

ALICE



Spherocity analysis for $\langle p_T \rangle$ vs N_{ch}

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ACO
meeting

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Brief summary

- Analysis note has been submitted, ARC questions have arrived
- DCAxy distributions for:
Data
MC prim & sec (material and weak decays)
- Efficiency by particle composition

Conclusions

Analysis details

- **Datasets**

Pythia Per2011 (LHC15g3c3) (36.1 M events after sel)

EPOS-LHC (LHC16d3) (39.7 M events after sel)

Data (LHC15f pass2) (27.2 M events after sel)

- **Event selection**

AliVEvent::KINT7, AnalysisUtils::IsSPDClusterVsTrackletBG(),
IsPileupFromSPDInMultBins(), IsIncompleteDAQ()

- **Vertex**

For events with both SPD and reconstructed Track vertices, their separation along the z-axis was required to be smaller than 5 mm

- **Sphericity is reconstructed** using more than two tracks with transverse momentum greater than 0.15 GeV/c and within $|\eta| < 0.8$. Three set of cuts were tested:

TPC: GetStandardTPCOnlyTrackCuts()+TPCrefit

Hybrid: CreateTrackCutsPWGJE(10001008)+CreateTrackCutsPWGJE(10011008)

Standard: GetStandardITSTPCTrackCuts2011(kTRUE,1)

- At the end we decided to use the TPC track cuts (global tracks wich satisfy GetStandardTPCOnlyTrackCuts()+TPCrefit). More details can be found in: <https://aliceinfo.cern.ch/Notes/node/529>

- In this presentation, results for the reference estimator are discussed

GetReferenceMultiplicity(fESD, AliESDtrackCuts::kTrackletsITSTPC, 0.8)

- We use the recommended vertex selection for 13 TeV pp analysis:

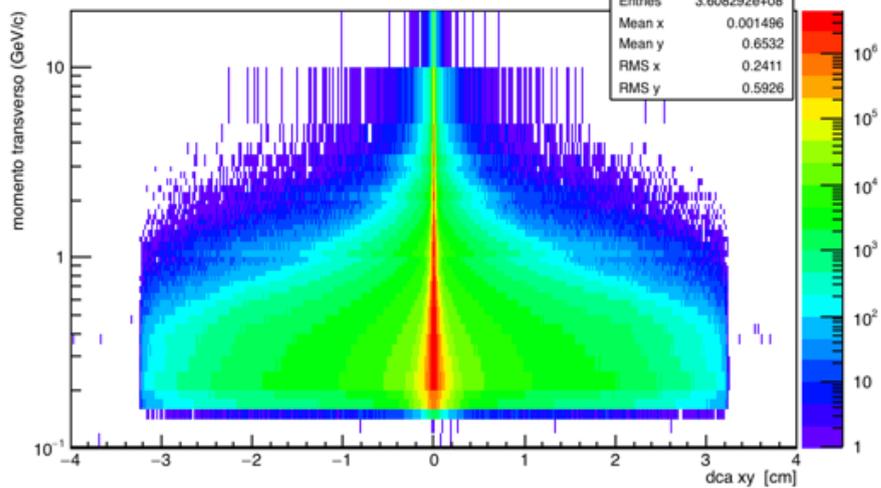
<https://twiki.cern.ch/twiki/bin/view/ALICE/PWGPP/SELRun2pp>

DCA xy distributions

- This was done with Data LHC15fpass2 & MC Pythia Per2011.

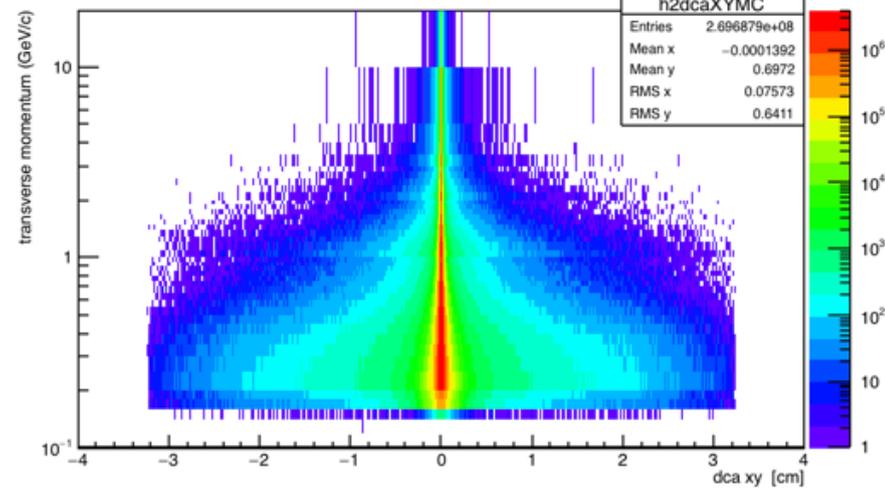
All data

dcaxy distribution



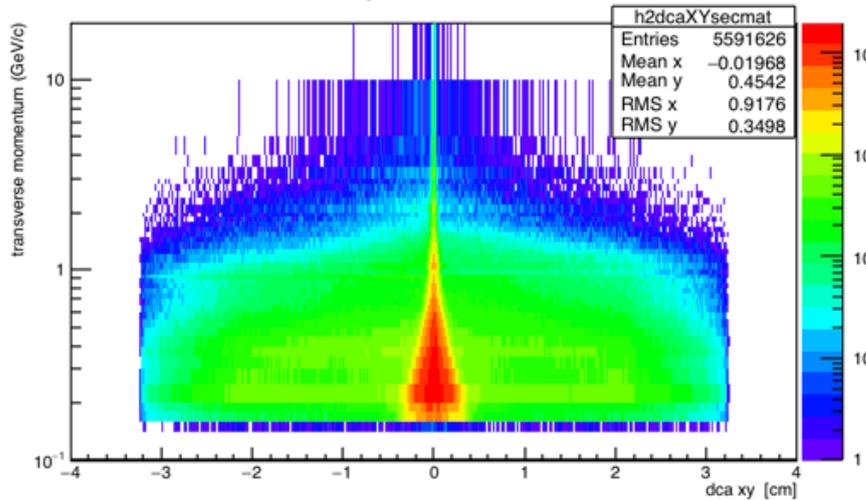
Primaries MC

dcaxyMC distribution



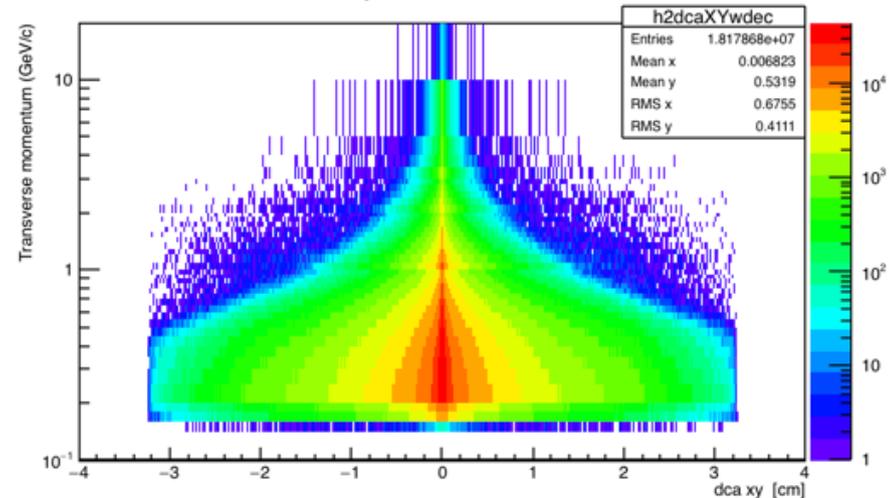
- MC Sec material

dcaxysec distribution



MC Weak decays

dcaxywdec distribution

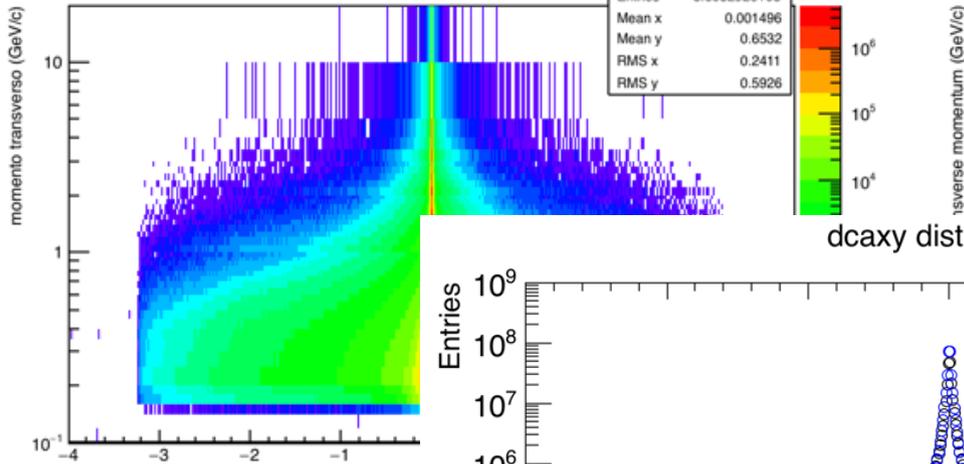


DCA xy distributions

- This was done with Data LHC15fpass2 & MC Pythia Per2011.

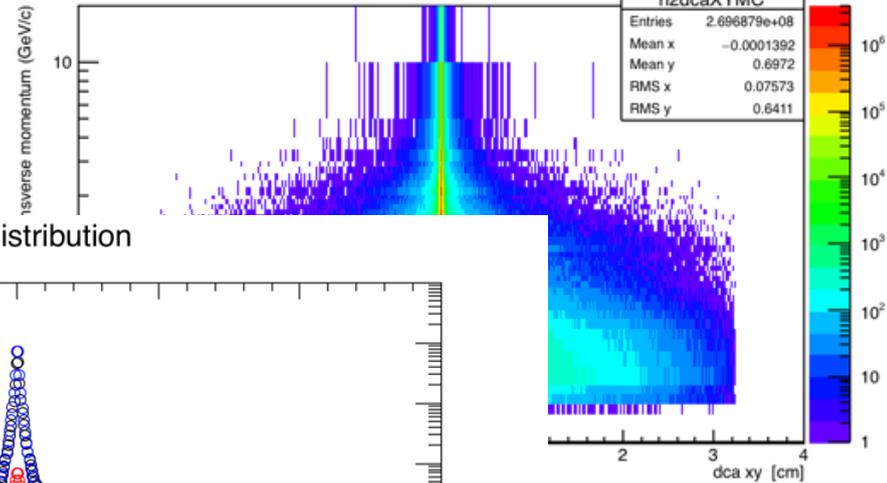
All data

dcaxy distribution

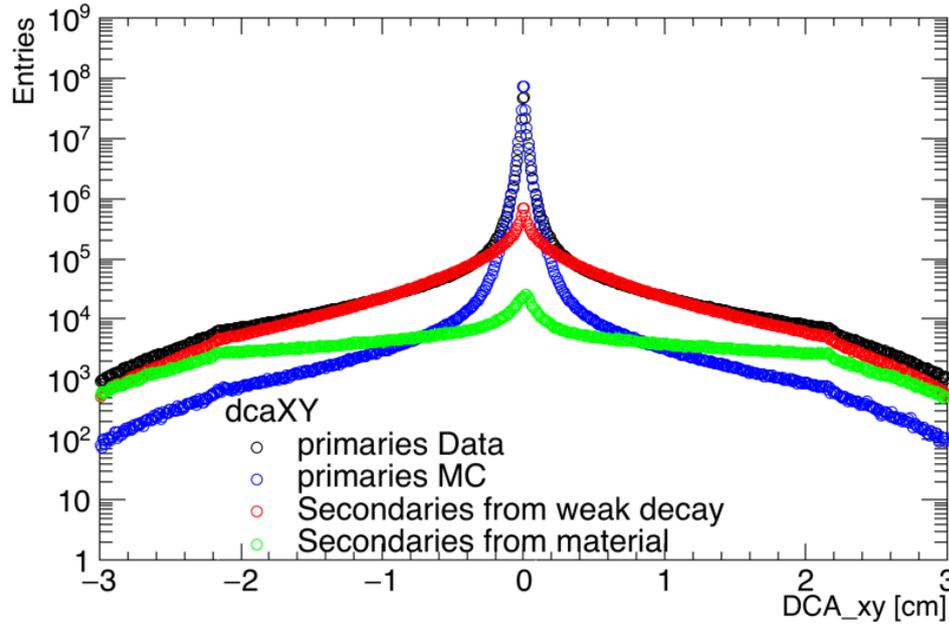


Primaries MC

dcaxyMC distribution

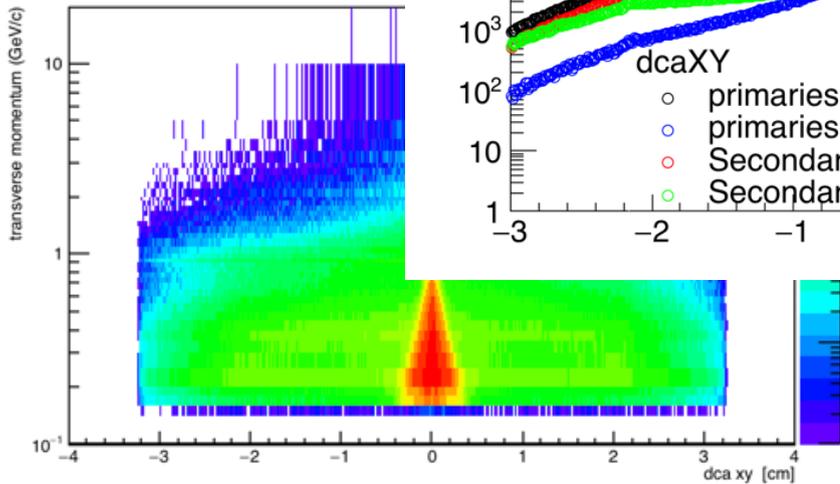


dcaxy distribution



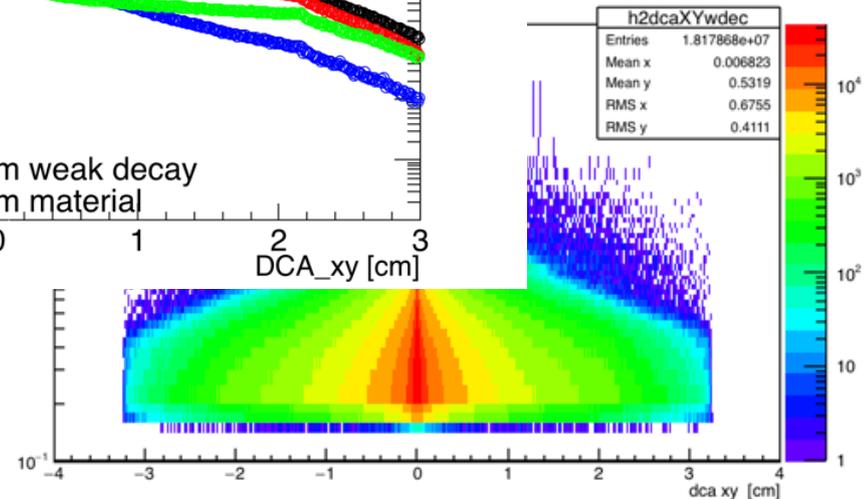
- MC Sec ma

dcaxyse



decays

n



DCA xy distributions

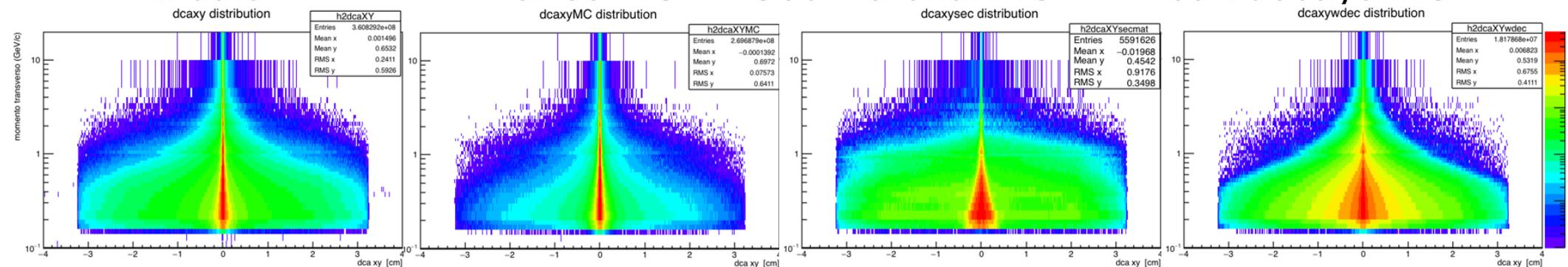
- This was done with Data LHC15fpass2 & MC Pythia Per2011

All data

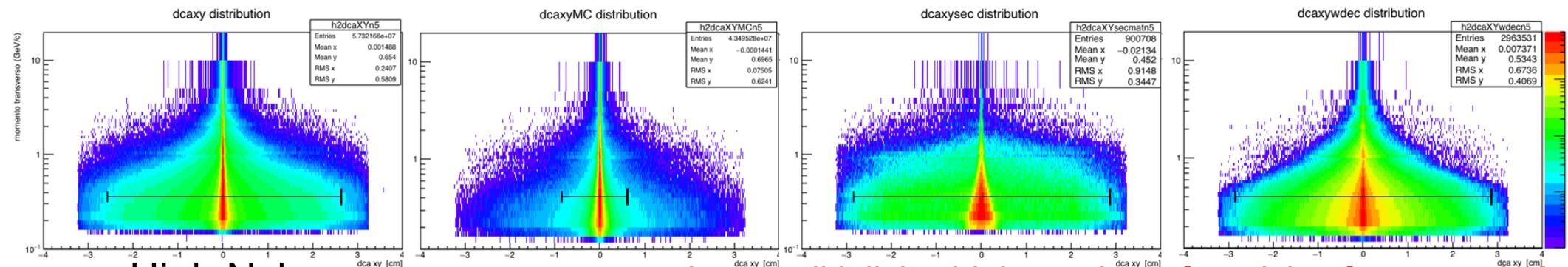
Primaries MC

Sec material MC

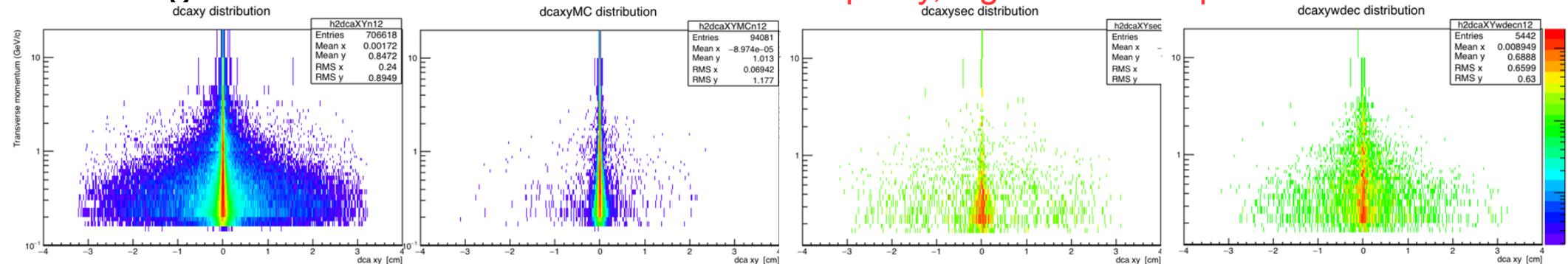
weak decays MC



- Low Nch



- High Nch



Low multiplicity, high number of particles for secondaries

DCA xy distributions Jetty $0% < So_{perc} < 10%$

- This was done with Data LHC15fpass2 & MC Pythia Per2011

All data

Primaries MC

Sec material MC

weak decays MC

DCAxy reduces for jetty compared with MB

- Low Nch

dcaxy distribution

h2dcaXYns5_0
Entries 5459655
Mean x 0.001528
Mean y 0.7967
RMS x 0.2262
RMS y 0.9621

dcaxyMC distribution

h2dcaXYMCns5_0
Entries 4201446
Mean x -8.416e-05
Mean y 0.8896
RMS x 0.07142
RMS y 1.093

dcaxysec distribution

h2dcaXYsecn
Entries 3
Mean x
Mean y
RMS x
RMS y

dcaxywdec distribution

h2dcaXYwdecns5_0
Entries 263388
Mean x 0.007167
Mean y 0.6101
RMS x 0.6485
RMS y 0.6262

- High Nch

dcaxy distribution

h2dcaXYns12_0
Entries 68218
Mean x 0.00186
Mean y 1.034
RMS x 0.2351
RMS y 1.42

dcaxyMC distribution

h2dcaXYMCns12_0
Entries 8770
Mean x -0.000941
Mean y 1.43
RMS x 0.06697
RMS y 2.085

dcaxysec distribution

h2dcaXYsecmats12_0
Entries 253
Mean x 0.0484
Mean y 0.7992
RMS x 0.9745
RMS y 1.553

dcaxywdec distribution

h2dcaXYwdecns12_0
Entries 458
Mean x -0.002009
Mean y 0.7543
RMS x 0.6738
RMS y 0.717

DCA xy distributions Isotropic $90% < S_{o,perc} < 100%$

- This was done with Data LHC15fpass2 & MC Pythia Per2011

All data

Primaries MC

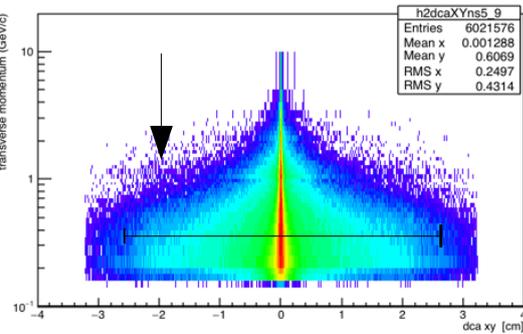
Sec material MC

weak decays MC

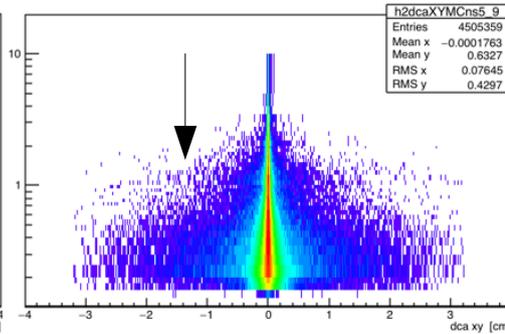
Less high pt particles in range
DCAxy increases for isotropic compared to jetty

- Low Nch

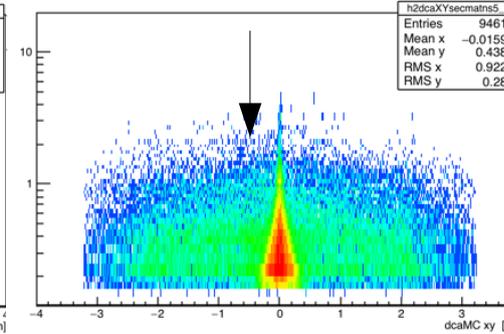
dcaxy distribution



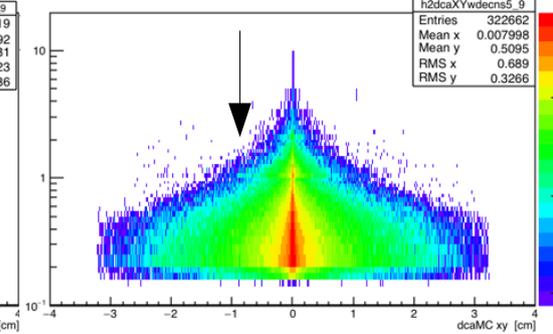
dcaxyMC distribution



dcaxysec distribution

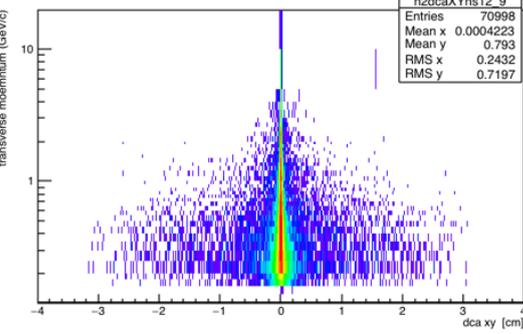


dcaxywdec distribution

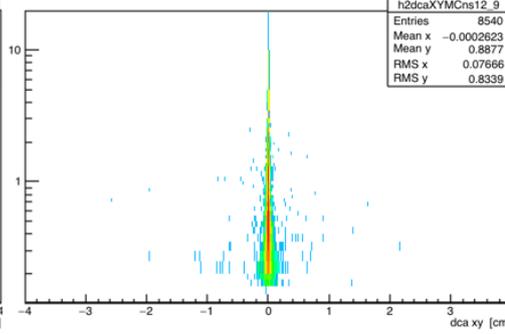


- High Nch

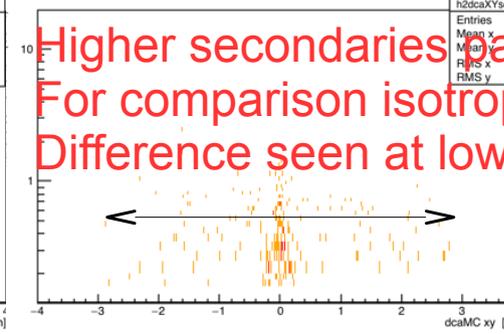
dcaxy distribution



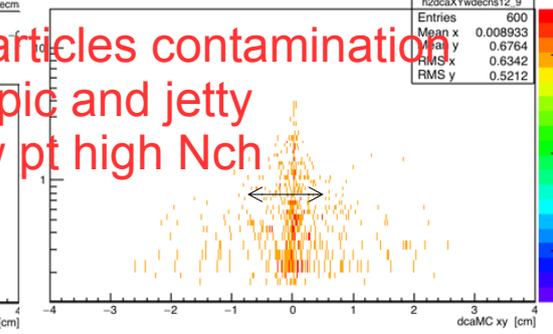
dcaxyMC distribution



dcaxysec distribution



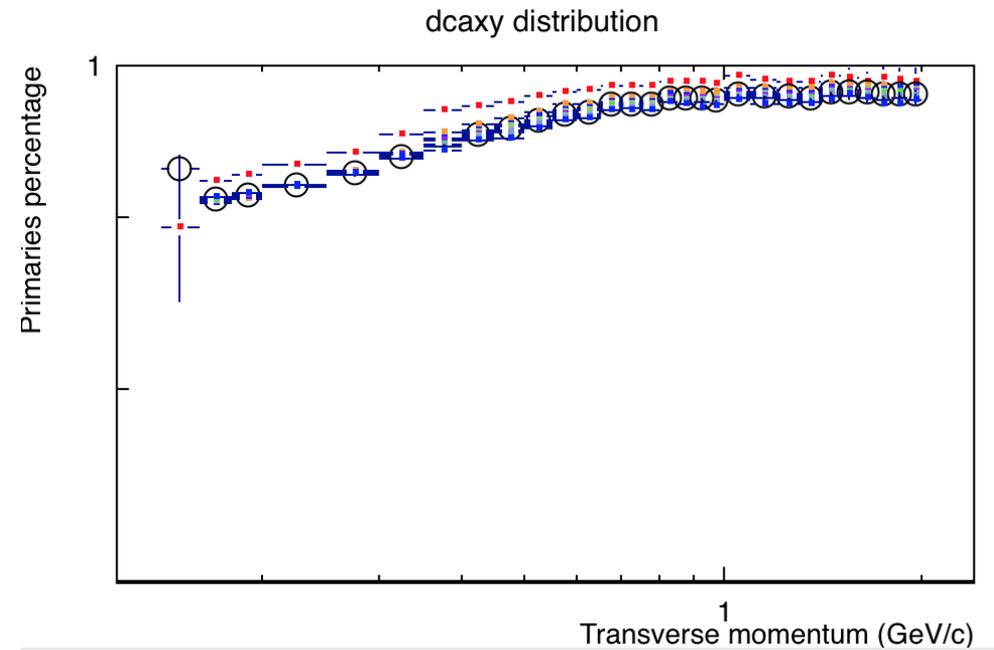
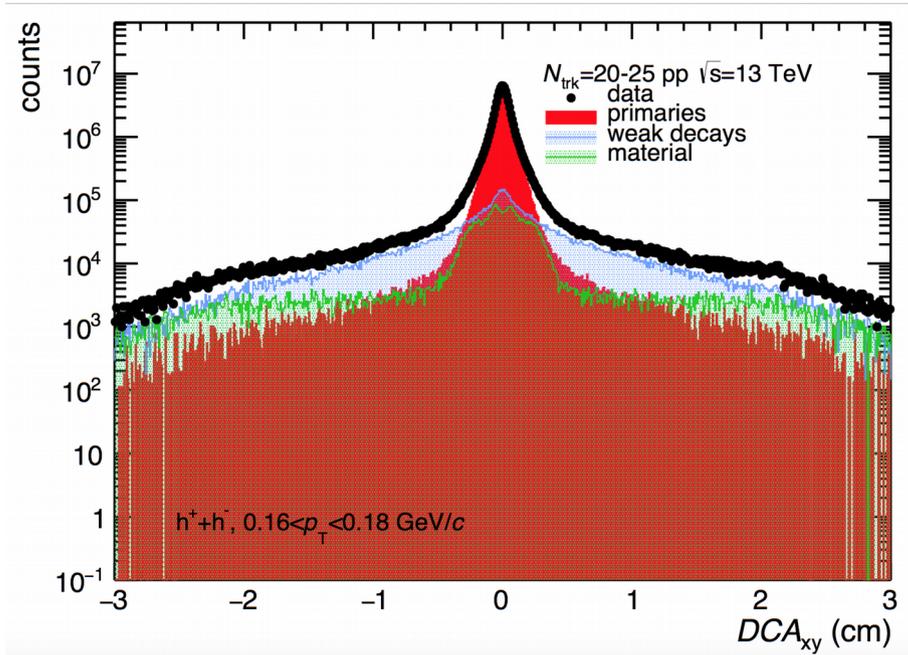
dcaxywdec distribution



Higher secondaries particles contamination
For comparison isotropic and jetty
Difference seen at low pt high Nch

All entries at each column have the 10% of the events.

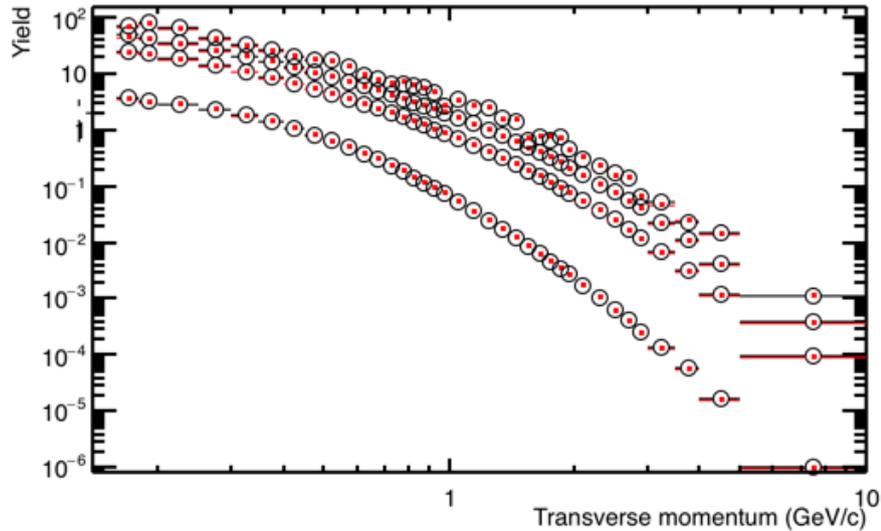
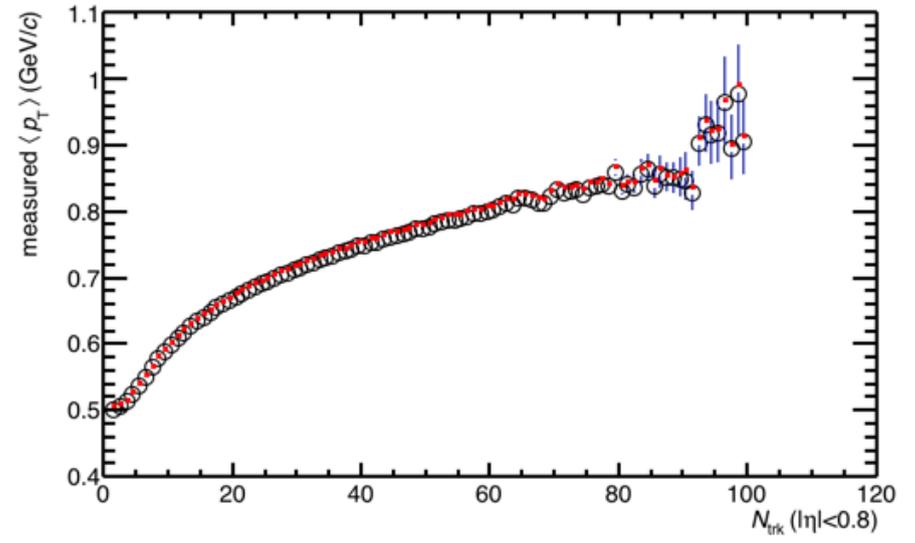
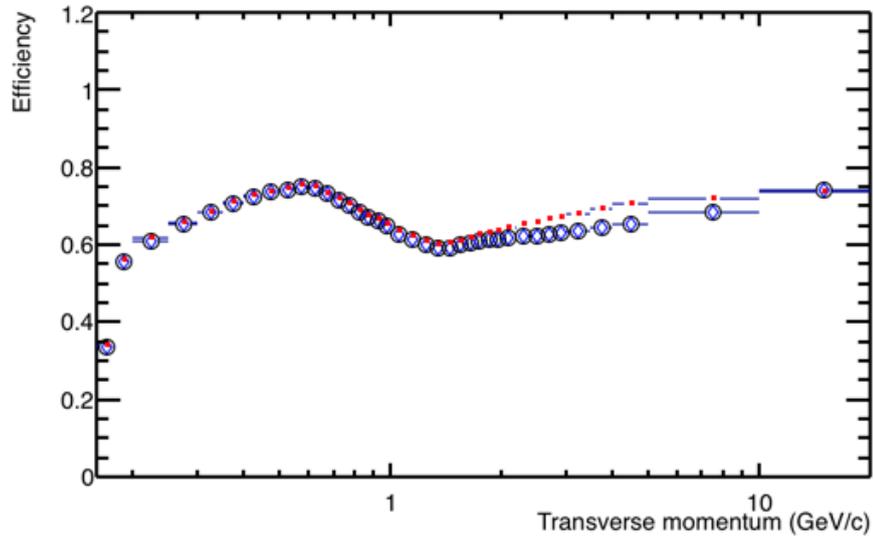
- DCA fit



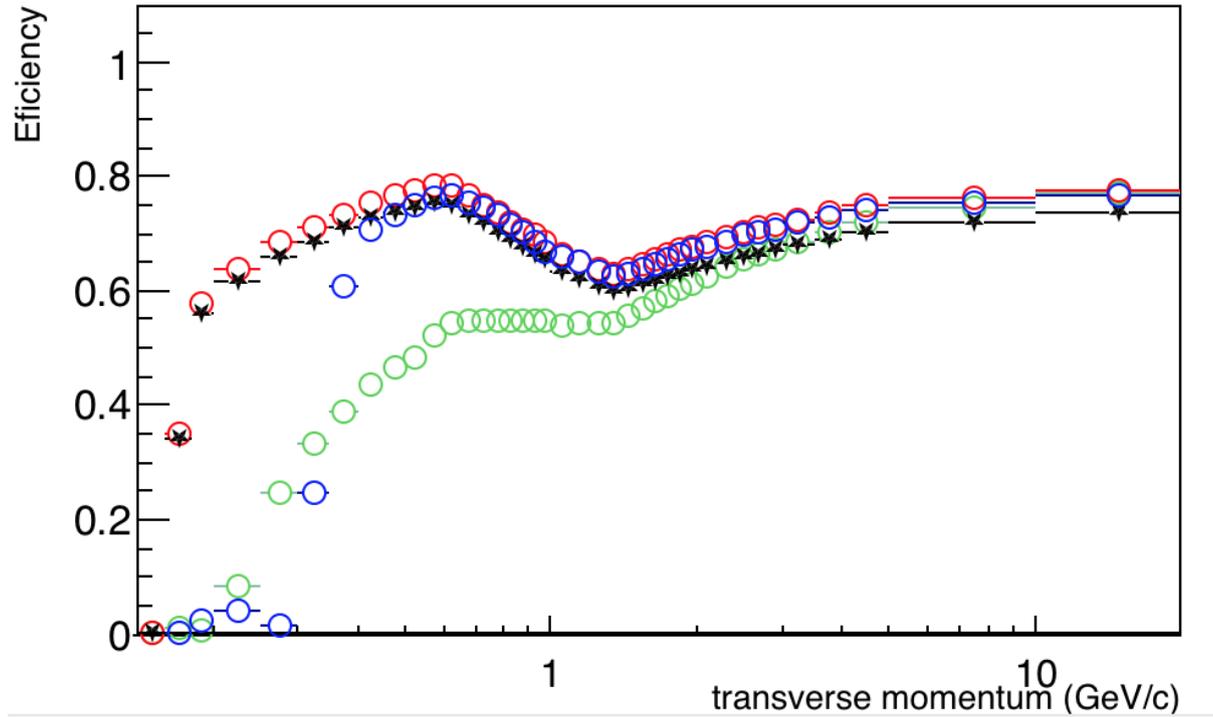
$$DCA_{XY}^{\text{Data}} = \alpha \cdot DCA_{XY\text{sec-mat}}^{\text{MC}} + \beta \cdot DCA_{XY\text{sec-decays}}^{\text{MC}} + \gamma \cdot DCA_{XY\text{prim}}^{\text{MC}}$$

- Efficiency open& close DCA

$$SetMaxDCAToVertexXYPtDep("0.0182 + 0.0350/pt^{1.01}")$$



- Efficiency by particle composition w closed DCA



$$\epsilon_{\text{PartComp}} = \frac{\sum_i \epsilon_{MC}^i \cdot (dN/dp_T)^i + \epsilon_{MC}^{\text{RestMC}} \cdot (dN/dp_T)^{\text{RestMC}}}{\sum_i (dN/dp_T)^i + (dN/dp_T)^{\text{RestMC}}}$$

Conclusions

- Secondaries contamination via `dcaxy` can be gotten from plots obtained.
- Wider range for jetty events than for inclusive case
- Higher secondaries contamination expected to arrive from isotropic events at low p_T in high & low multiplicity

To do

- Answer questions from Oliver and Jacek to Analysis Note
- Apply secondaries contamination
- Get efficiency by particle composition
- Calculate systematics
- ...