IST Hit-Track Matching Efficiency for Run15 (PP@200GeV)

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Event vertex selection: Run 16102012

Suggested by Hao (fixed two inner PXL hits issue):
Modified StarDb/Calibrations/tracker/KalmanTrackFinderParameters.y2015.C

```
row.mHitRegions     =   28170904; // pxl1<4>pxl2<9<pxl3<17<SST<28;
row.mHitWeights     =      1111; //1090309; // Coeffs of nhits. sum must be >=20;
```

BFC chain options (STAR lib. Version: starver SL15g):
"pp2015,mtd,btof,BEmcChkStat,CorrX,OSpaceZ2,OGridLeak3D,-hitfilt,pxlHit,istHit,NoIstIT, HftMatTree,-evout"

Data sample (~510K events):
st_ssdmb_16102012_raw, st_ssdmb_adc_16102012_raw

Working directory:
/star/u/ypwang/disk01/Data_QA_IST/istTrackingEff_PP200_DEV

Cuts applied

Event selection (/star/u/ypwang/disk01/Data_QA_IST/istTrackingEff_PP200_DEV/Ana/istEff_helix.C):

- |vertexZ| ≤ 10.0 cm
- ~~|vZVpd - vertexZ| ≤ 5.0 cm~~ → |vzVpd|≤ 100.0 cm
- HFT (PXL+IST) hits in StEvent: ≥ 1
- Tracks: 1 ≤ N_track ≤ 3000
- IST hits in StEvent: <= 4000
- PXL hits in StEvent: PXL1+PXL2 <= 30000

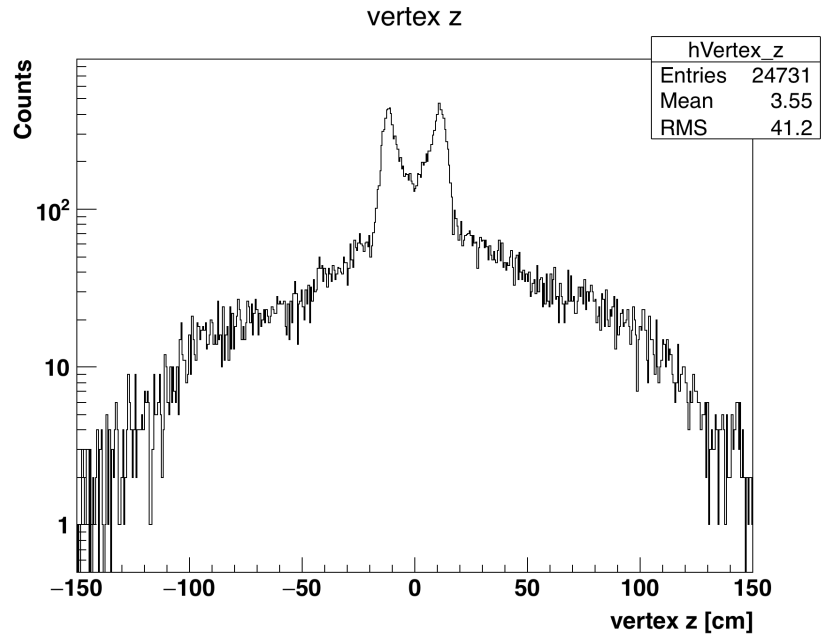
Analysis cuts (/star/u/ypwang/disk01/Data_QA_IST/istTrackingEff_PP200_DEV/drawPlot/makeIstEfficiencyHisto_PP.C):

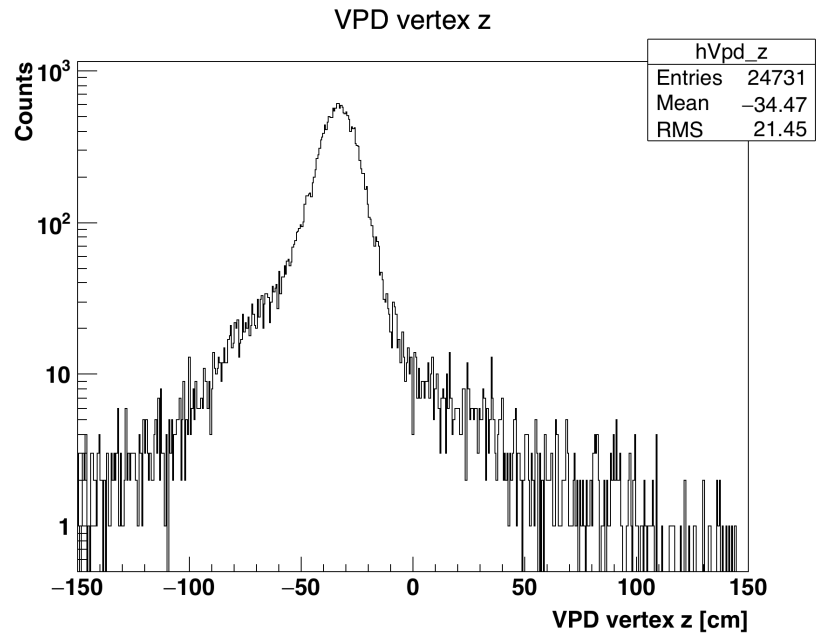
- Event cuts:
  - ✧~~|vertexZ| ≤ 5.0 cm~~ → |vertexZ| ≤ 10.0 cm
  - ✧~~|vZVpd - vertexZ| ≤ 3.0 cm~~ → |vZVpd – vertexZ + 35.0| ≤ 5.0 cm
  - ✧ Number of tracks per event: < 3000
  - ✧ Number of IST hits per event: <= 3000
- Track cuts:
  - ✧DCA cut: < 3.0 cm
  - ✧Track dca-Geometry origin: $\sqrt{(x^2+y^2)}$ ≤ 2.0 cm, |z|≤ 15.0 cm (this cut copied from Xin)
  - ✧TpcFitPoints: ≥ 25
  - ✧TpcFitPoints/TpcPossPoints: ≥ 0.52
  - ✧TOF matching: btofMatchFlag>0 && |btofMatchYlocal|<1.8
  - ✧ Number of PXL hits in reconstructed track points: 2 (1 inner hit + 1 outer hit)

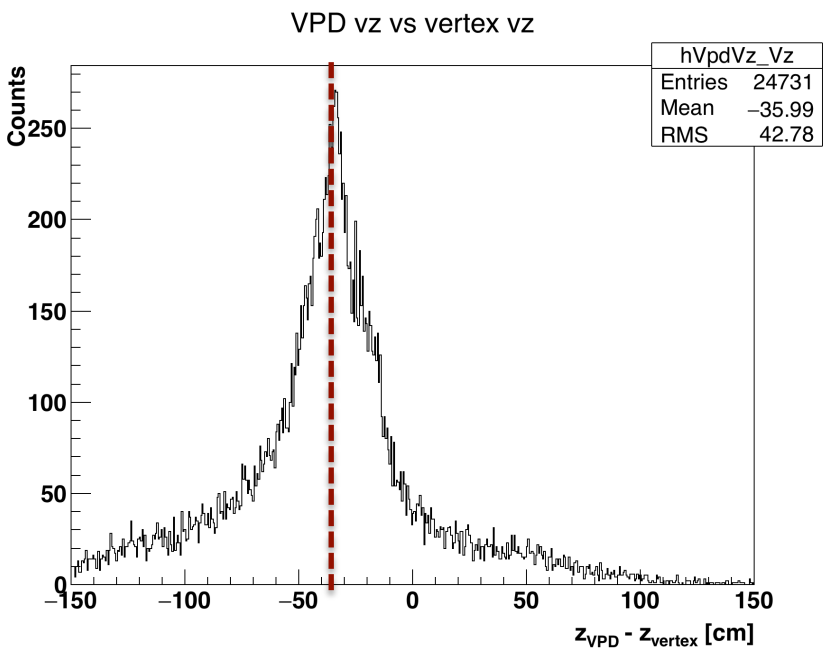
More plots can be found:
http://www4.rcf.bnl.gov/~ypwang/IST_Performance_Study/PP_200GeV/

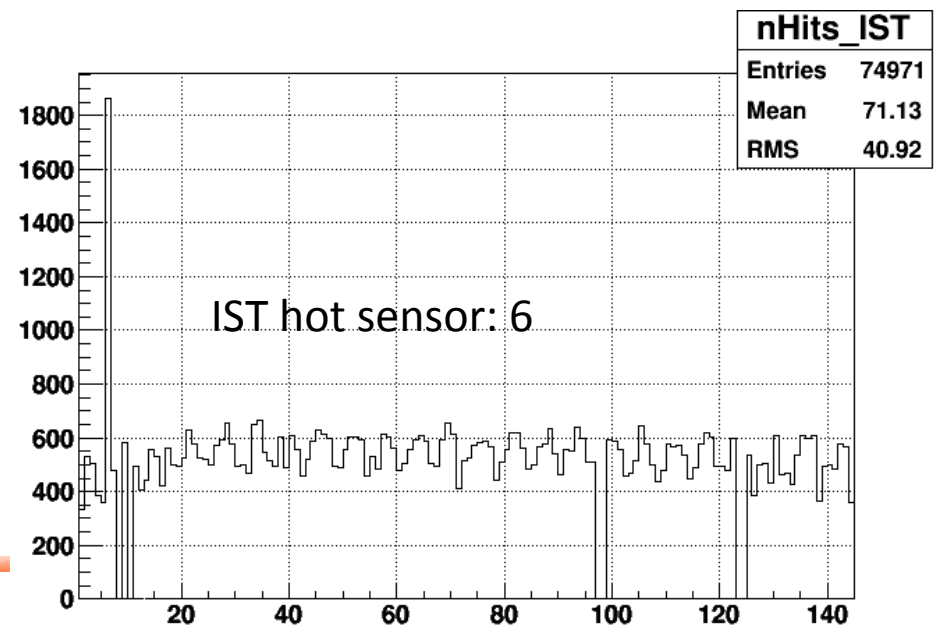
IST hit-tracking method:
https://drupal.star.bnl.gov/STAR/event/2014/07/11/hft-software/ist-hit-track-matching-efficiency

Issues


vertex z
hVertex_z
Entries 24731
Mean 3.55
RMS 41.2
Counts
vertex z [cm]


VPD vertex z
hVpd_z
Entries 24731
Mean −34.47
RMS 21.45
Counts
VPD vertex z [cm]


VPD vz vs vertex vz
hVpdVz_Vz
Entries 24731
Mean −35.99
RMS 42.78
Counts
$z_{VPD} - z_{vertex}$ [cm]


nHits_IST
Entries 74971
Mean 71.13
RMS 40.92
IST hot sensor: 6

IST hit tracking matching efficiencies

With analysis cuts:

(1) Track pT > 0.2 GeV/c:

2X2 IST pitch window size: 0.22362+-0.00197/0.00196

(2) Track pT > 1.0 GeV/c

2X2 IST pitch window size: 0.31982+-0.01316/0.01289

Without analysis cuts:

(1) Track pT > 0.2 GeV/c:

2X2 IST pitch window size: 0.01935+-0.00008/0.00008

(2) Track pT > 1.0 GeV/c

2X2 IST pitch window size: 0.02663+-0.00056/0.00055

Detailed QA plots can be found:

http://www4.rcf.bnl.gov/~ypwang/IST_Performance_Study/PP_200GeV/