



DCA to Primary Vertex Cut Study

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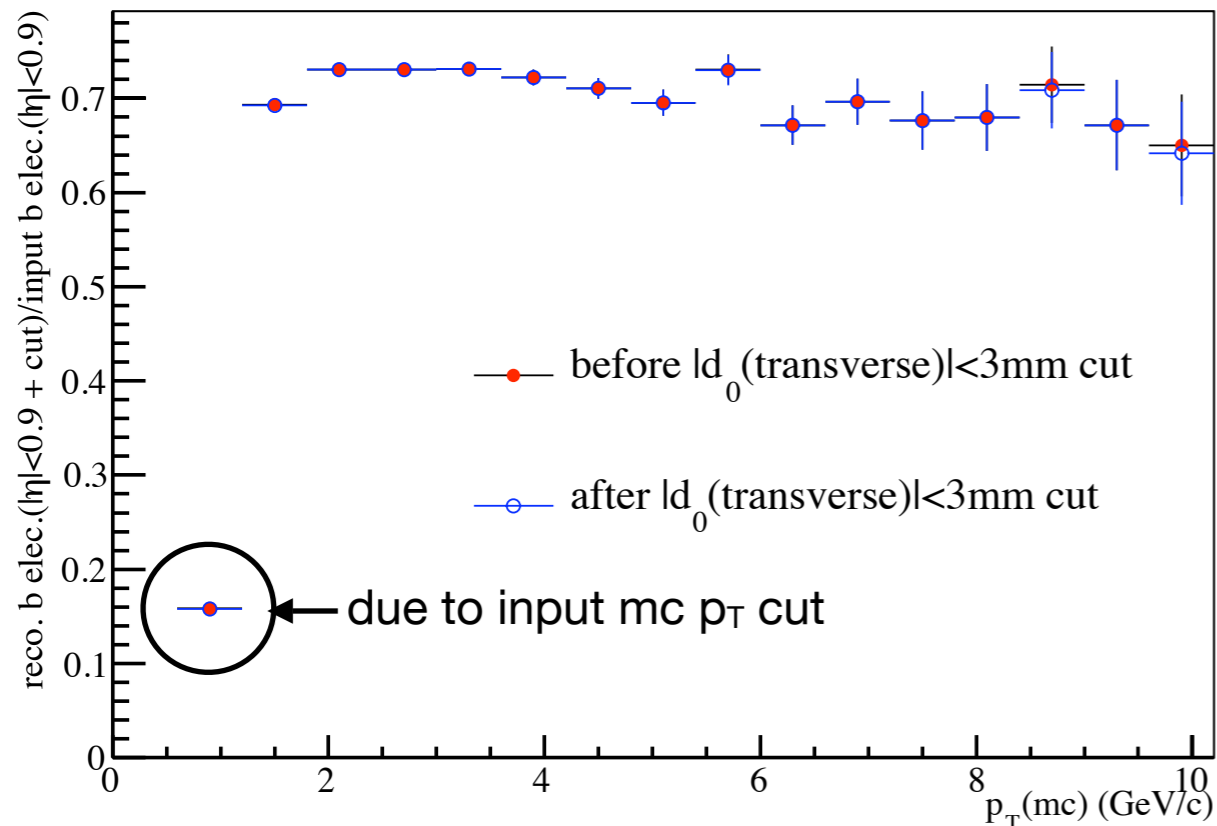
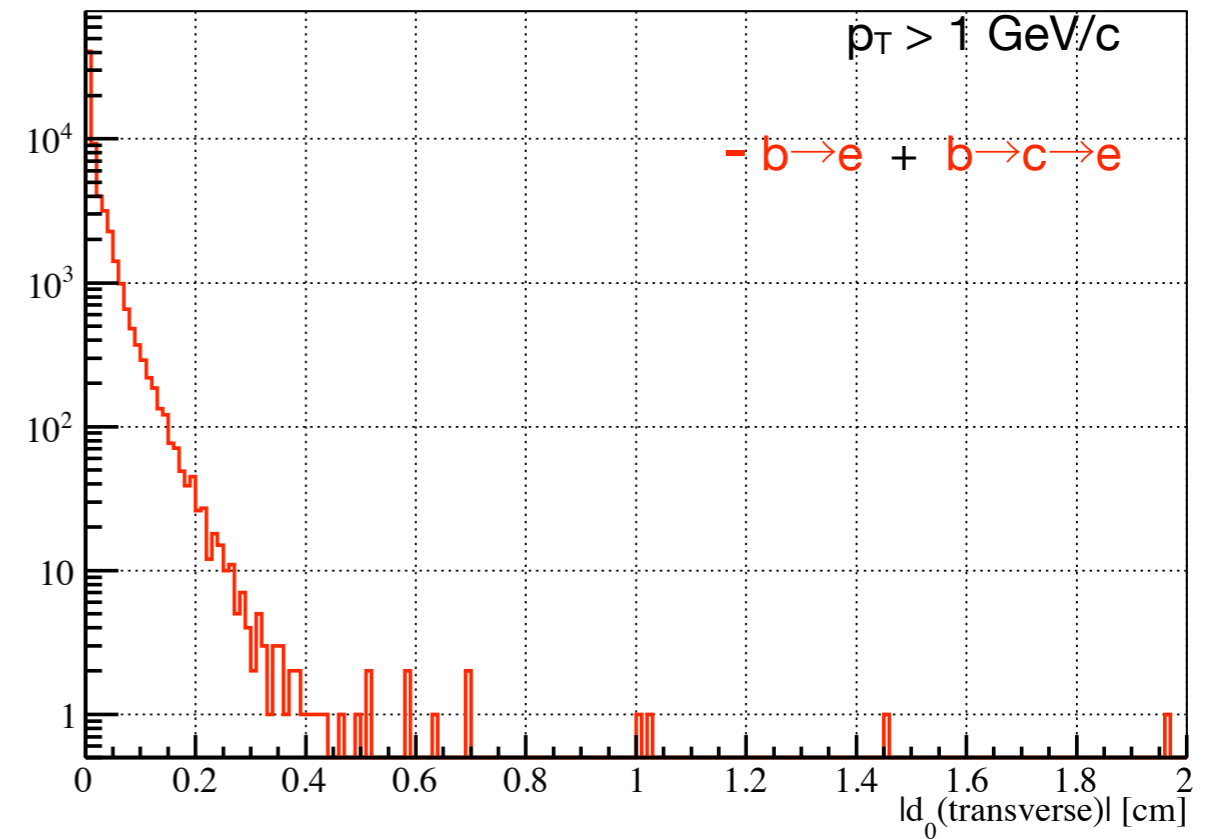
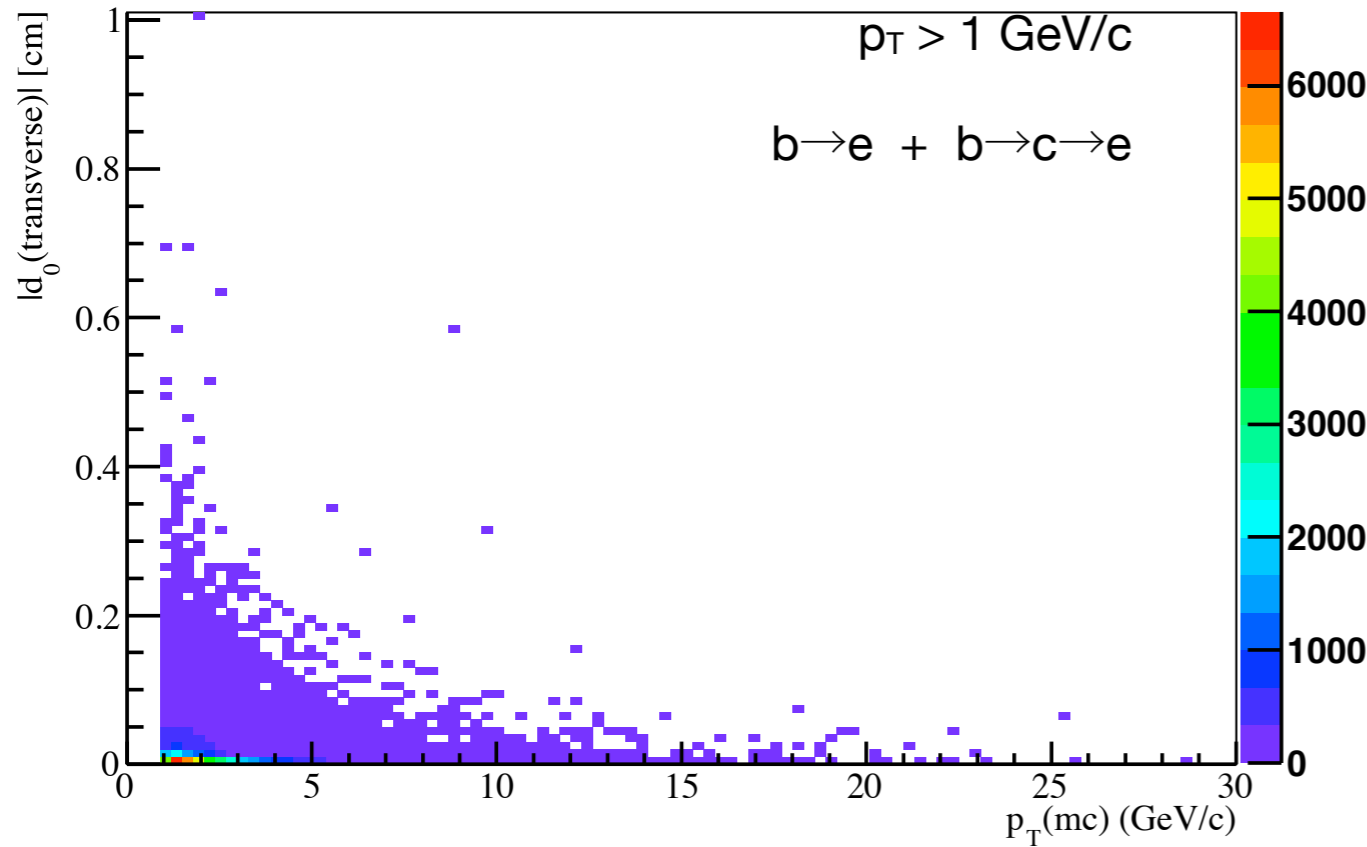
Introduction

- Question started from Calro's comment on $150 \mu\text{m} < |d_0(\text{trans.})| < 3 \text{ mm}$ cut to reduce conversion background
- Further more, secondary vertexing using (beauty)e-hadrons require preselection of displaced tracks to reduce combinatoric background
- Outline
 - signal electron $|d_0|$ vs. p_T
 - effect of maximum and minimum $|d_0|$ cut on efficiency and S/B
 - conclusion

Data Sets and Quality Cuts (1)

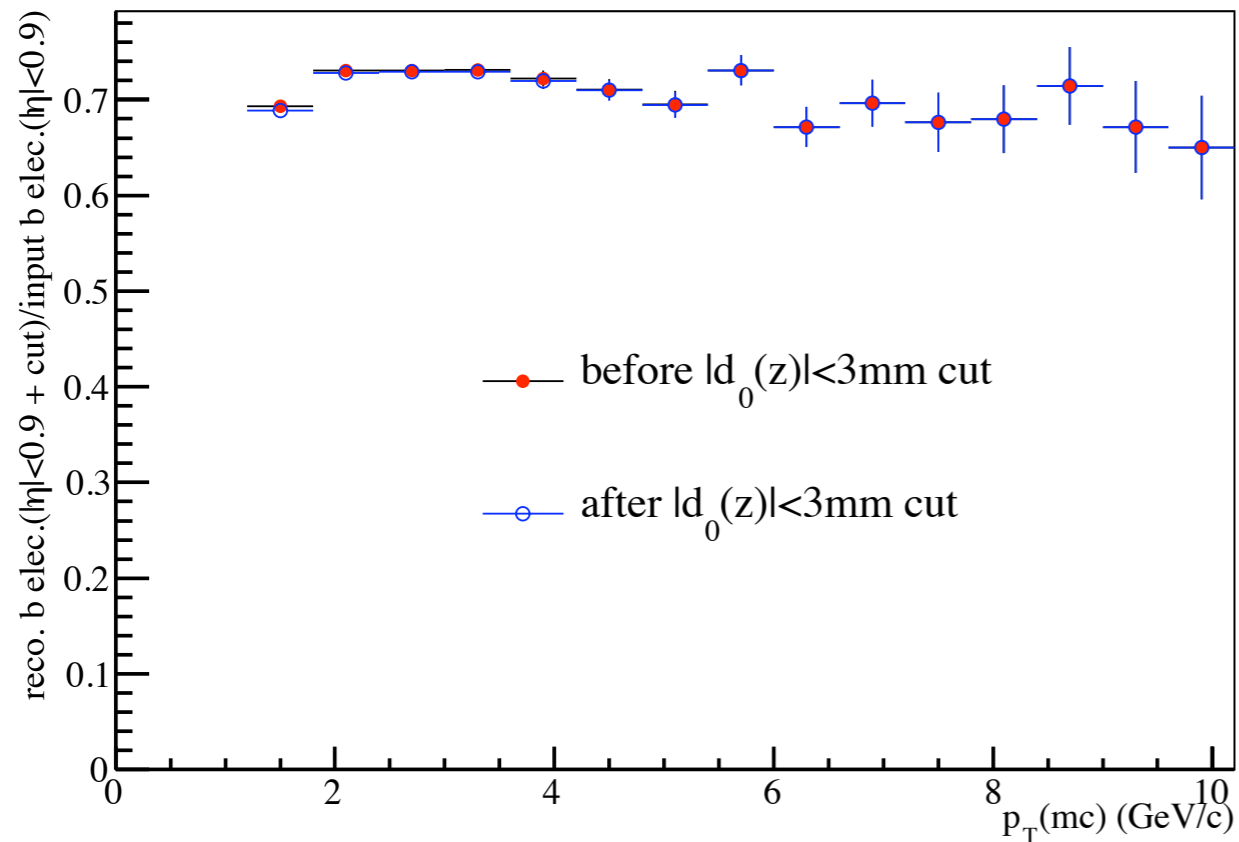
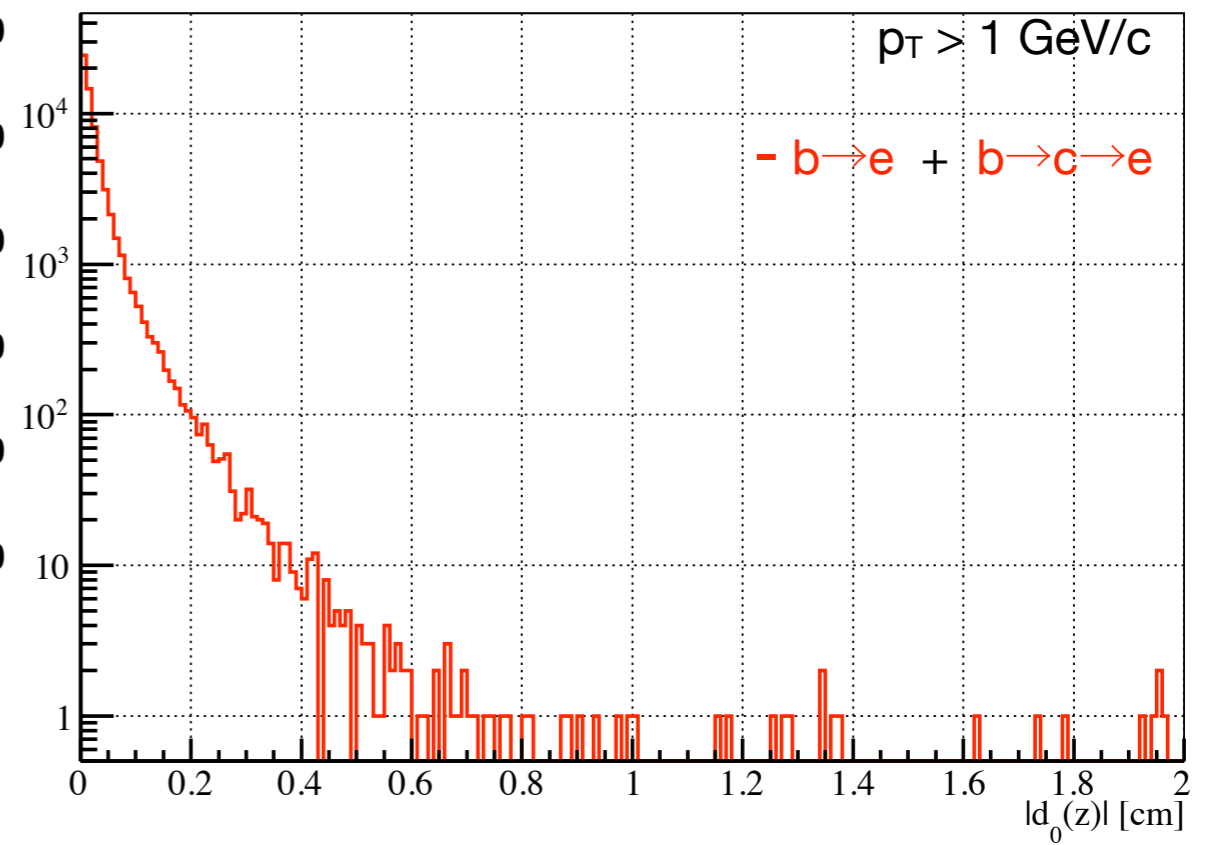
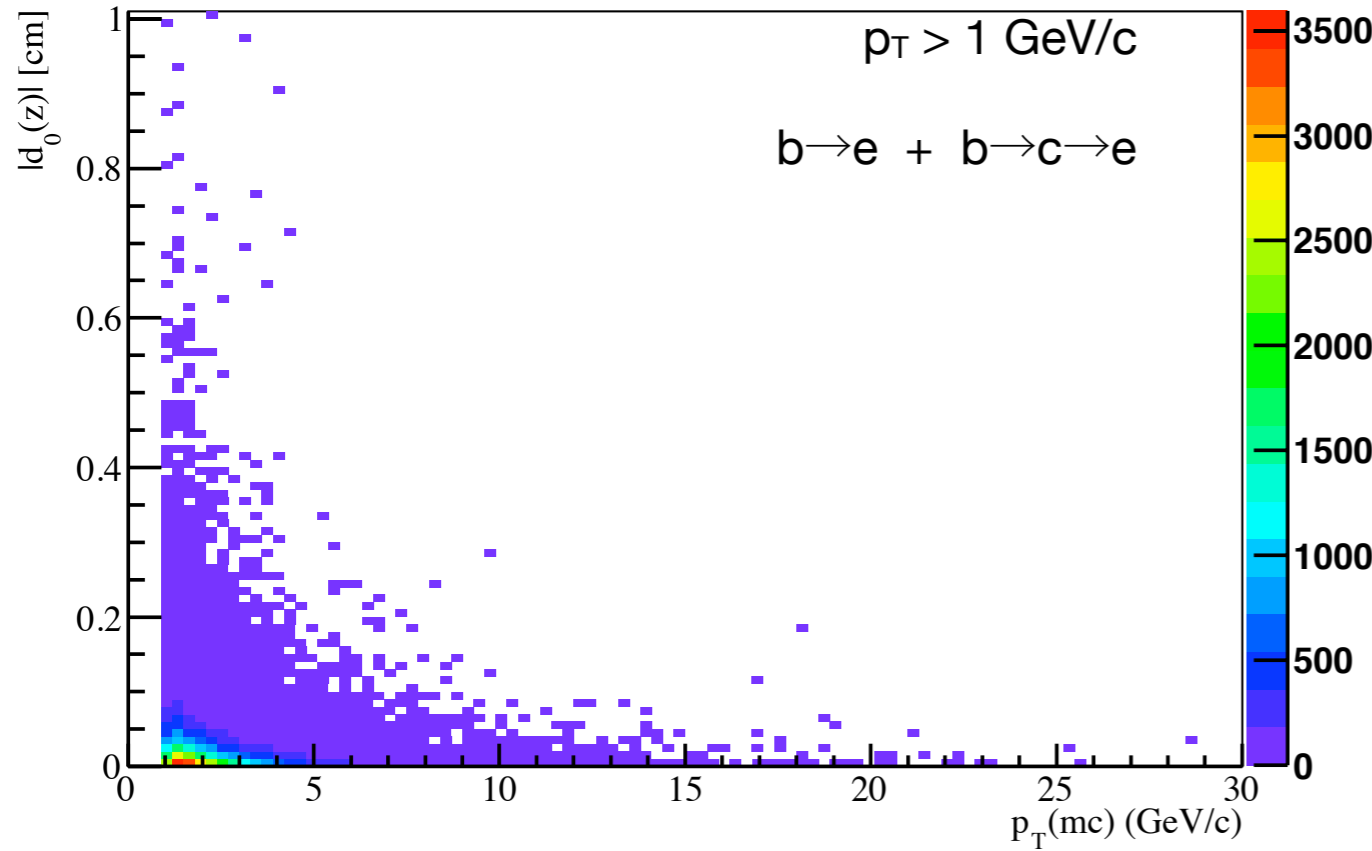
- Production with v4-16-Rev-08
- Data
 - beauty electron triggered samples: 0.4 M (GSI)
 - charm electron triggered samples: 0.4 M (GSI)
- Cuts
 - $p_T > 1 \text{ GeV}/c$
 - number of TPC clusters > 50
 - require ITS, TPC refit
 - require hit on the first pixel
 - reject kink daughter tracks
 - require at least 2 primary vertex contributor

Beauty electron $|d_0(\text{trans.})|$ and Maximum allowance



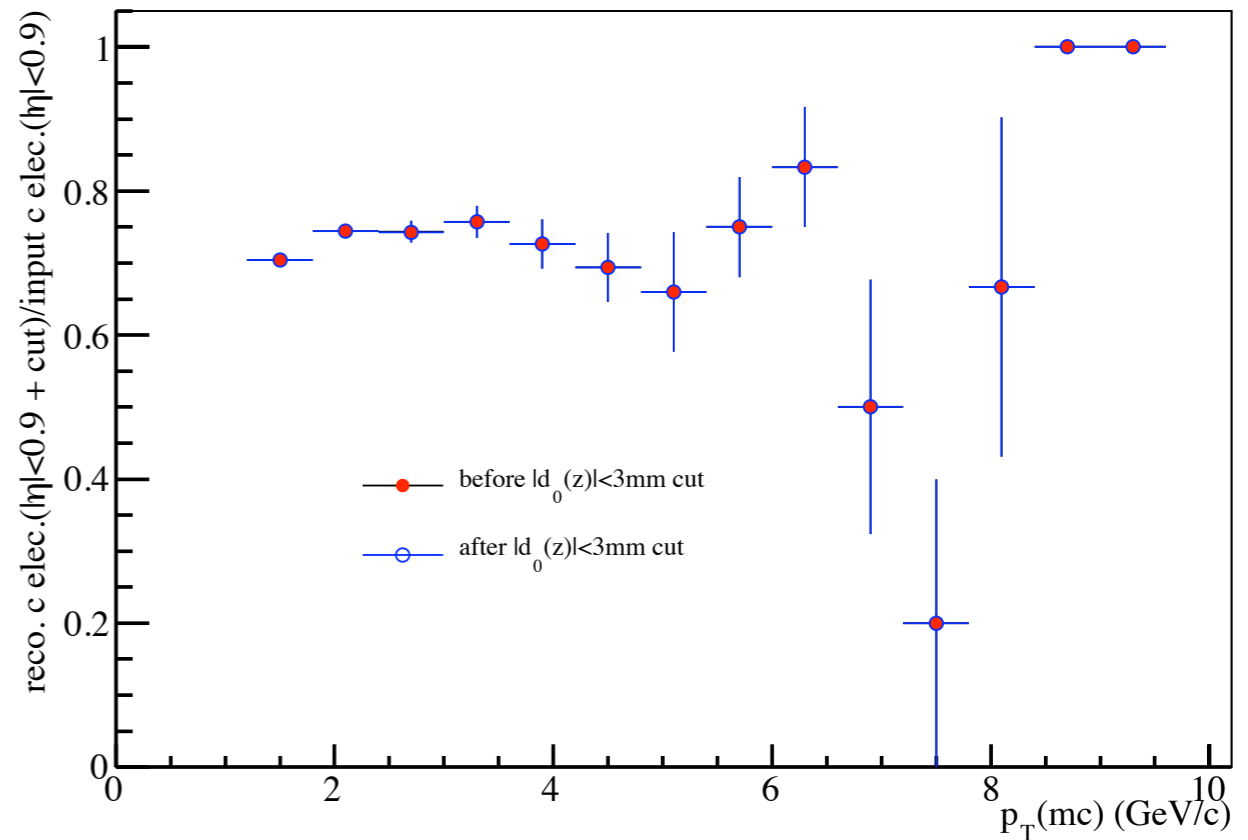
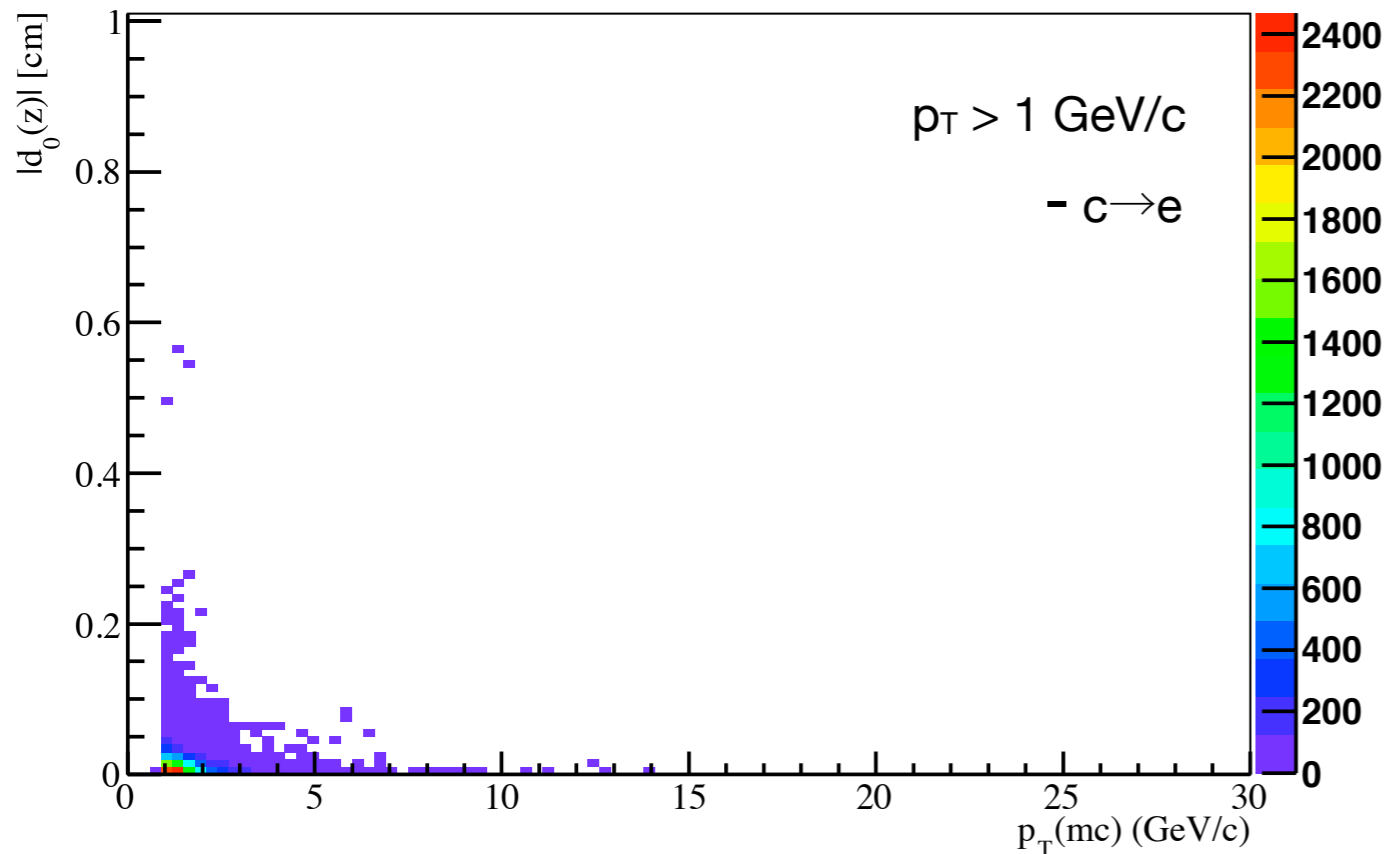
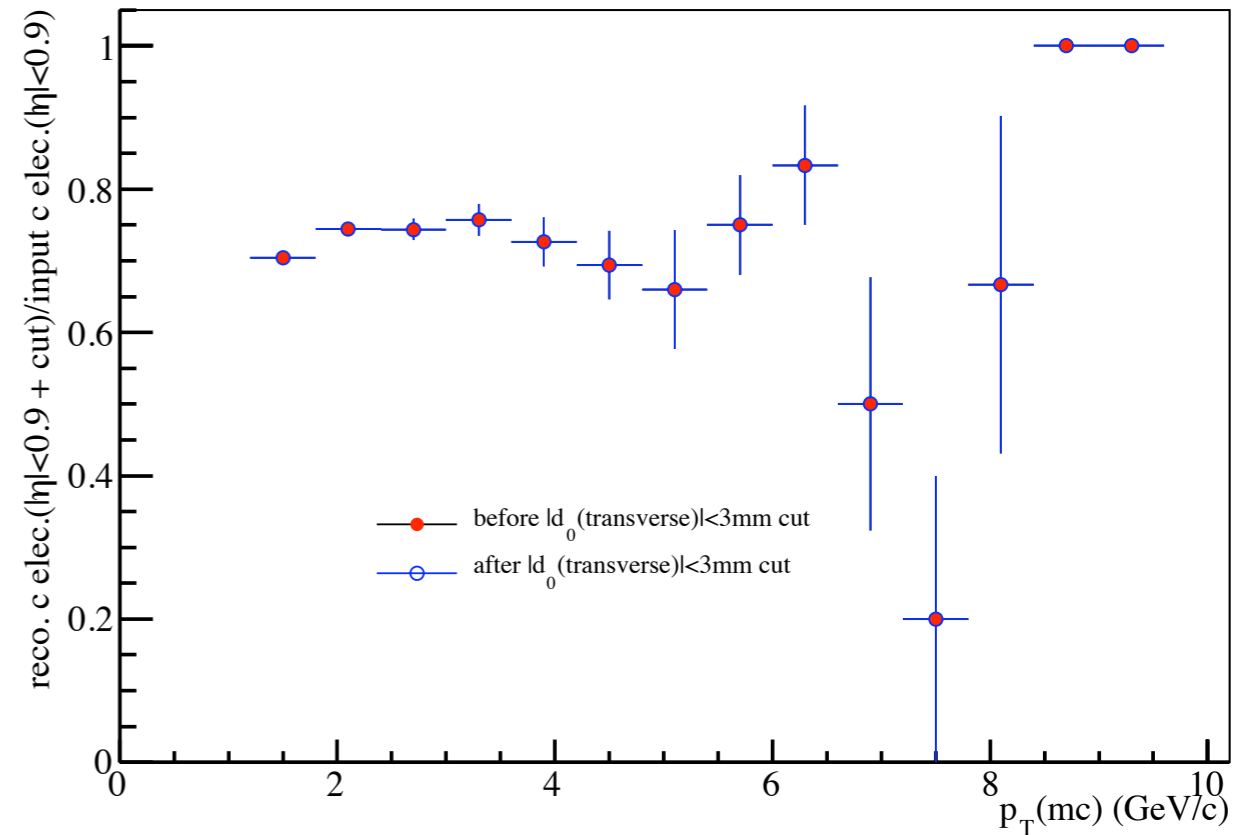
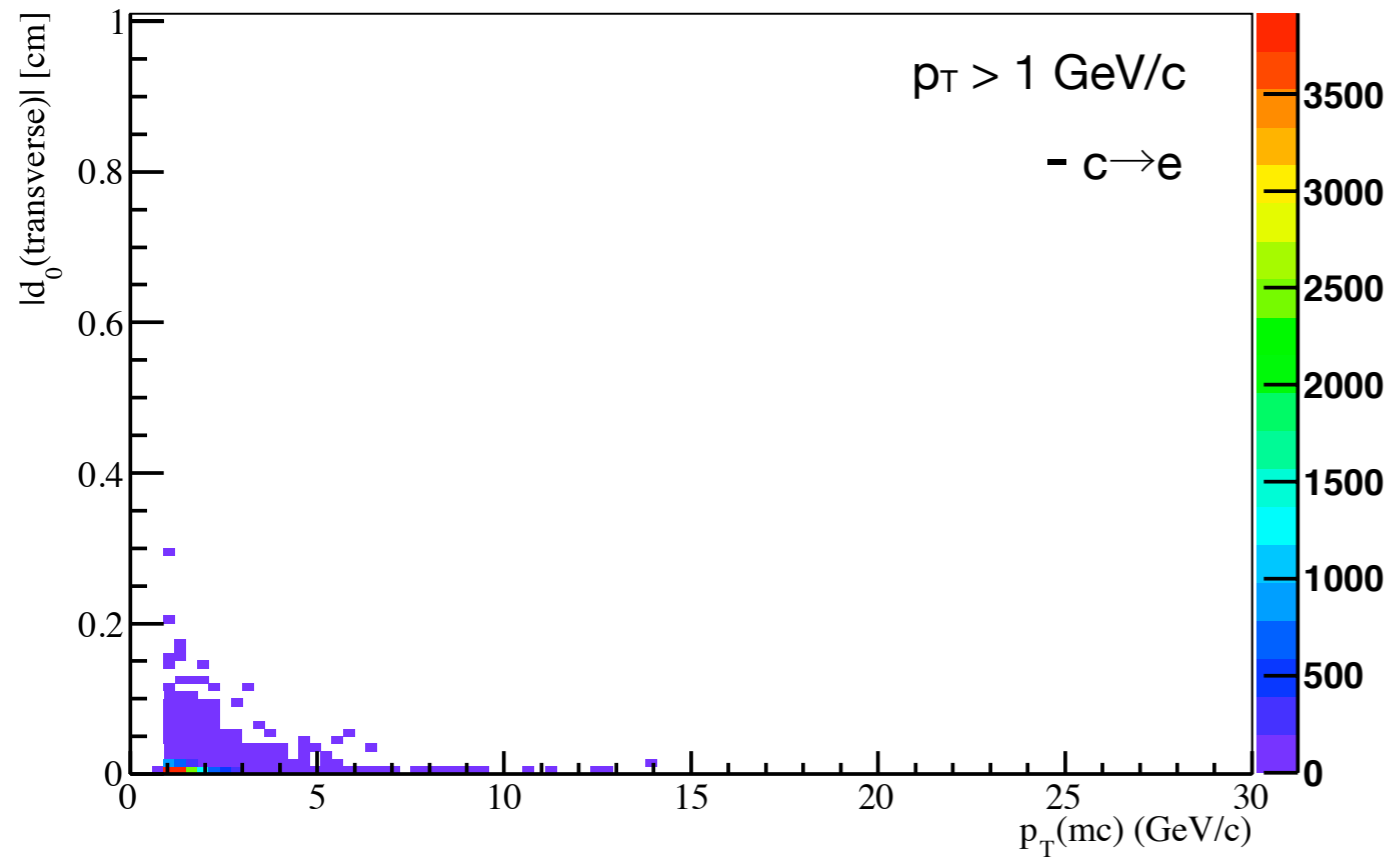
⇒ Fraction of low momentum beauty electron $|d_0(\text{trans.})| > 3 \text{ mm}$ is negligible, so one can give 3 mm as maximum cut.

Beauty electron $|d_0(z)|$ and Maximum allowance

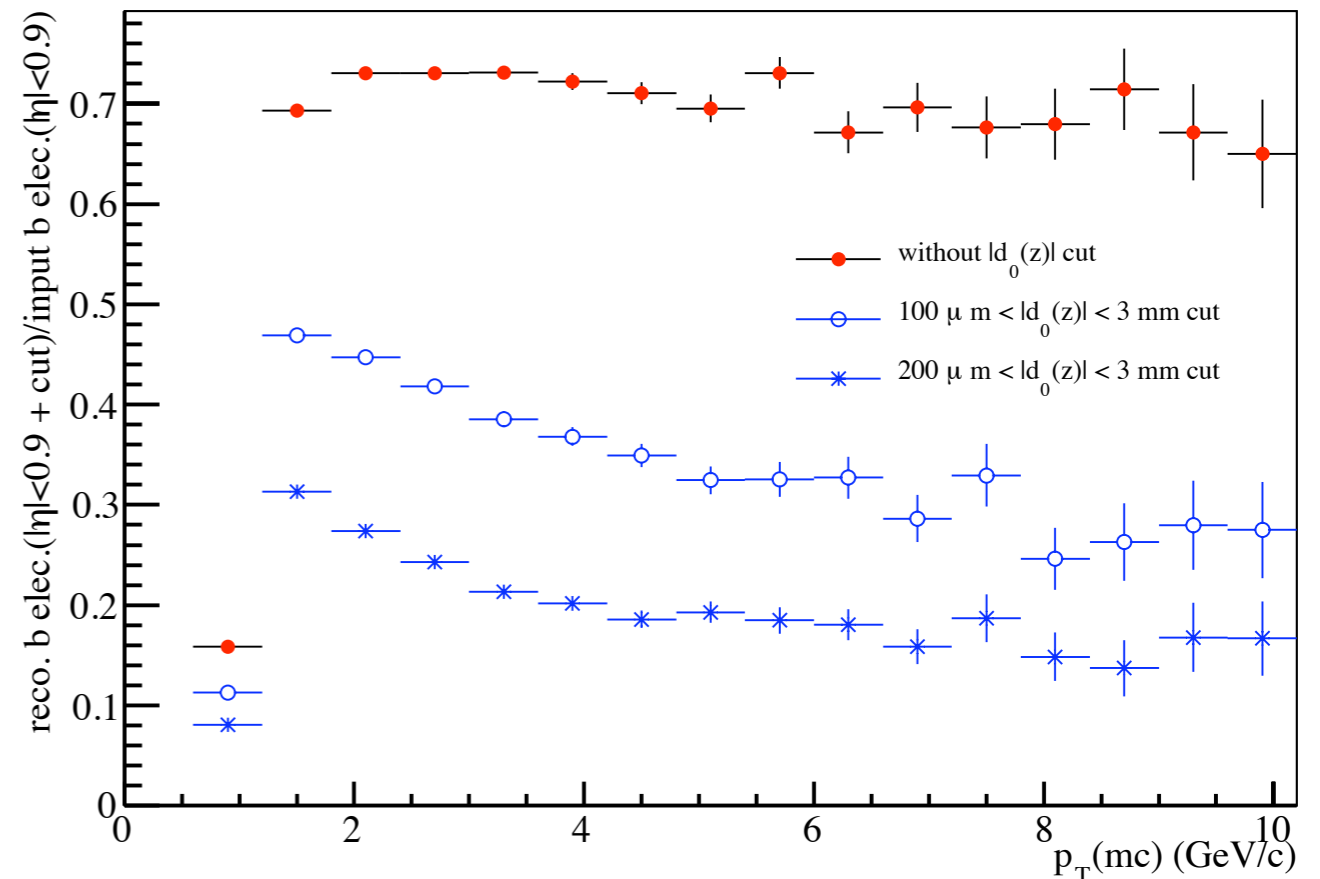
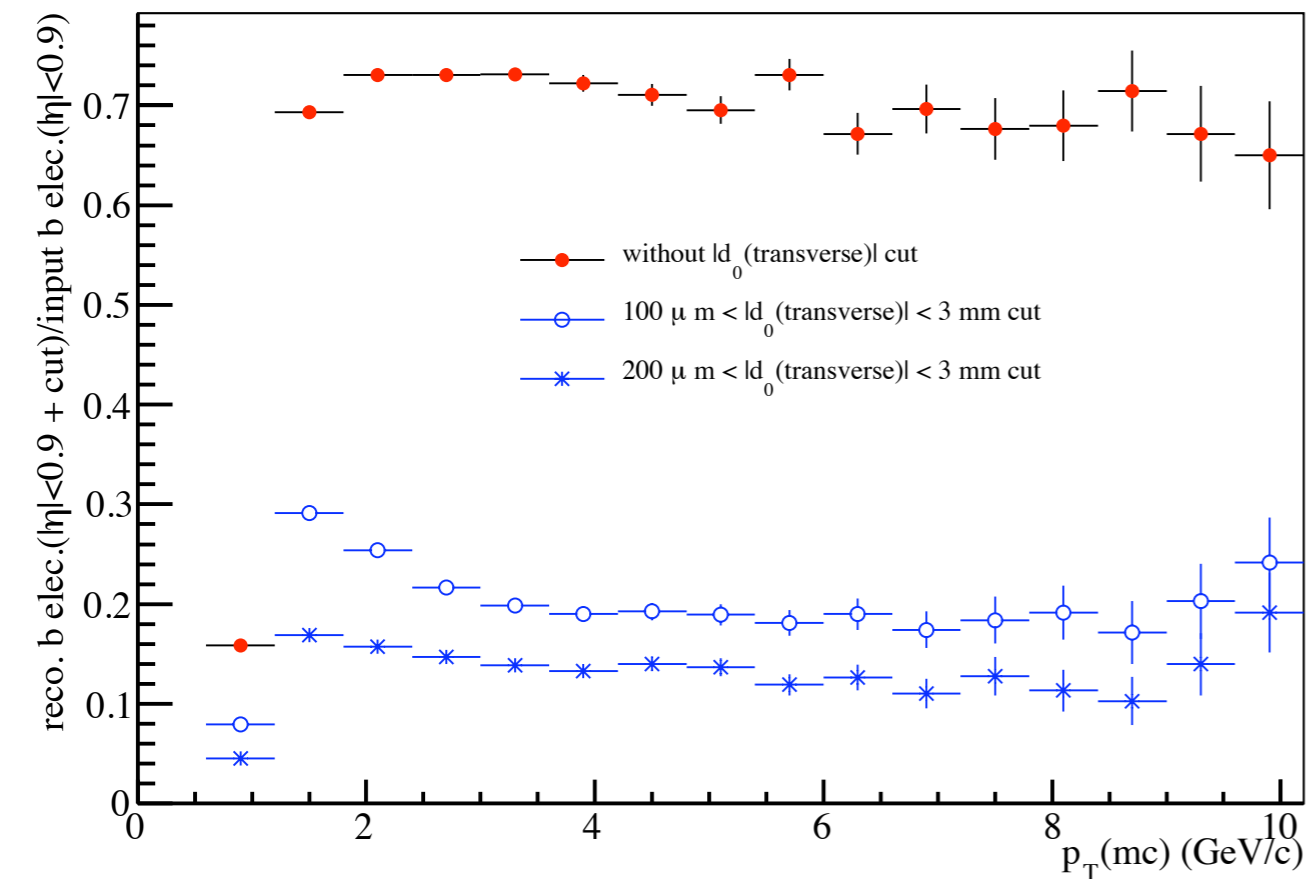


⇒ Efficiency drop due to $|d_0(z)| < 3 \text{ mm}$ cut is negligible (here 3 mm is trial cut).

Charm electron $|d_0(\text{trans.})|$, $|d_0(z)|$ and Max. allowance

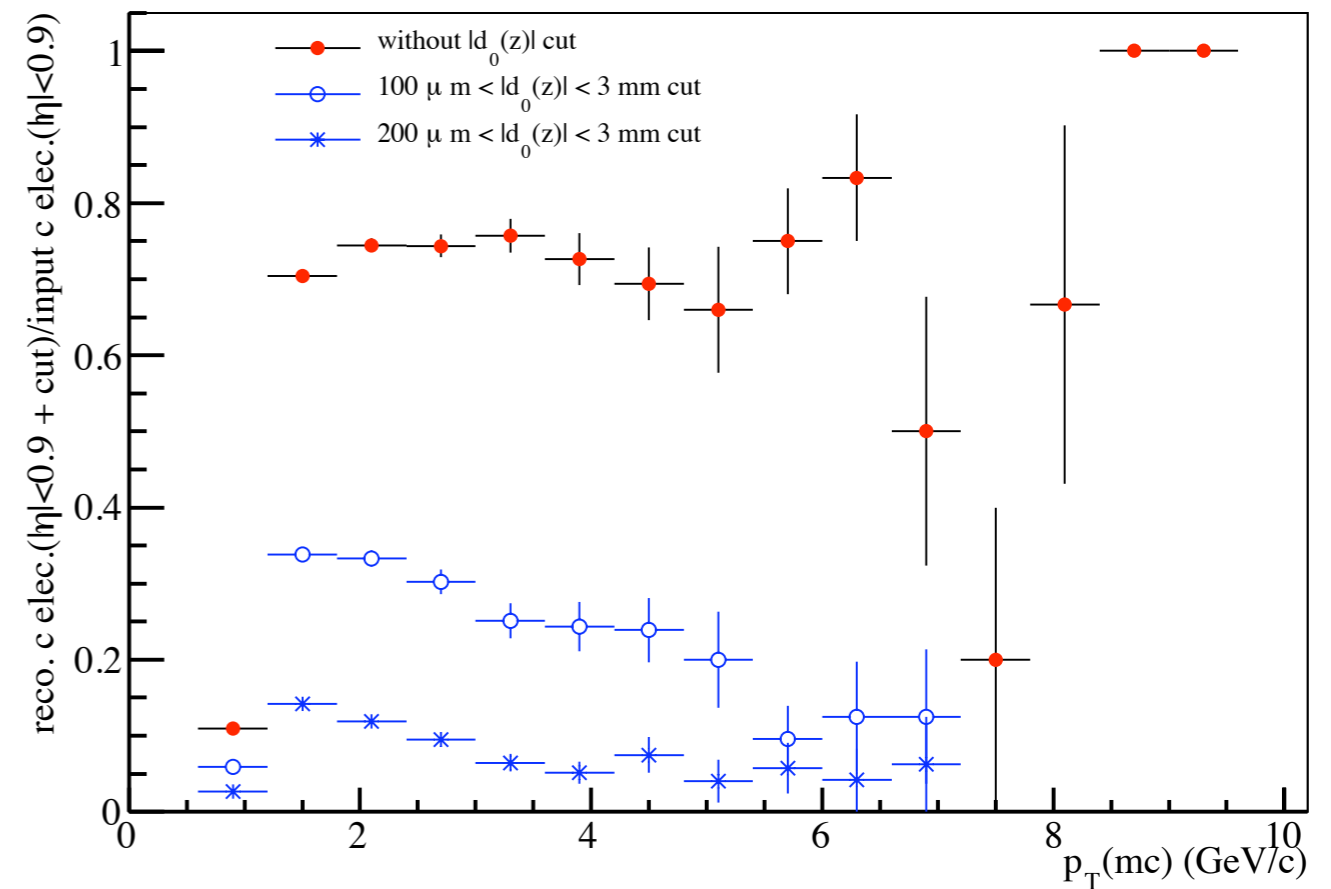
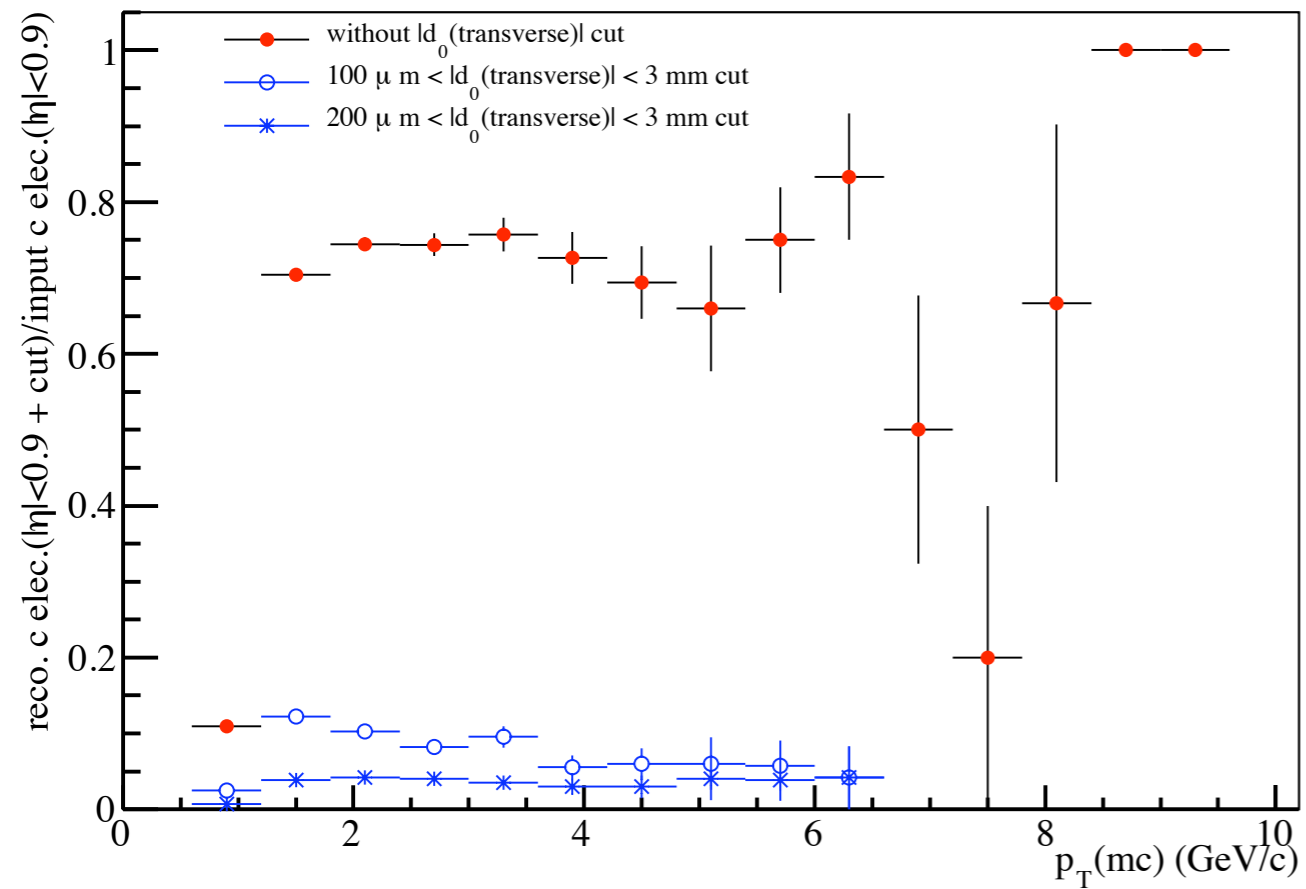


Beauty electron efficiency for different $|d_0|$ minimum cut



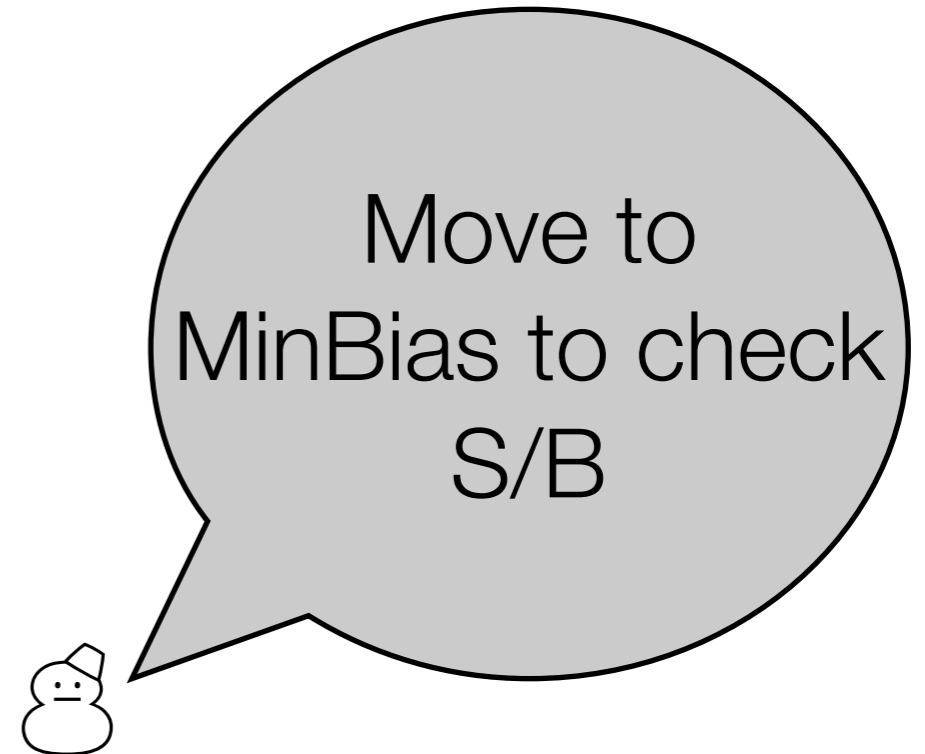
⇒ One have to check how much we gain on background reduction at different $|d_0|$ minimum cuts

Charm electron efficiency for different $|d_0|$ minimum cut

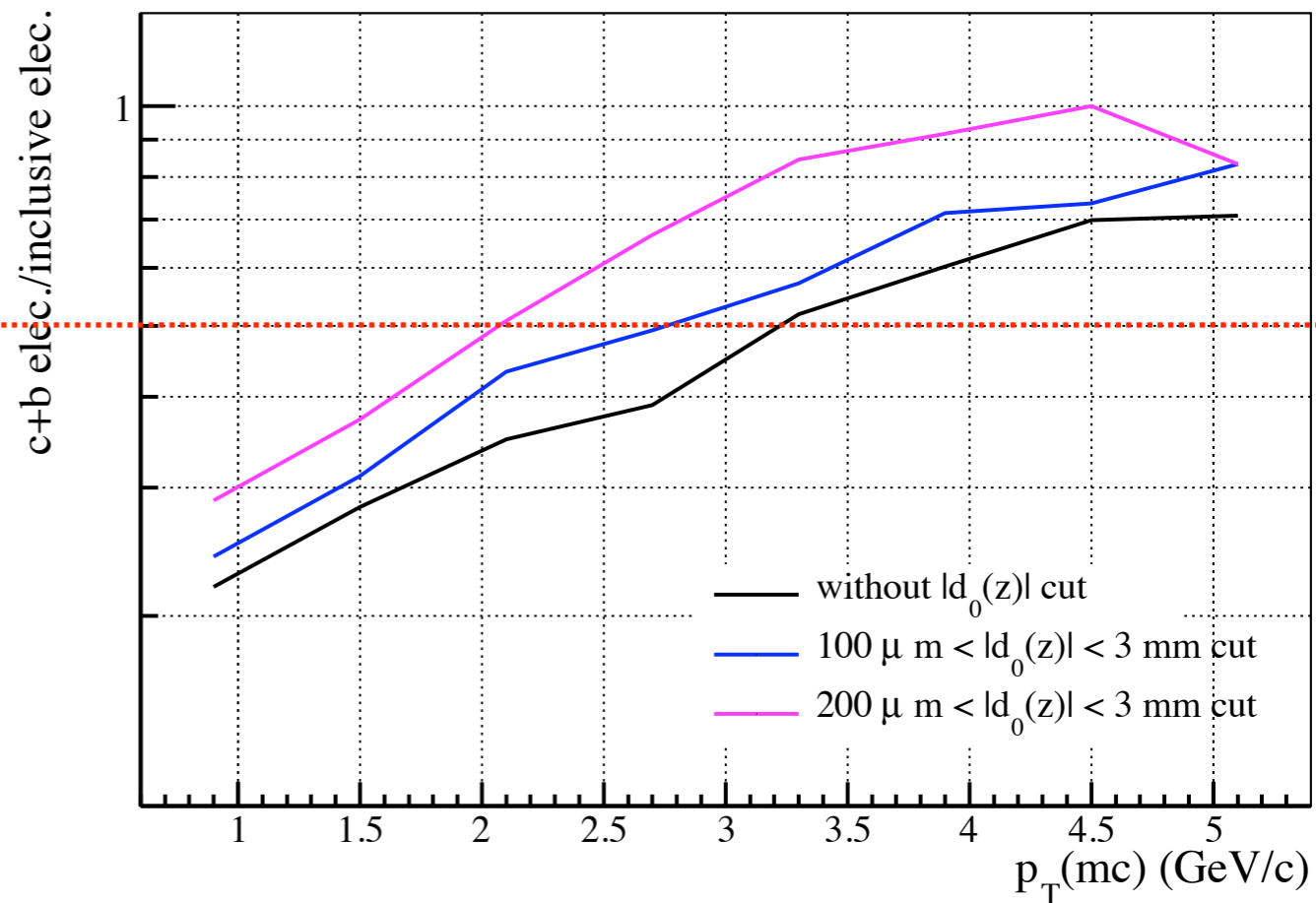
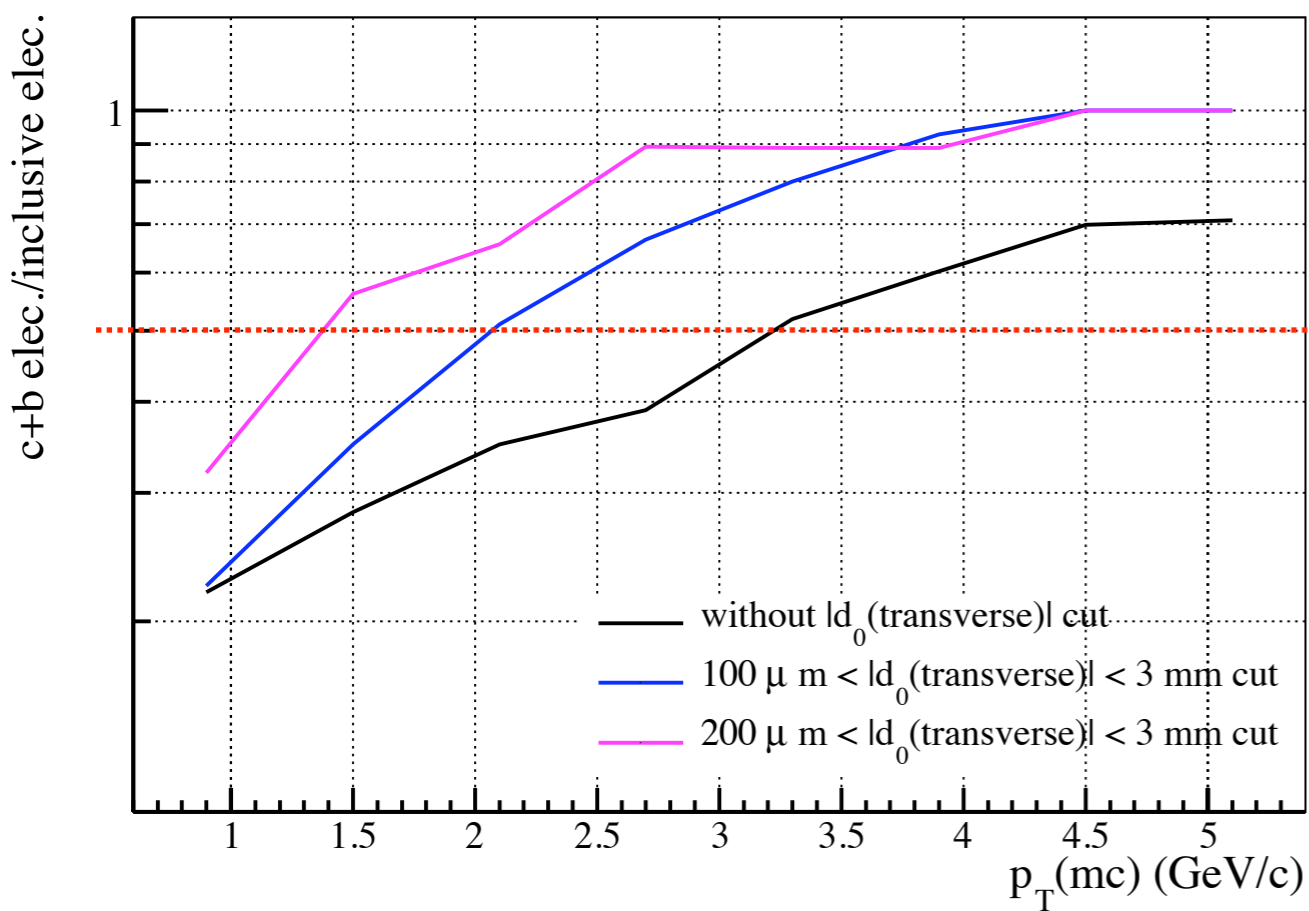


Data Sets and Quality Cuts (2)

- Production with v4-16-Rev-08
- Data
 - MinBias samples: 4 M (Grid)
- Cuts
 - $p_T > 1 \text{ GeV}/c$
 - number of TPC clusters > 50
 - require ITS, TPC refit
 - require hit on the first pixel
 - reject kink daughter tracks
 - require at least 2 primary vertex contributor
- PID method
 - ESD PID



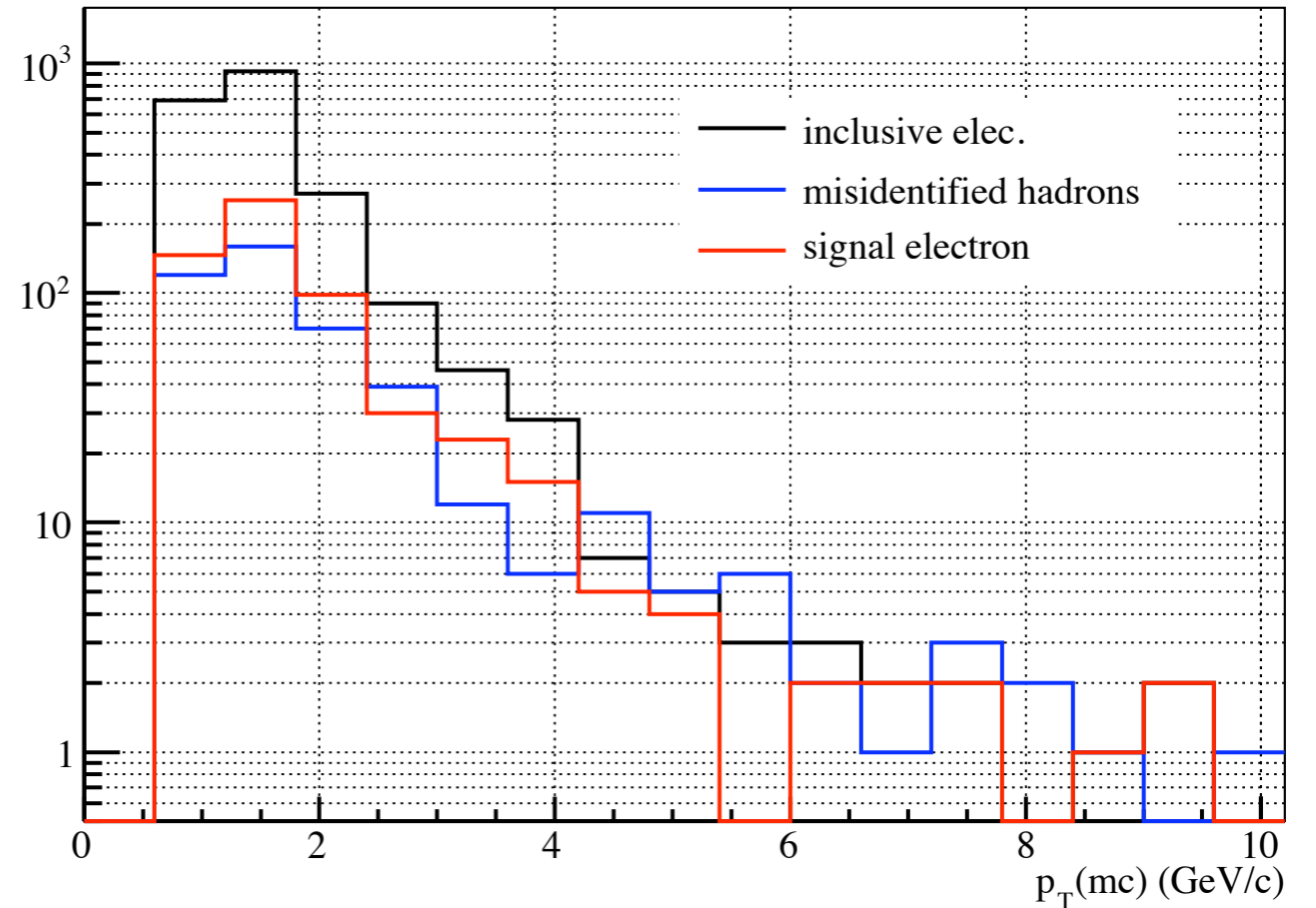
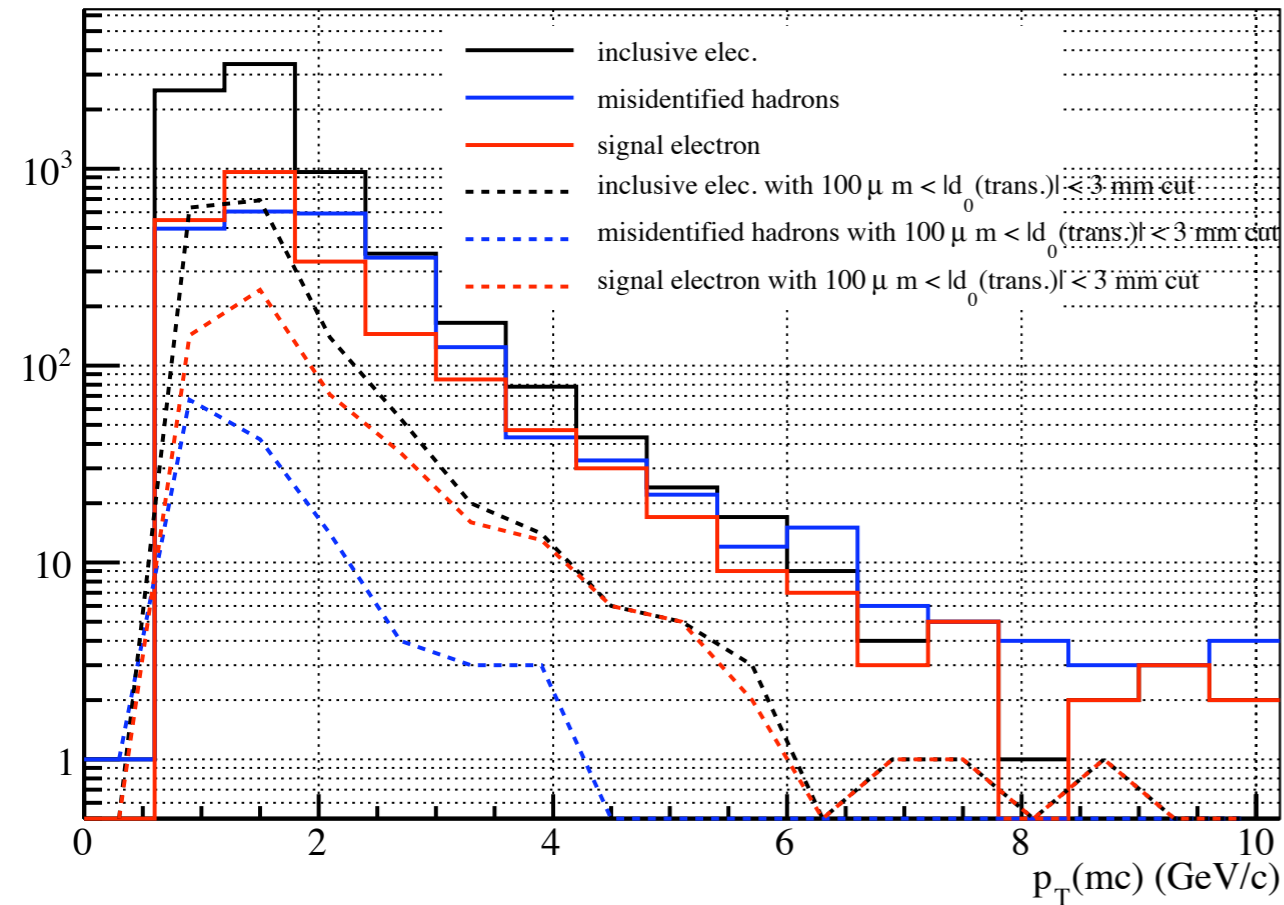
(signal e)/(inclusive e) for different $|d_0|$ minimum cut



⇒ Now, question of significance

Hadron Contamination

Requiring TRD Track (TRDpidQuality ≥ 4)



⇒ Question of significance. We need systematic study of $|d_0|$ cut to optimize efficiency and S/B

Summary

- Requiring $|d_0(\text{trans.})| < 3 \text{ mm}$ and $|d_0(z)| < 3 \text{ mm}$ are safe not to lose beauty and charm signal electron at $p_T > 1 \text{ GeV}/c$, however, one can check larger number to see if it is effective to reduce any other background
- $100 \mu\text{m} < |d_0(\text{trans.})| < 3 \text{ mm}$ cut effects:
 - beauty signal efficiency drops to 30 % of “without cut” at intermediate p_T
 - charm signal efficiency drops to $\sim 15 \%$ of “without cut” at intermediate p_T
 - $S_g(\text{charm+beauty})/B_g(\text{inclusive electron})=1$ moves from $3 \text{ GeV}/c$ to $2 \text{ GeV}/c$

⇒ We need systematic study of $|d_0|$ cut to optimize efficiency and S/B