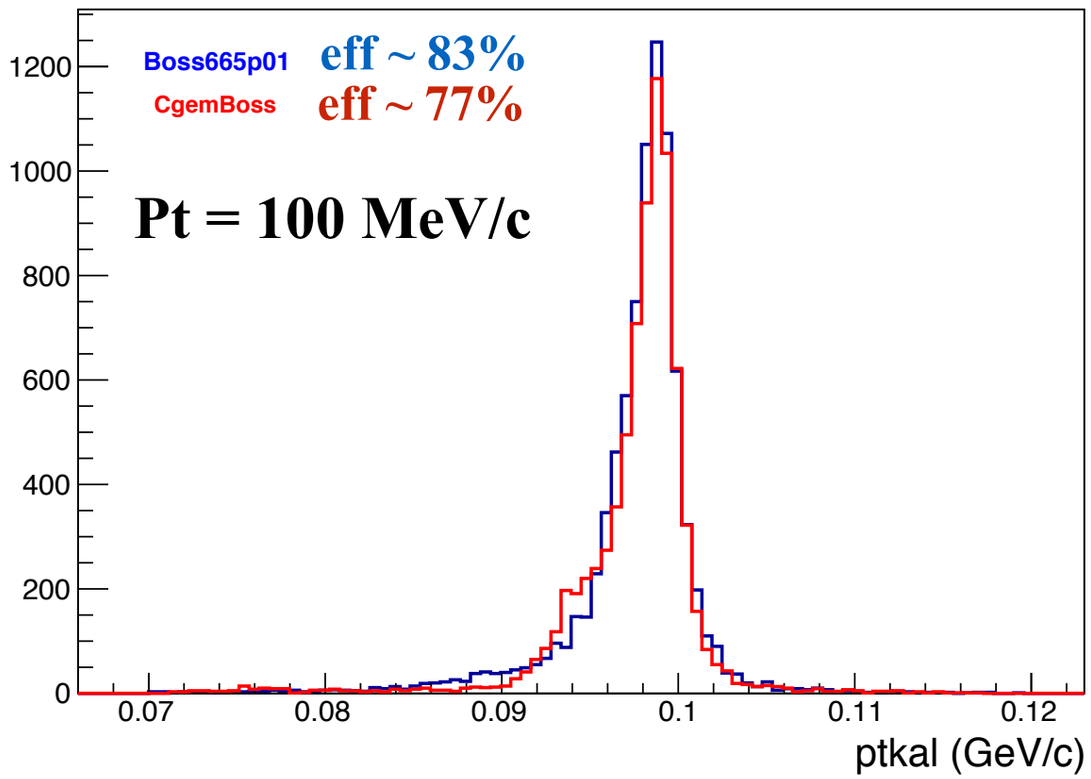
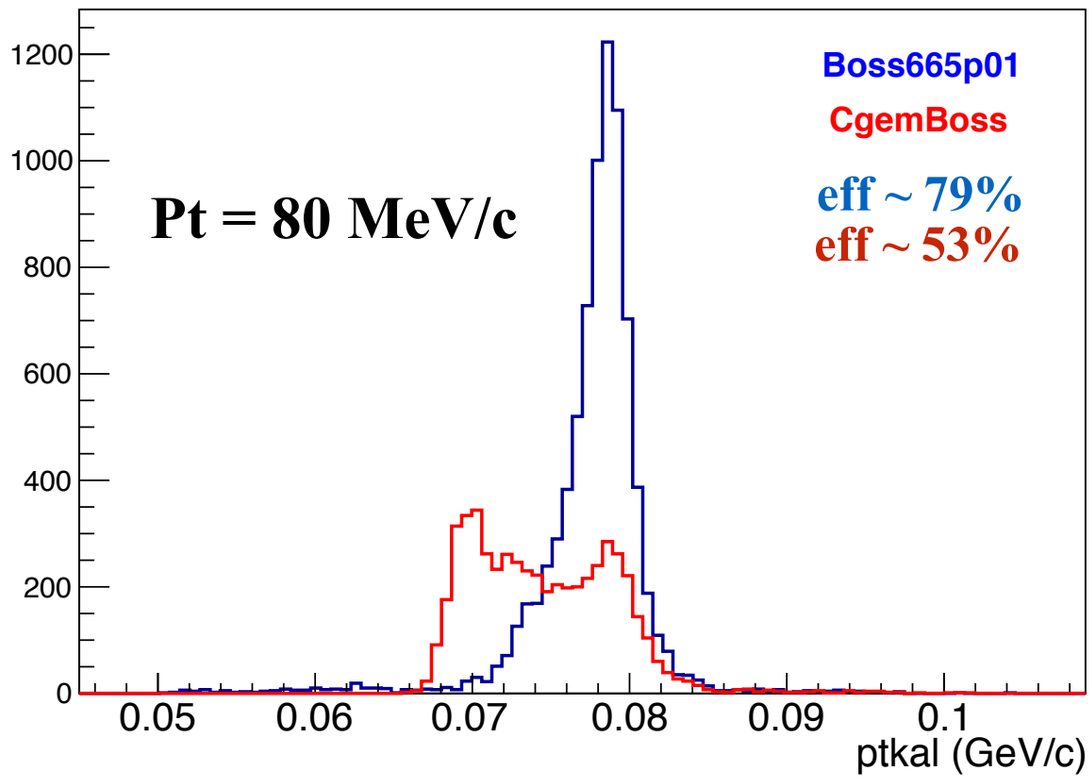
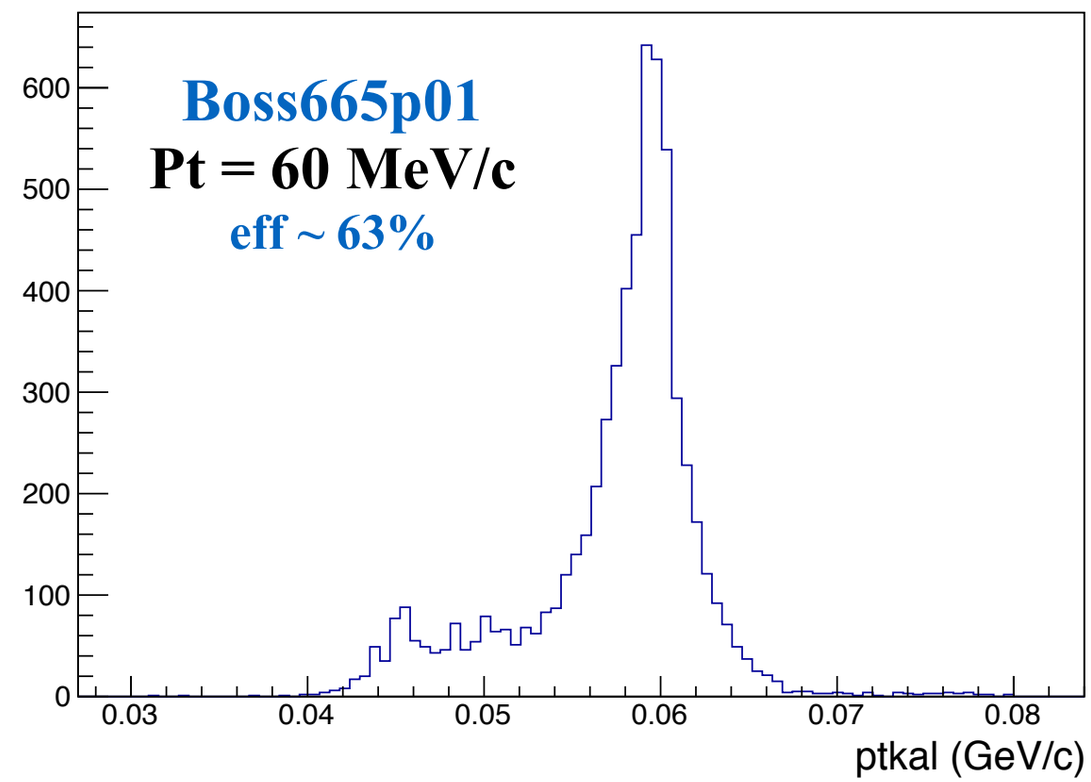
Single track simulation

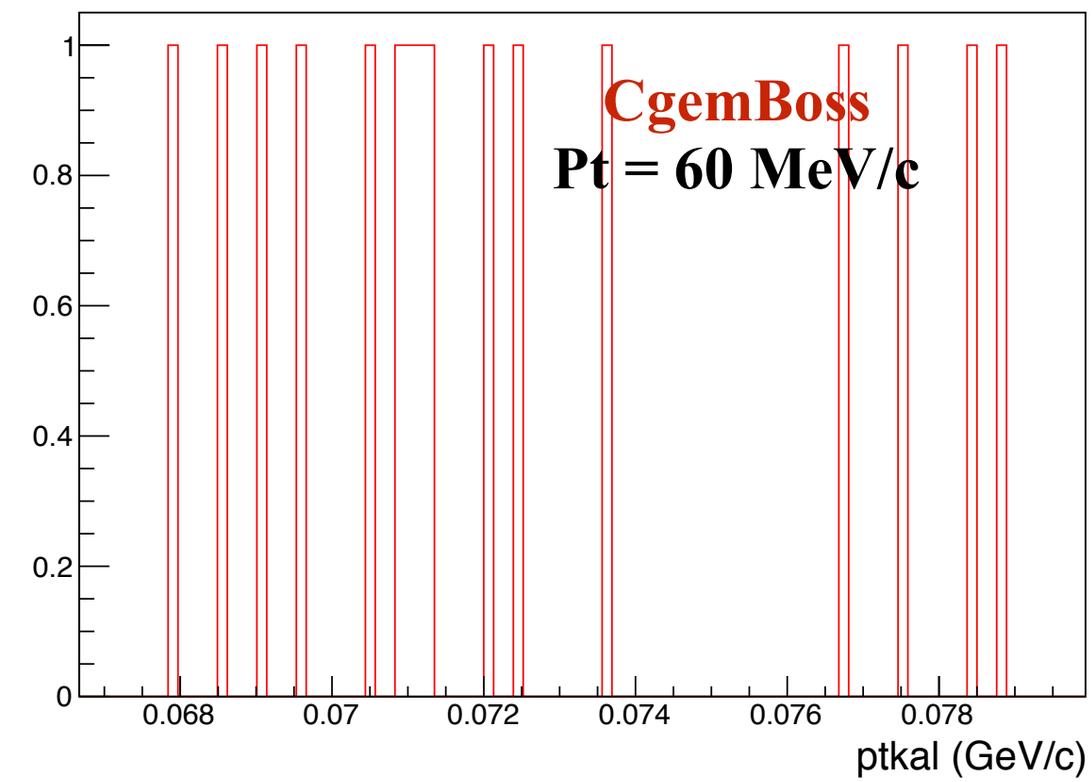
- CGEMBoss software 6.6.5.b and Boss version 665p01
- **All detectors** included in the simulation
- **“fixpt”** generator used to generate single particle tracks
- **10000 pions**
  - pt = 60 MeV/c, 80 MeV/c, 100 MeV/c, 500 MeV/c
  - -0.93<cos(theta)<0.93
- **CUTS**: POCA applied before the Kalman:
  - Rxy < 1 cm
  - Rz < 10 cm
- **Difference in Reconstruction:**
  - 665p01: #include “$MDCXRECOROOT/share/jobOptions_MdcPatTsfRec.txt” (Runge-Kutta)
  - CGEMBoss: #include “$MDCXRECOROOT/share/jobOptions_MdcPatTsfRec_NoRK.txt"
- Observables:
  - Reconstructed pt
  - nstereo: number of stereo hits

Pt for soft pions

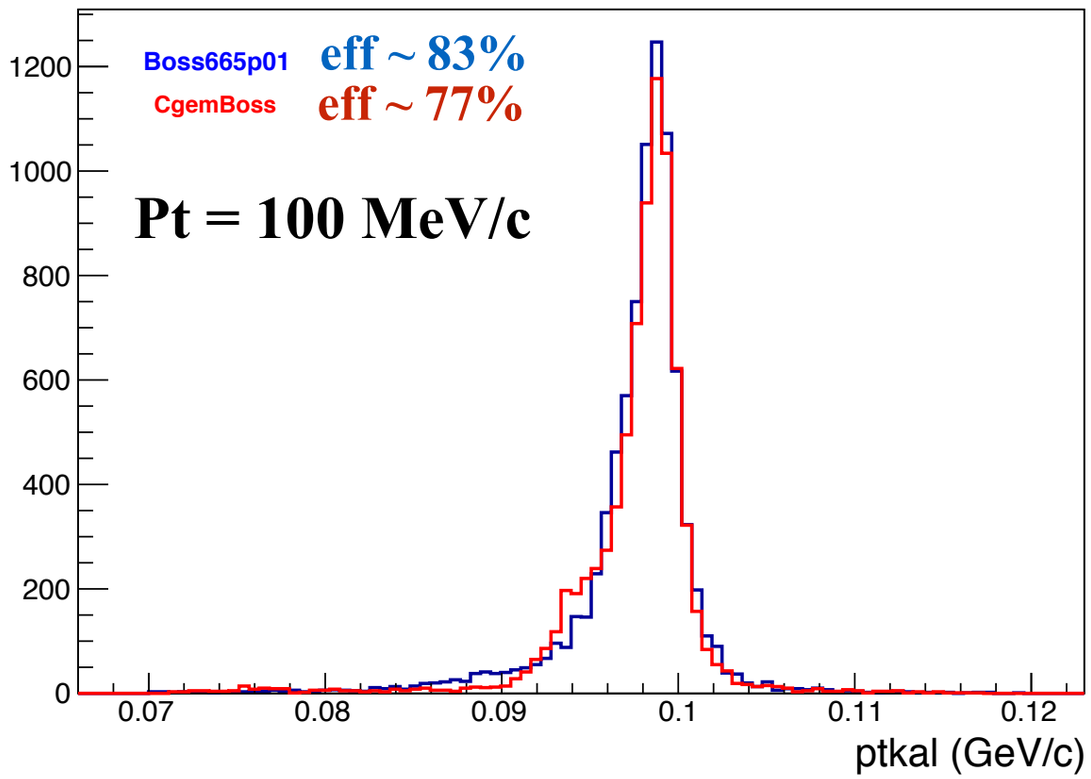


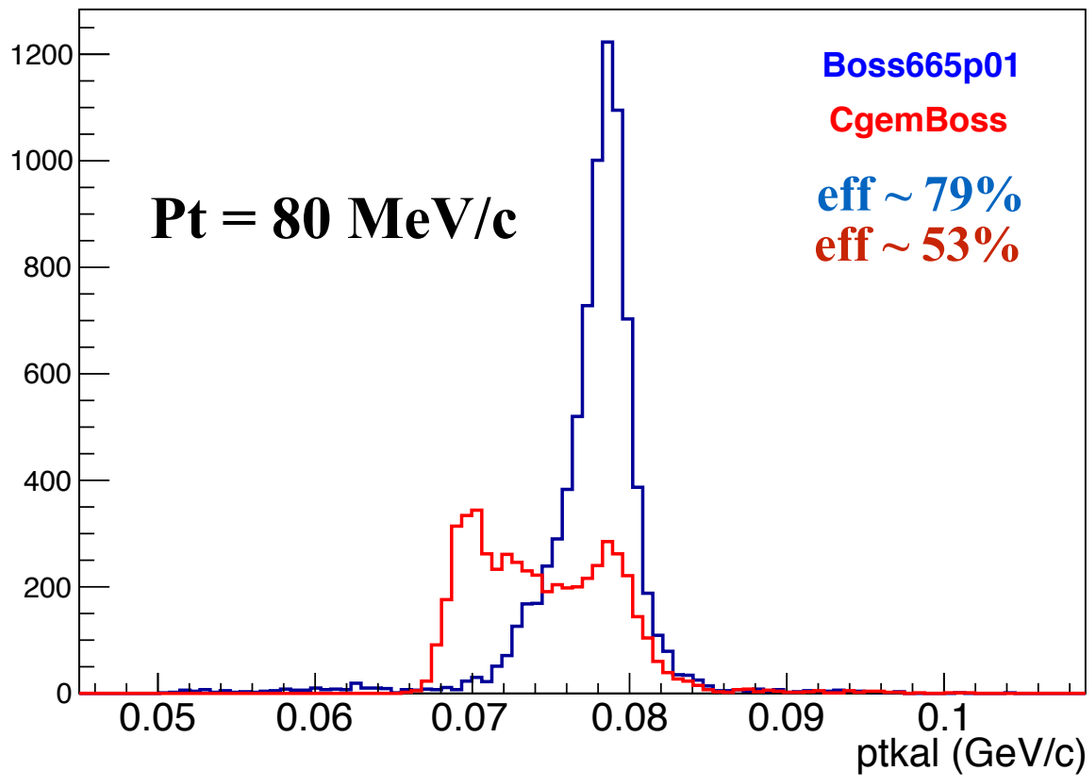


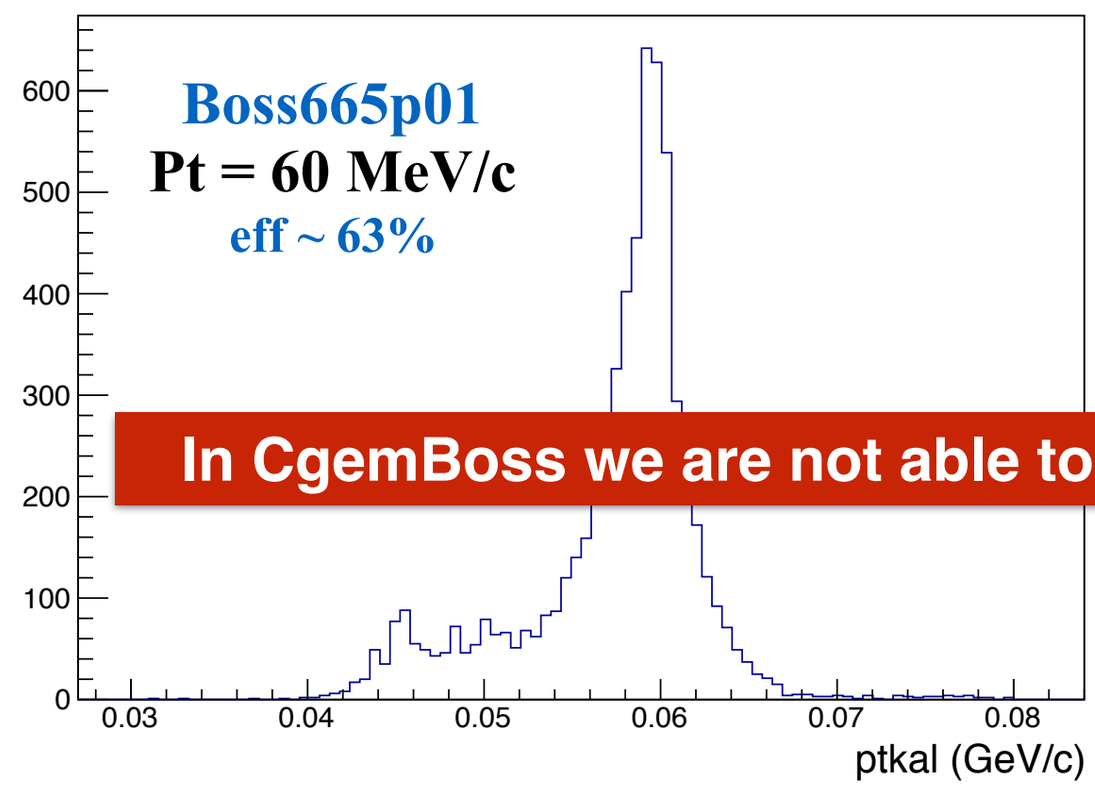


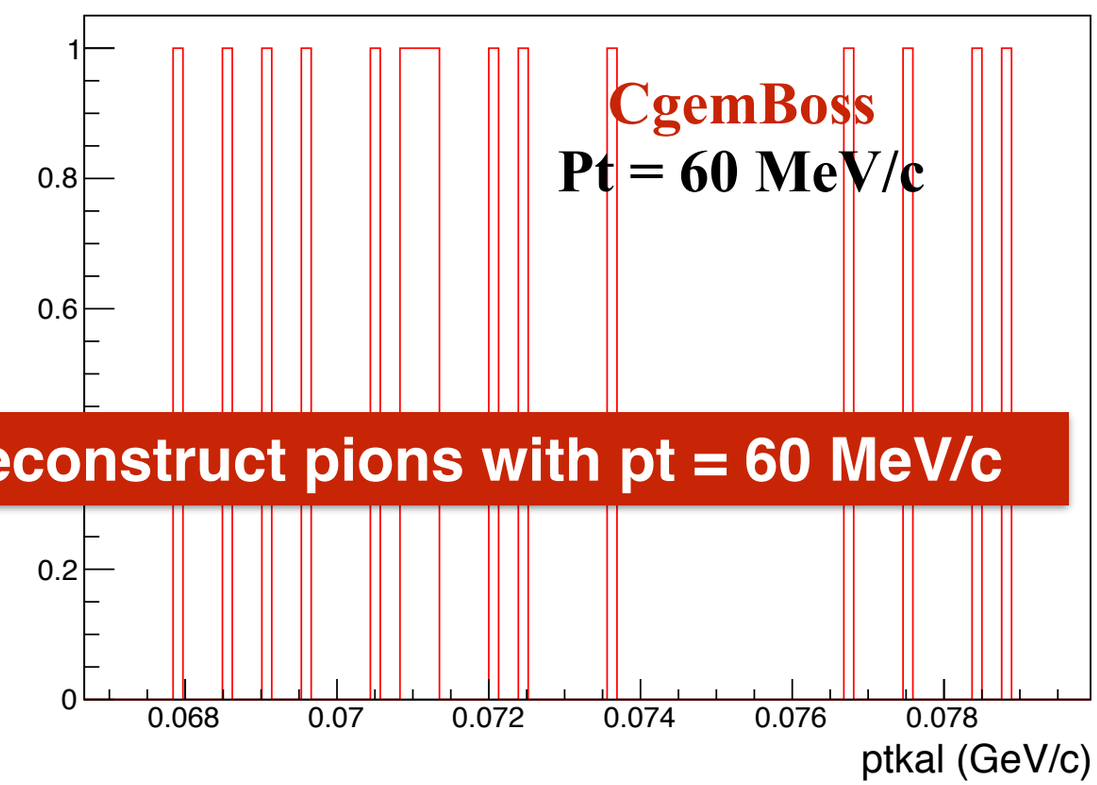


Pt for soft pions





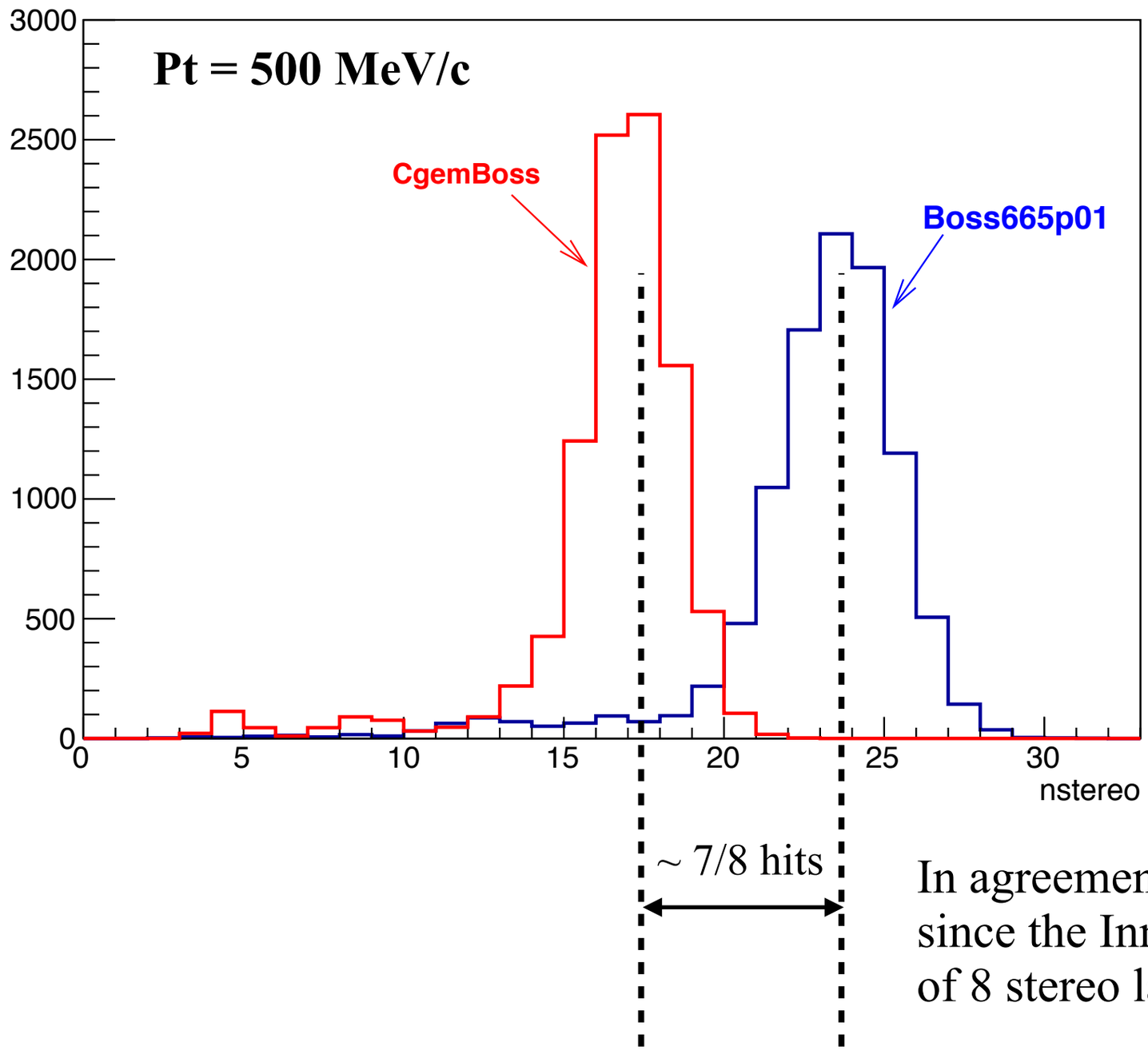




In CgemBoss we are not able to reconstruct pions with pt = 60 MeV/c

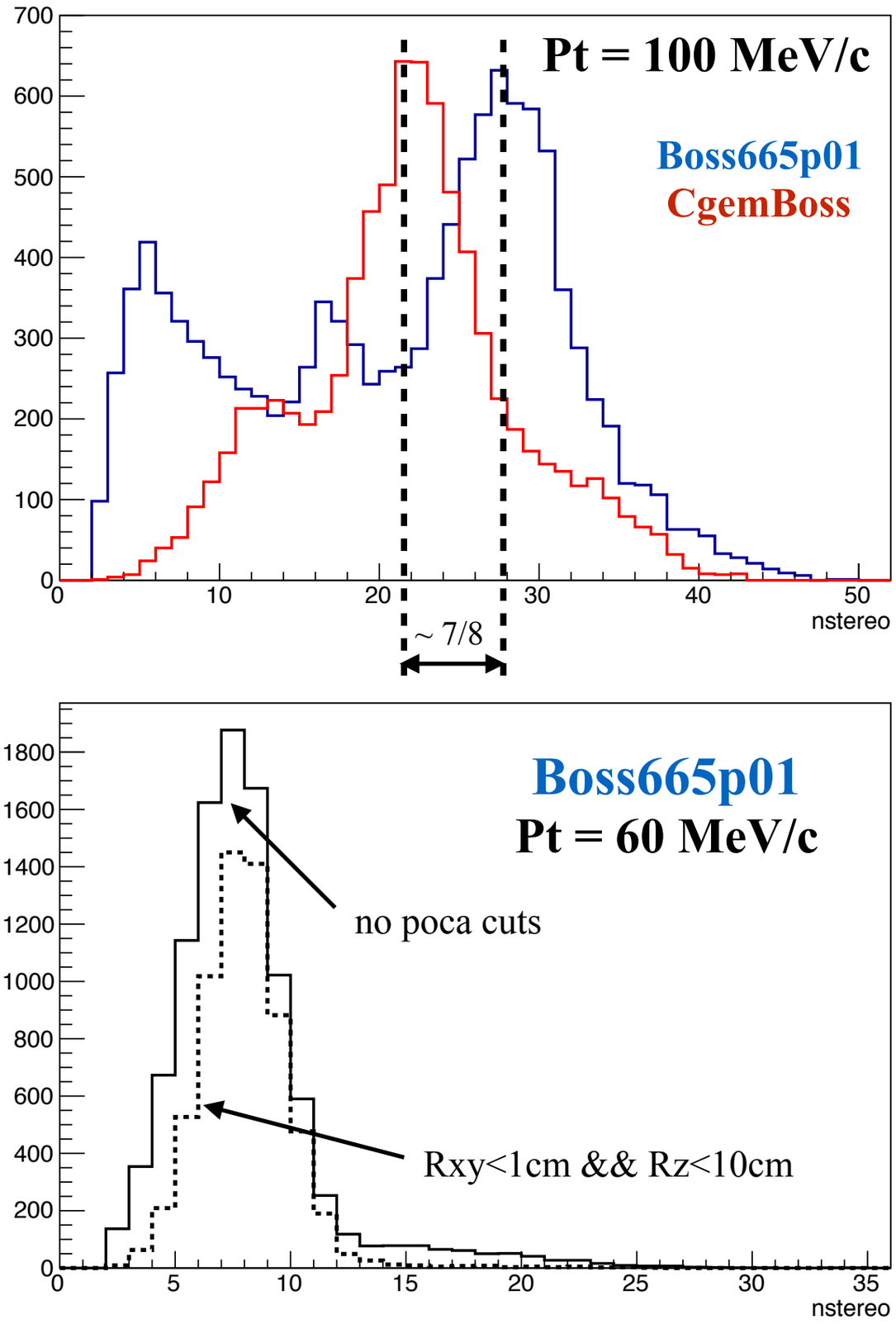
nstereo hits

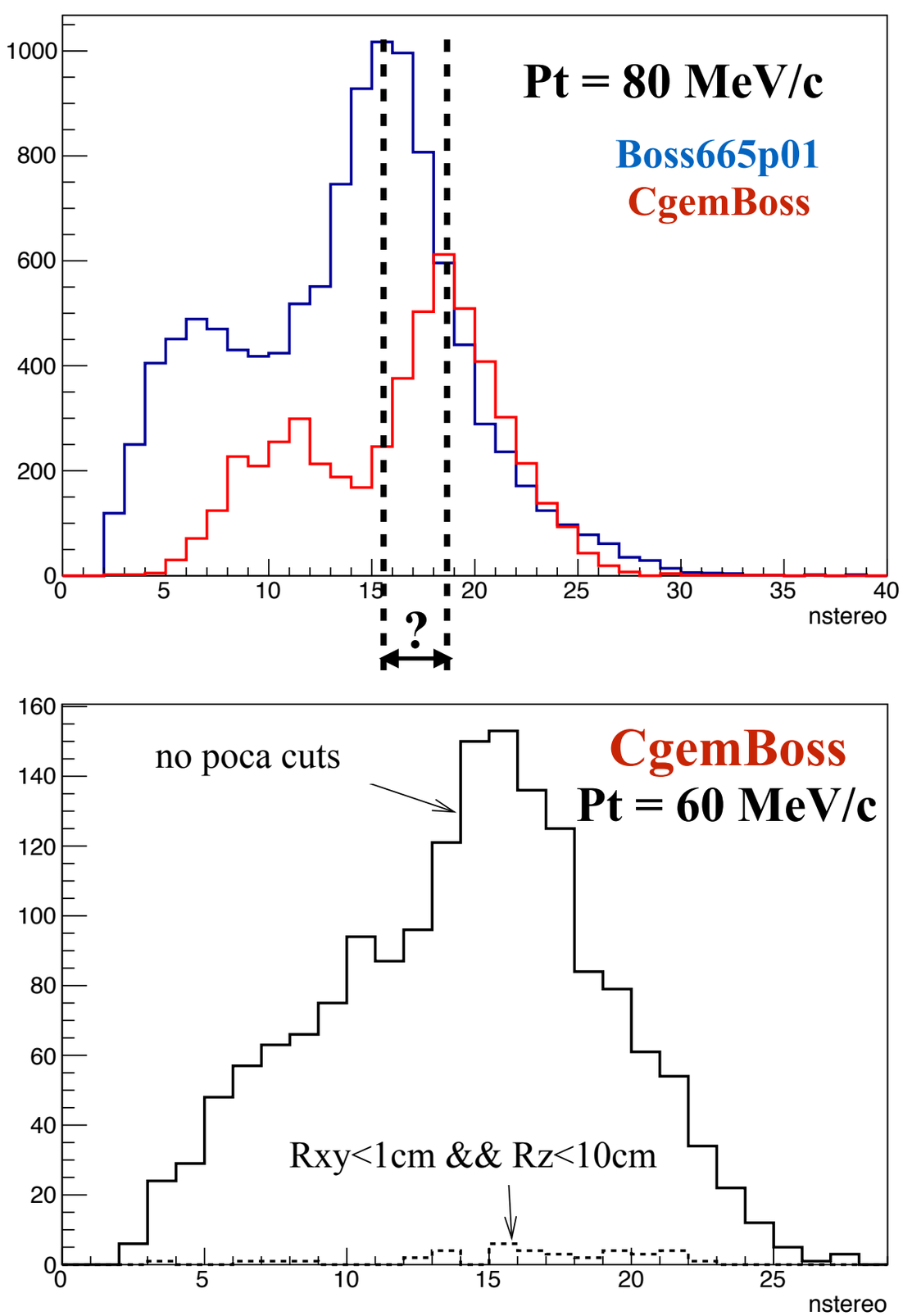
What is the distribution for pions with large pt? (pt > 100 MeV/c)



In agreement with the expectation since the Inner DC (IDC) consists of 8 stereo layers

nstereo hits

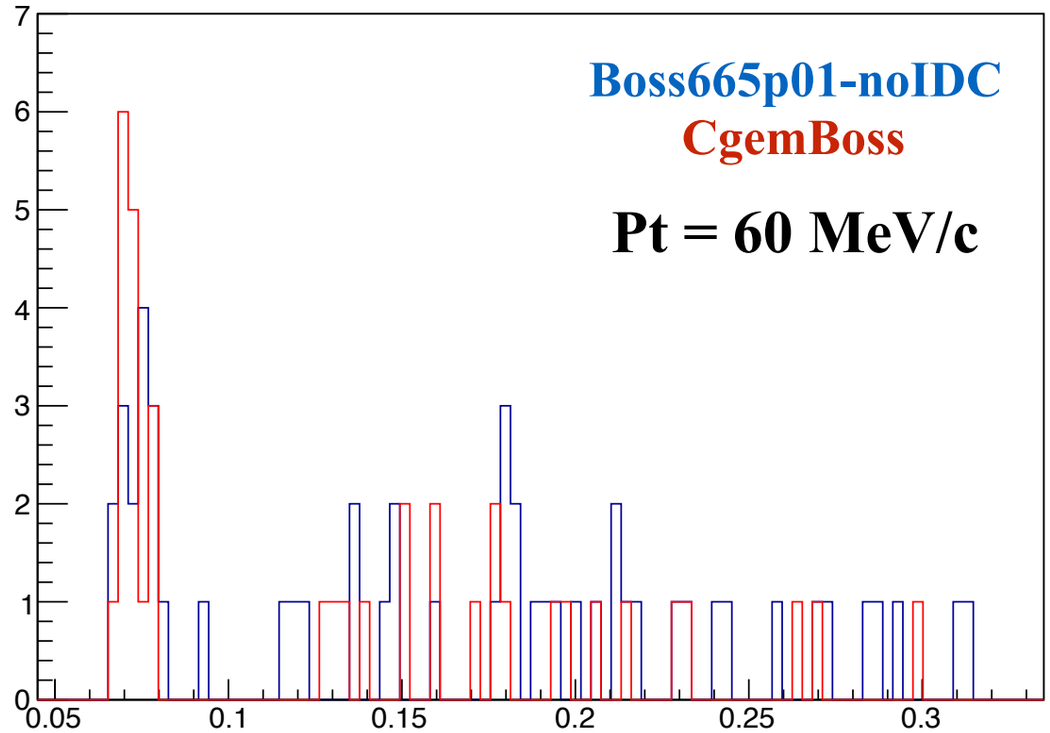


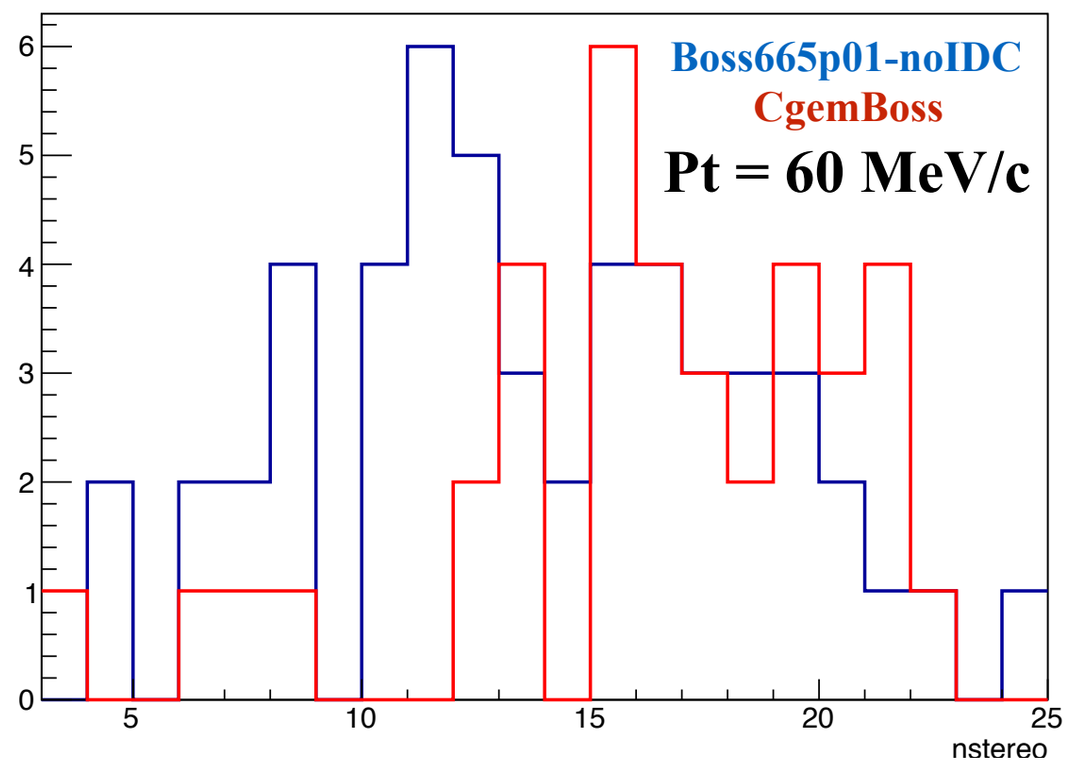


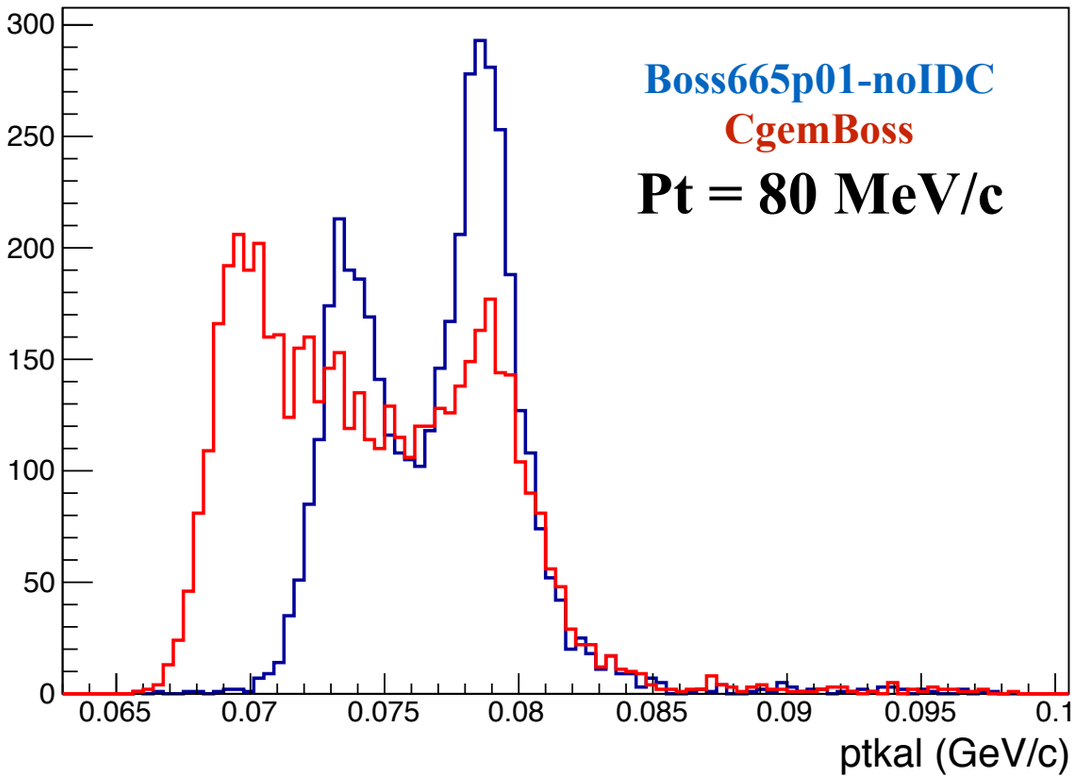
- From previous plots, we can see that for pt up to 100 MeV/c we are able to well reconstruct the track
- For pt<100 MeV/c
  - few pions reach the stereo hits of the Outer DC (ODC)
  - the matching between ODC and CGEM fails: if no tracks are reconstructed in the ODC, there is no match and the track is not reconstructed. This is the reason of the low efficiency for low momentum tracks

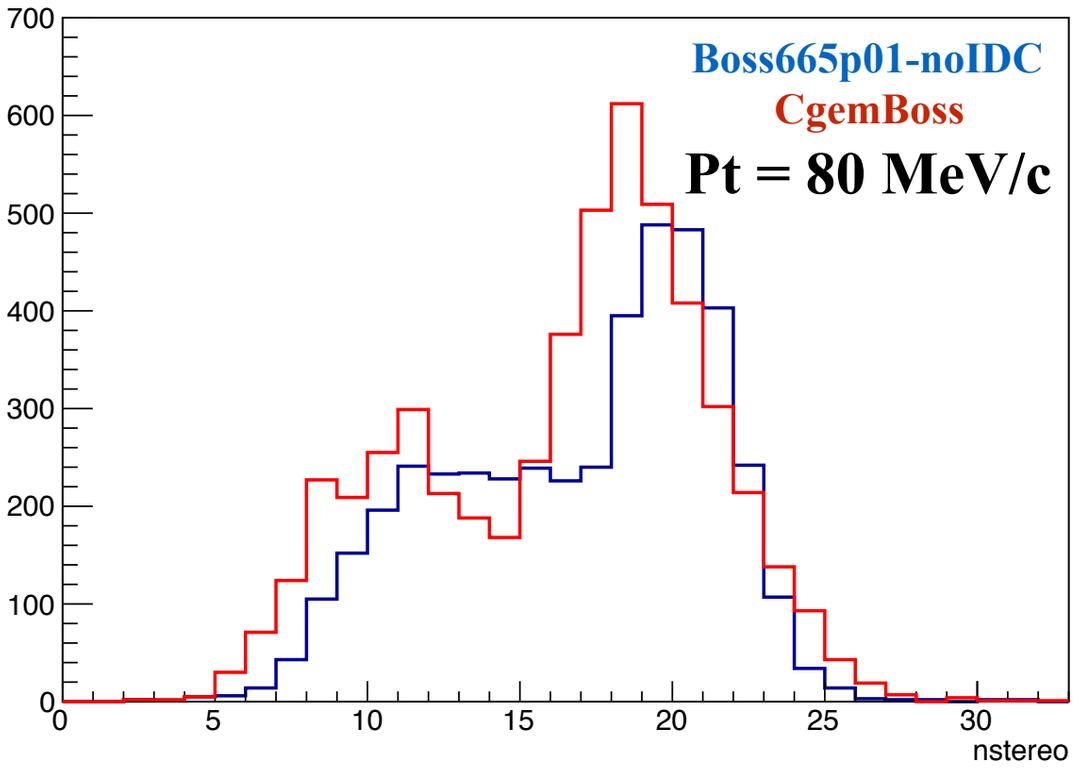
- In order to confirm previous sentences, I've compared CgemBoss results with Boss-665p01 without the IDC used for the reconstruction
  - I expected consistent results between the two software versions

CgemBoss vs Boss-noIDC





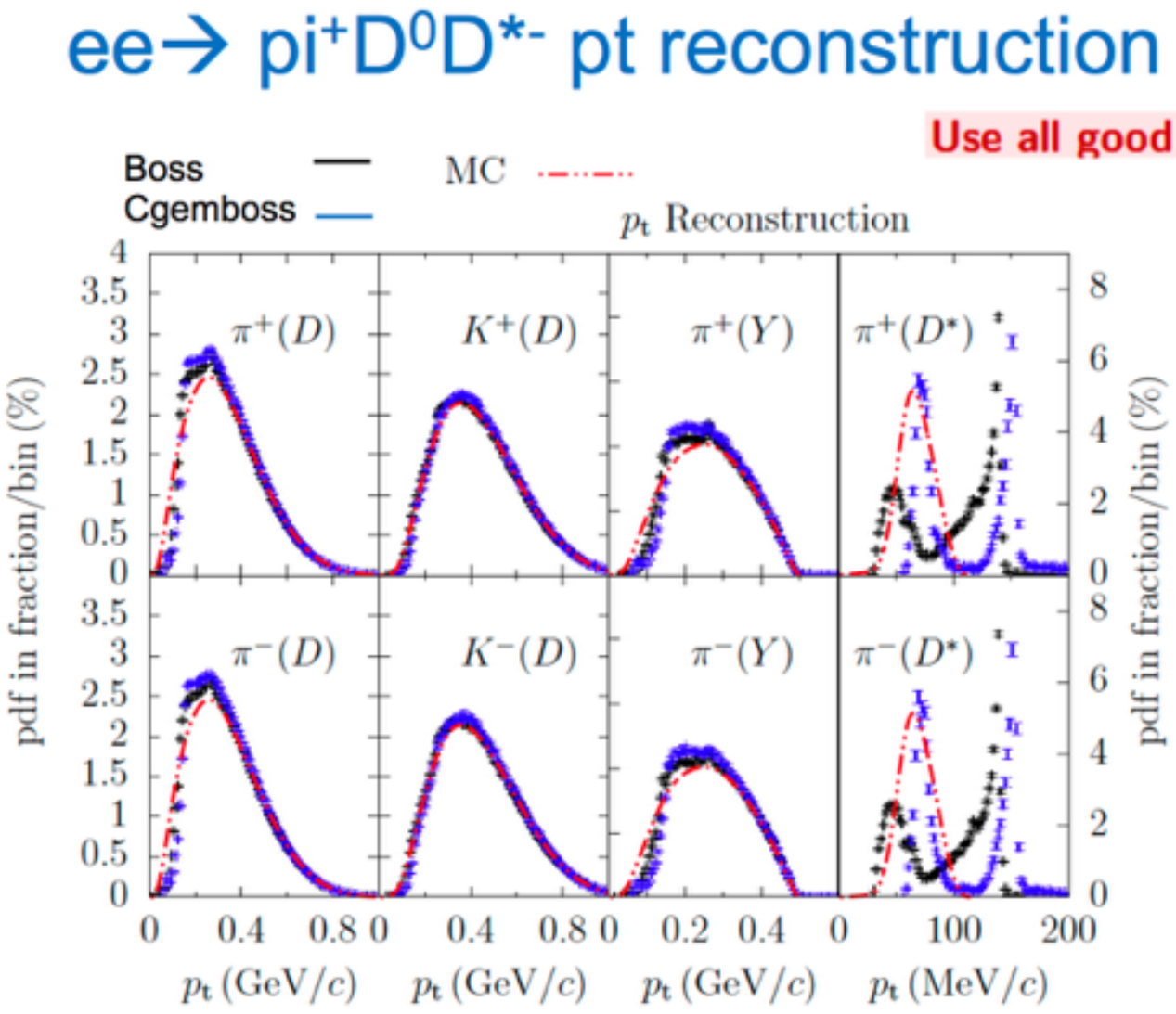




Conclusions

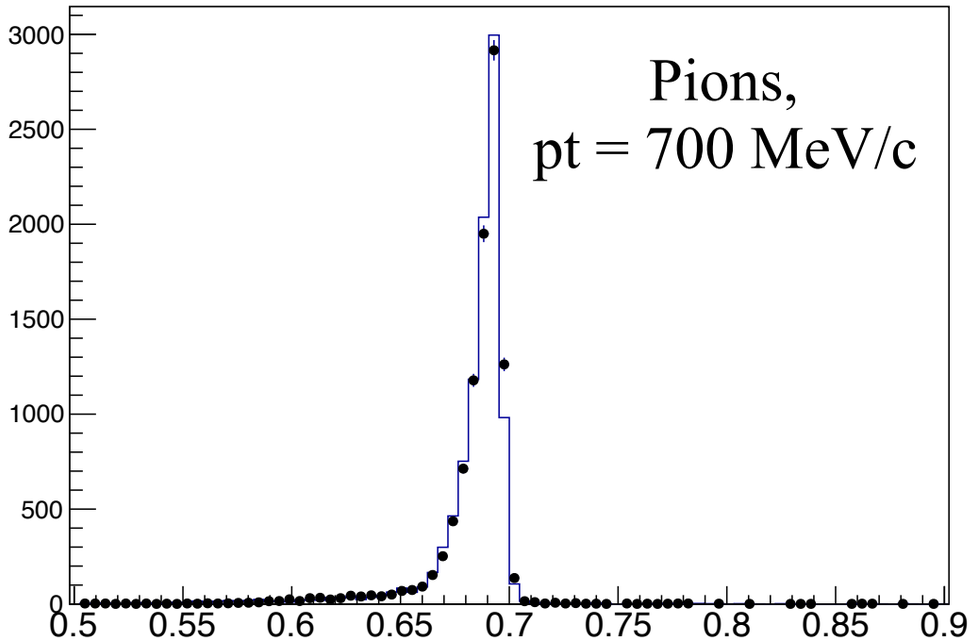
As expected, the results between CgemBoss and Boss-665p01 without the IDC show similar behavior

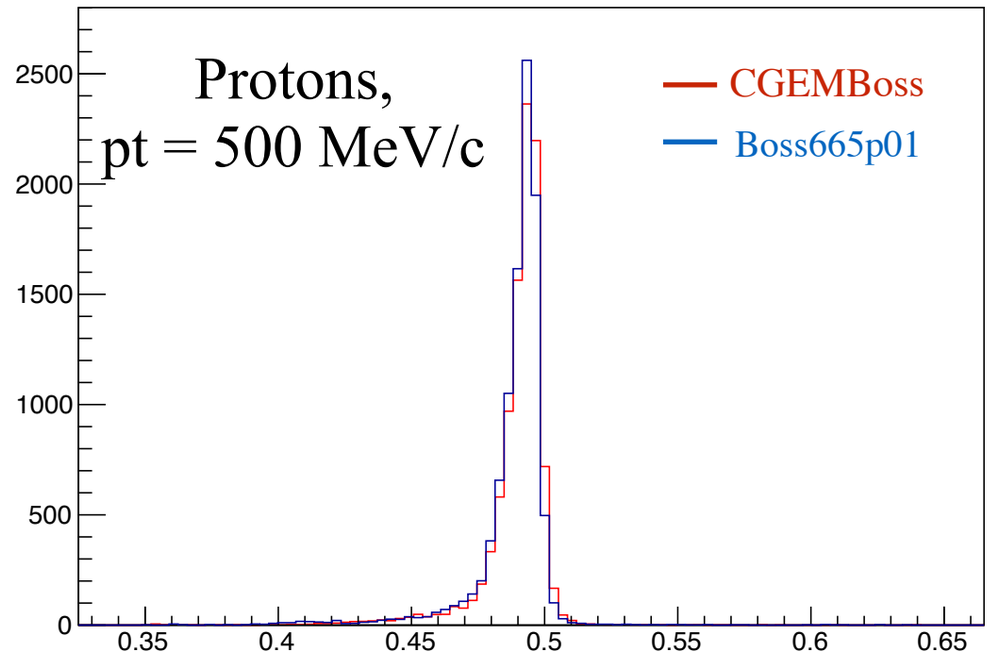
- prof that the matching between CGEM and ODC is not sufficient for low pt track reconstruction
- global tracking is fundamental

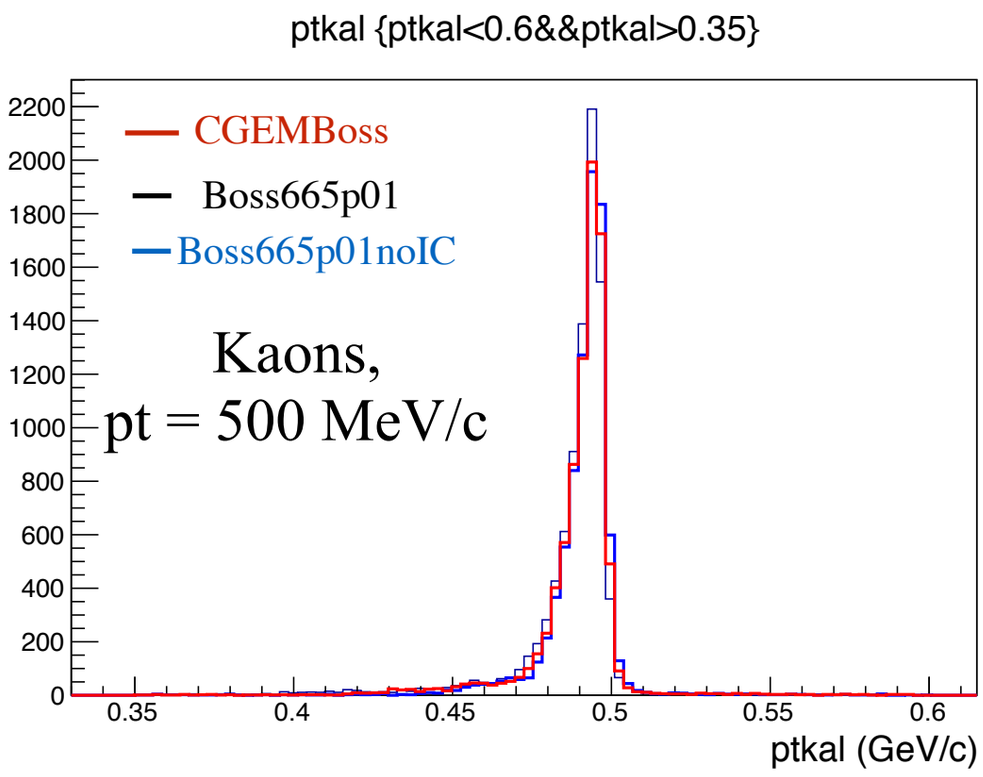


We need to understand the behavior of the soft pions observed by Andreas in his benchmark analysis

To be understood







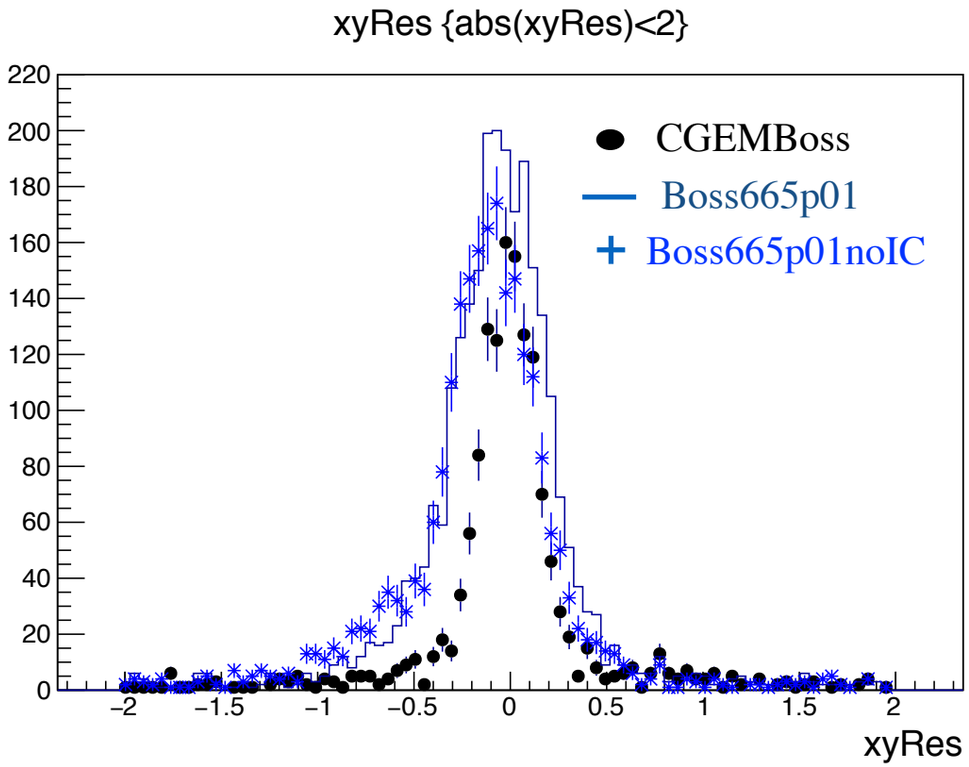
AFTER KALMAN:
for each track and transverse momentum simulated, the pt reco is always underestimated (2.5%-3% fewer)

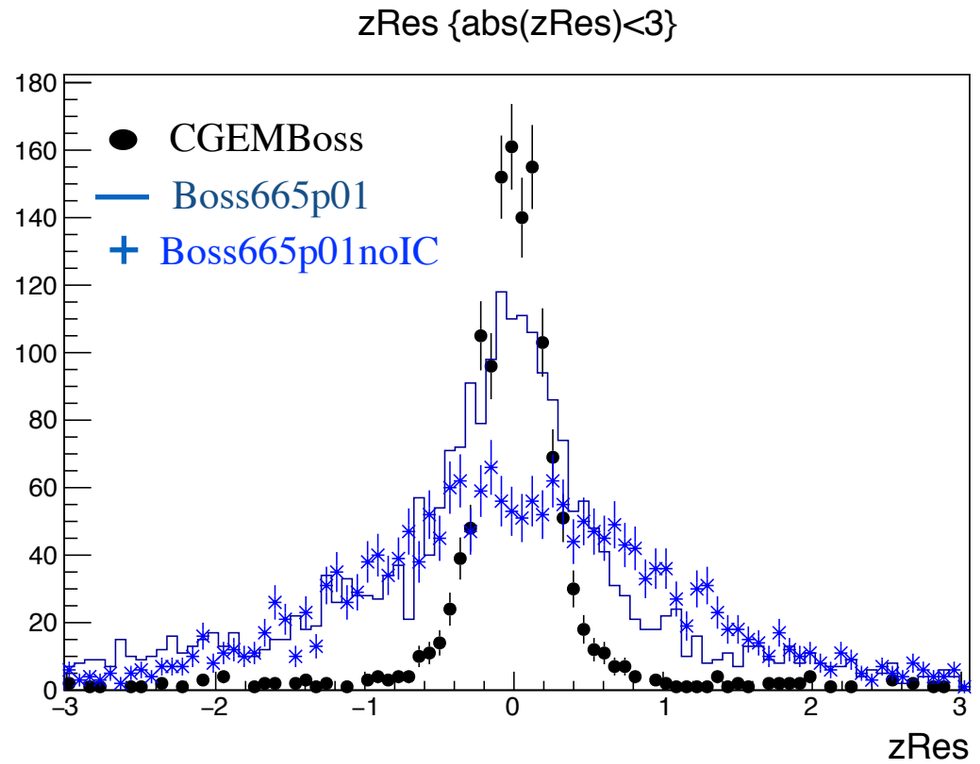
This problem is not present for CgemBoss before the Kalman

BK slides

Vertex resolution for kaons

Kaons:
pt=150 MeV





Kaons:
pt=500 MeV