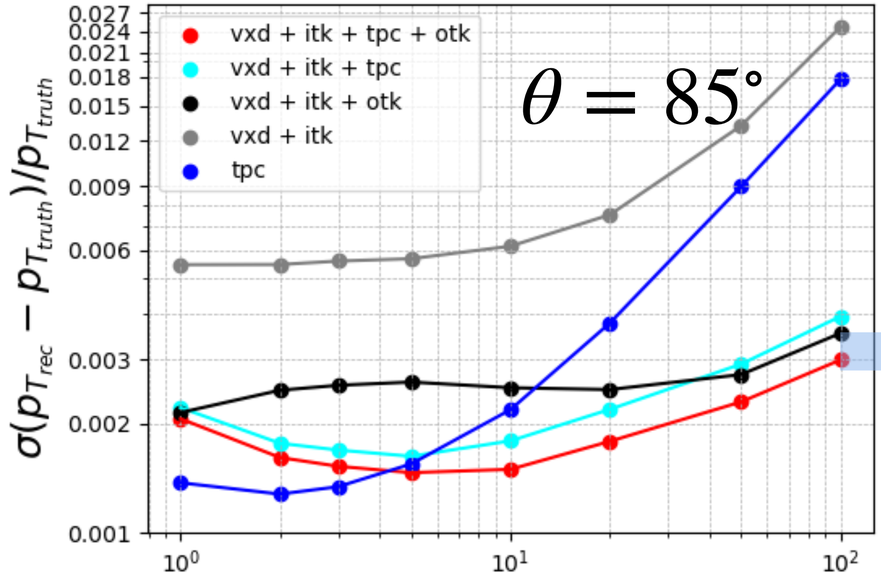
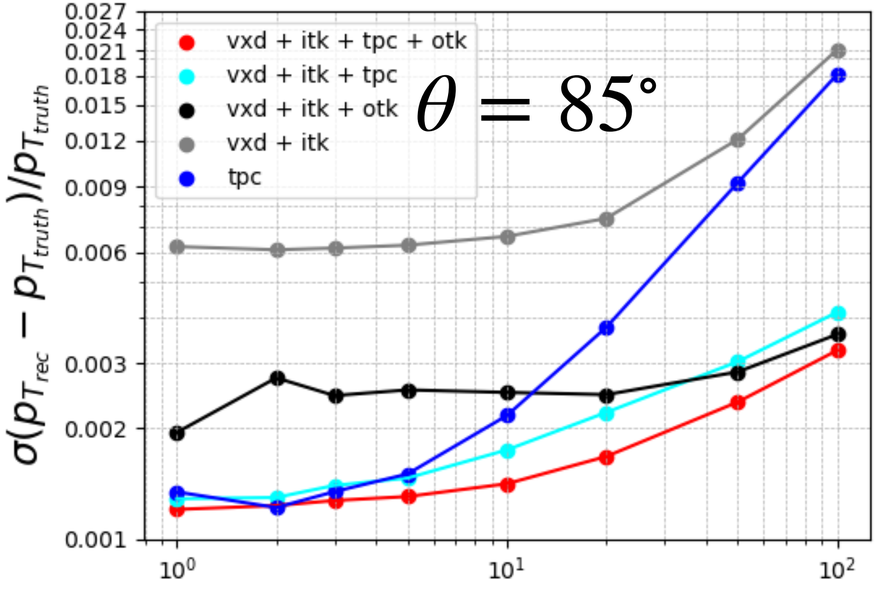
Trk, PID, Vtx

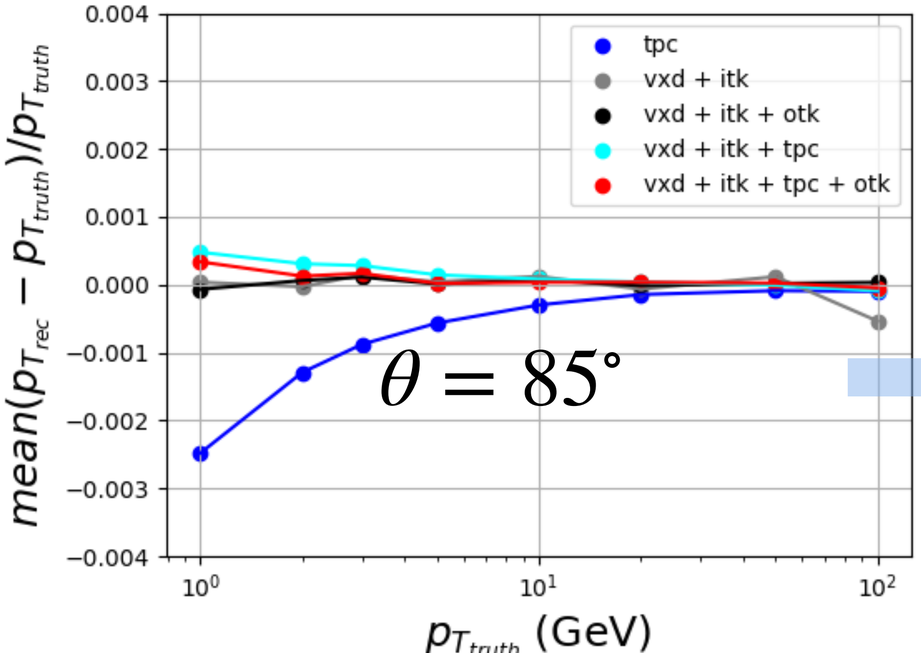
C.Zhang/10Feb2025

Trk

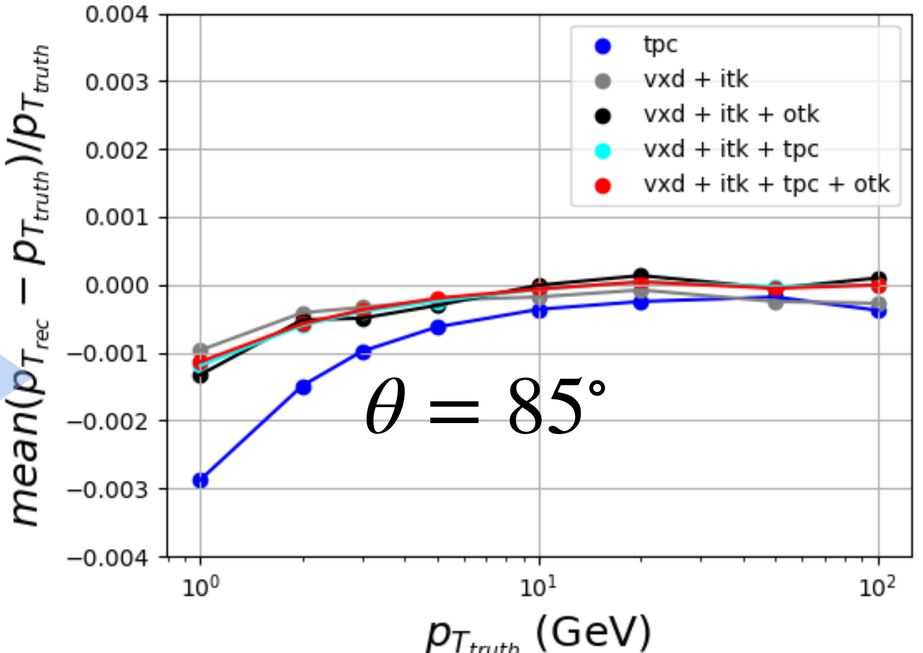


MR198

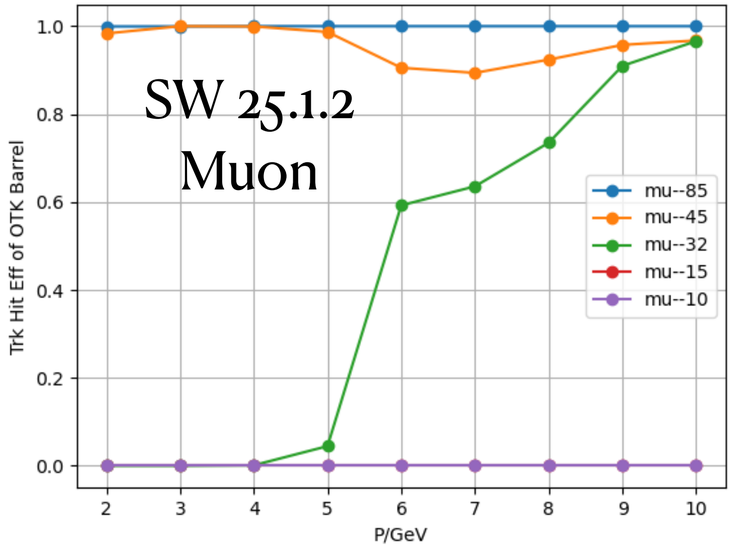


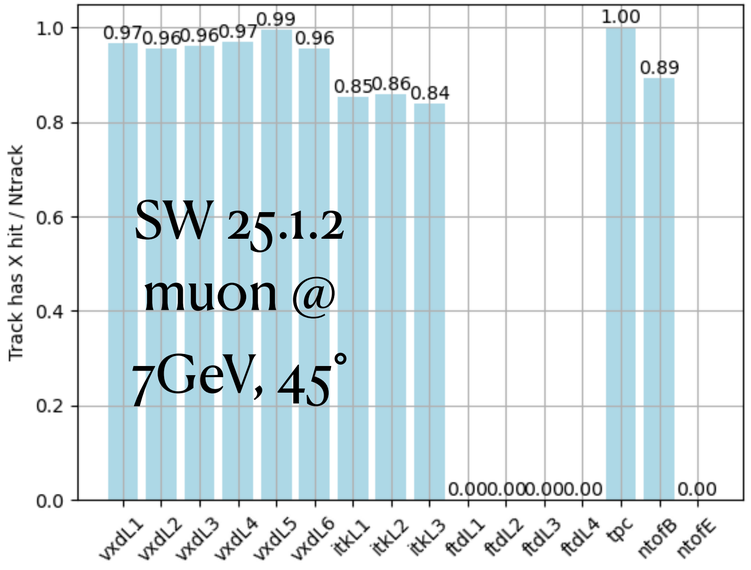


MR198

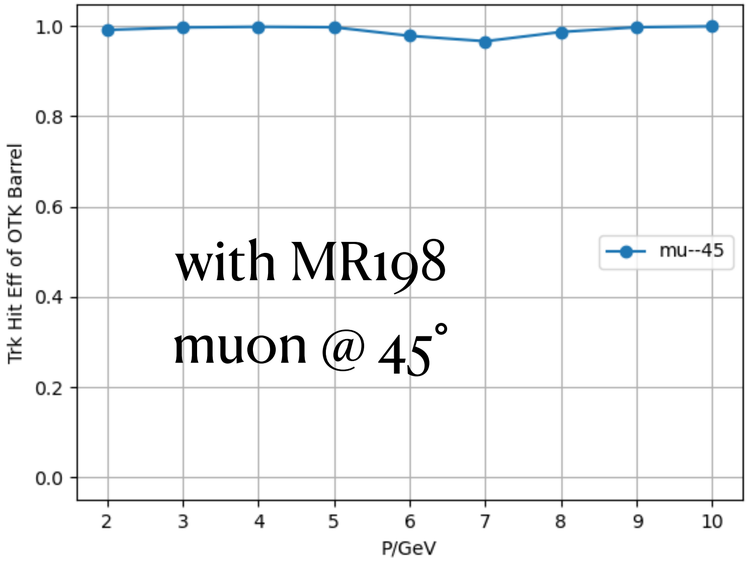


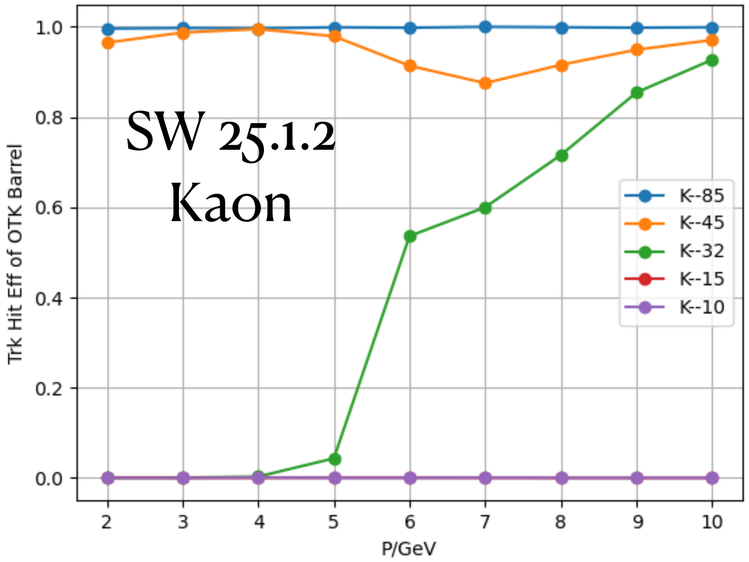
Trk (OTK hit eff.)

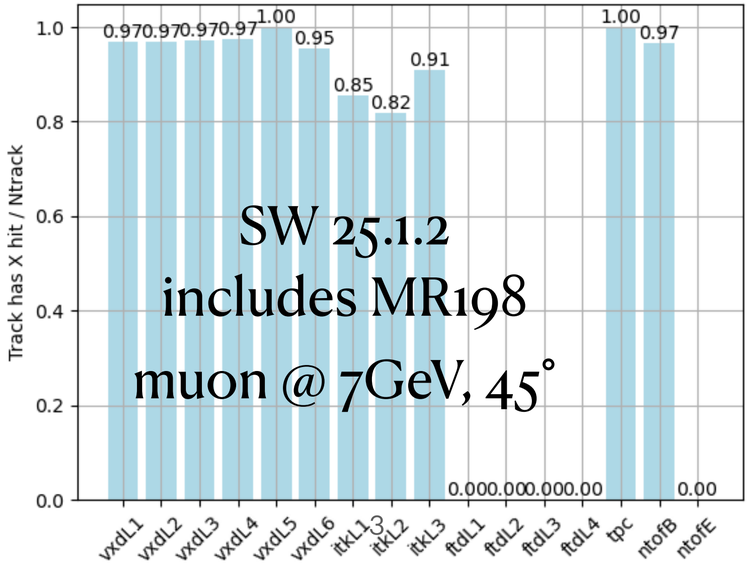




- $\text{Hit Eff}=\dfrac{N_{trk}\ \text{has X hit}}{N_{trk}}$





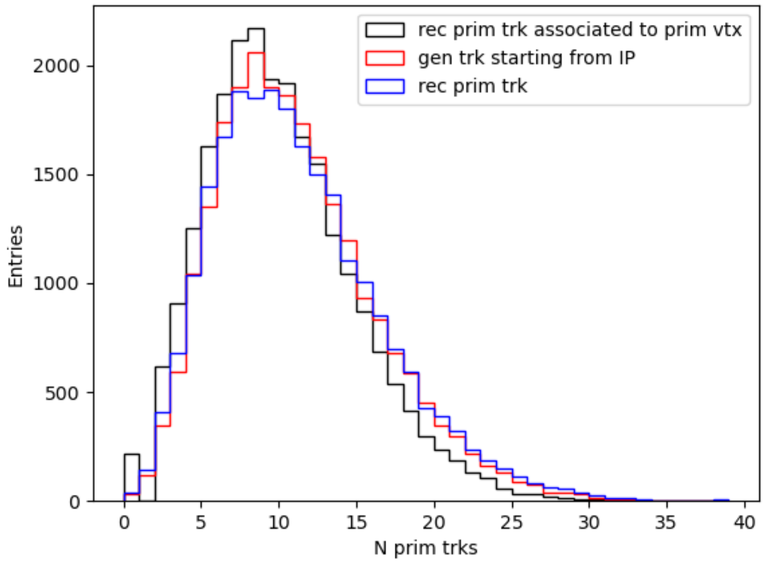


PID

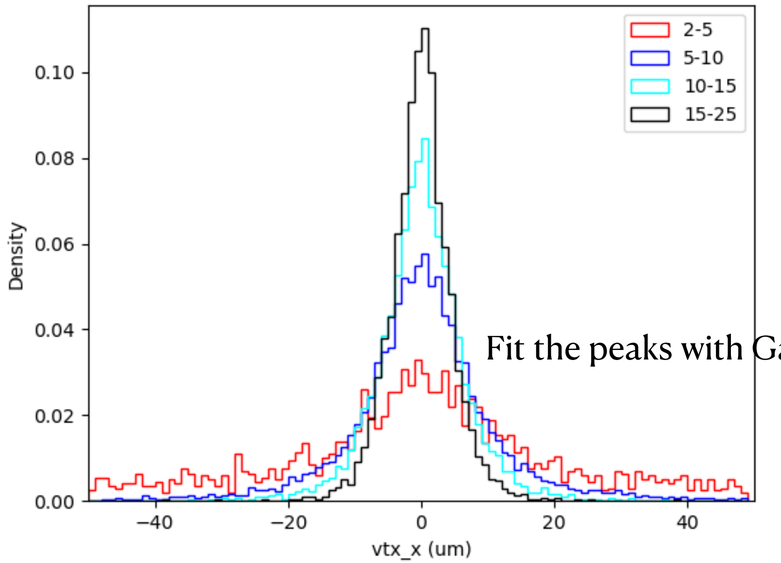
- ParticleGun K PID efficiency with ITKToF
  - (itktof and tpc and tof track) 1-10GeV and 35/45/55/65/75/85/89 degree: ~ 89.5%
  - (itktof or tpc or tof track) 1-10GeV and 35/45/55/65/75/85/89 degree: ~ 89.5%
- K PID efficiency/purity in ParticleGun and Z->qq using TPC and TOF
  - ParticleGun 1-10GeV and 35/45/55/65/75/85/89 degree: ~ 89.6%
  - Z->qq >1GeV and |costheta|<0.85: ~ 89.3%/86.0%
- K PID efficiency/purity in ParticleGun and Z->qq using TPC or TOF
  - ParticleGun 1-10GeV and 35/45/55/65/75/85/89 degree: ~ 89.1%
  - Z->qq >1GeV and |costheta|<0.85: ~ 88.4%/80.1%
  - Simple PID efficiency matrix for pi, K, p
- Samples generated under CEPCSW_tdr25.1.2
- Backup (Equations, definitions and distributions of track truth phase space)

SW 25.1.2

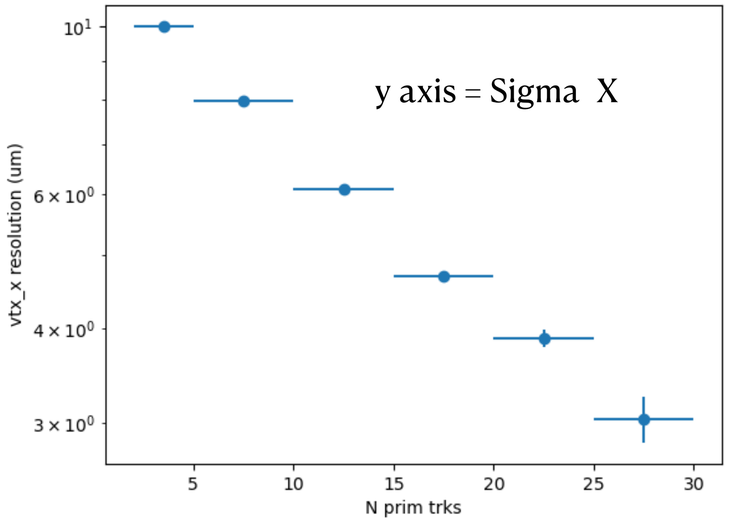
Primary vertex (E91_eebb events)

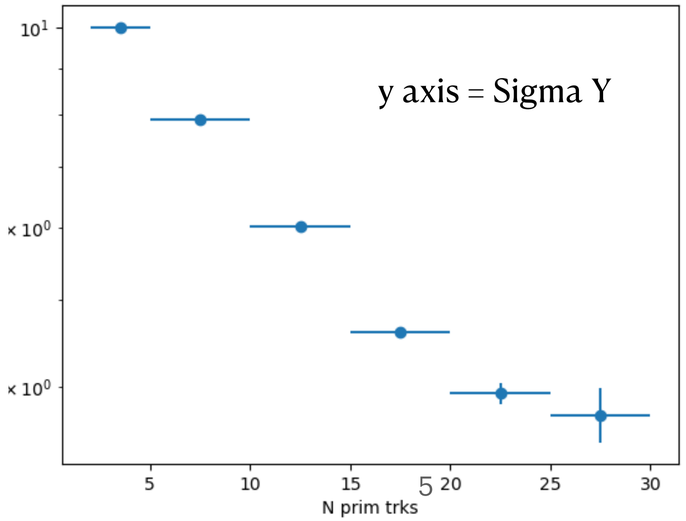


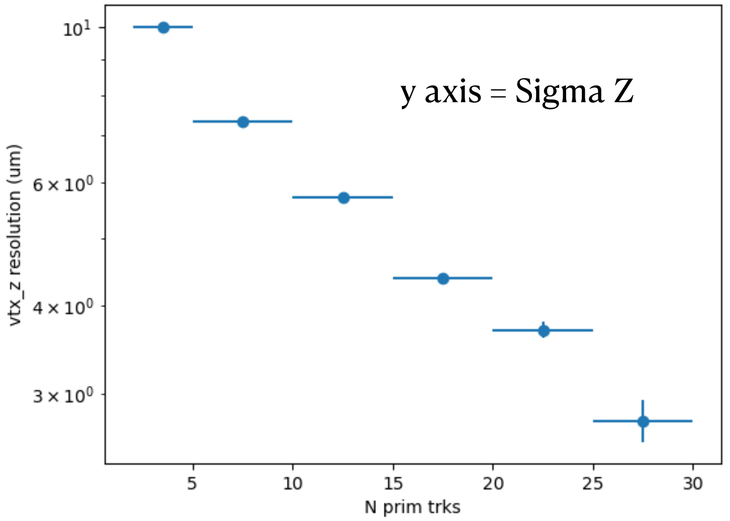
- PV
  - eff.: **99.3%**
    $$\frac{\textit{Number of events with N prim trk} > 1 \textit{ \& PV reco'ed}}{\textit{Number of events with N prim trk} > 1}$$
  - fake: **0.5%**
    $$\frac{\textit{Number of events with N prim trk} < 2 \textit{ \& PV reco'ed}}{\textit{PV reco'ed}}$$
- Trk association
  - eff.: **81%** $\frac{\textit{Number of prim trk associated to prim vtx}}{\textit{Number of prim trk}}$
  - purity: **90%** $\frac{\textit{Number of prim trk associated to prim vtx}}{\textit{Number of trk associated to prim vtx}}$



Fit the peaks with Gaussian

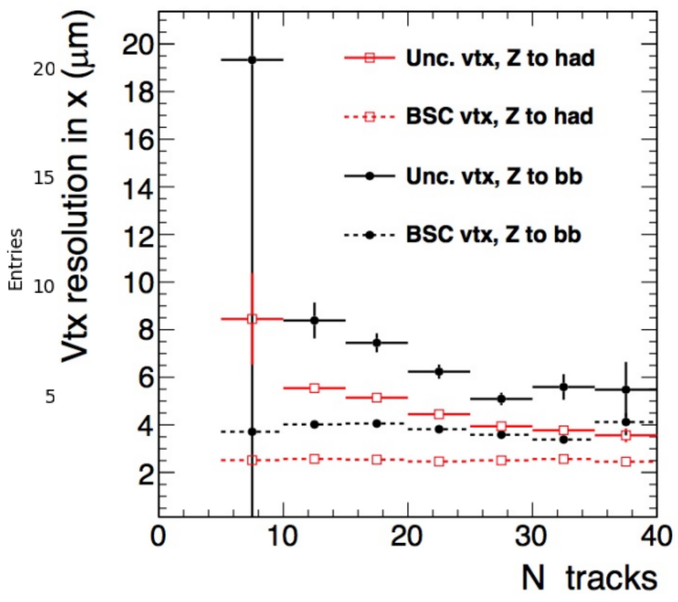


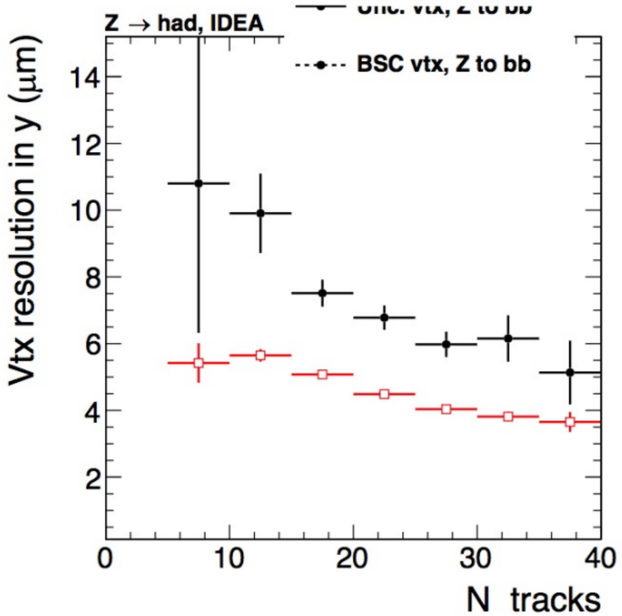


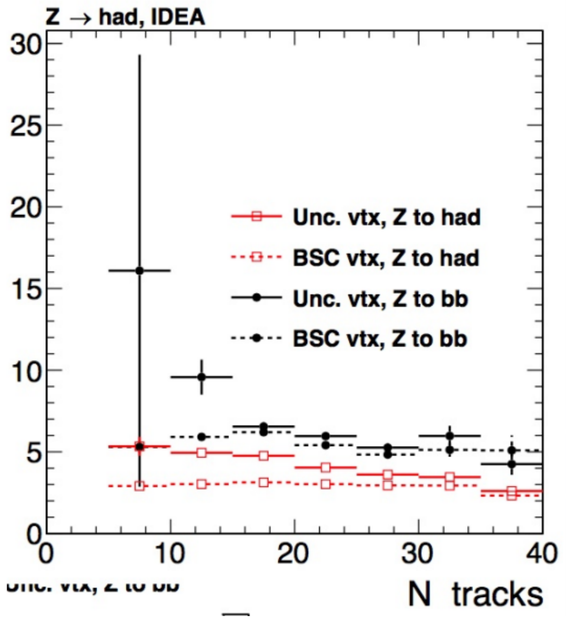


SW 25.1.2

Primary vertex (E91_eebb events)

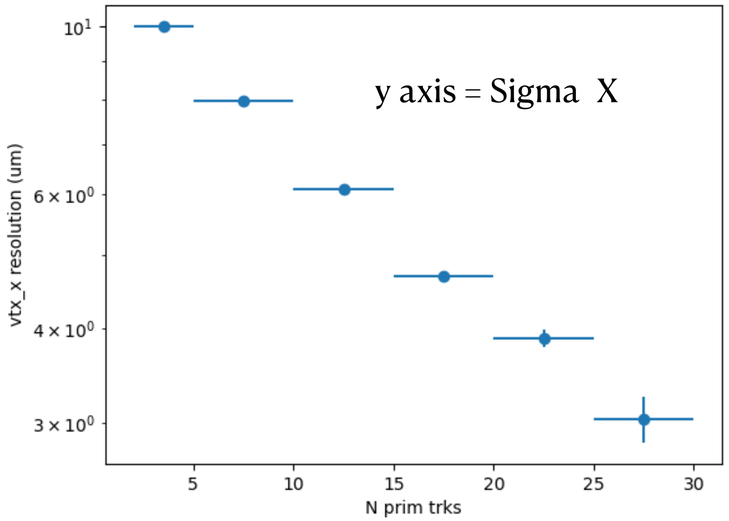


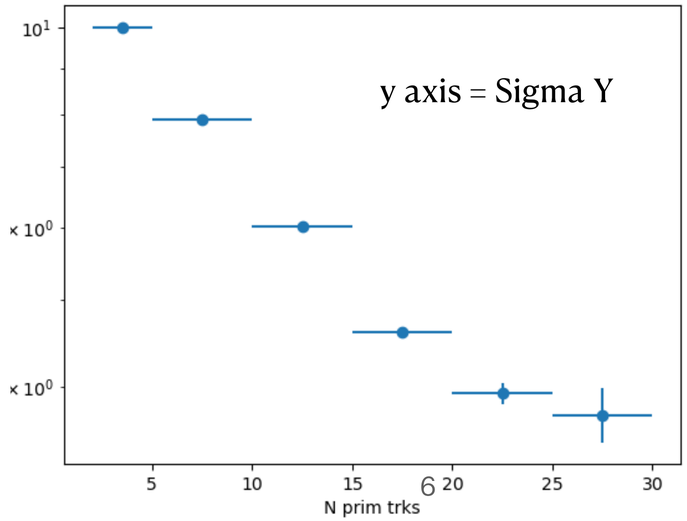


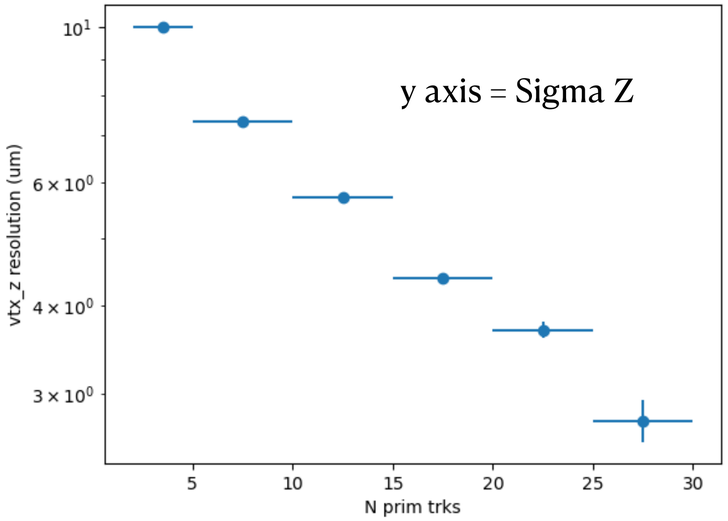


Cross reference to FCC-ee [link]

Similar performance 3~10 um



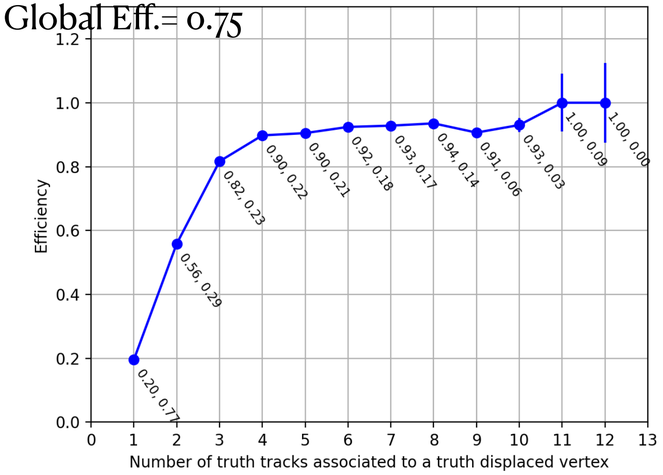


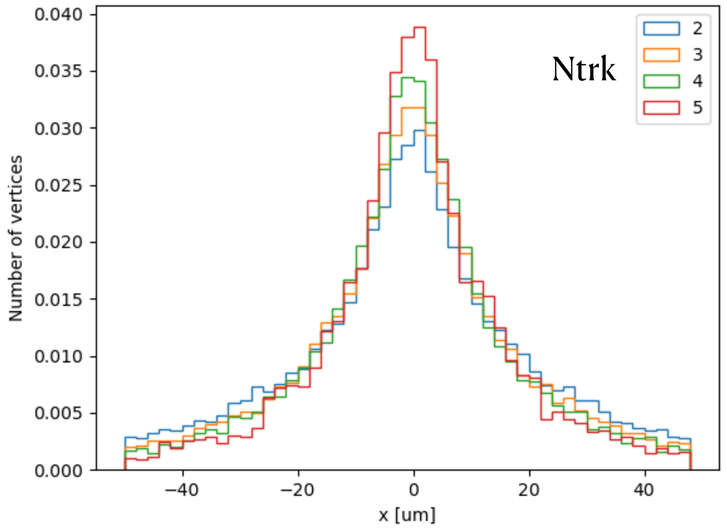


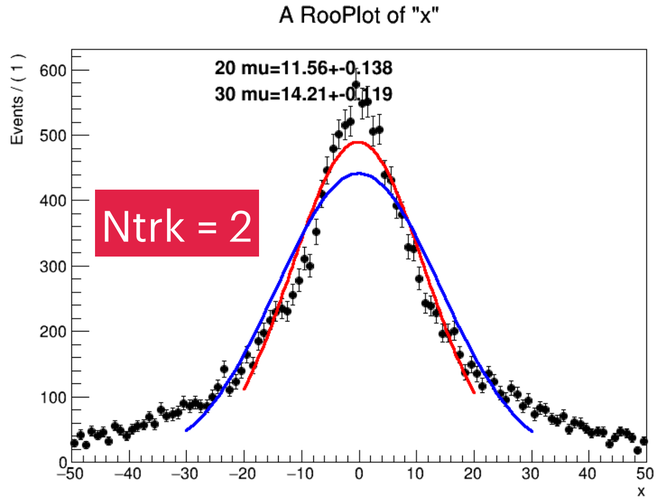
SW 25.1.2

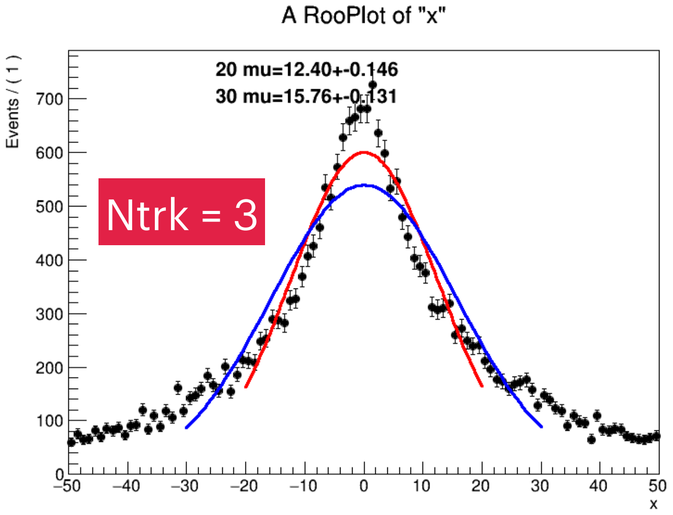
Secondary vertex (E91_eebb events)

- There is not a common way to define secondary vertex efficiency/purity for inclusive reconstruction
  - 2D distance between rec and truth < 200 um
- Global Eff.= 0.75



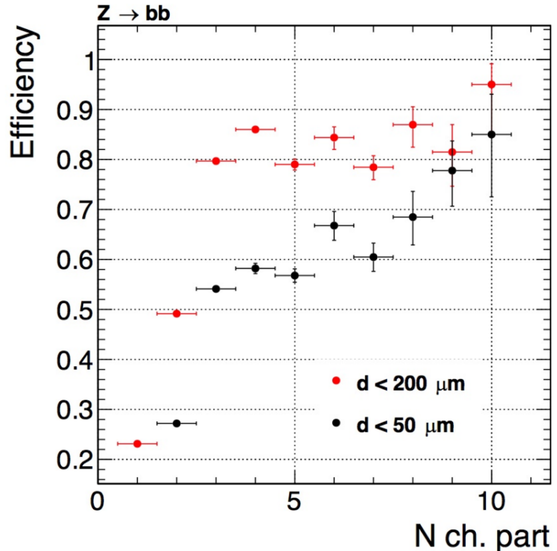






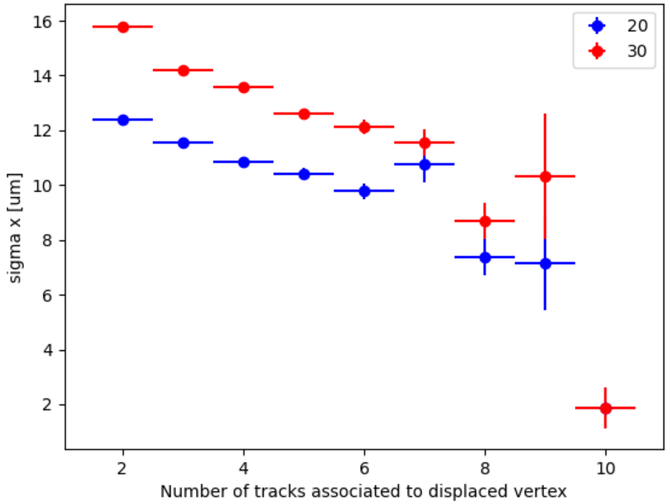
- for matched SV: (recX - genX) vs. Ntrk
- The distributions are not Gaussian, fit them using Gaussian with different ranges of 20 and 30 um

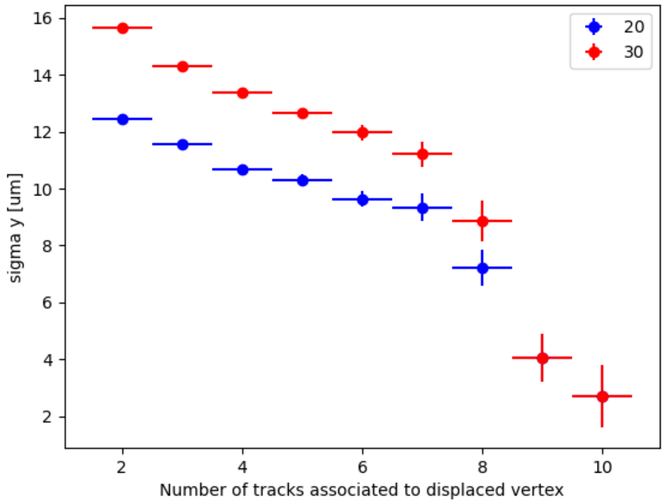
Cross reference to FCC-ee

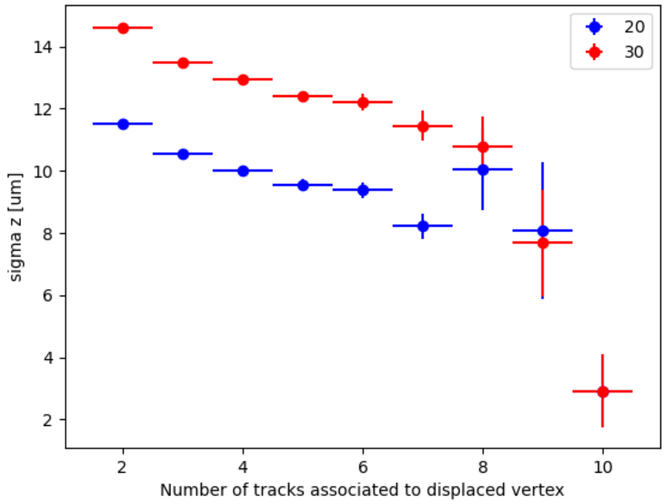


SW 25.1.2

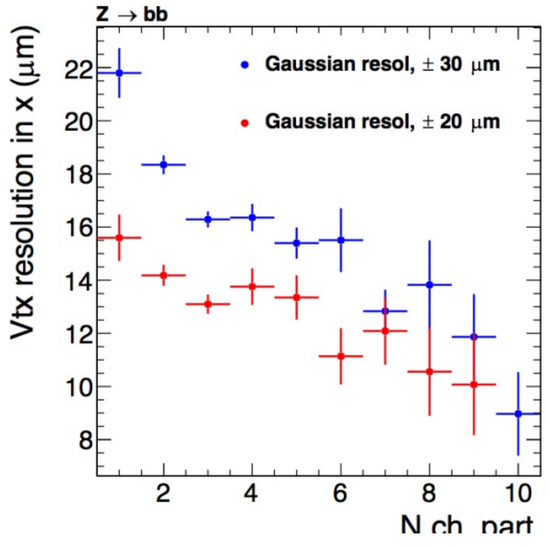
Secondary vertex (E91_eebb events)

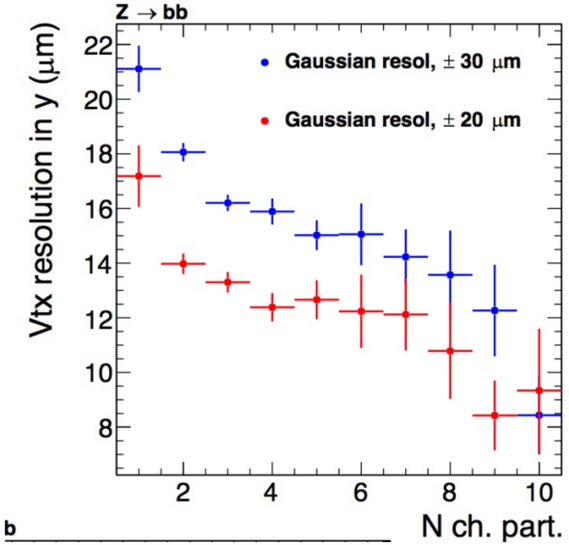


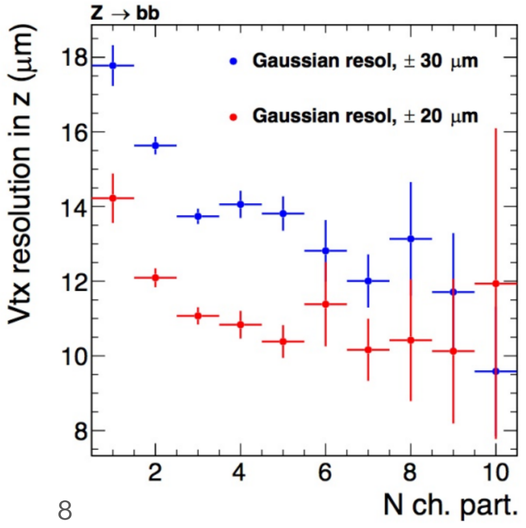




Cross reference to FCC-ee







- 10-16 um
- Z is slightly better
- Todo
  - Performance in exclusive decay