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LHCb Muon System Calibration:

Meetings:

- March 21th, 2006: Calibration and Offline Muon ID
 - ◆ G. Lanfranchi CalibMuon.ppt

- Main.galanf - 17 Mar 2006

Comments about the meeting:

- We investigated how much time it would take to get about 100k events in the single muon line (at 2.10^{32} - numbers from Hans Dijkstra)
 - ◆ How many events/s are expected to be triggered by the muon line-> single muon line: ~1 kHz, di-muon: ~600 Hz
 - ◆ How many of those are J/Psi's -> for signals take numbers from Table 9.4 in the Reop TDR (yields/year);for prompt psi's: ~160 Hz via the di-muon line. I expect almost nothing via the single muon-line, since there is a hard IPS/pT cut to get the rate down.
 - ◆ How many from the J/Psi's are single muon triggers -> Look at this talk, page 9. For psiX, about ~45% of the total eff comes via the single mu-line, hence these are the events you want.

Some rate estimate: $1. BR(B \rightarrow \psi X) = 8 \times BR(B \rightarrow \psi K^+)$, hence $1.7 \cdot 10^6 \times 8 \times 45 / 10^7 = 0.6$ Hz. Hence for your 100k muons you have to wait 45 hours of solid running, say less than a week. Should be OK I think. A more recent number for the single muon line efficiency (From Leandro de Paula) is ~38%. In this case we would take $45 \text{ hours} \cdot 45 / 38 = 53$ hours. But we must remember that the dimuon line can be used as well, to populate the higher momentum part of the spectrum.

Leandro has plotted the spectrum of J/Psi muons triggered by the muon line and the spectrum below 10 GeV/c from J/Psi muons triggered exclusively by the single muon line (from J/Psi Ks sample), which is attached below. Soon we will attach the complete spectrum.

- About the questions raised in the talk:
 - ◆ maximum muon ID efficiency below 100% is due to chamber inefficiencies. Remember that we require hits in all 5 stations for particles above 10 GeV.
 - ◆ whether to make a momentum cut or a DLL cut is a question for each analysis and the answer depends both on the spectrum of muons and on the required purity and efficiency. The efficiency of a DLL cut which yields 1% total pion misid in the J/Psi sample, as a function of momentum, is shown in this note

-- EricaPolycarpo - 23 Mar 2006

Some more comments:

- Let me summarize your numbers with some comment:
 - ◆ **from the single muon line we can get ~ 0.6 Hz (out of ~ 0.9 kHz) of J/Psi from B:** this is more or less what we expect - as you pointed out - from the ratio: $(BR(B \rightarrow J/Psi X) \times \text{eff}) / BR(B \rightarrow \text{semileptonic}) \sim 2 \times 10^{-4} \times 0.38 / 11 \% \sim 7 \times 10^{-4}$, so $900 \text{ Hz} \times 7 \times 10^{-4} = \sim 0.6 \text{ Hz}$.
 - ◆ **from the dimuons line we get ~ 160 Hz of J/Psi that can be used to calibrate Muon ID in the upper part of the spectrum** But the dimuon line is already biased by the trigger Muon ID which, again, is based on FOI and Dist variables and, therefore, can bias also the determination of the FOI and DLL distribution in the Offline Muon ID.

- ◆ ***In order to collect 100 k events we need ~ 53 hours of stable run at full luminosity*** Yes but we must be ready to calibrate the detector in a "reasonable time" even at lower luminosity. In particular this can be an important issue for the muon trigger.
 - ◆ ***The muon efficiency saturates below 100% due to chamber inefficiency*** Now I understand. But in the next release of Boole this number is going to change. The chamber inefficiency - following the test beam results - has been reduced by a factor 10.
- My general concern is that if we keep the HLT streams as they are we will toil a lot to calibrate trigger, offline Muon ID, efficiencies, at the beginning of data taking. This is a question that we must raise at the Muon Group.

-- GaiaLanfranchi - 24 Mar 2006

Meetings:

- April 5th, 2006: Calibration and Offline Muon ID
 - ◆ G. Lanfranchi MuonIDCalib_revised.ppt[?]
- May, 3th, 2006: Calibration and Offline Muon ID
 - ◆ G. Lanfranchi gaia_muonid_may3.ppt[?]
 - ◆ E. Polcarpo & M. Gandelmann - talk.ppt
- May, 17th, 2006: Calibration and Offline Muon ID
 - ◆ G. Lanfranchi gaia_17may.ppt[?]

This topic: LHCb > MuonCalibration

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