B tagging algorithm/software in HFE package

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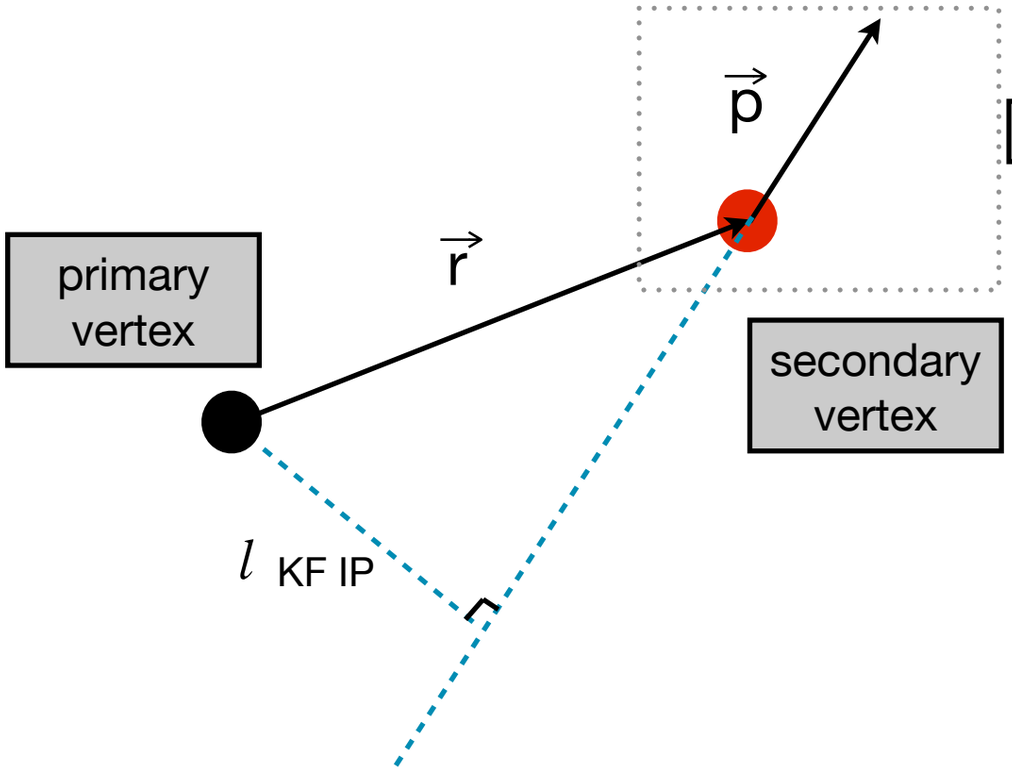
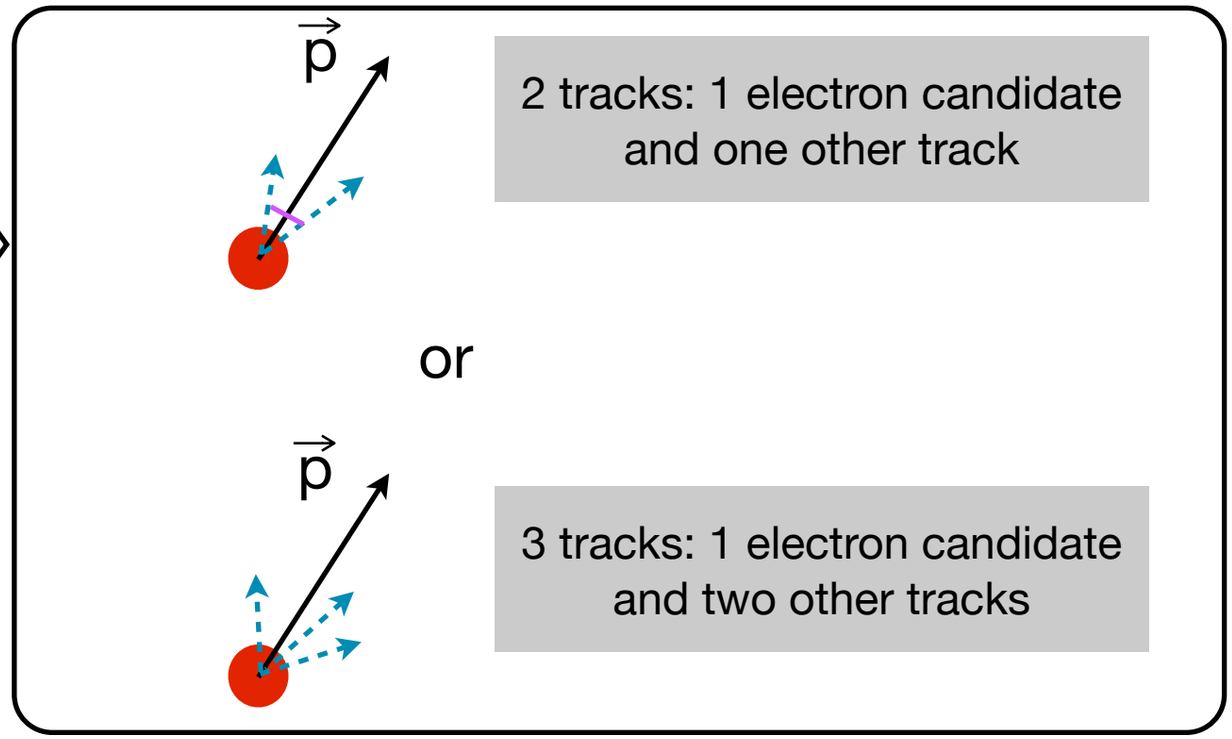
Idea of B tagging based on Secondary Vertexing





⇒Secondary vertexing is done by AliKF class

- distinctive variables
  - signed L_{xy}= $\frac{\vec{r}\cdot\vec{p}}{|\vec{r}||\vec{p}|}\vec{r}$
  - invariant mass
  - KF secondary vertex χ^2
  - impact parameter of KF particle ⇒ l KF IP
  - opening angle of constructing KF particle(in case of pair)

Algorithm

Track Loop

- apply HFE standard cuts

- apply HFE pid cuts to select electron candidate(AliHFEpid::IsSelected)

- apply p_T and DCA cuts

Track Loop(for pairing)

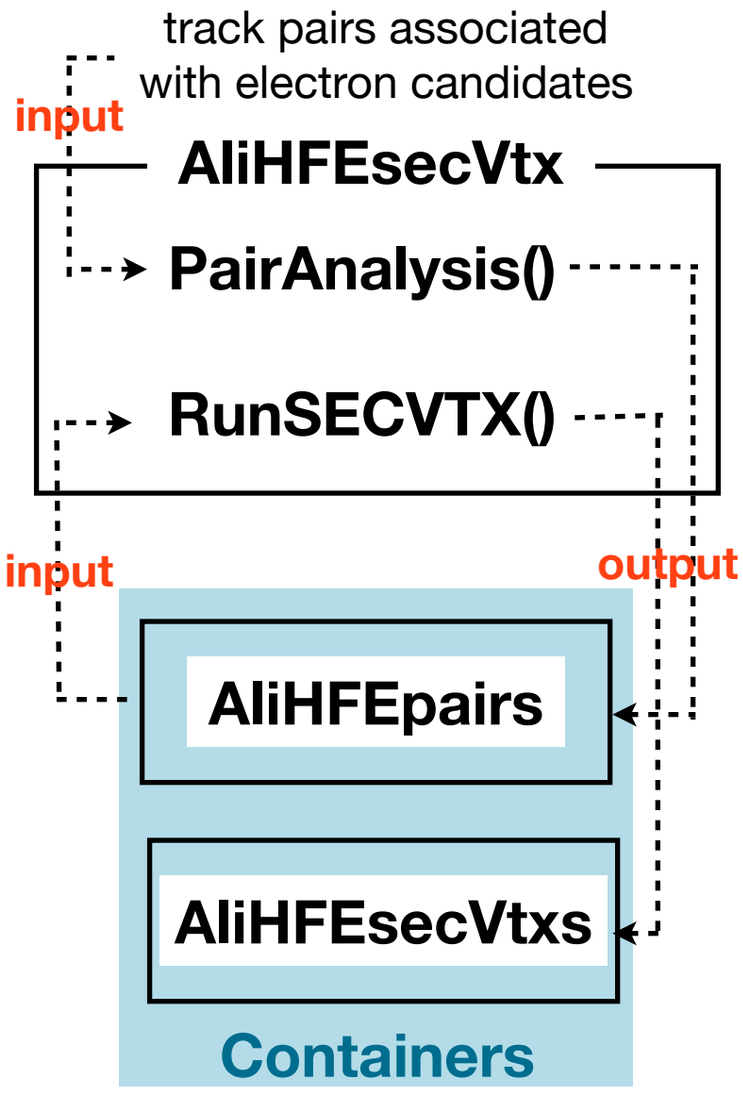
- apply quality, p_T and DCA cuts for paired tracks

- pair analysis to calculate distinctive variables ⇒store them into container(AliHFEpairs)

- apply pair cuts and remove them from pairs container

- secondary vertex(with 2,3 tracks) analysis to calculate distinctive variables, here inputs are pairs from pairs container ⇒store them into container(AliHFEsecVtxs)

- apply tagging cuts, tag B electron



runs inside AliAnalysisHFE task

Distinctive Variables - beauty

- b electron triggered samples used (7 TeV@pp, ~ 1.8M events)

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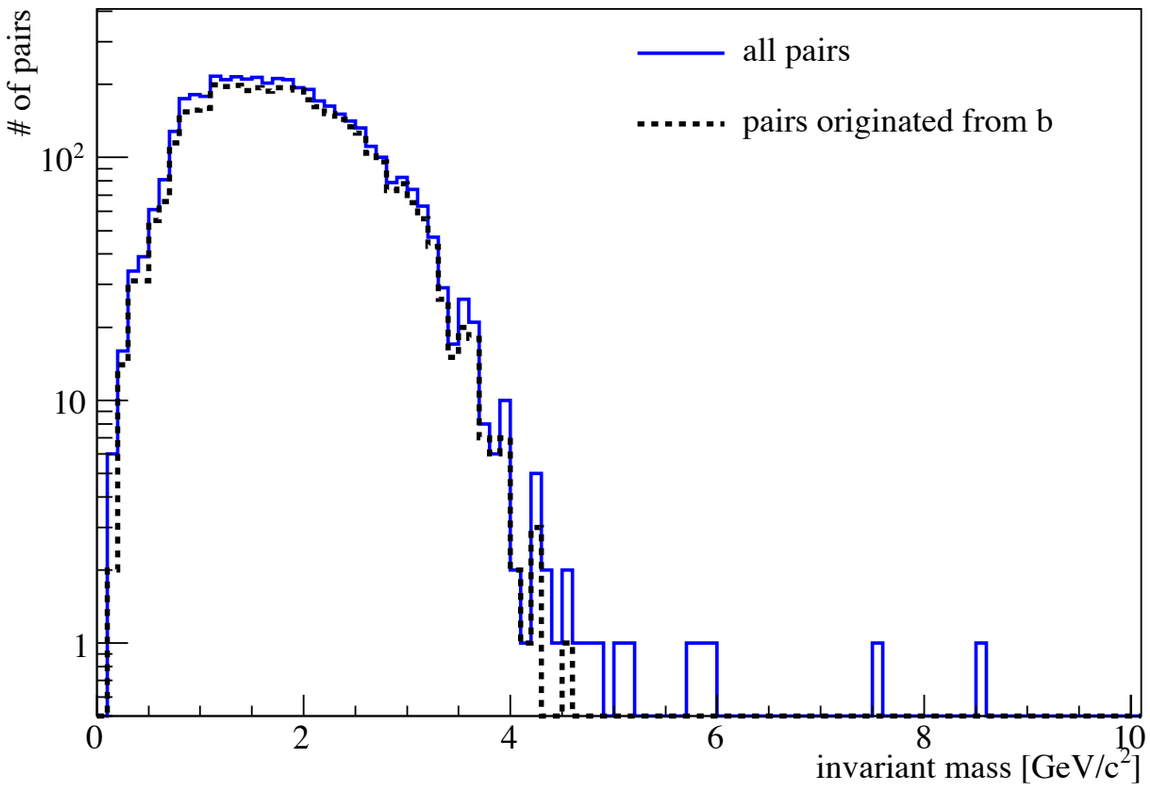
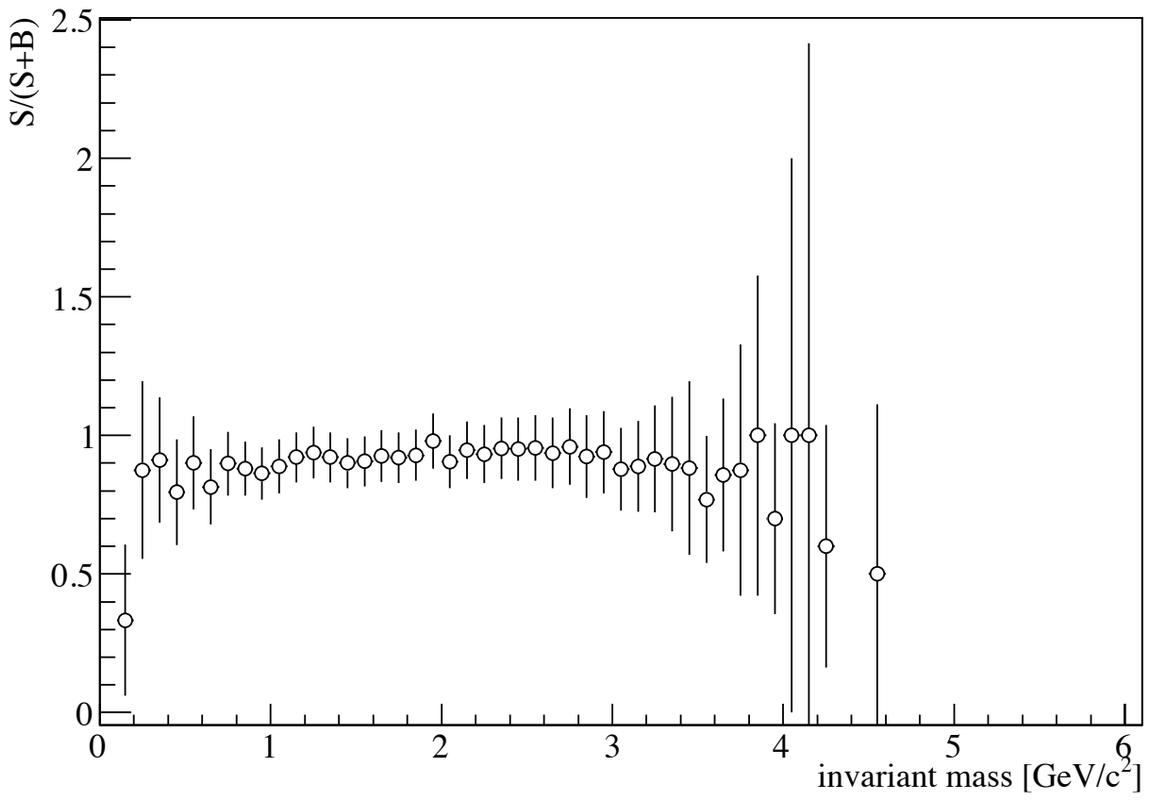
single track cuts

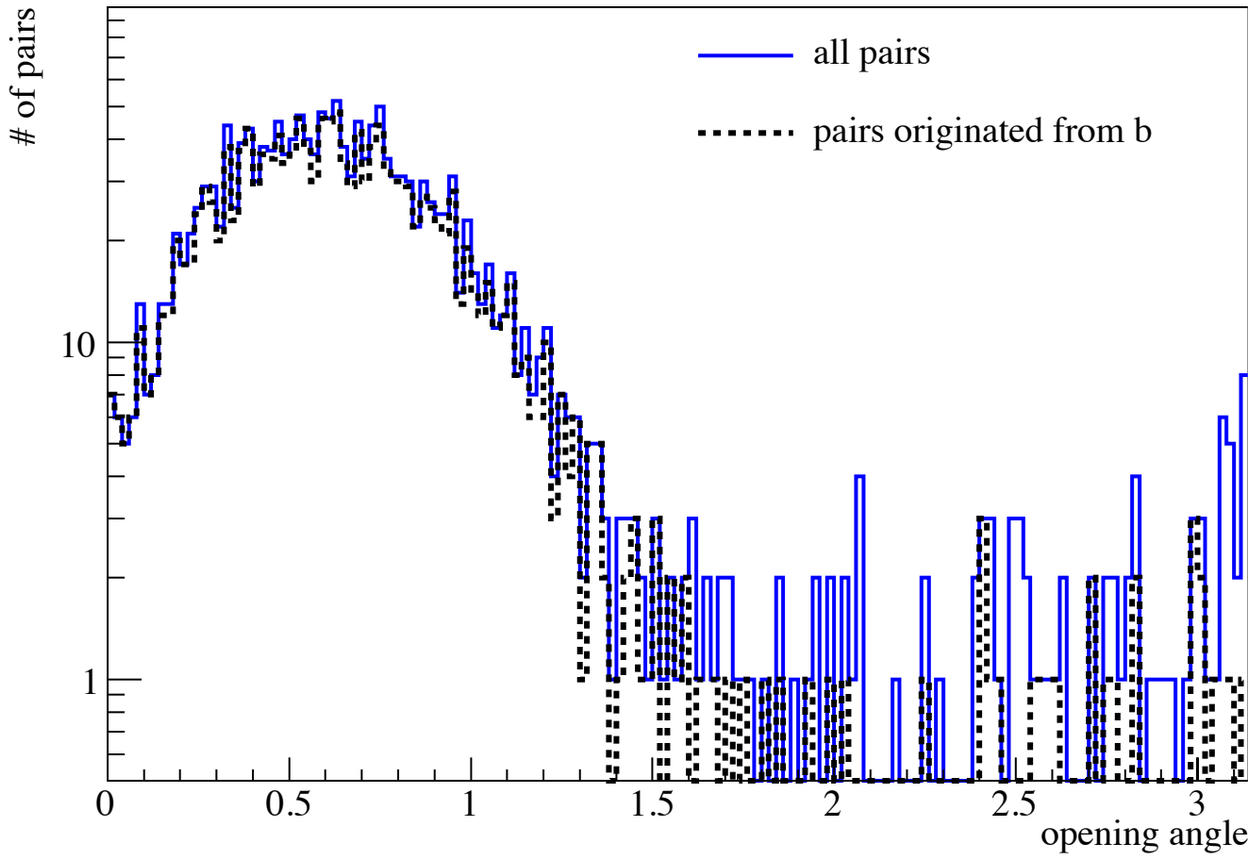
- HFE standard track cuts(ITS pixel layer only for e candidate)
- $p_T > 2.0$ GeV/c,
- DCA for paired tracks(p_T dependent cuts ALICE-INT-2006-015)

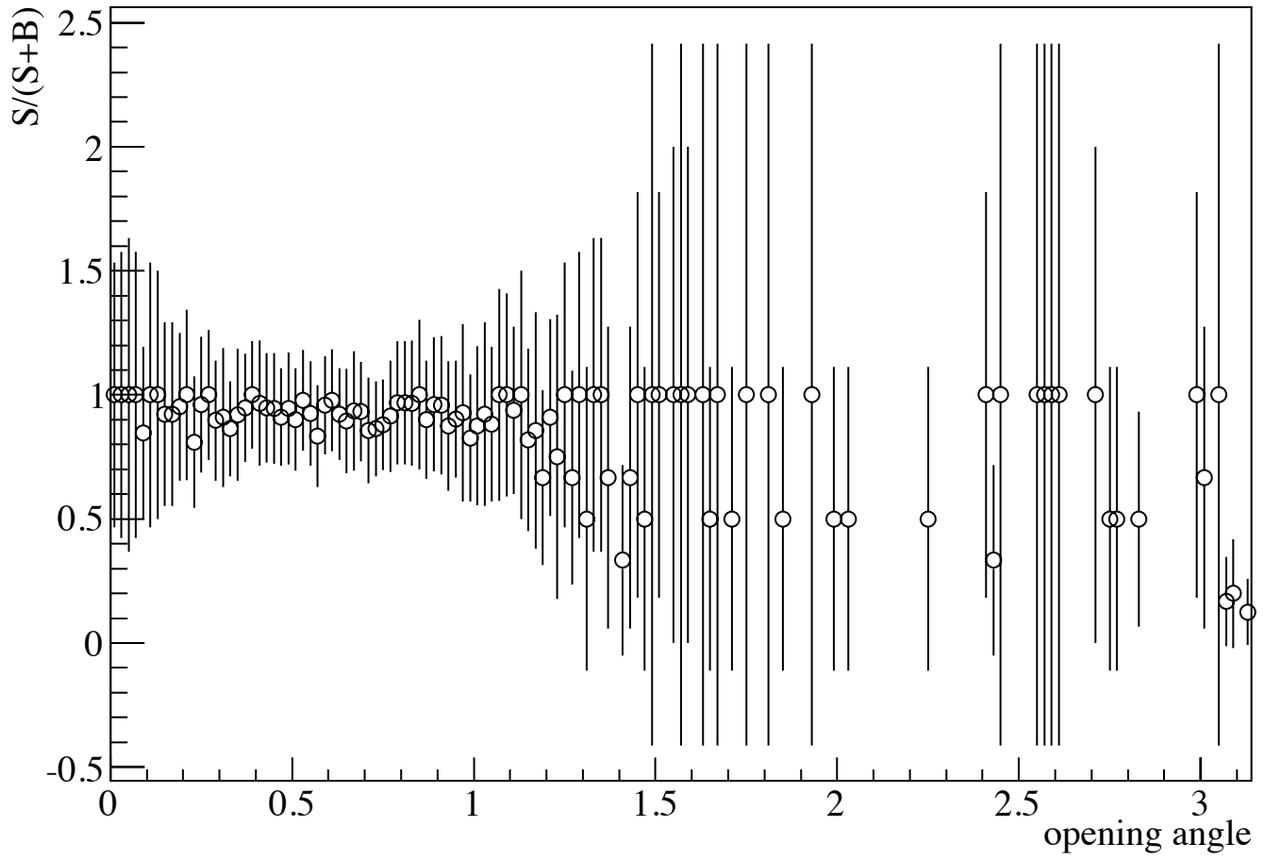
pair cuts

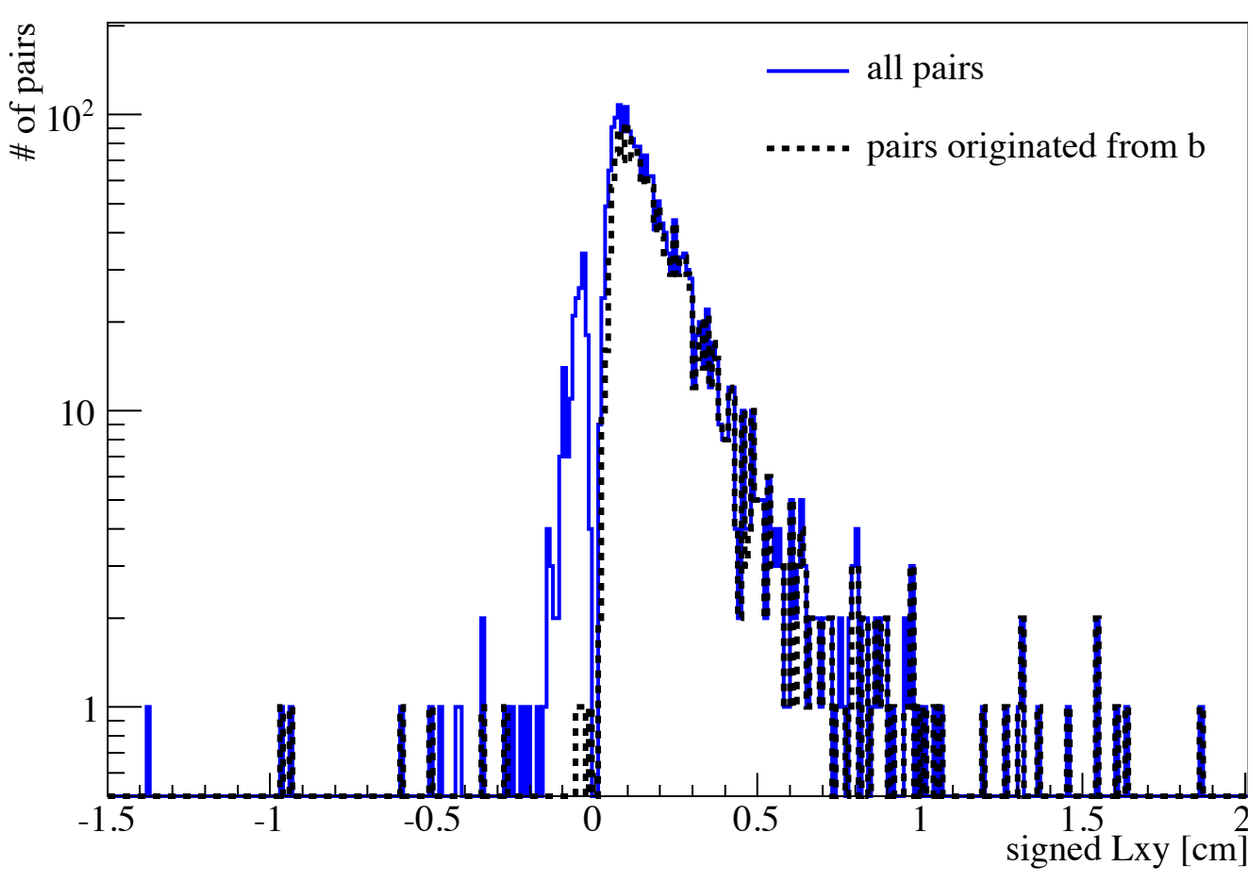
- 700 μ m < signed L_{xy} < 1 cm
- 2.0 GeV/c^2 < invariant mass < 5.2 GeV/c^2
- KF secondary vertex $\chi^2 < 3.0$
- opening angle of constructing KF particle < 180°

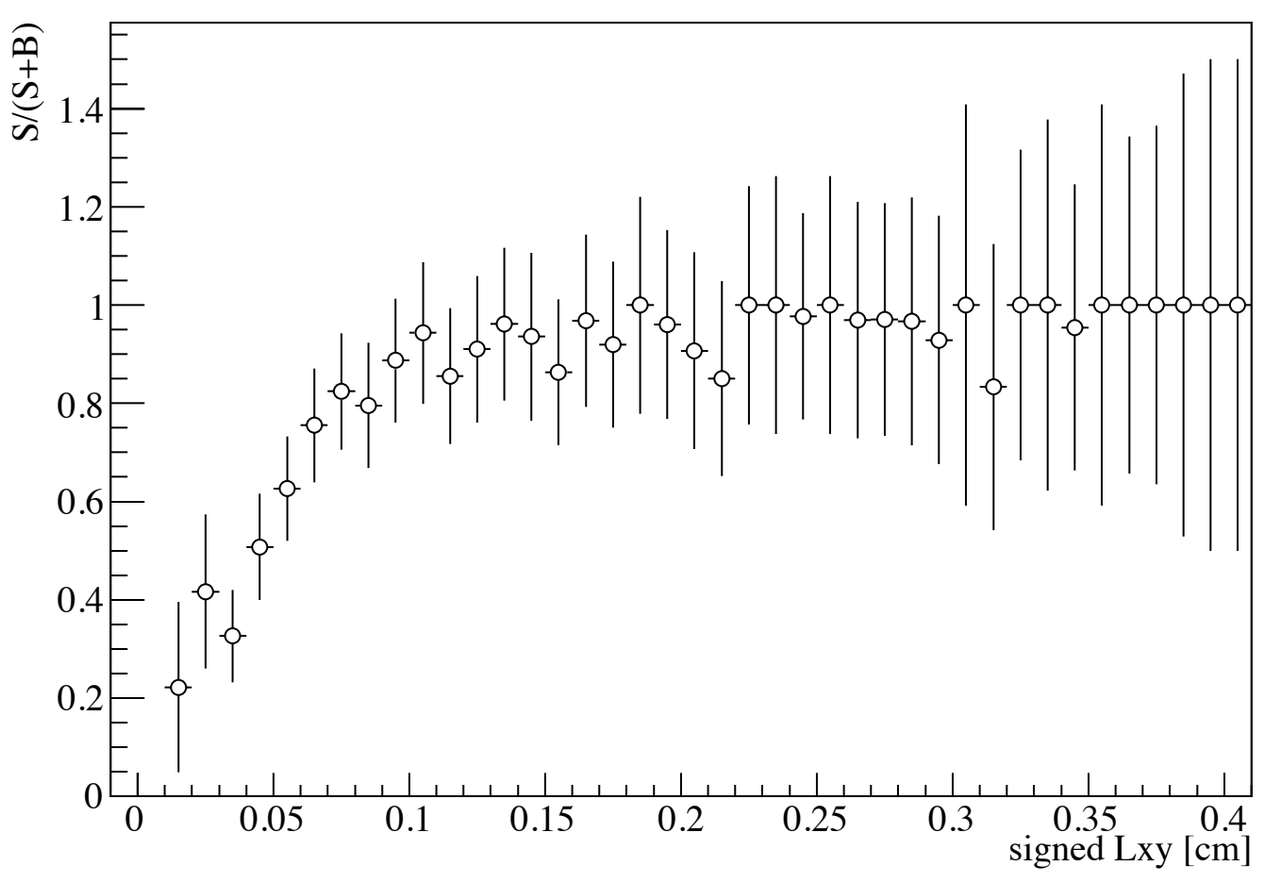





all pairs
pairs originated from b
# of pairs
opening angle

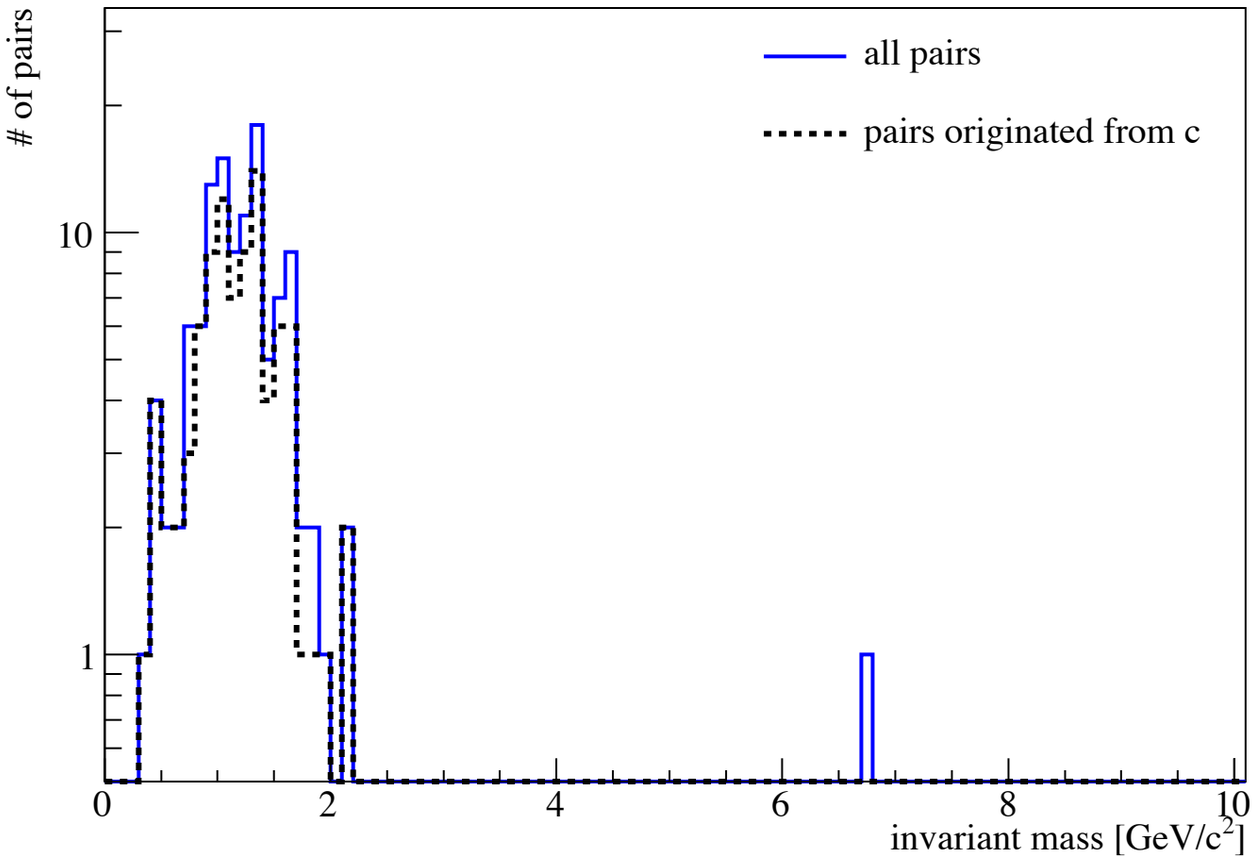

S/(S+B)
opening angle

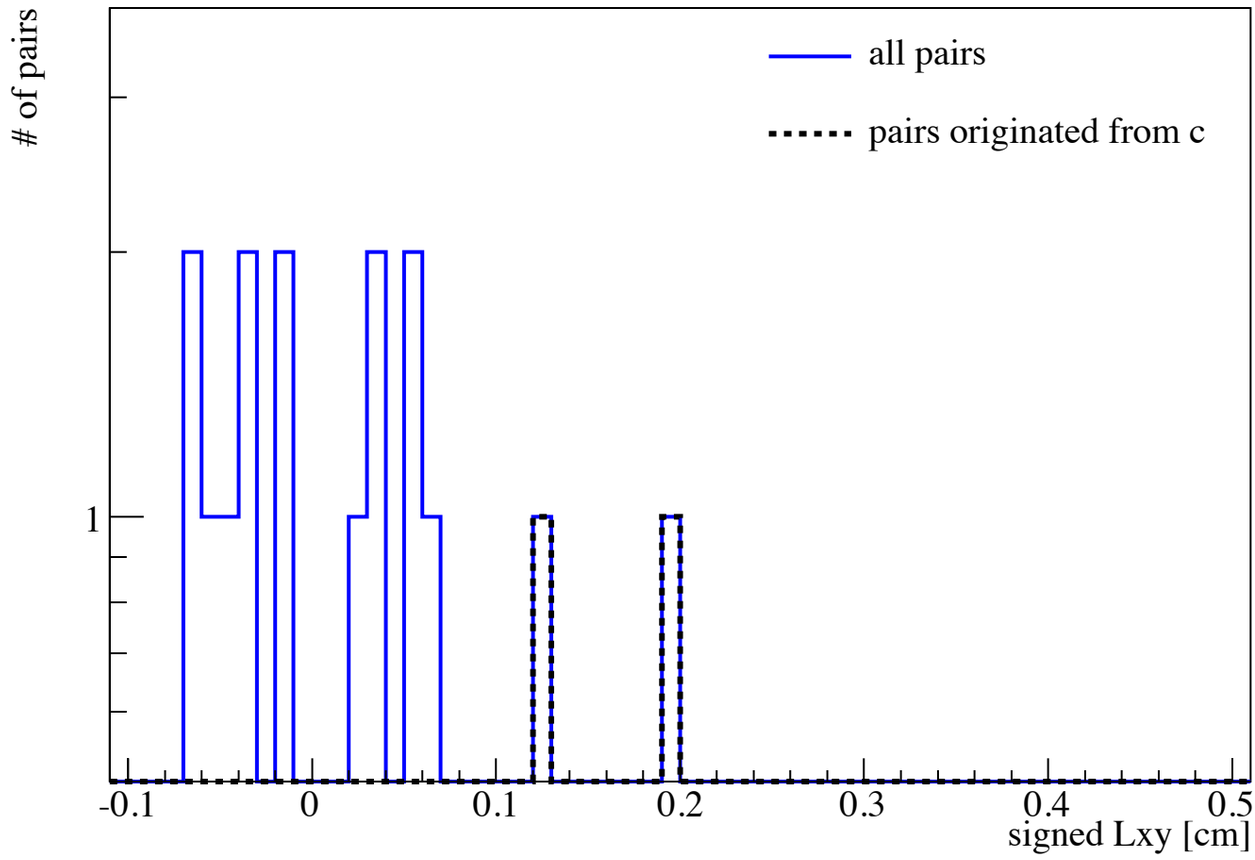

all pairs
pairs originated from b
# of pairs
signed Lxy [cm]


S/(S+B)
signed Lxy [cm]

Distinctive Variables - charm

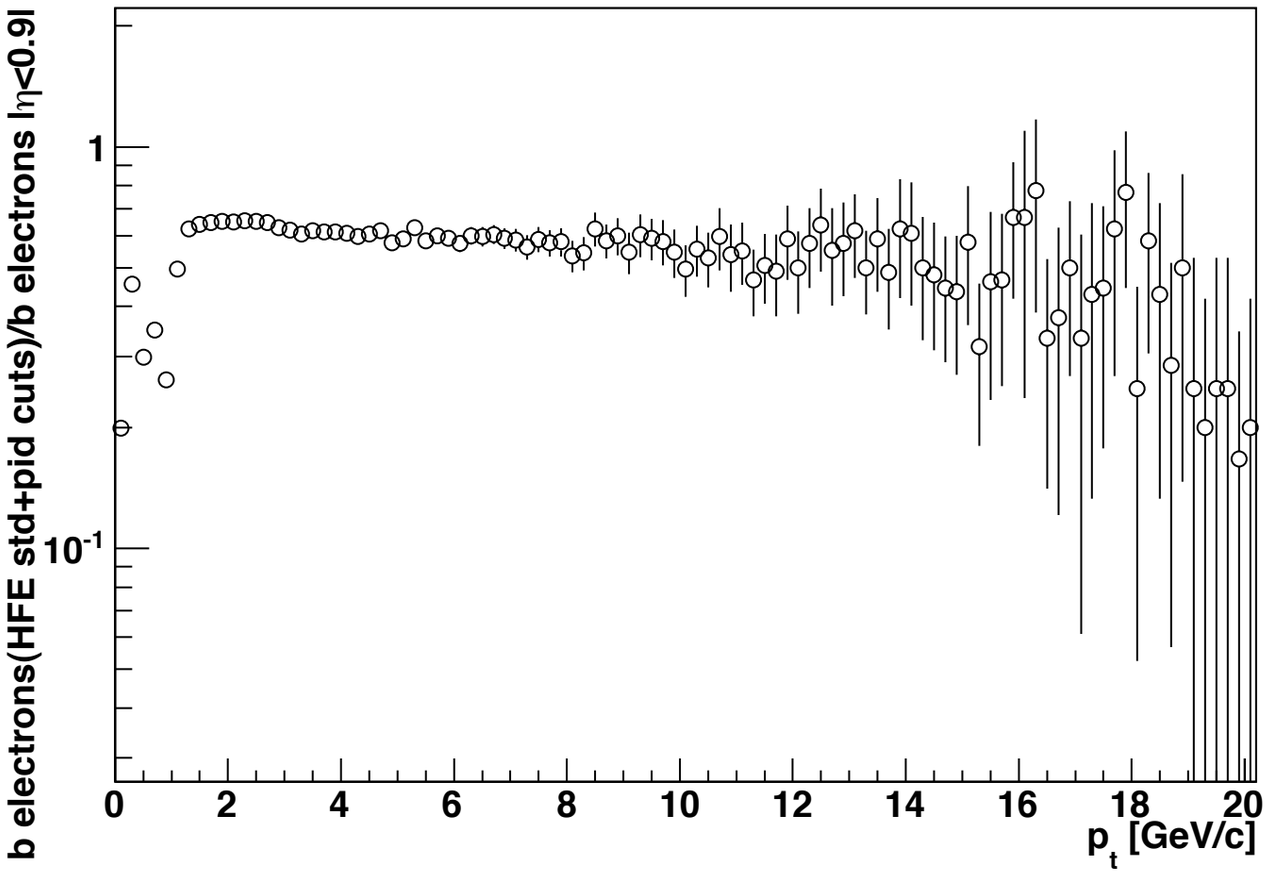
- c electron triggered samples used (7 TeV@pp, ~ 1.9M events)

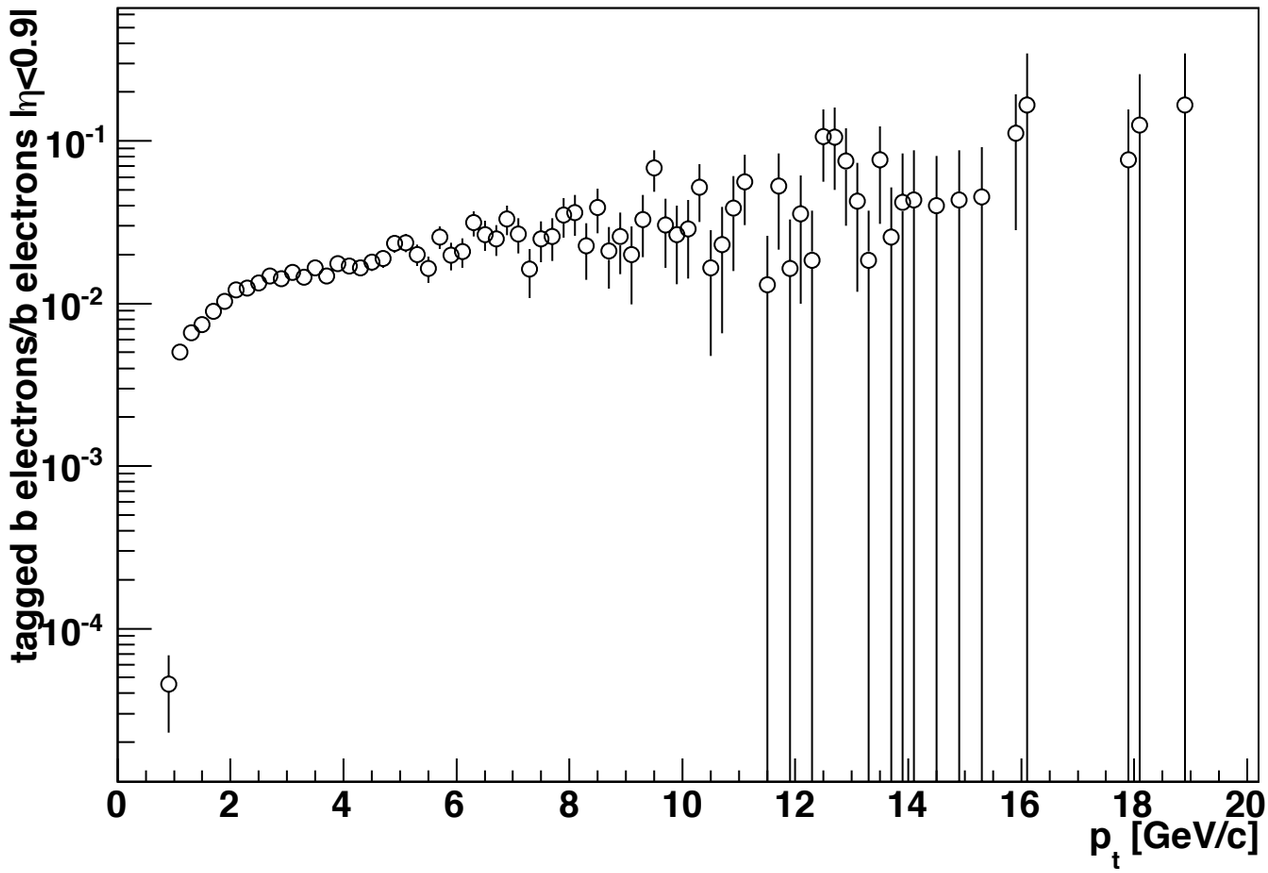




- invariant mass cut is good to suppress charm background

Tagging Efficiency





low efficiency, then hadron contamination can be issue?

⇒ impact parameter cuts to remove primary hadron priors

Outlook

- SecVtx package itself has ESD/AOD and NOMC mode
- study secvtx with 3 tracks
- associating jets, use AOD tracks once AOD pid is available, easy to implement