First look to data: distributions and D^0 invariant mass compared to MC (LHC09d10)

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Outline

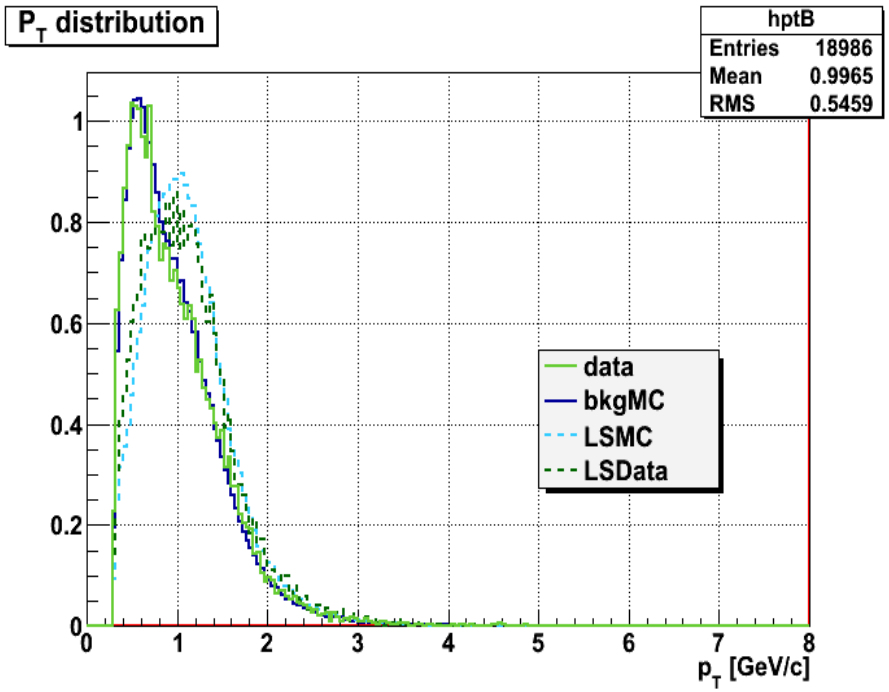
1. Cut variables distributions
2. Invariant mass distribution
3. Conclusions & Outlook

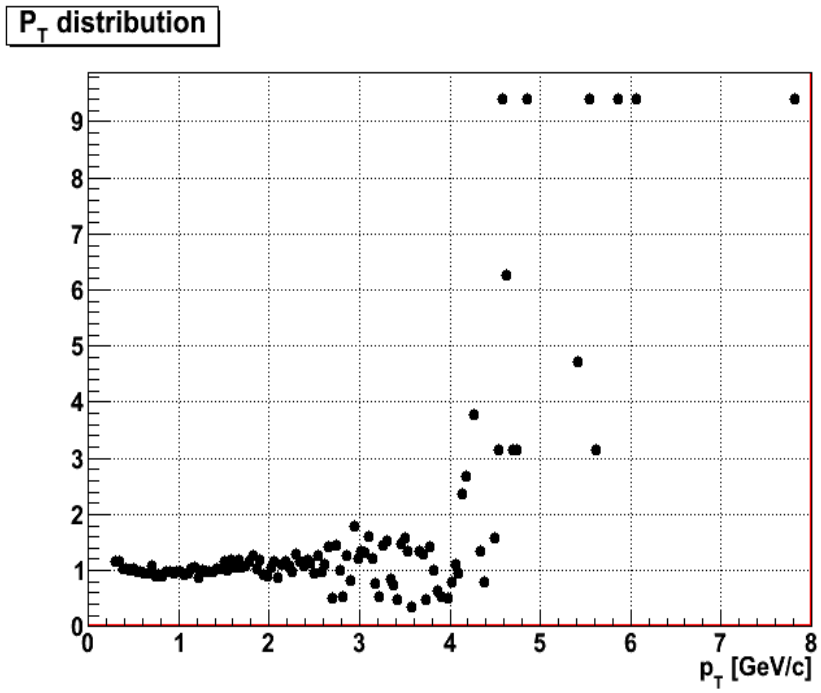
Data samples

Many thanks to Renu for running the trains on the GRID

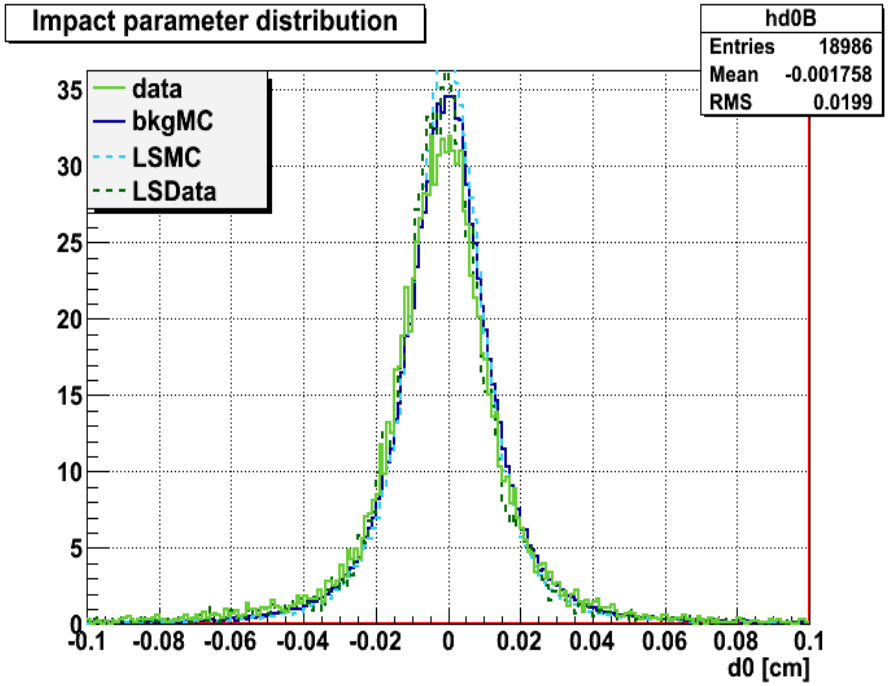
- p-p collisions at $\sqrt{s} = 900$ GeV
  - Good runs with ITS+TPC without event selection
  - 0.544728×10^6 events
  - reconstruction pass2 (similar results with pass1)
- Simulation: LHC09d10
  - 4.7163×10^6 events
- Configurations for the analysis train:
  - ITS & TPC refit
  - 4 points in ITS
  - at least one in pixels
  - $p_t > 0.3$ GeV

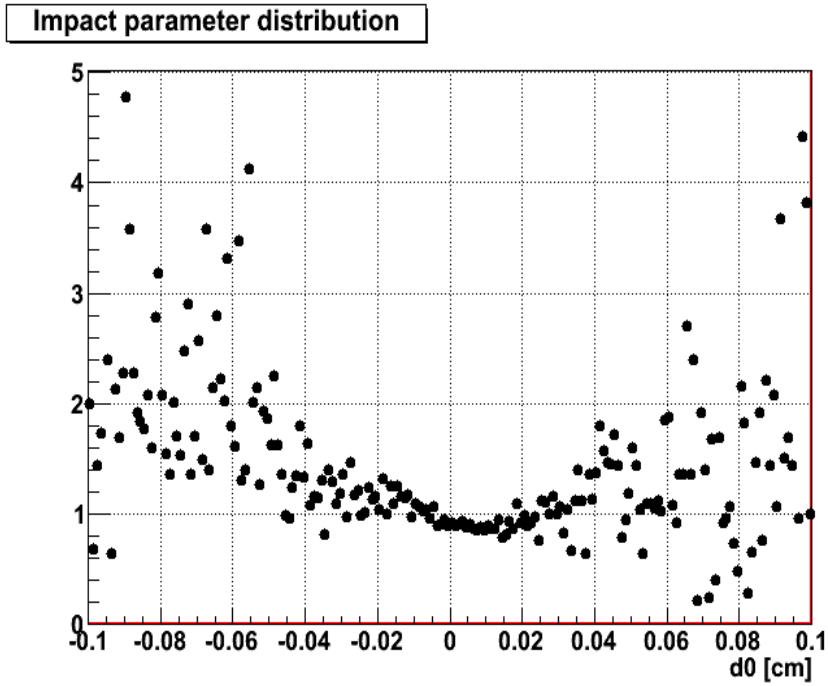
p_t distributions



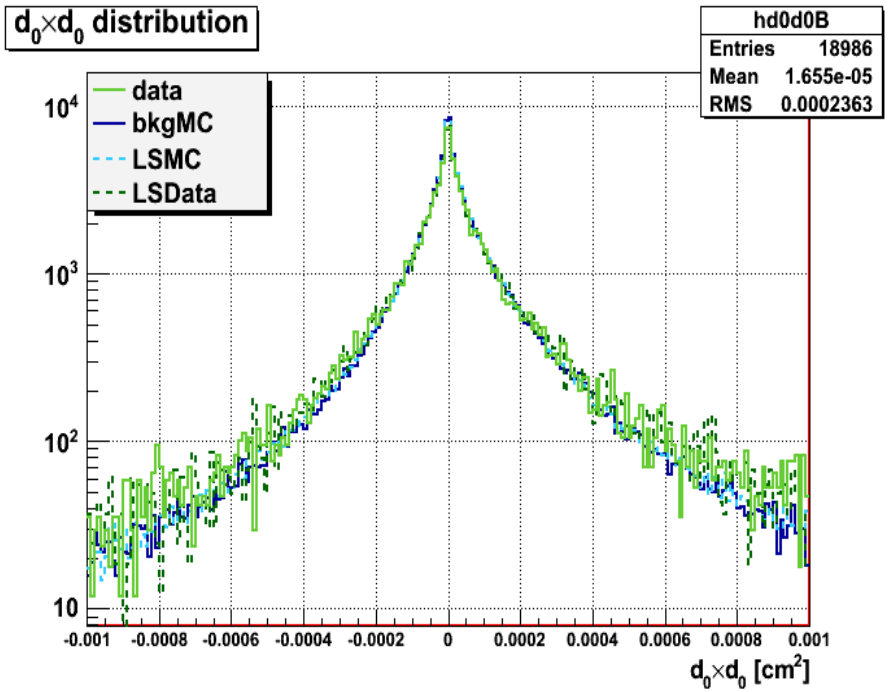


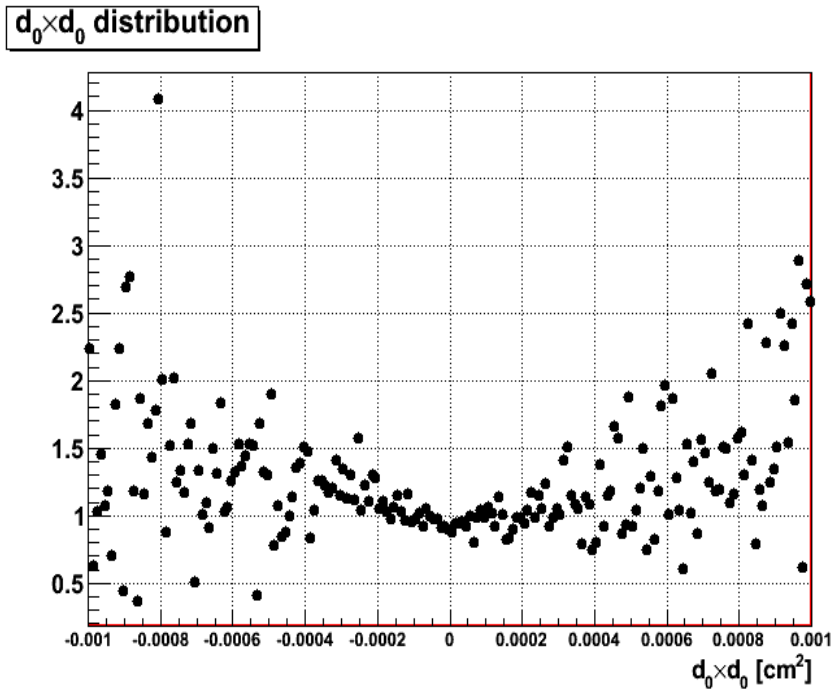
d_0 distributions



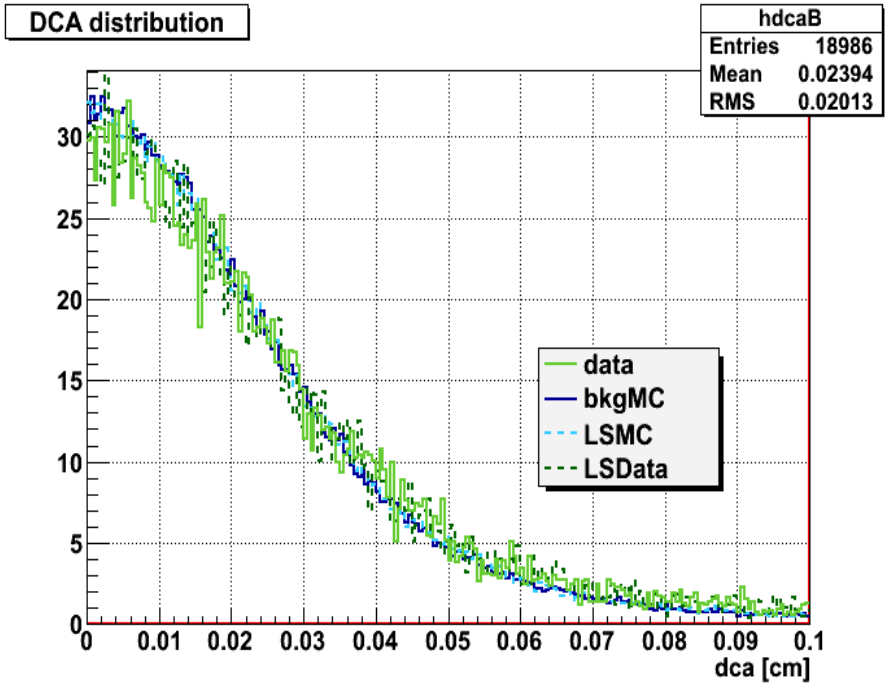


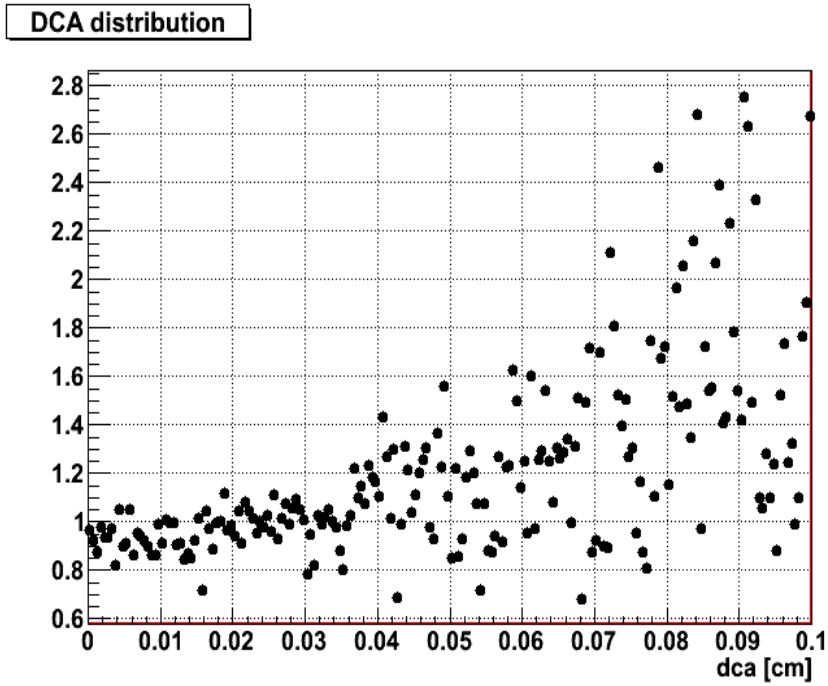
$d_0 \times d_0$ distributions



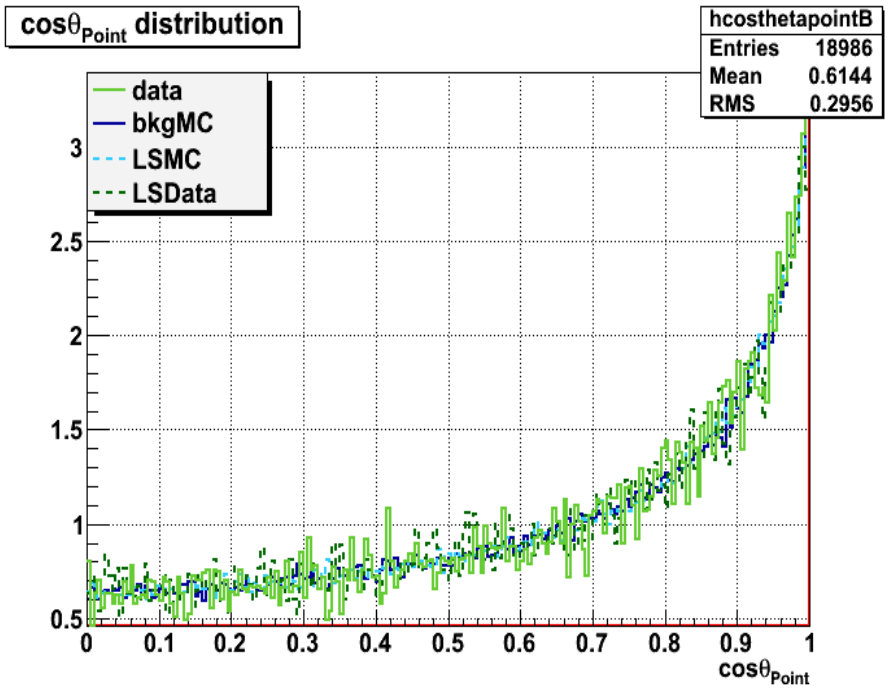


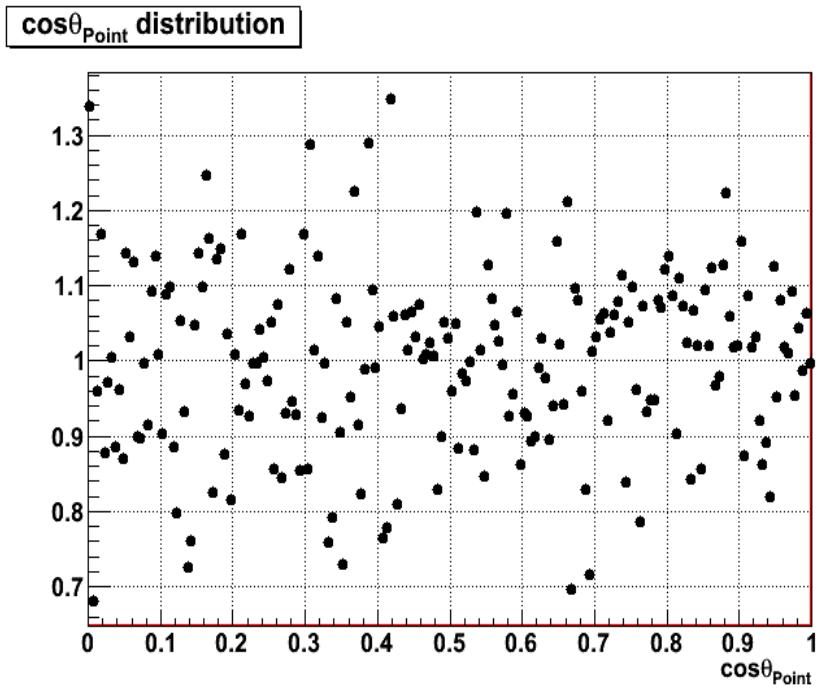
dca distributions



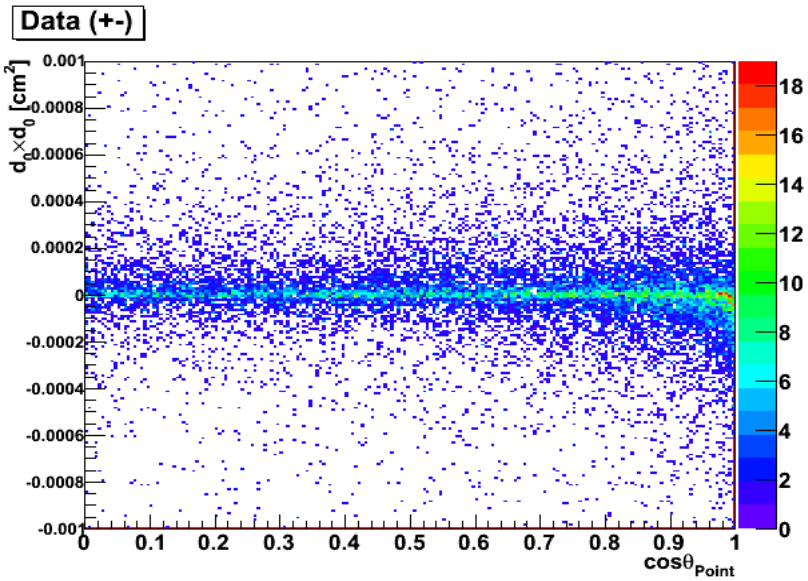


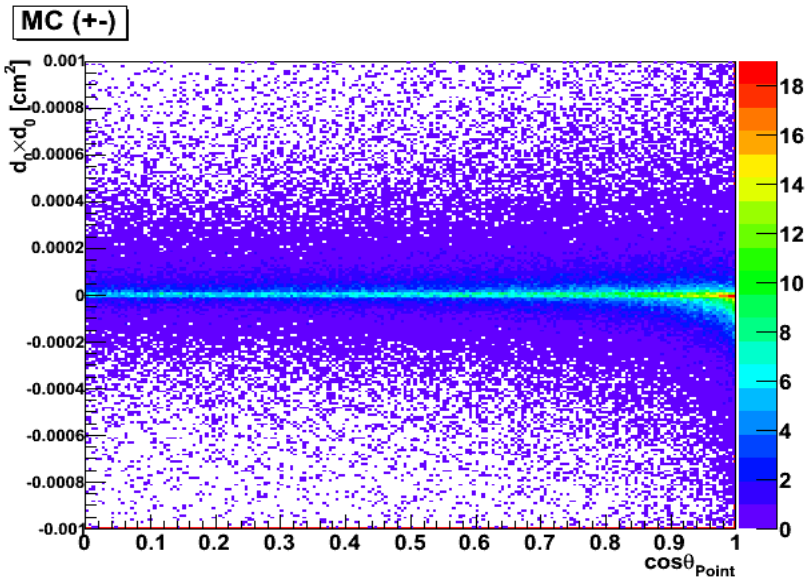
$\cos\theta_{Point}$ distributions

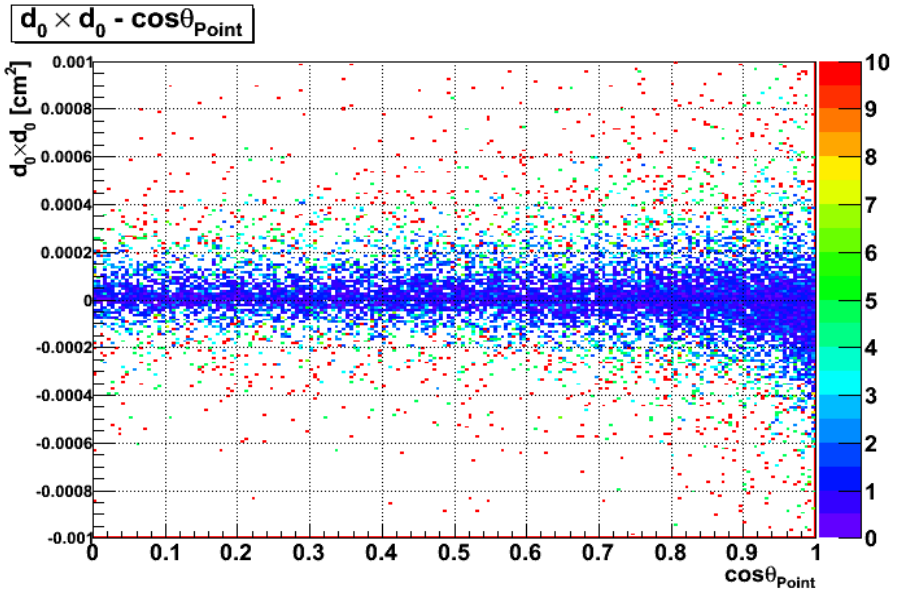




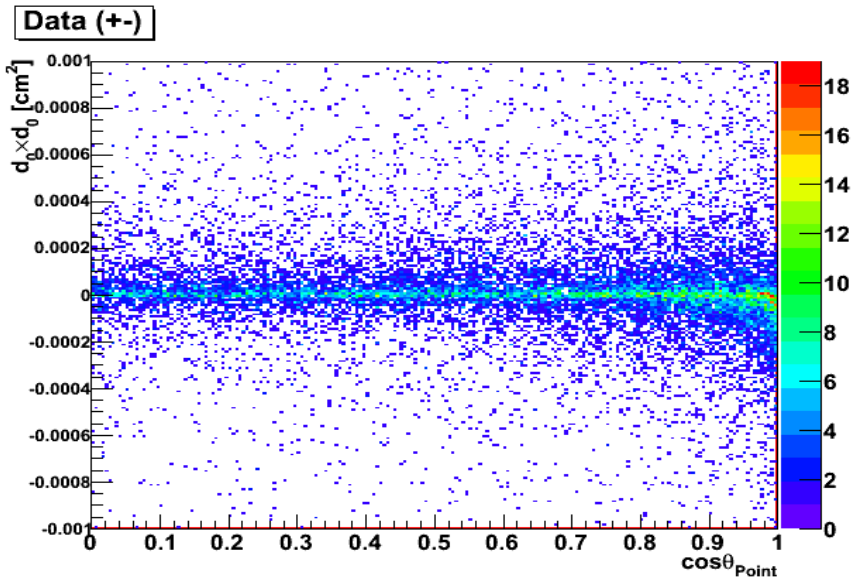
Correlation between $\cos\theta_{Point}$ and $d_0 \times d_0$

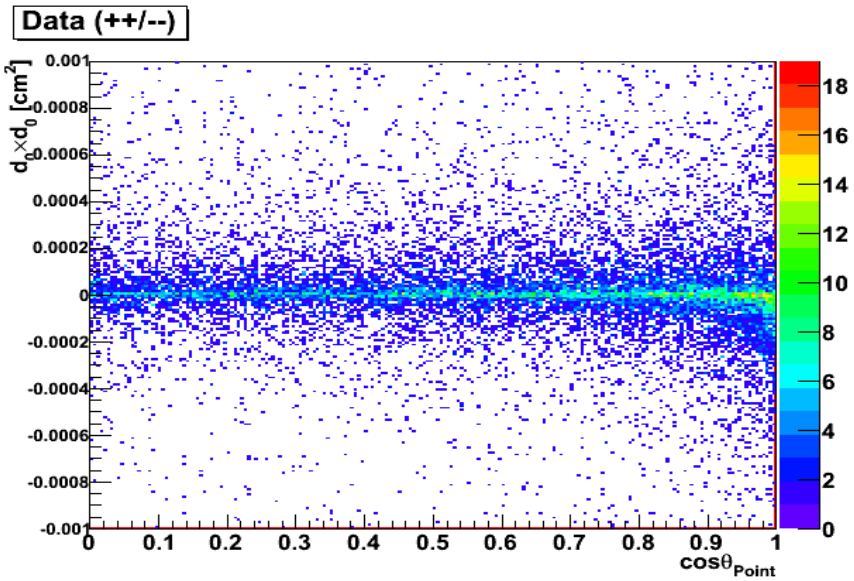


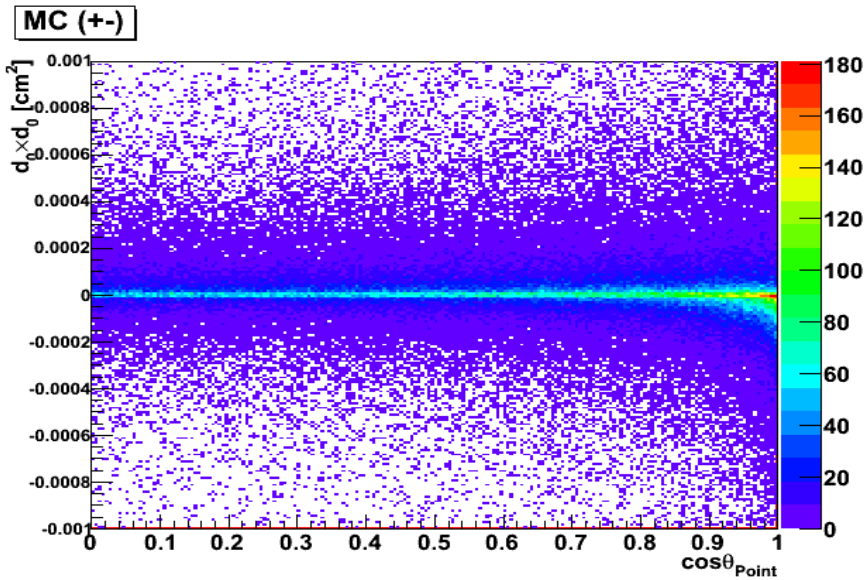


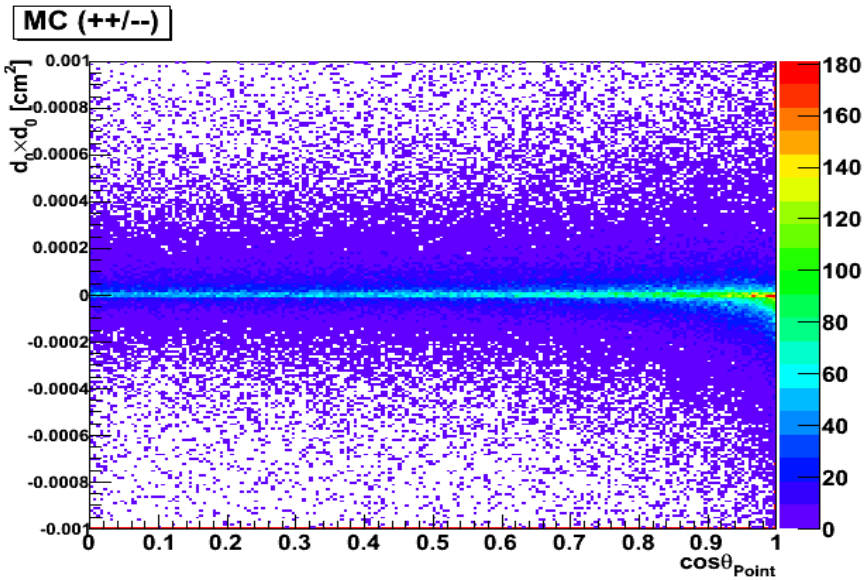


Correlation between $\cos\theta_{Point}$ and $d_0 \times d_0$ LS



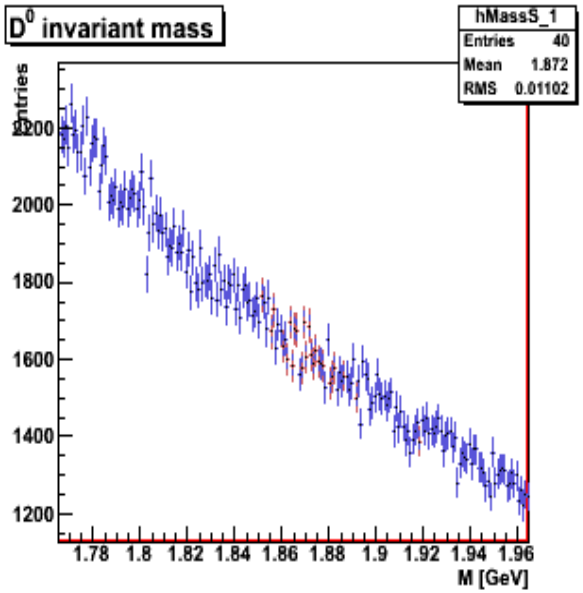


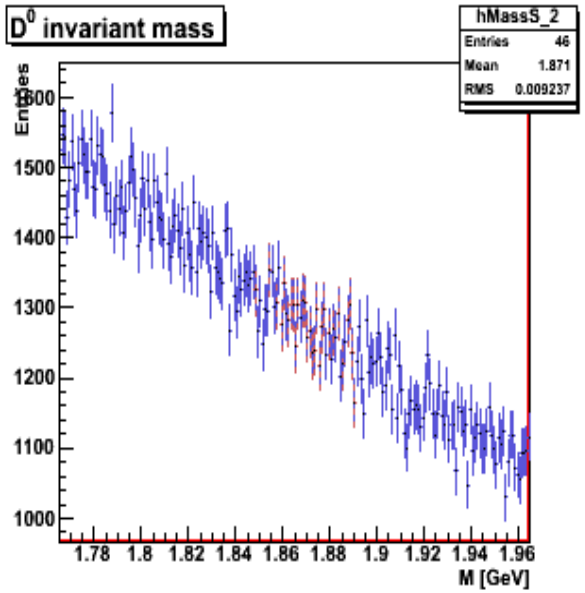


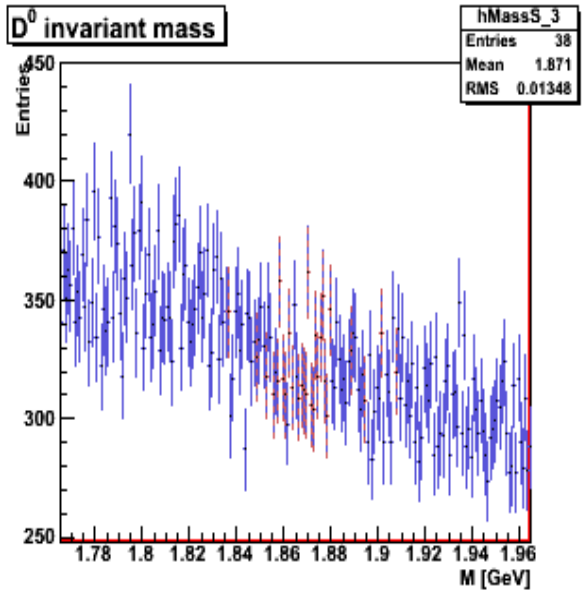


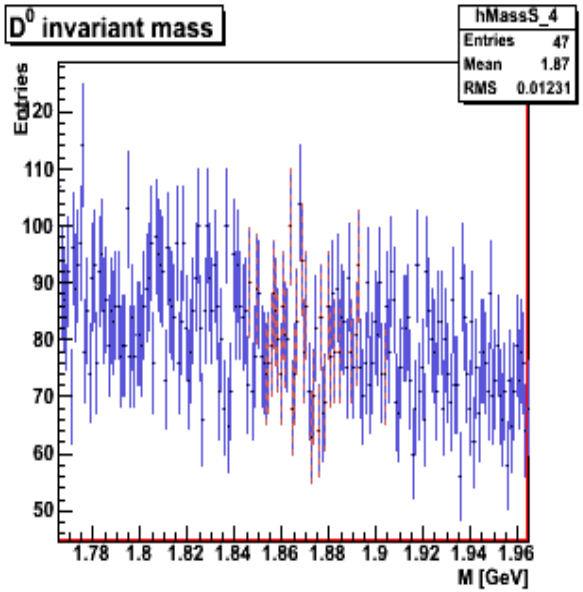
Invariant mass - MC

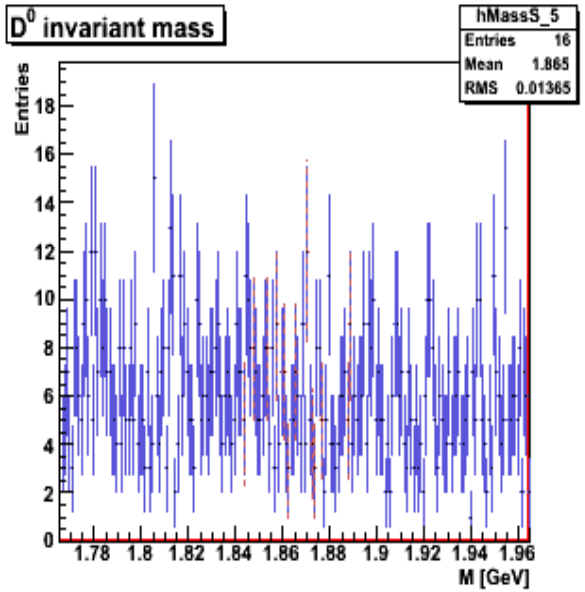
$0 < p_t < 1$ GeV $\quad 1 < p_t < 2$ GeV $\quad 2 < p_t < 3$ GeV
$3 < p_t < 5$ GeV $\quad p_t > 5$ GeV





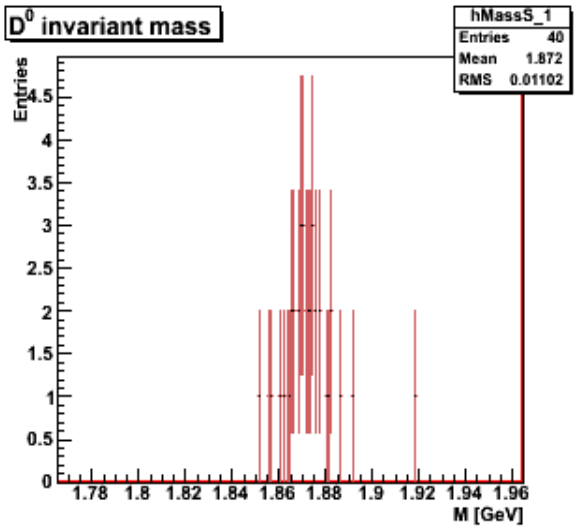


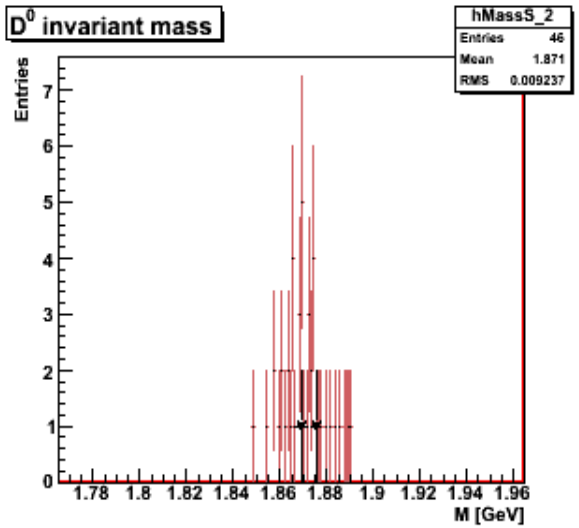


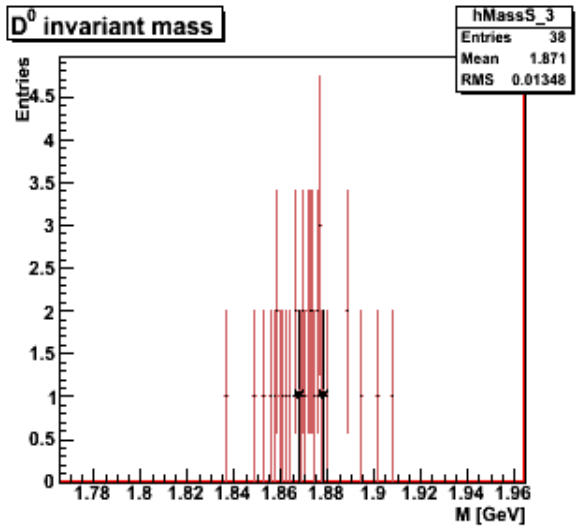


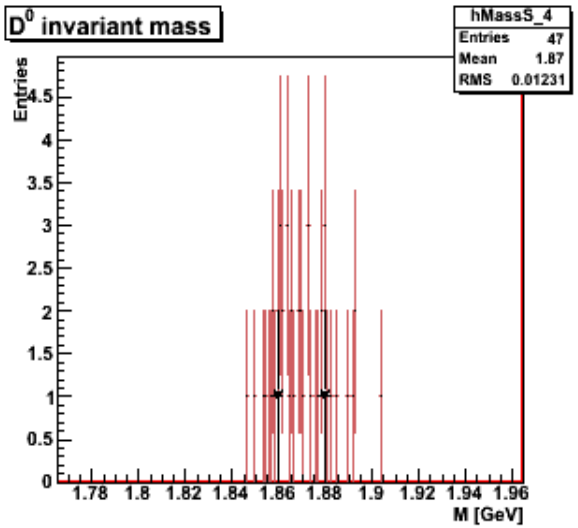
Signal from MC

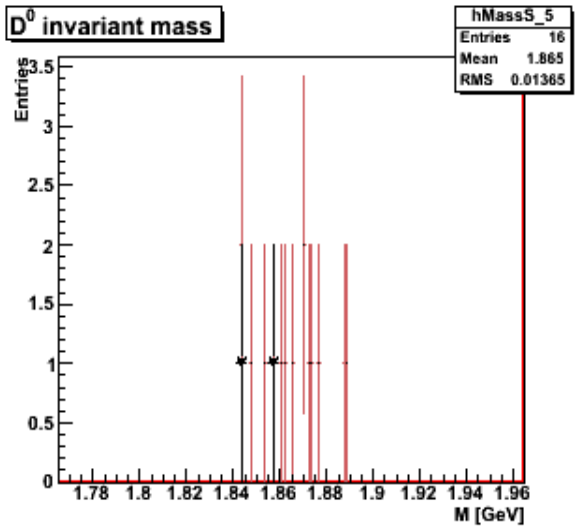
$0 < p_t < 1$ GeV $\quad 1 < p_t < 2$ GeV $\quad 2 < p_t < 3$ GeV
$3 < p_t < 5$ GeV $\quad p_t > 5$ GeV











Number of D^0 = 187

Number of MC bkg = 2556888

Number of Data = 270020

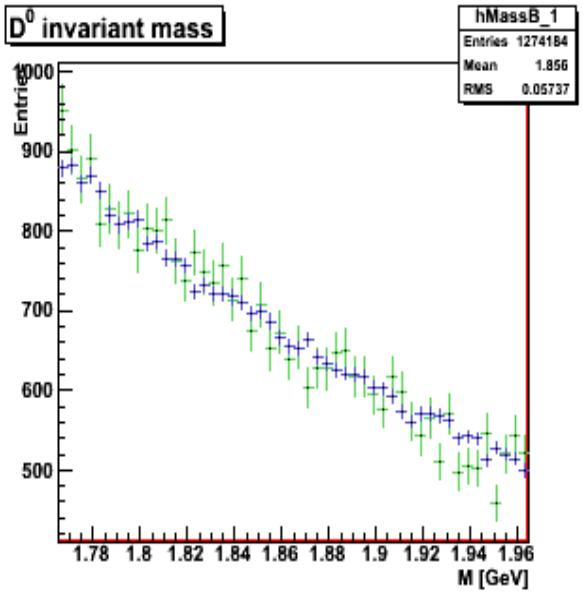
Number of D^0 after analysis cuts = 8

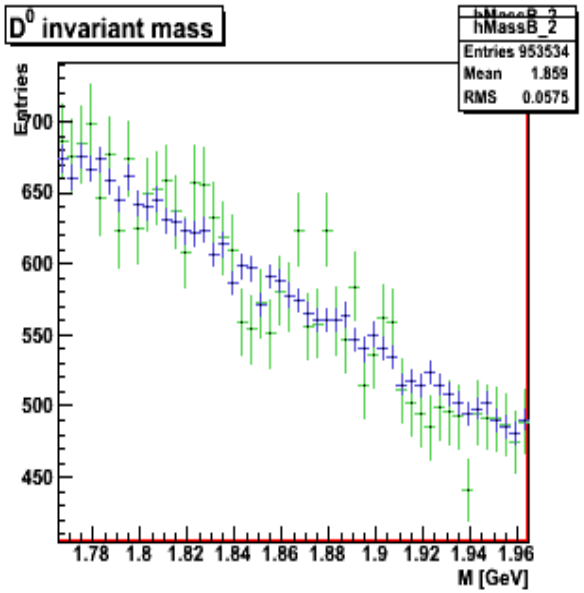
Number of MC bkg after analysis cuts = 12298

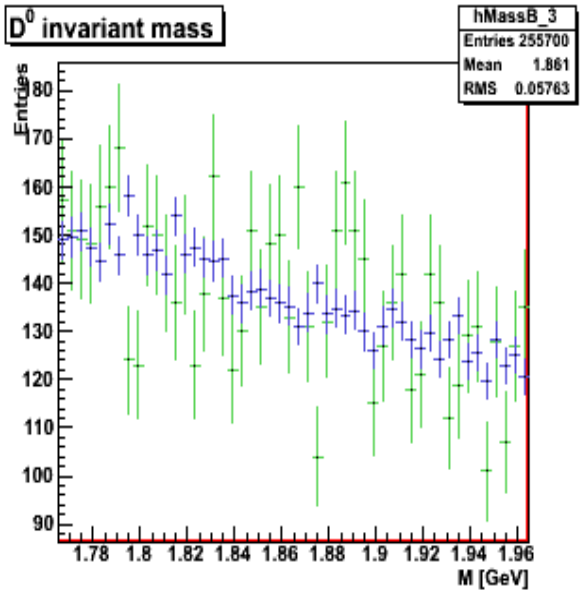
Number of Data after analysis cuts = 2902

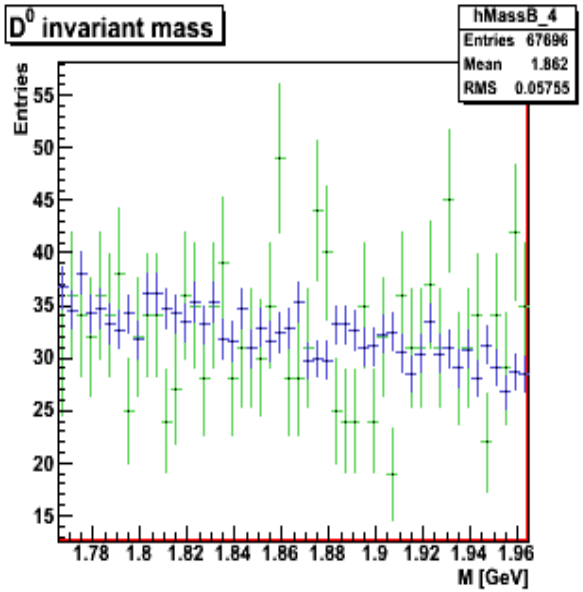
Invariant mass - Comparison

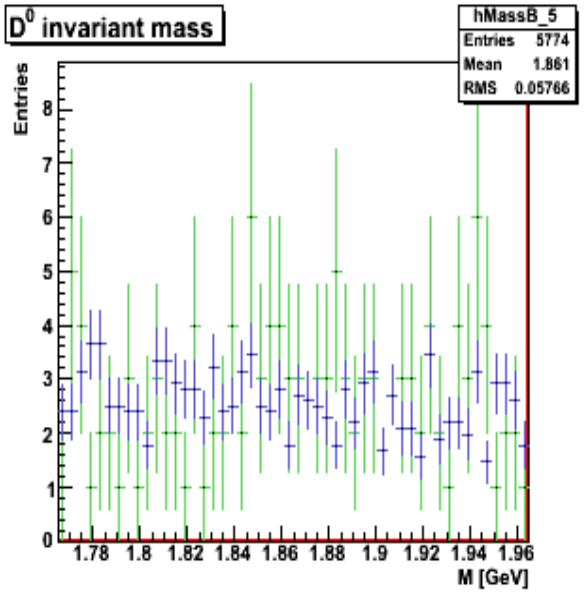
$0 < p_t < 1$ GeV $\quad 1 < p_t < 2$ GeV $\quad 2 < p_t < 3$ GeV
$3 < p_t < 5$ GeV $\quad p_t > 5$ GeV

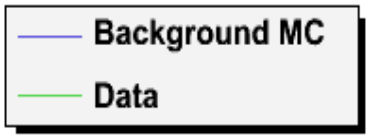






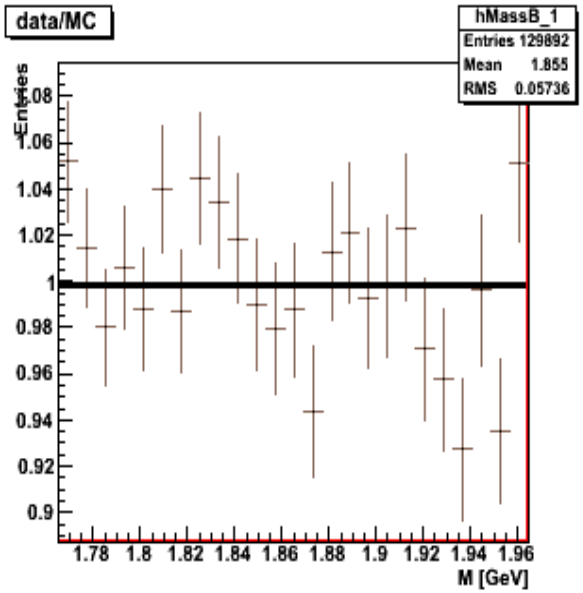


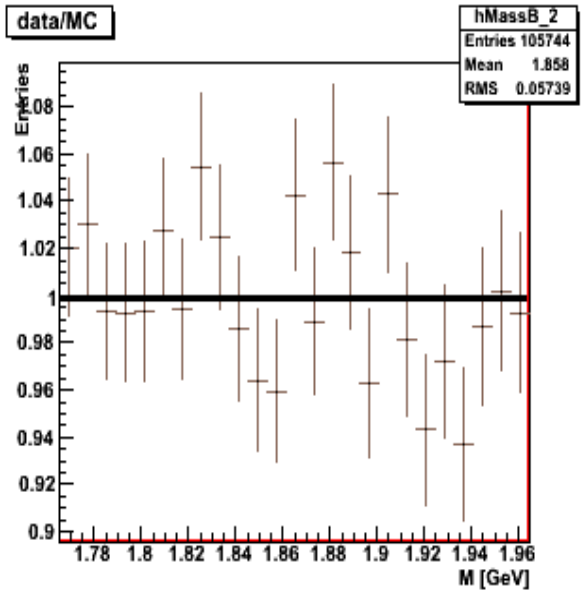


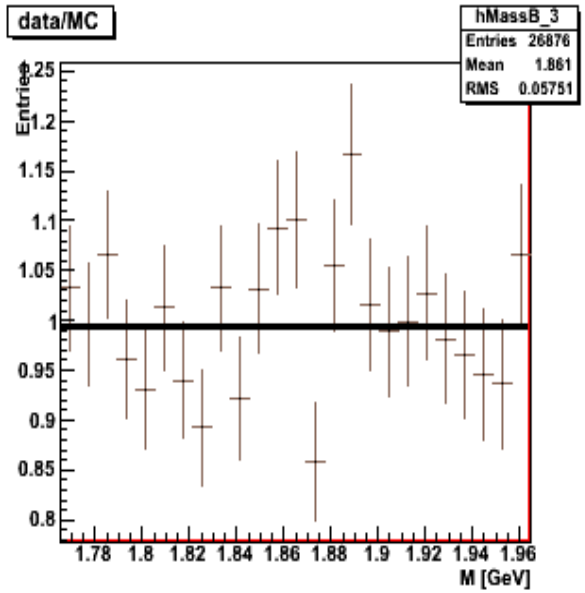


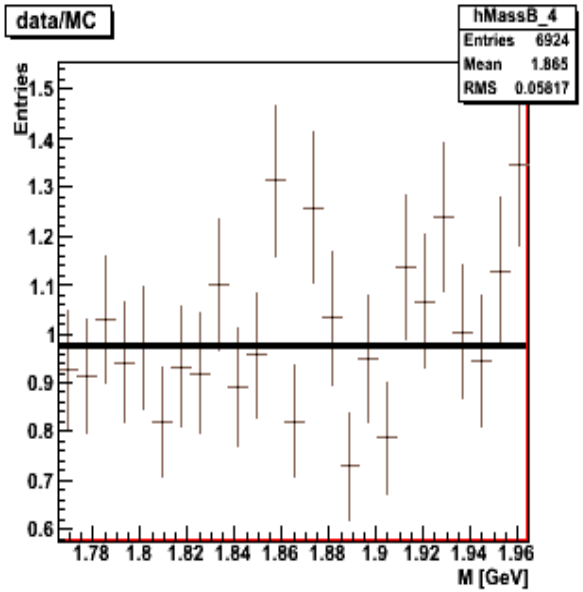
Invariant mass - data/MC

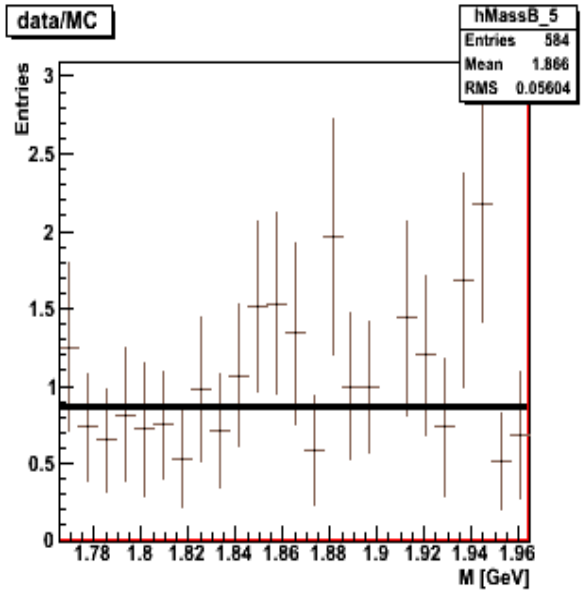
$0 < p_t < 1$ GeV $\quad 1 < p_t < 2$ GeV $\quad 2 < p_t < 3$ GeV
$3 < p_t < 5$ GeV $\quad p_t > 5$ GeV











Fit 0: Par 0.998817 +/- 0.005714

Fit 1: Par 0.998877 +/- 0.006205

Fit 2: Par 0.994844 +/- 0.012663

Fit 3: Par 0.975012 +/- 0.025772

Fit 4: Par 0.870958 +/- 0.088277

Conclusions & Outlook

- The code for the D^0 analysis has been tested also with real data and it works properly
- p_t, d_0, $d_0 \times d_0$, dca and $\cos\theta_{Pointing}$ distributions have been compared
  - ⋆ Simulation (LHC09d10) and data are in agreement both for D^0 candidates and like sign pairs
  - ⋆ Some discrepancy between like sign and candidate pairs (in both MC and data) are under investigation
- Invariant mass distributions have also been compared