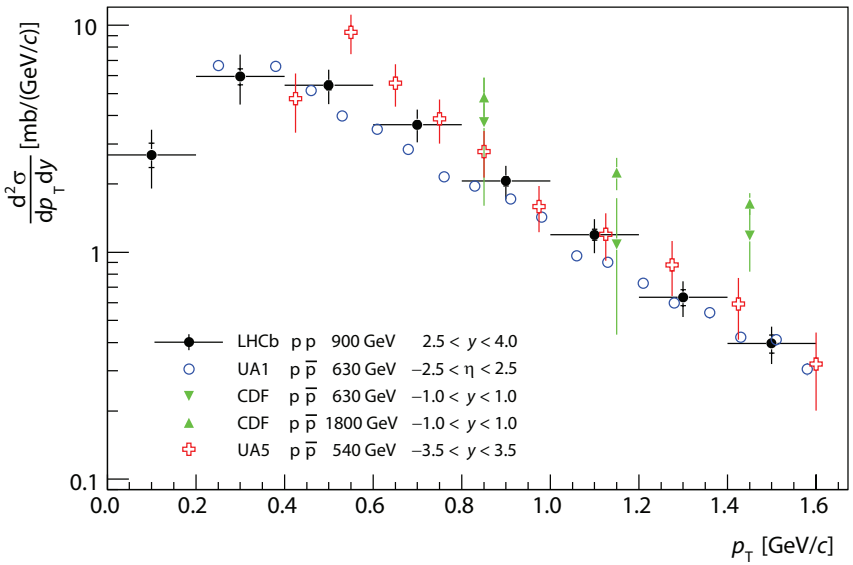
- CP violation in $B_s \to J/\Psi\phi$ decay small in Standard Model
- Observation of large value indicates New Physics
- Complicated multi-parameter fit performed on data
- With low statistics: statistical error underestimated
- Use Feldman-Cousins method to determine error

- Toy MC simulate many experiments in $\Delta\Gamma$-ϕ_s space
- fit used to determine $\Delta\Gamma$ and ϕ_s at each point with fixed and floating values for $\Delta\Gamma$ and ϕ_s
- From $\mathcal{L} \approx 200\ \mathrm{pb}^{-1}$ on, error propagation similar to F-C method.

K_s production in LHCb

- First publication of LHCb with large participation of Physikalisches Institut Heidelberg.
- NAF used for nTuple production from data: 2 kCPU days.

Comparison with other data:



- Strangeness production exhibits unexpected behaviour compared to hadronization models.
- Measurement of strangeness production may serve as reference point for heavy ion physics.

$\Rightarrow$ LHCb data agrees reasonably well with MC predictions & other experiments.