CDF D SubGroup,

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First evidence of $B_S \to D_S\pi, D_S \to \pi\pi\pi$

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- $B_S \to D_S\pi, D_S \to \pi\pi\pi$ **Reconstruction**
- **Cuts**
- **Results**
- **Conclusions**

$B_S \to D_S\pi, D_S \to \pi\pi\pi$ **Reconstruction**

- Dataset: hbot0h and hbot1i. Integrated luminosity: $122 \pm 9pb^{-1}$ (up to run 164303);
- Release 4.11.1
- 3D vertex fit.
- Refit tracks:
  - KAL method;
  - Drop L00 and ISL;
  - Rescale COT covariance matrix:
    $cur = 5.33, d_0 = 3.01, \phi_0 = 3.7, z_0 = 0.653, \lambda = 0.58$
  - Alignment: ofotl_prd_read 100030 1 GOOD.

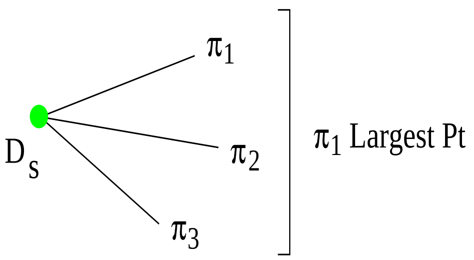
  - 20 Ax + 20 St Cot hits each track;
  - 3 $r - \phi$ Si hits each track before refitting;
  - $P_t > 0.4GeV$ and $|\eta| < 2$ each track.

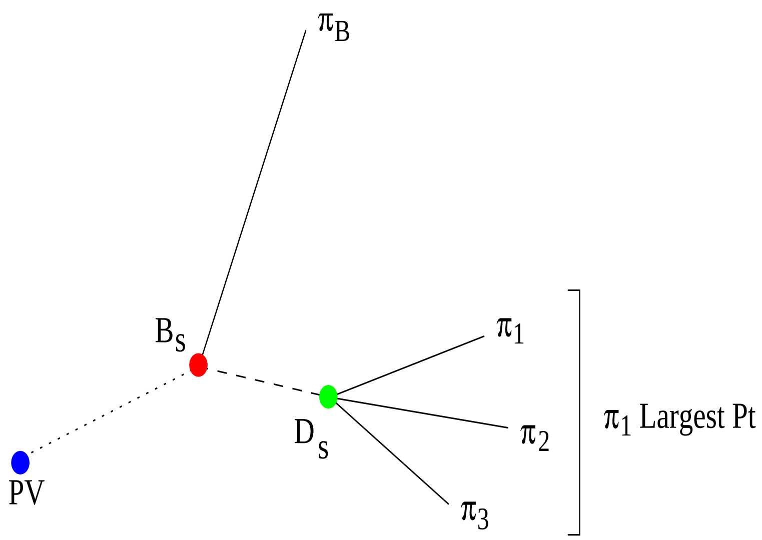
- Decay Reconstruction: CharmMods summer 03 package.
- All B_CHARM trigger paths.
- D Mass constraint
- 2 out of 4 tracks must have offline trigger confirmation:
  $P_t > 2GeV, 120\mu m \leq d_0 \leq 1000\mu m$
- Online trigger confirmation for Scenario A, low Pt and high Pt.

Cuts

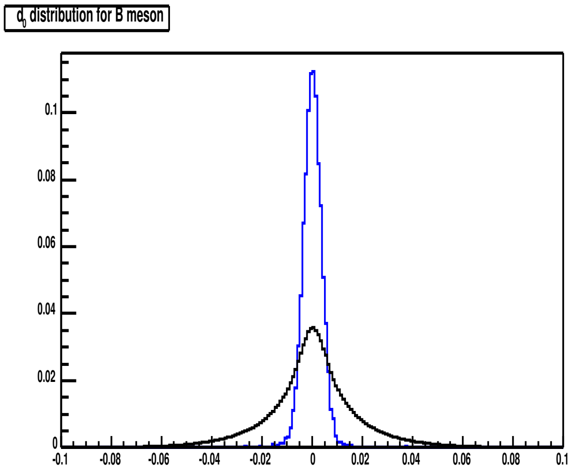
As in other decays similar to this one, these are the main variables selected for the cuts:

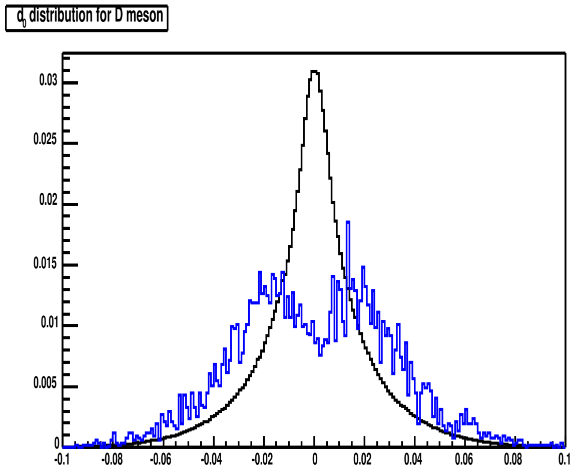
- m_D
- χ^2_D
- P_t^D
- L_{xy}^D
- L_{xy}^D
- P_t^D
- d_0^B
- $\Delta R_{D,\pi}$
- $P_t^{\pi\, B}$
- $d_0^{\pi\, B}$
- χ^2_B

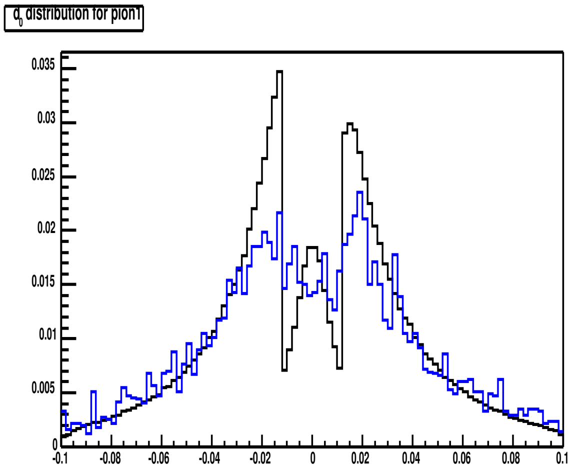


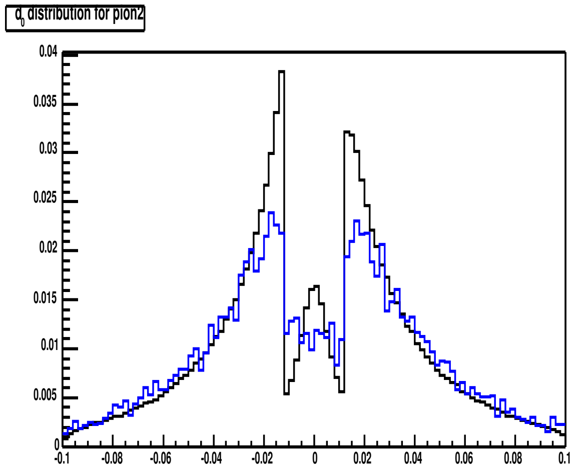


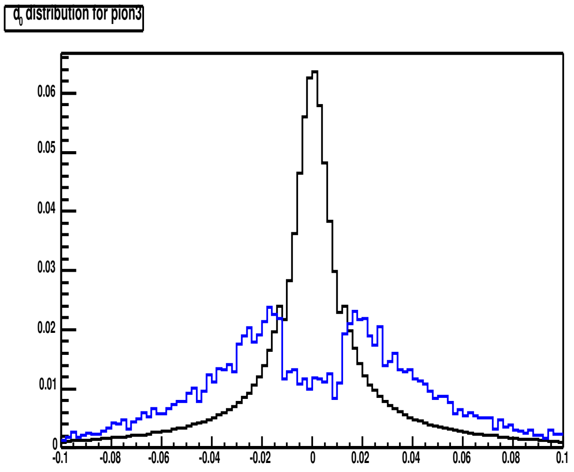
Cuts chosen comparing data $\leftrightarrow$ MC

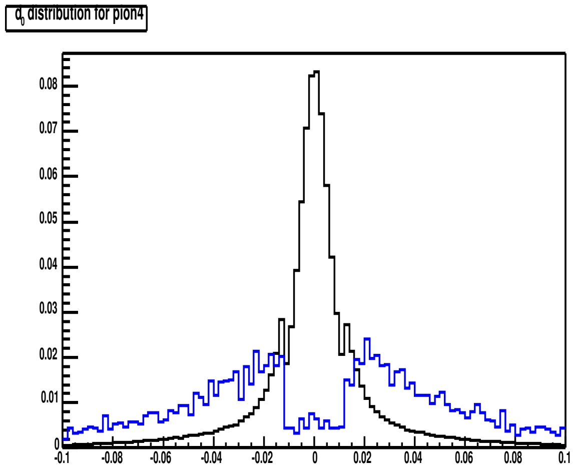

d_0 distribution for B meson


d_0 distribution for D meson


d_0 distribution for pion1

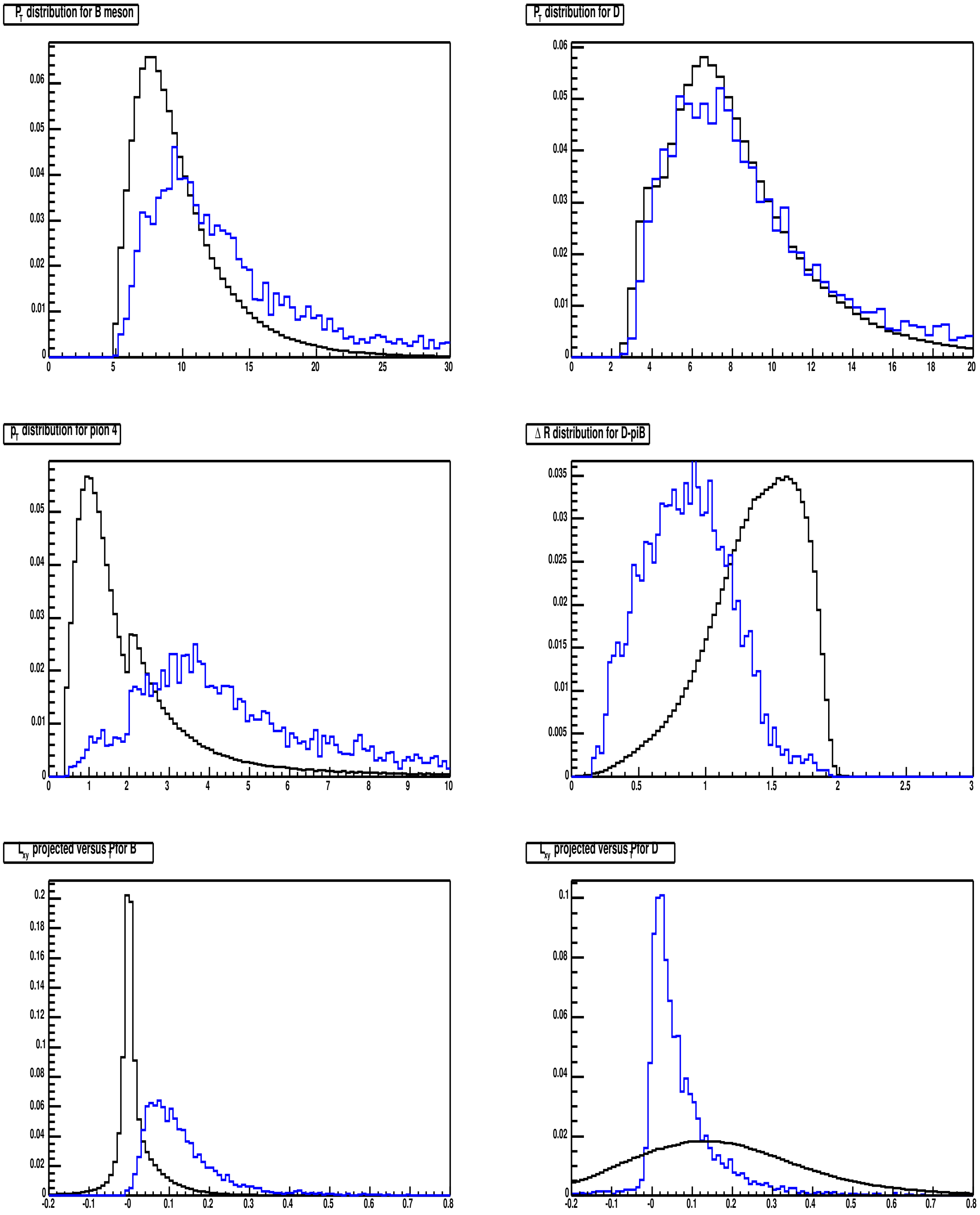

d_0 distribution for pion2


d_0 distribution for pion3


d_0 distribution for pion4

MC

Data


P_T distribution for B meson
P_T distribution for D
p_T distribution for pion 4
Δ R distribution for D-piB
L_{xy} projected versus P_T for B
L_{xy} projected versus P_T for D

MC

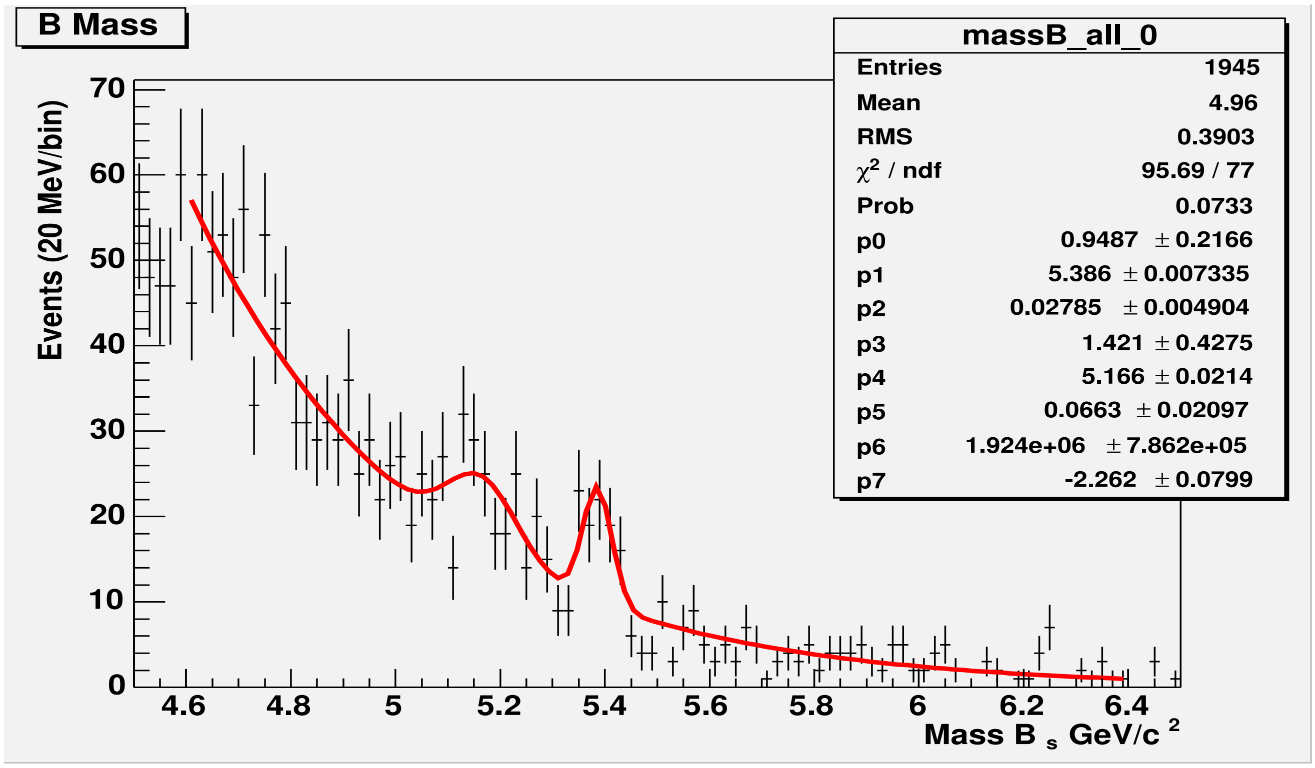
Data

Cuts

- $P_t^D > 4GeV/c$
- $50\mu m < L_{xy}^D < 3000\mu m$
- $\chi_D^2 < 10$
- $L_{xy}^B > 600\mu m$
- $P_t^B > 6GeV/c$
- $|d_0^B| < 100\mu m$
- $\Delta R_{D,\pi} < 1.5$
- $P_t^{\pi_B} > 2.0GeV/c$
- $|d_0^{\pi_B}| > 120\mu m$
- $\chi_B^2 < 15$
- $m_D > 1.929GeV/c^2, m_D < 2.001GeV/c^2$

Results

hbot0h and hbot1i:



Conclusions

- First pass optimization performed
- Hint of a signal [≈ 30 events]
- Selection is not optimal:
  - Rough optimization based on S/B
  - Scenario A MC $\leftrightarrow$ inclusive B_CHARM data
  - Simultaneous optimization in progress...
- ... stay tuned!