D^0 production at low p_T in MinBias events

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Outline

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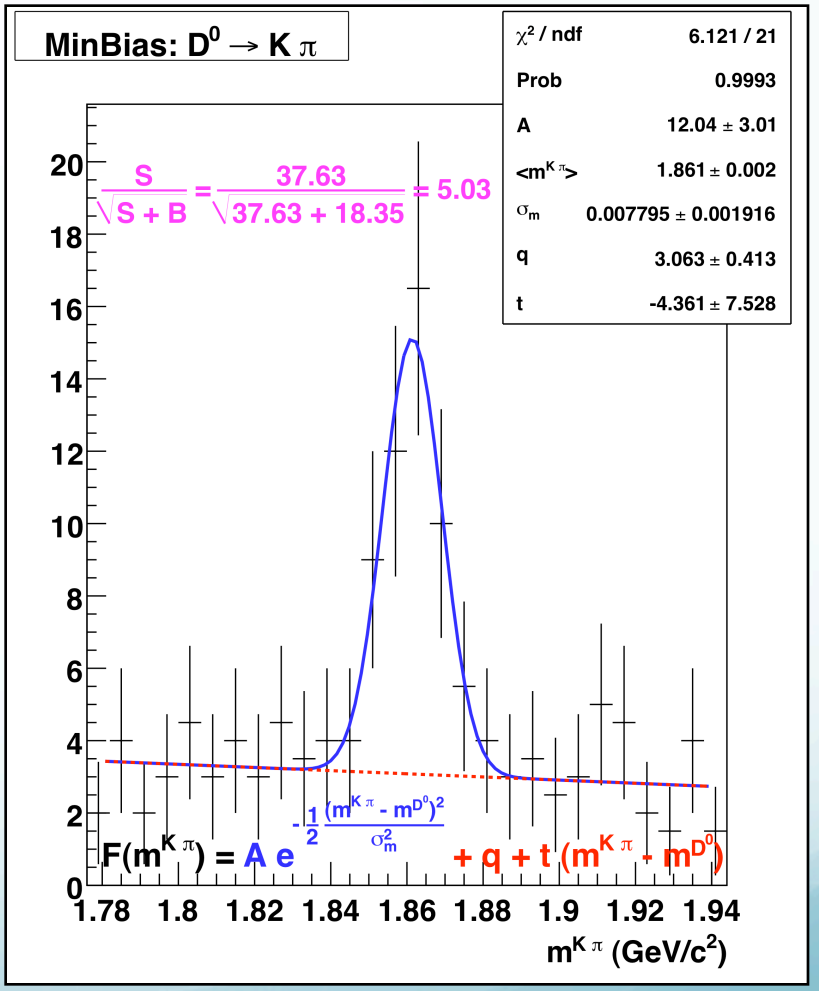
Motivation

- HF in MinBias because:
  - Un-biased sample
  - Contains low pt HF
- Channel
  - $D^0 \longrightarrow K^{\pm} \pi^{\mp}$
- Why?
  - High Br (3.8 %)
  - 2 bodies decay (easy to reconstruct)
  - Many studies already done (TwoTrk)
- Proposed to QCD group as measurement of low-p_T charm production (published CDF measure starts @ $p_T \geq 5.5$ GeV/c)

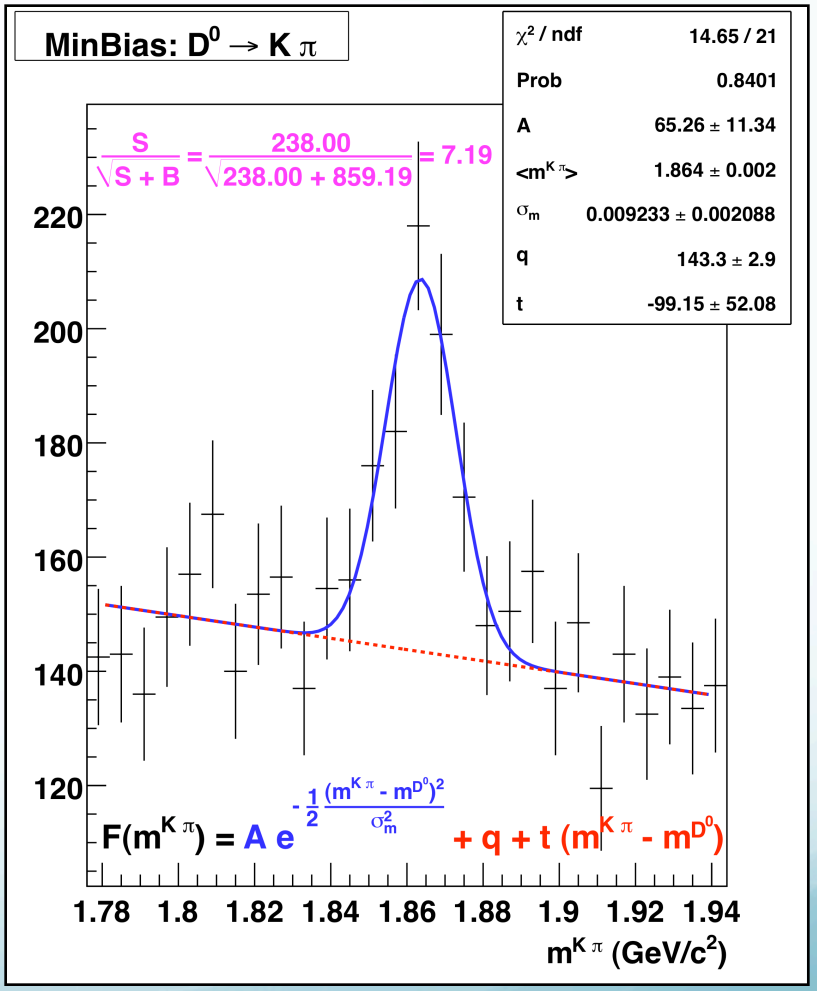
Previous works: Oldeman et al.

- **Tracks:**
  - ✓ $p_T \geq 2$ GeV/c
  - ✓ r-φ SVX hits ≥ 3
  - ✓ (Axial COT hits ≥ 25) && (Stereo COT hits ≥ 25)
  - ✓ $0.012 \leq |d_0| \leq 0.1$ cm
  - ✓ $|z_0| \leq 47.25$ cm
  - ✓ $|z| \leq 47.25$ cm (@ r = 10.645 cm)
  - ✓ IN && OUT from ~ the same barrel
  - ✓ $|z| \leq 155$ cm (@ r = 133 cm)
- **Pairs:**
  - ✓ $q_i \bullet q_j < 0$
  - ✓ $d_{0,i} \bullet d_{0,j} < 0$
  - ✓ $p_{T,i} + p_{T,j} \geq 5.5$ GeV/c
  - ✓ $|\Delta z_0| \leq 5$ cm
  - ✓ $2° \leq \Delta \varphi_0 \leq 90°$
- **D^0:**
  - ✓ $p_T \geq 5.5$ GeV/c
  - ✓ $L_{xy} \geq 0.05$ cm



Previous works: Punzi et al.

- **Tracks:**
  - ✓ $p_T \geq 1.5$ GeV/c
  - ✓ SVX + COT track
  - ✓ Axial COT segments ≥ 4 (≥ 5 hits / seg)
  - ✓ $|d_0| \geq 0.01$ cm
- **Pairs:**
  - ✓ $q_i \bullet q_j < 0$
  - ✓ $|\Delta z_0| \leq 5$ cm
  - ✓ $2° \leq \Delta \varphi_0 \leq 135°$
- **D^0:**
  - ✓ $p_T \geq 3$ GeV/c
  - ✓ $0.01 \leq L_{xy} \leq 3$ cm



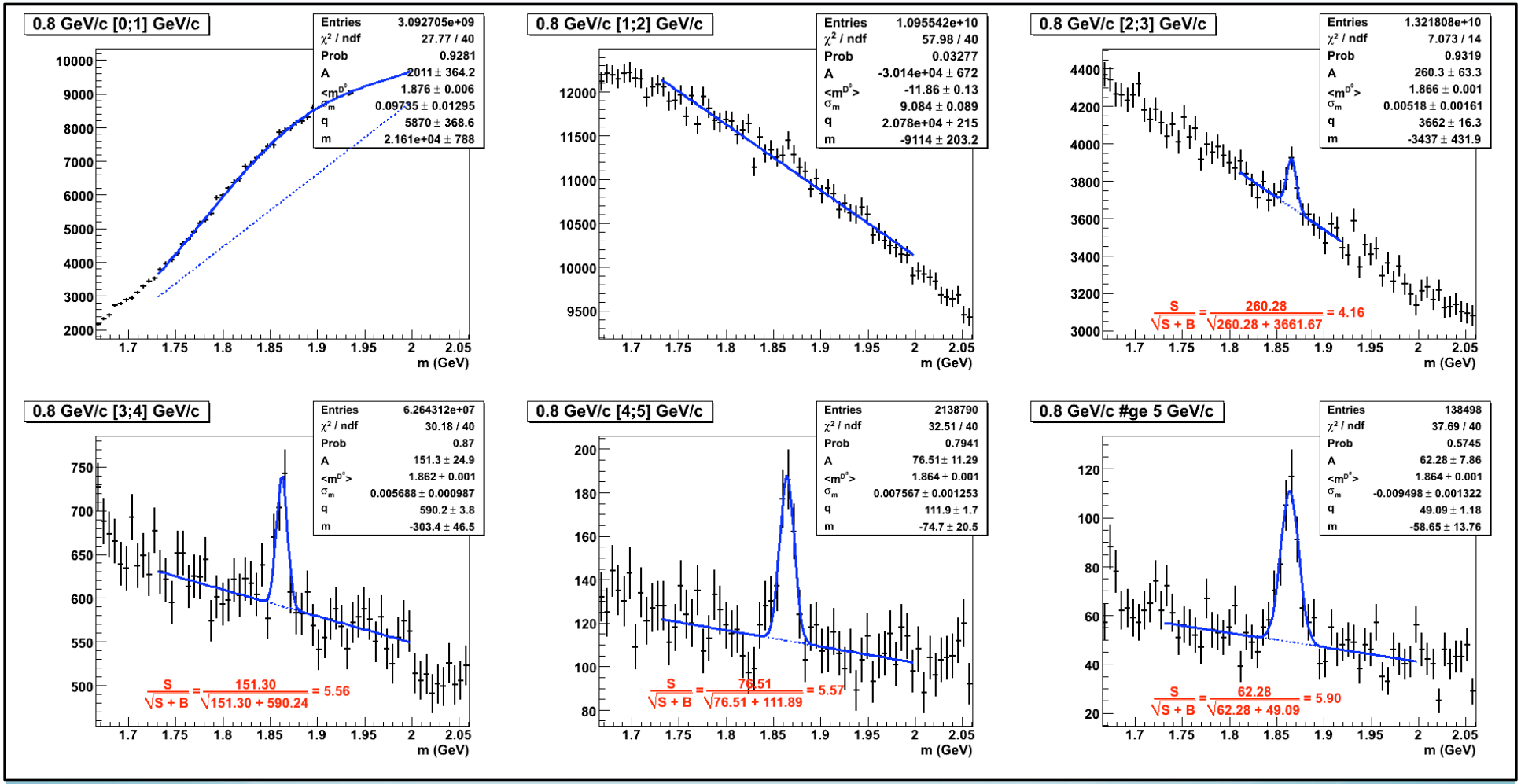
Dataset

- All the available datasets (gmbs*)
- Good run list (QCD with Si)
- Trigger: MINBIAS_1HZ
- ~ 3.4 $(fb)^{-1}$
- From p0 to p18

Lower in p_T : tracks selection

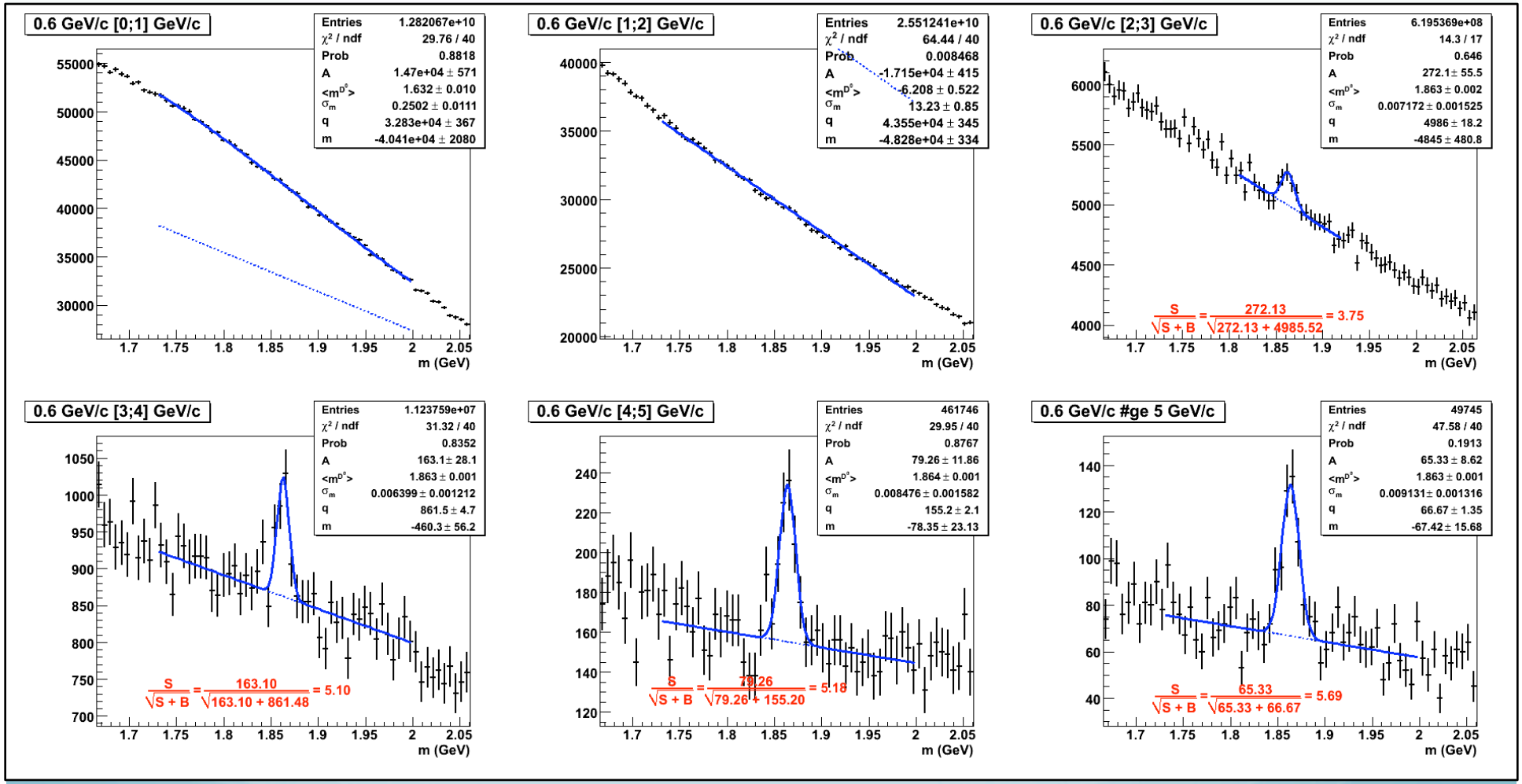
- **From resolutions and efficiencies:**
  - ✓ $p_T \geq 0.8$ GeV/c
  - ✓ (r-φ SVX hits ≥ 3) && (Stereo SVX hits ≥ 2)
  - ✓ (Axial COT hits ≥ 25) && (Stereo COT hits ≥ 25)
  - ✓ $|\eta| \leq 1$
  - ✓ $|d_0| \geq 0.01$ cm
  - ✓ $|z_0| \leq 45$ cm
- **That's it ?**
  - ✓ @ 0.6 GeV/c the efficiency is ~ the same but S/B is worst
  - ✓ Something more to reduce bkg from materials
- **What from that?**
  - ✓ A point @ 4 GeV/c
  - ✓ A point @ 3 GeV/c
  - ✓ (A point @ 2 GeV/c)

Lower in p_T : D^0 at a glance 1/2



Fit ok && $0.010 \leq l_{xy} \leq 3$ cm

Lower in p_T : D^0 at a glance 2/2



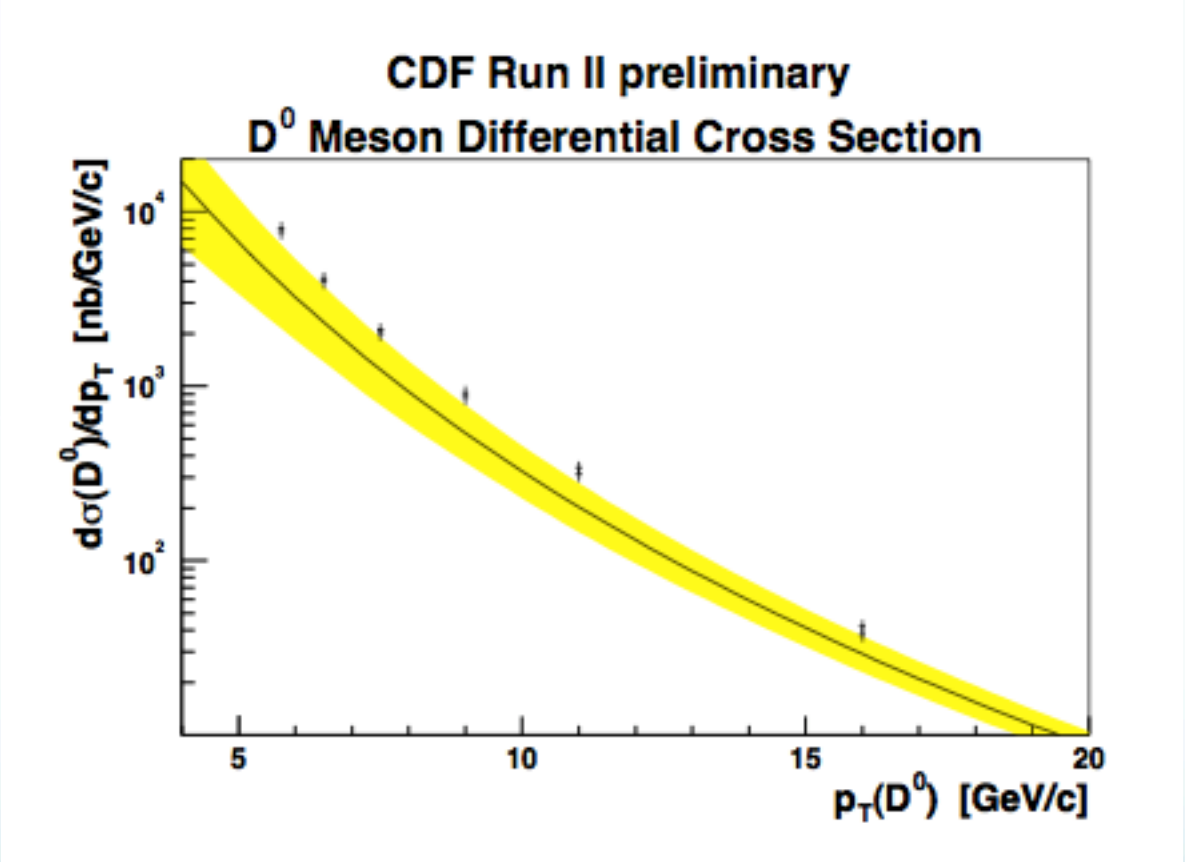
Fit ok && $0.010 \leq l_{xy} \leq 3$ cm

Next steps

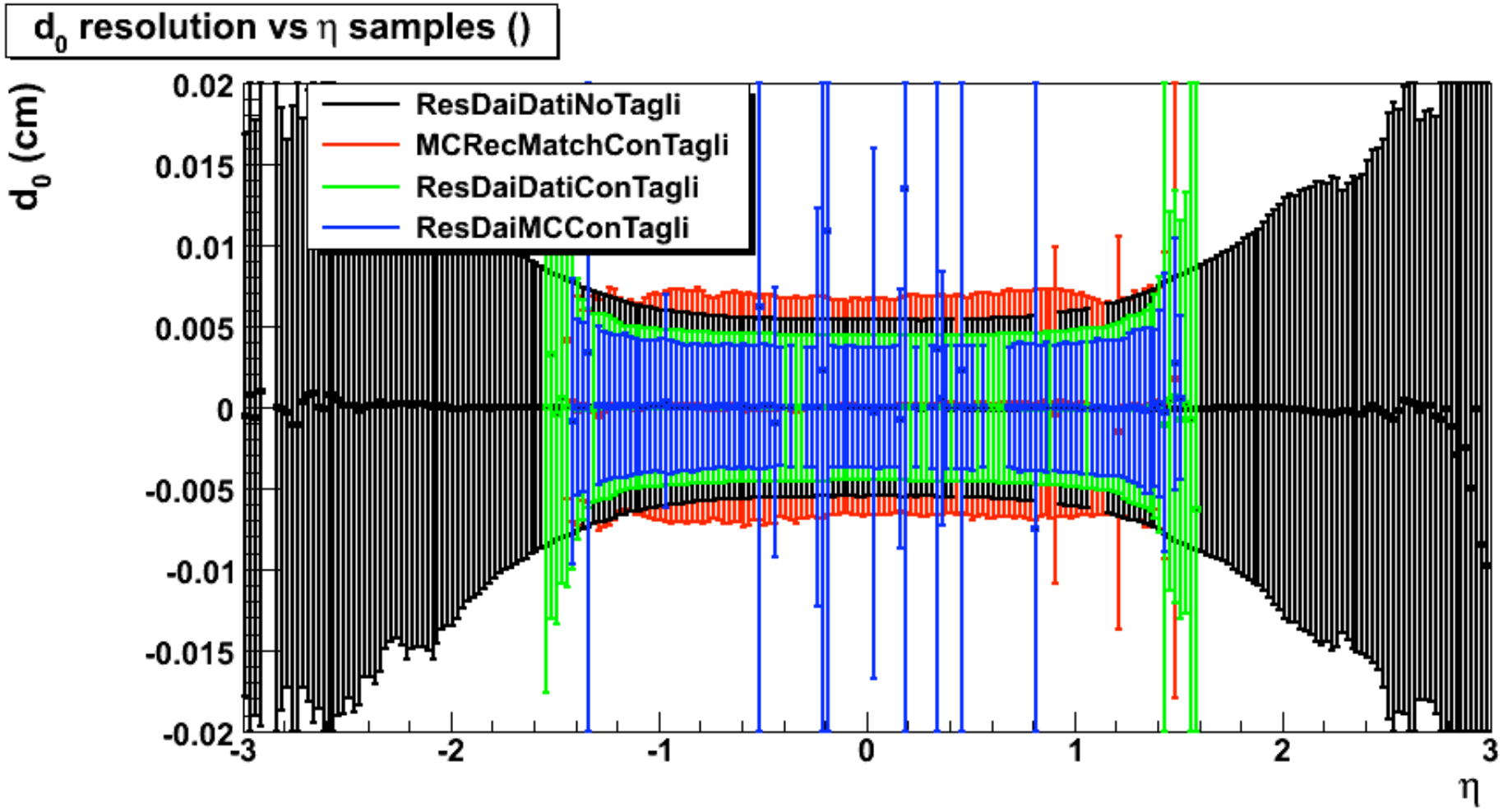
- Fix D^0 selection
- Evaluate efficiency
- Evaluate acceptance
- Evaluate cross section
- See what happens with 0.6 GeV/c tracks
- D*
- Other channels ?
- Other flavors ?

Backup

Oldeman results



Tracks resolutions 1/2



Tracks resolutions 2/2