A first look at decays in flight in CSA07 samples

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Next Slides

- no L1/HLT filters
- QCD_Pt_30_50 CSA07 samples
Associate L3 Tk-Tracks By Hits

~50% of hltL3Muons:L2Seeded (tracker tracks) are made of $\pi/K$ hits!

#hltL3Muon:L2Seeded = 1570
no major pb with associator

reconstructed by L3(tracker) : 1544.00

- 33.03 [%] association quality of reco::Track to $\pi^+/-$
- 16.71 [%] association quality of reco::Track to $K$
- 47.22 [%] association quality of reco::Track to $\mu^+/-$
- 3.04 [%] association quality of reco::Track to other

remember
47.22% of 1544 = 729
L3 Tk-tracks Associated (by hits) to $\mu$

~20% coming from $\pi$/K decays in $\mu$

reconstructed by L3(tracker)

~70% coming from B/D decays in $\mu$

muon $p_T^\text{sim}$: 729.00

- 15.23 [%] $p_T^\text{sim}$ of muon coming from $\pi^+/-$
- 4.53 [%] $p_T^\text{sim}$ of muon coming from K
- 39.37 [%] $p_T^\text{sim}$ of muon coming from D
- 32.78 [%] $p_T^\text{sim}$ of muon coming from B
- 3.43 [%] $p_T^\text{sim}$ of muon coming from $\Lambda_d$
- 0.14 [%] $p_T^\text{sim}$ of muon coming from J/$\Psi$
- 1.51 [%] $p_T^\text{sim}$ of muon coming from $\tau^+/-$
- 3.02 [%] $p_T^\text{sim}$ of muon coming from other

hltL3Muons:L2Seeded are not refitted in 16X: cannot plot the track $p_T$
Associate L3 Glb-Fit by $\Delta R<0.1$ to $\mu$

540 not associated to $\mu$, open space in stack

$p_T$ of $\mu$ from $\pi/K$ decays are not too much overestimated

reconstructed by L3

reconstructed by L3 : 1030.00

$p_T^{\text{muon reco}} : 1570.00$

- 25.34 [%] $p_T^{\text{reco}}$ of muon coming from $\pi^{+/0}$
- 13.98 [%] $p_T^{\text{reco}}$ of muon coming from $K$
- 30.49 [%] $p_T^{\text{reco}}$ of muon coming from $D$
- 24.27 [%] $p_T^{\text{reco}}$ of muon coming from $B$
- 2.43 [%] $p_T^{\text{reco}}$ of muon coming from $\Lambda_b$
- 0.10 [%] $p_T^{\text{reco}}$ of muon coming from $J/\Psi$
- 1.17 [%] $p_T^{\text{reco}}$ of muon coming from $\tau^{+/0}$
- 2.23 [%] $p_T^{\text{reco}}$ of muon coming from other
Summary and Deductions

Decay vertex outside of the tracker
Is there a muon at all? μ?
Punch through?

~800 associated by hits to π/K

π/K

By deduction ~500

Decay vertex inside of the tracker

π/K

π/K and others

729 associated by hits to μ

By deduction ~300

1030 associated by ΔR<0.1 to μ

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muon HLT, decays in flight, CSA07
Conclusions: part 1

- A lot (50%) of L3 muons are made from $\pi/K$ tracks
- Implication on d0 cut
  - short lived hadrons: pick up the muon track, d0 of muon (wide)
  - long lived hadrons: pick up the hadron track, d0 of hadron track... (narrow)
- Tend to remove B/D but not $\pi/K$

![Graph showing muon d0 reco distribution with various categories and percentages.]

- muon $d_0^{\text{reco}}$ : 1013.00
- 25.37 [%] $d_0^{\text{reco}}$ of muon coming from $\pi^+/-$
- 13.43 [%] $d_0^{\text{reco}}$ of muon coming from K
- 30.60 [%] $d_0^{\text{reco}}$ of muon coming from D
- 24.68 [%] $d_0^{\text{reco}}$ of muon coming from B
- 2.47 [%] $d_0^{\text{reco}}$ of muon coming from $\Lambda_b$
- 0.10 [%] $d_0^{\text{reco}}$ of muon coming from J/Ψ
- 1.18 [%] $d_0^{\text{reco}}$ of muon coming from $\tau^{+/-}$
- 2.17 [%] $d_0^{\text{reco}}$ of muon coming from other
Remember

Open space in stack histograms mostly $\pi/K$:

- Punch through
- Hadron “late” decays
Next Slides

- No filter Cut
- Plot L2 pT and L3 pT: need to plot 90% pT threshold
- Combine CSA07 samples according to Xsec/NbEvts
  - QCD_Pt_0_15
  - QCD_Pt_15_20
  - QCD_Pt_20_30
  - QCD_Pt_30_50
  - QCD_Pt_50_80: job aborted, not in plots
  - QCD_Pt_80_120
  - QCD_Pt_120_170: job aborted, not in plots

\[ \kappa = \frac{\sigma [mb]}{NbEvt [M]} \text{ for } L = 10^{32} \text{ cm}^{-2} \text{ s}^{-1} \]
Leading L2 Muon pT

There's not much $\mu$ from $\pi/K$ above threshold

There are quite some punch throughs (open space in the stack)
There's not much \( \mu \) from \( \pi/K \) above threshold

- There are quite some punch throughs (open space in the stack)
Leading L3 Muon pT

There's not much $\mu$ from $\pi/K$ above threshold
Less punch throughs (open space in the stack)

- 21.63 [%] leading $p_T^{\text{reco}}$ of muon coming from $\pi^+/-$ weighted
- 26.77 [%] leading $p_T^{\text{reco}}$ of muon coming from K weighted
- 8.69 [%] leading $p_T^{\text{reco}}$ of muon coming from D weighted
- 35.83 [%] leading $p_T^{\text{reco}}$ of muon coming from B weighted
- 3.96 [%] leading $p_T^{\text{reco}}$ of muon coming from $\Lambda_b$ weighted
- 1.95 [%] leading $p_T^{\text{reco}}$ of muon coming from J/ψ weighted
- 0.09 [%] leading $p_T^{\text{reco}}$ of muon coming from $\tau^+/\tau^-$ weighted
- 1.09 [%] leading $p_T^{\text{reco}}$ of muon coming from other weighted

16 GeV

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2/12/08
Cumulative: Leading L3 Muon pT

There's not much $\mu$ from $\pi/K$ above threshold
Less punch throughs (open space in the stack)
Conclusions: part 2

- Large rate of $\pi/K$ at L2
- Killing J/Psi ...
- Rate of $\pi/K$ reduced at L3
  - from pT, not d0 cut