SiTrack＋EMCAL Analysis w/ single J/psi sim.

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Play the framework w/ Single Jpsi simulation

- Done:　checking SiSeedTrack distributions
  - SiSeed:　Pt, Phi, Z, theta distributions
    - NMVTX vs NINTT
- Done:　EMCAL hit distributions
  - Cluster positions、　Energy distribution、
  - Not yet: Prob, Chi2ndf, Ecore
- Done:SiSeedTrack projection to EMC surface using the Event Display
  - Si-Cluster, EMC-Cluster in X-Y, R-Z
  - Track trajectories, projection position
  - Matching parameter (dphi, dz)
- Done:EID: SiSeed＋EMC matched tracks
  - Done : E/p
  - Not yet: Cluster shape, chi2 for electrons
- Done:Mass reconstruction
  - J/psi
- Mon recal w/ EMC cluster
  - How E/p width is improved
  - How J/psi mass width is improved
- Apply the code to pp Data
  - Track-EMC geo calibration
  - Etc, etc, more, more

Analysis cut (originally from Jaein and Mahiro)

- Single Jpsi sim by Jaein
  - pT ?, eta? Zvertex? Nevents?
  - https://github.com/sPHENIX-Collaboration/INTT/tree/main/general_codes/Jaein/SiliconSeeding/gunmacro

- Analysis chain by Jaein
  - https://github.com/sPHENIX-Collaboration/INTT/tree/main/general_codes/Jaein/SiliconSeeding/SiliconSeedAna
  - /sphenix/user/jaein213/tracking/SiliconSeeding/SiliconSeedAna/
  - /sphenix/user/jaein213/tracking/SiliconSeeding/analysis/DrawMassDis_JPSI.C

Tree

- SiliconSeedAna output
  - trackTree : SiSeedTrack info
    - Px, py, pz, x, y, z, pT, eta, phi, chi2ndf, nmaps, nintt, charge, crossing
    - EMC projection_phi, と projection_z, proj_px, proj_py, proj_pz
  - caloTree : EMC cluster info
    - Emc cluster positions (x, y, z, r), phi, energy, chi2
  - siClusTree: cluster info used in SiSeedTrack

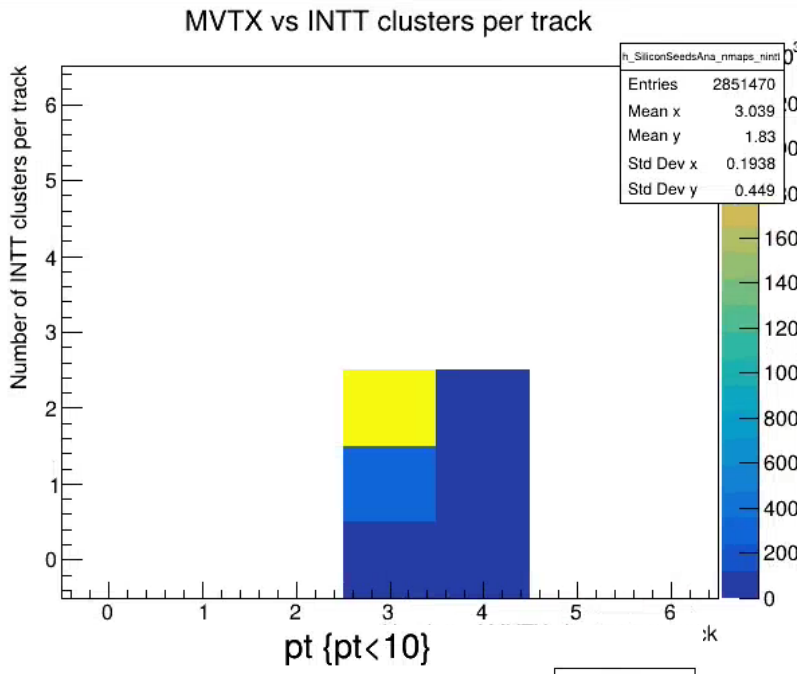
My code

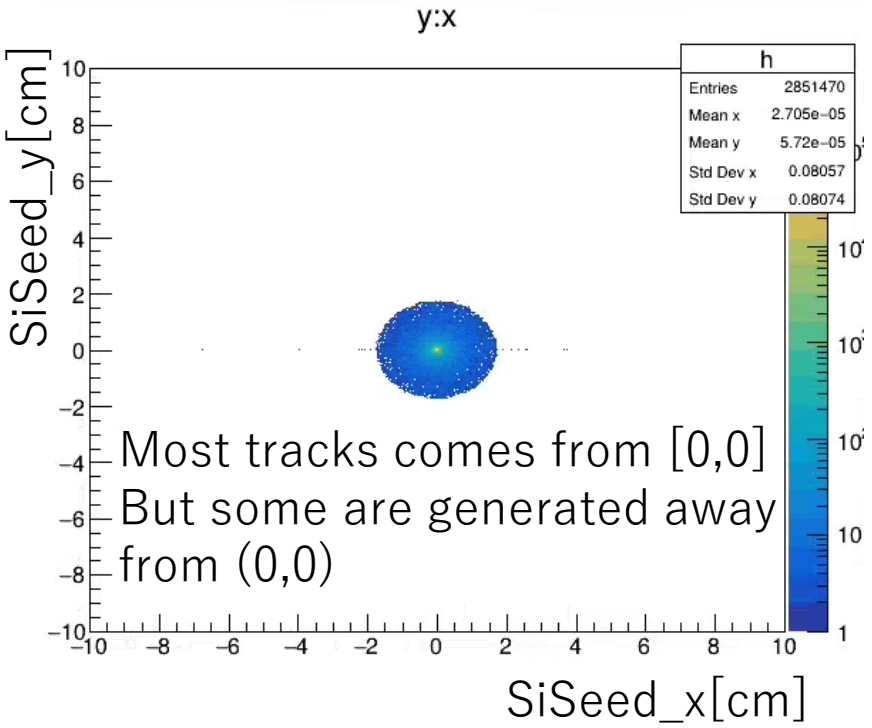
- /gpfs/mnt/gpfs02/sphenix/user/hachiya/INTT/INTT/general_codes/hachiya/SiSeedAna/ana_macro/
- analyze_SiSeedPair.C
  - Calculate pair info
  - Copied from Jaein's DrawMassDis_JPSI.C
- drawDisplay.C
  - Make event display

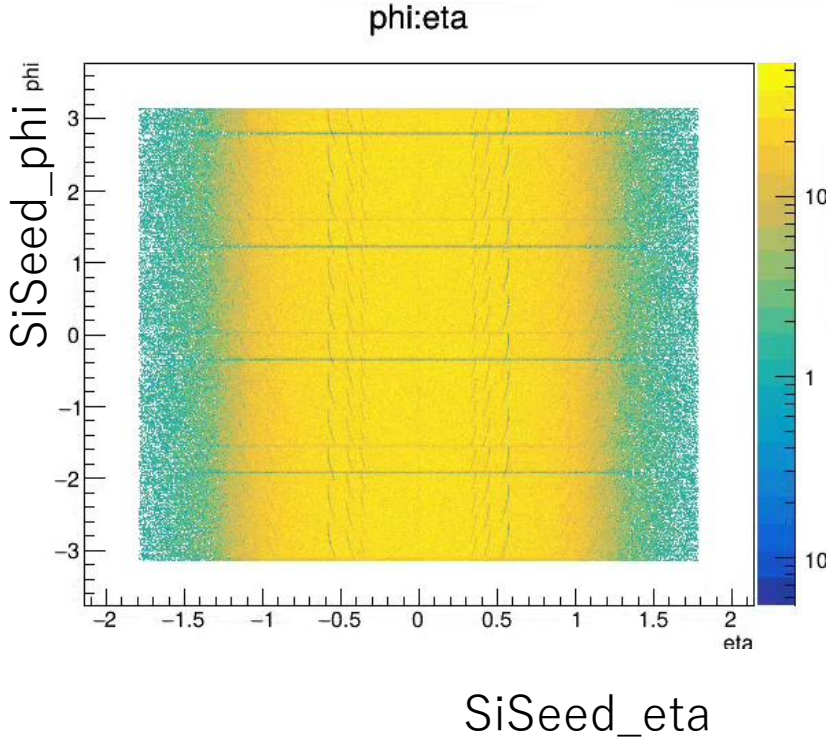
SiSeed

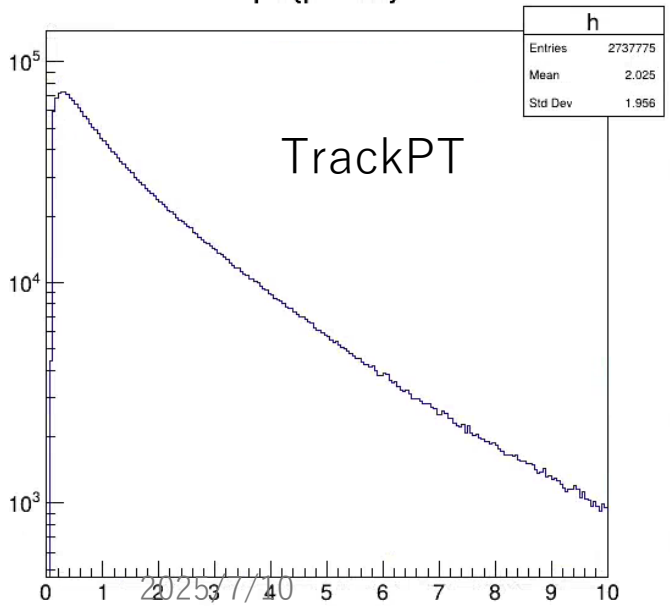
/sphenix/user/jaein213/tracking/SiliconSeeding/MC/macro/ana/jpsi/ana_all.root

trackTree->Draw("phi:eta","","colz")

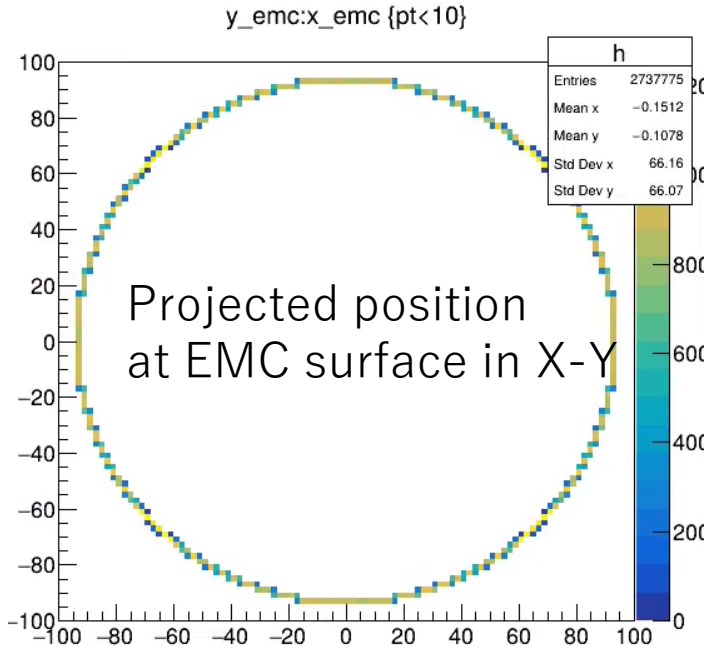


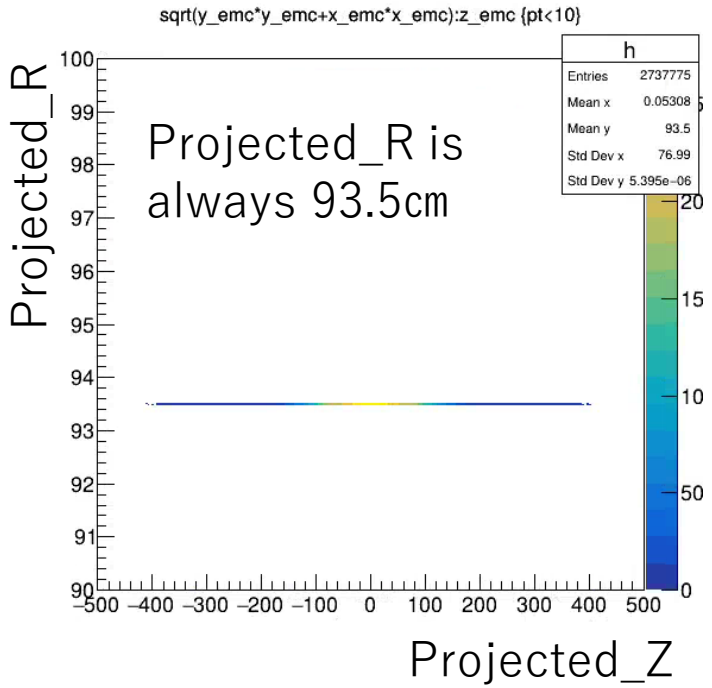






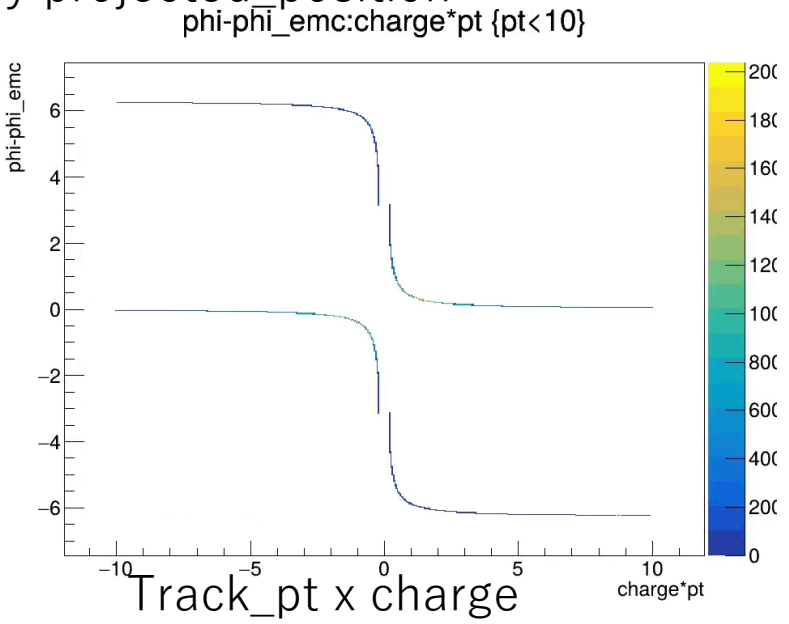
Projection to EMC surface



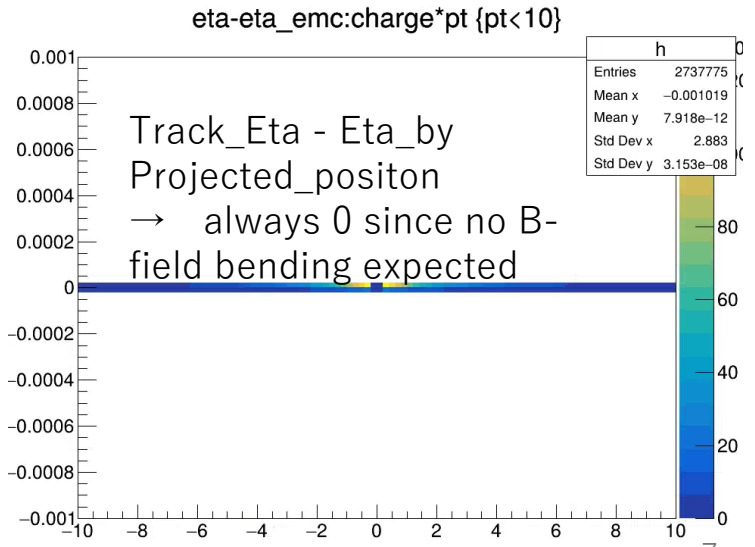


- Projected_Z covers wider than the EMC acceptance
  - |EMC_Z|<150cm
  - SiSeedの範囲としてはあり得る

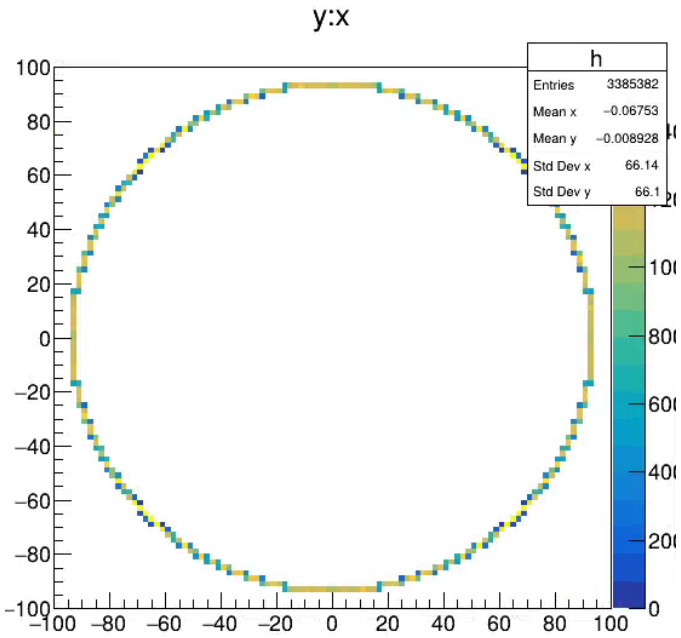
Track_phi(at 0) – phi
by projected_position

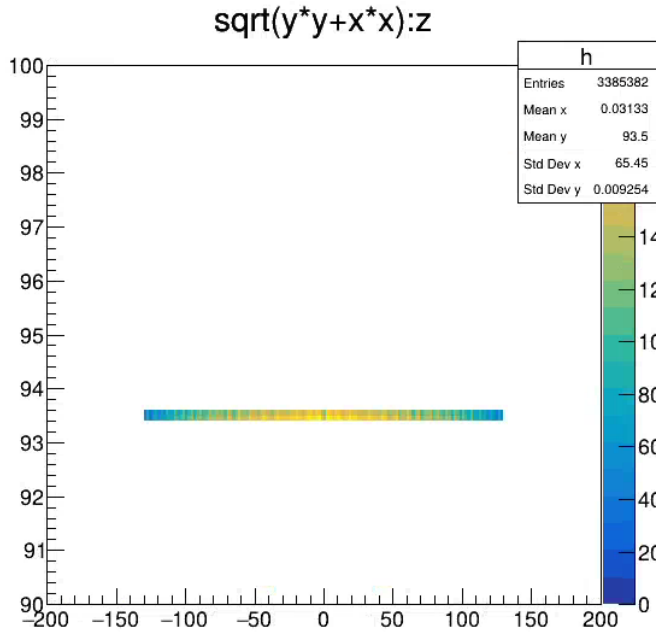


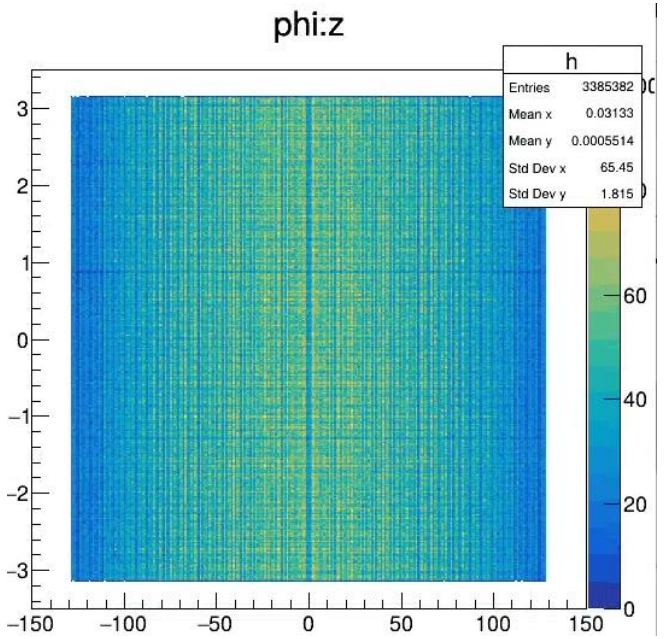
Track bending by B-field is seen in phi

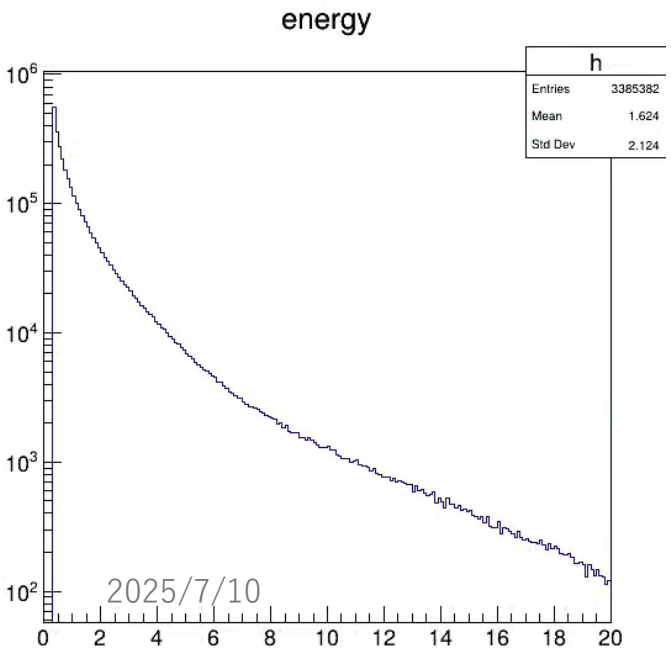


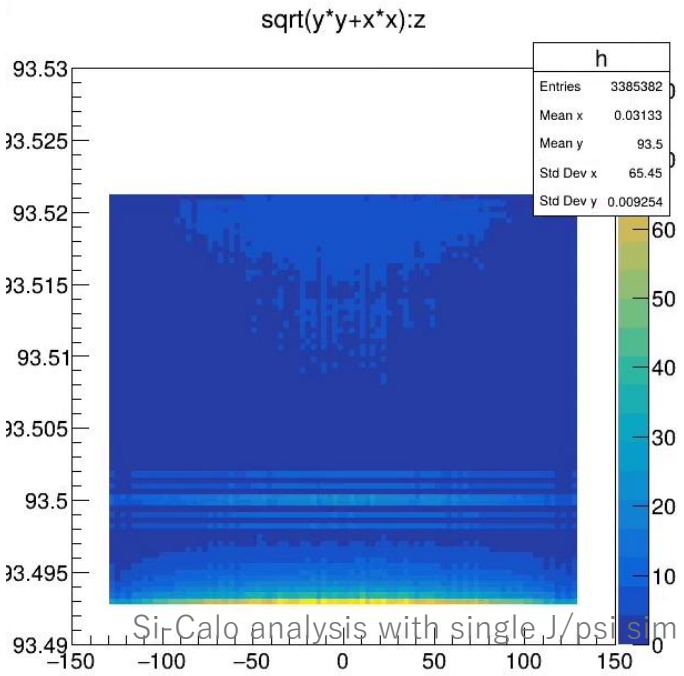
EMC clusters







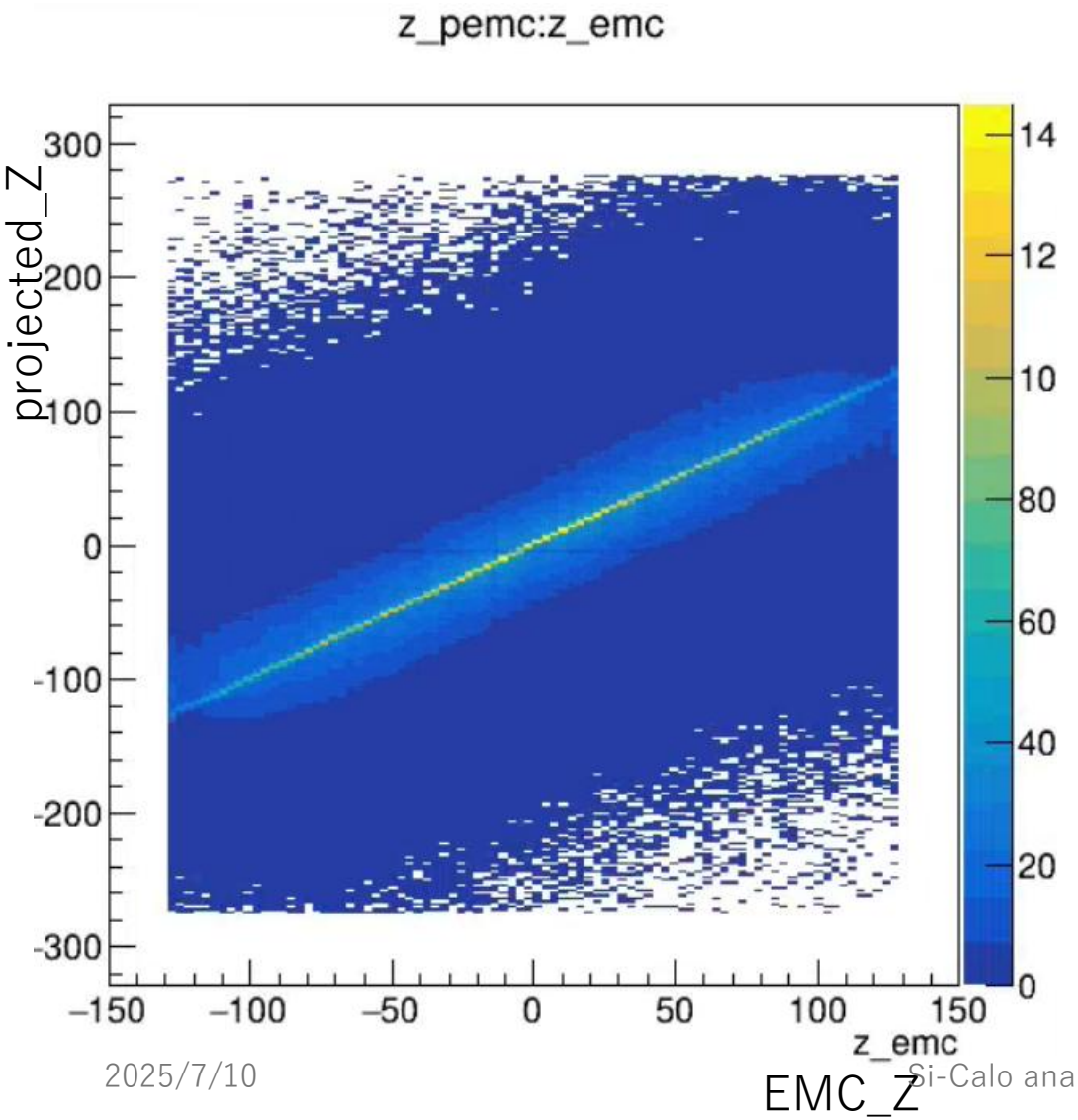




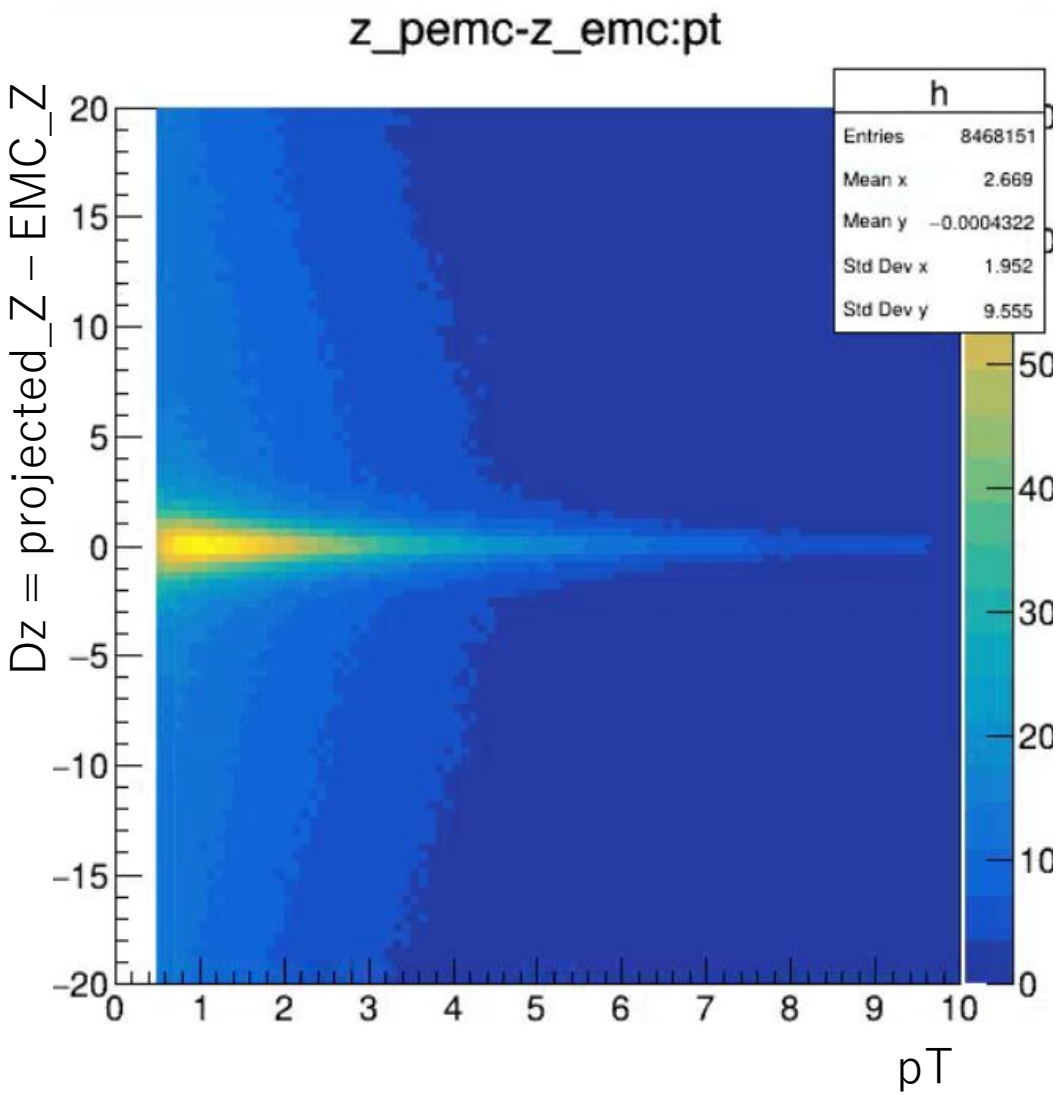
- Prob and chi2 variables are not in tree now
- How different Ecore and Energy of EMC-cluster ?
- EMC cluster position is changing within 93.49～93.52㎝
  - Something is implemented?

Matching parameter in dz

Dz = projected_Z – EMC_Z

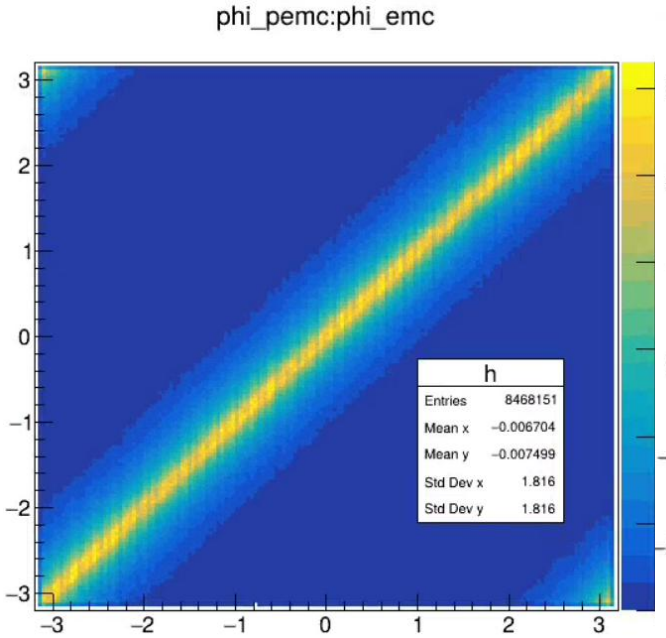


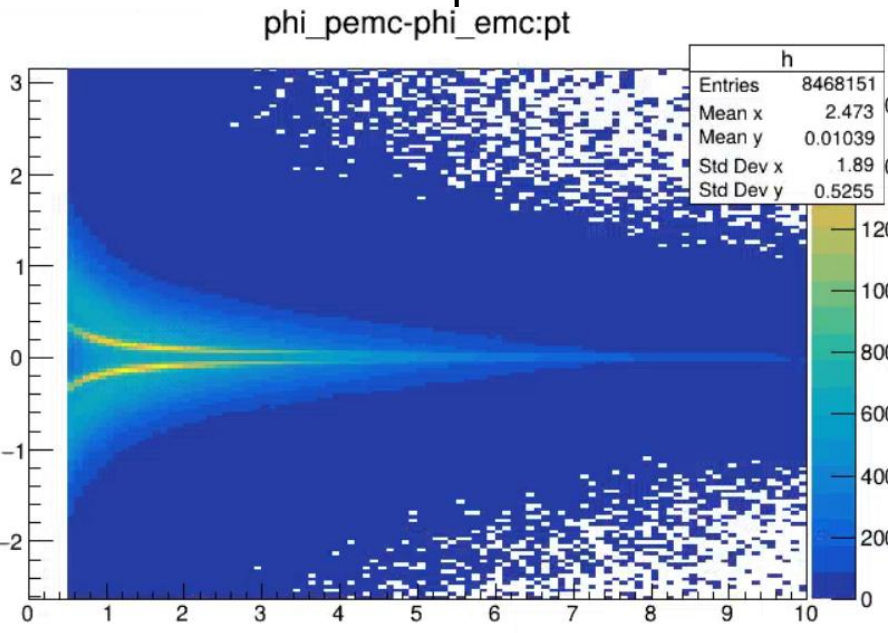
EMC_Z

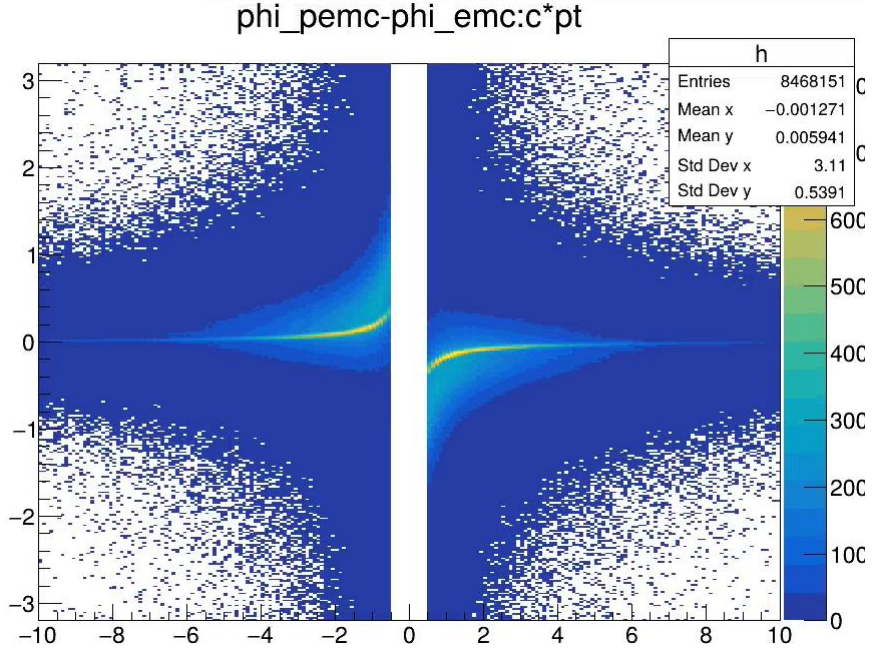


- No pT dependence for dZ.
  - Width looks less than 1cm

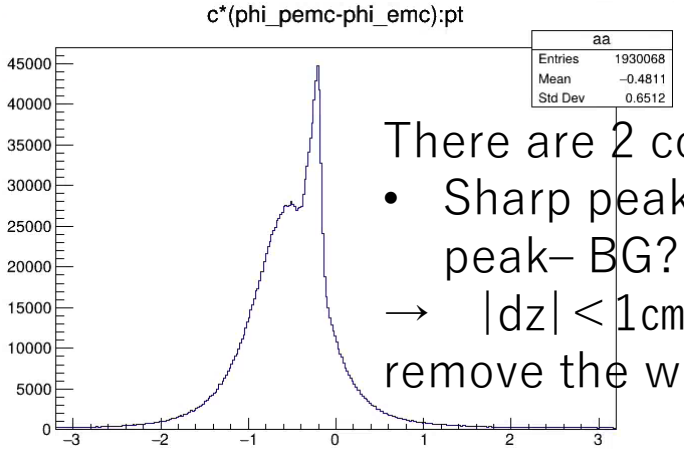
Matching Parameter dphi





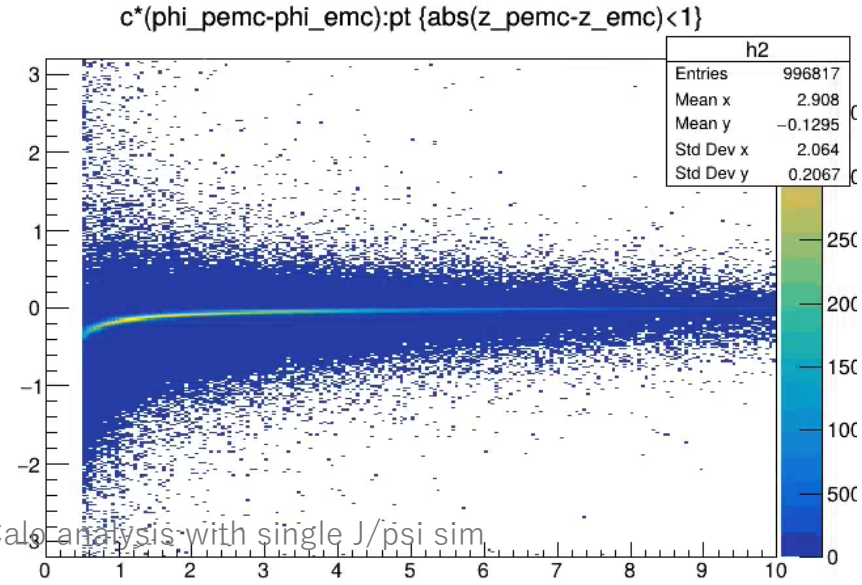


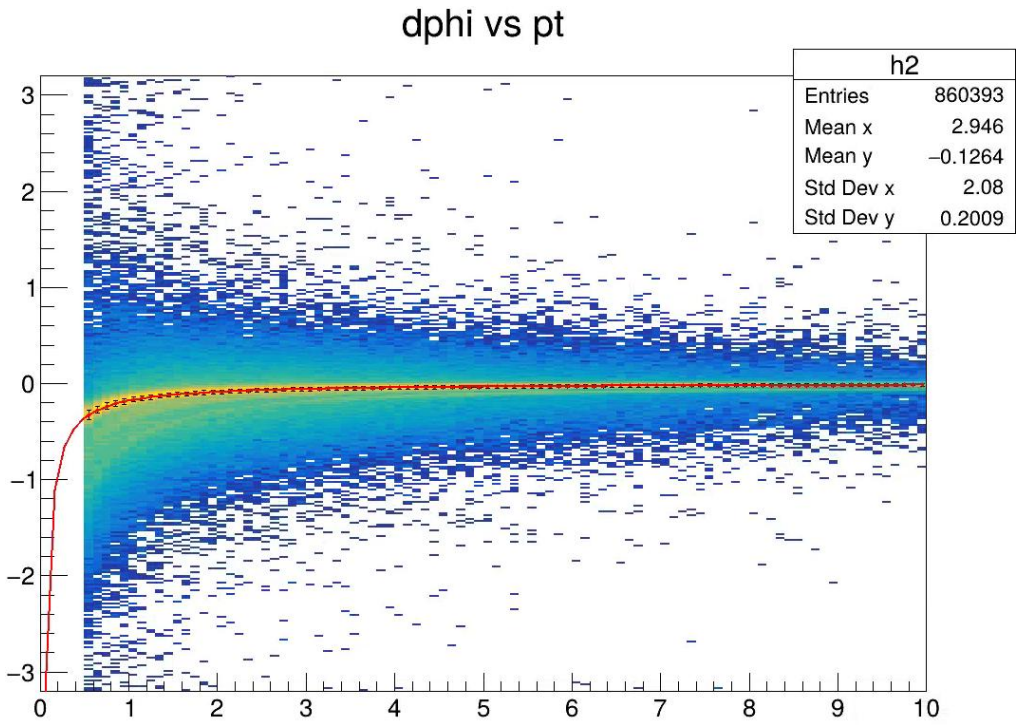
- Dphi is split to 2 lines: Bending is not well described by the tracking mode

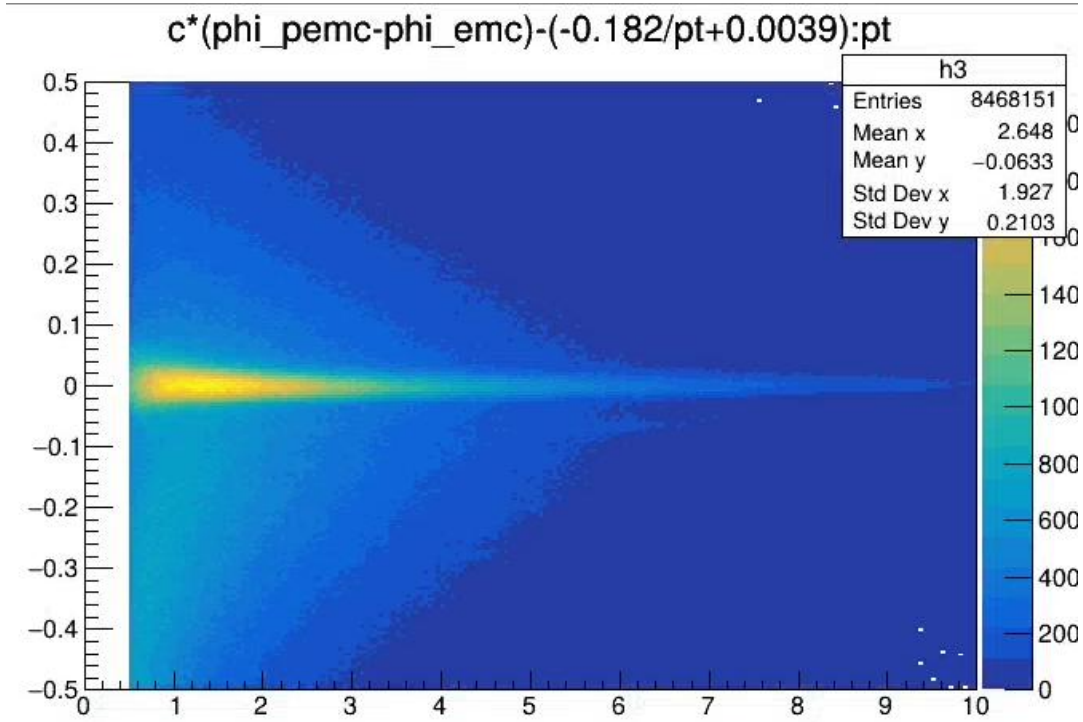


There are 2 components
- Sharp peak and wider peak– BG?

→ $|dz| < 1$cm cut help to remove the wider peak





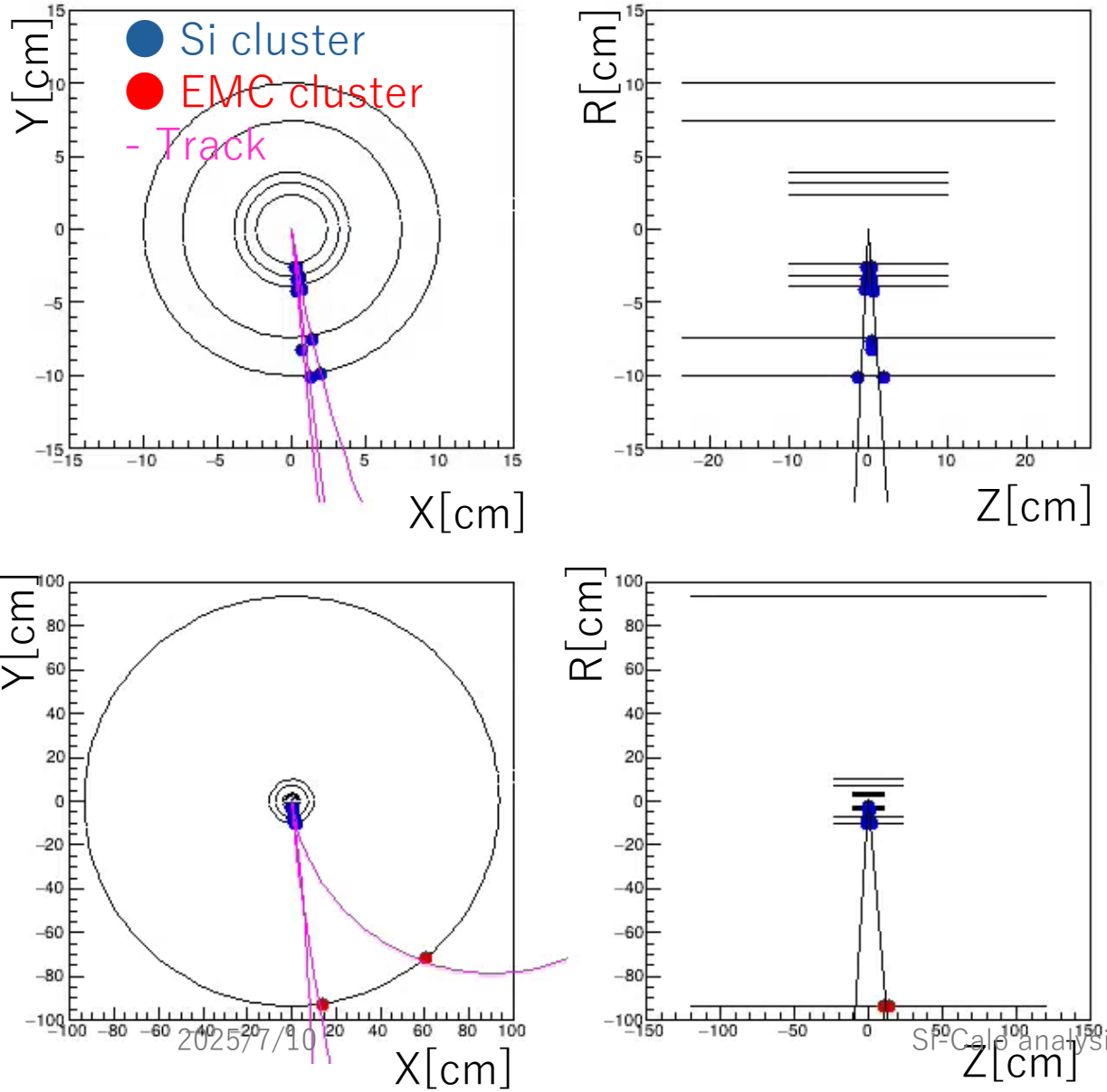


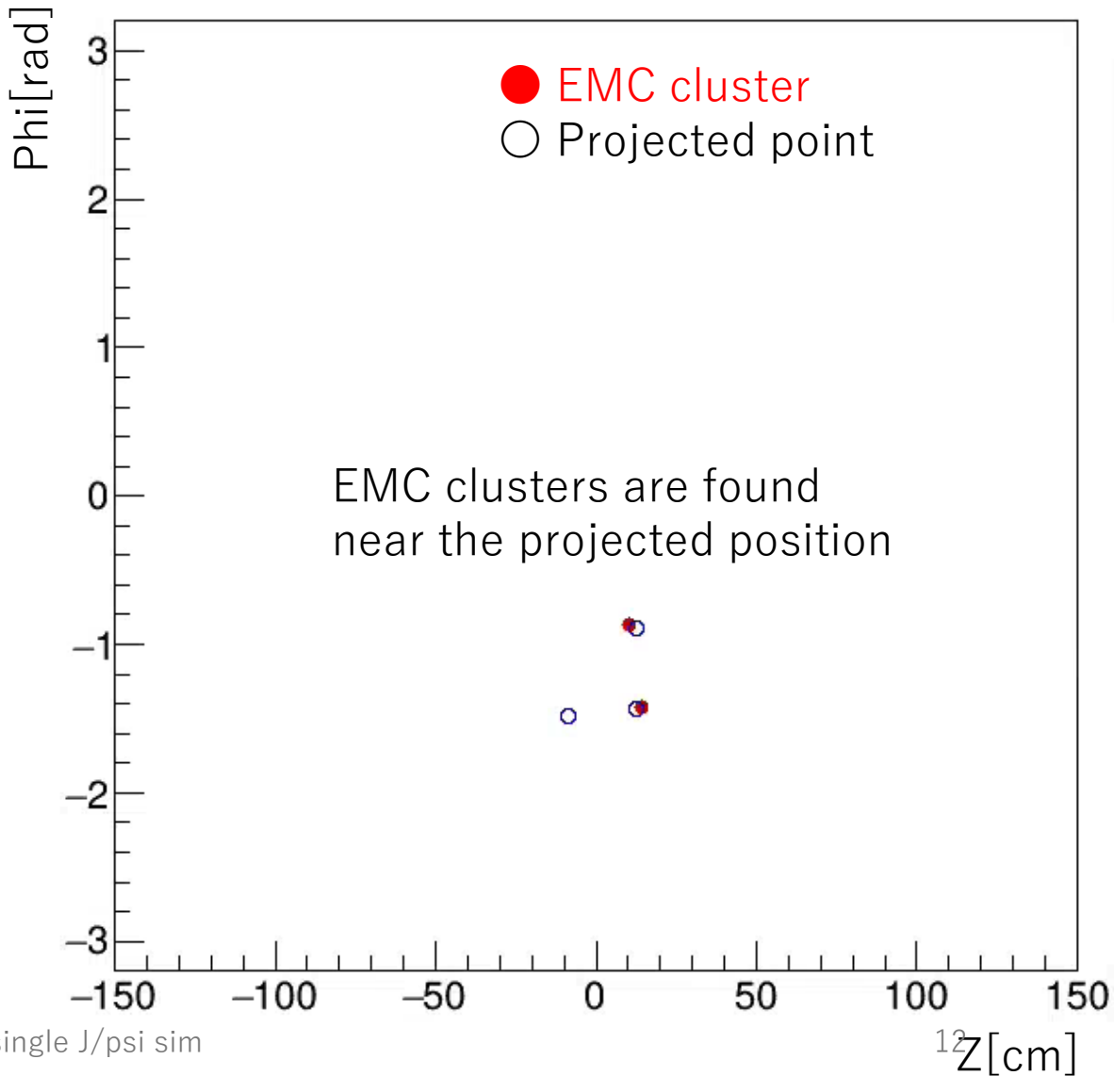
- Fit
  - The curve is obtained by taking the peak of the correlation
  - The curve is fit to determine the parameters of the p0/x+p1

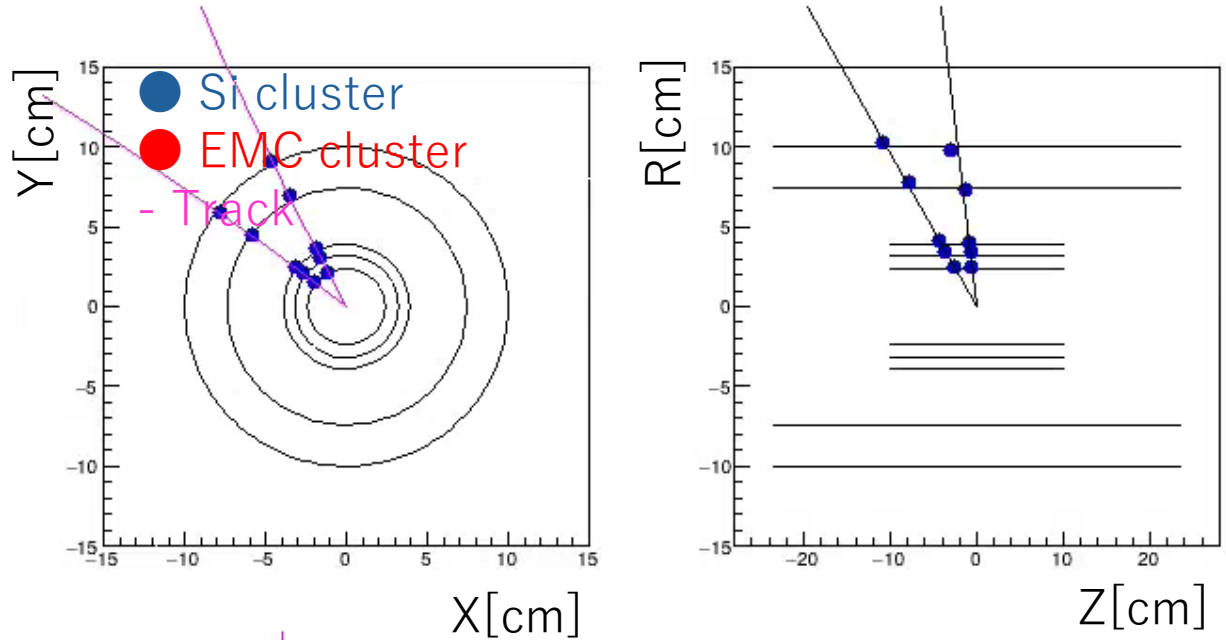
Applying the parameter works
Dphi Width looks 0.02

- p0 = -0.181669 +/- 0.0088971
- p1 = 0.00389827 +/- 0.00263065

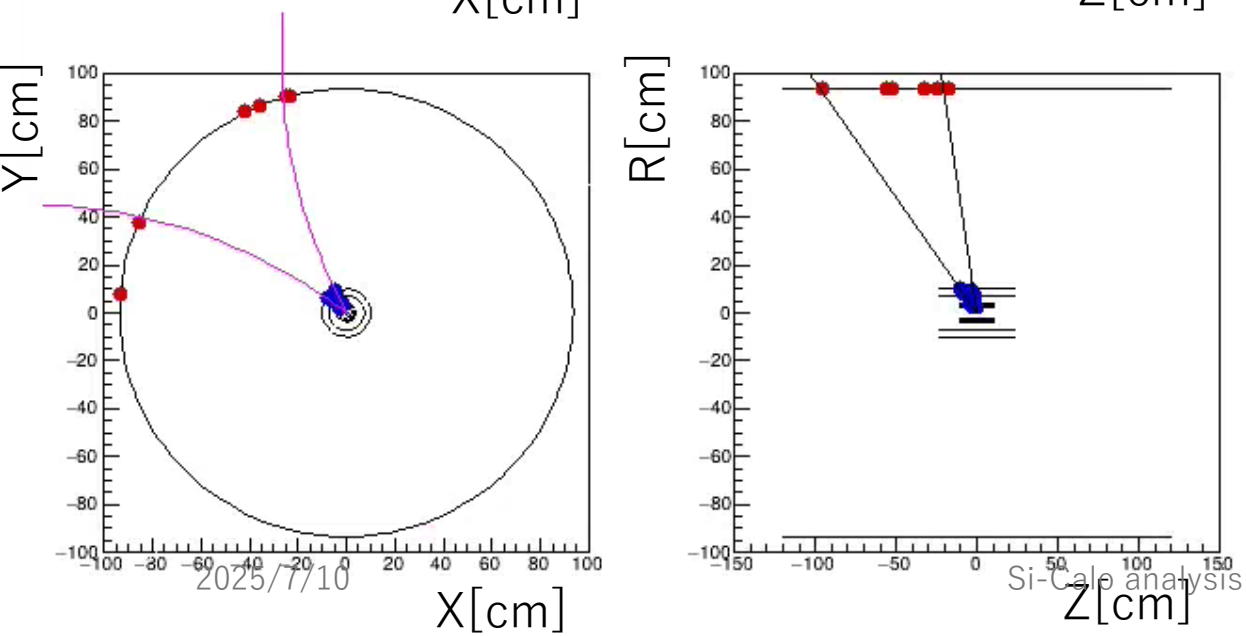
Event Display



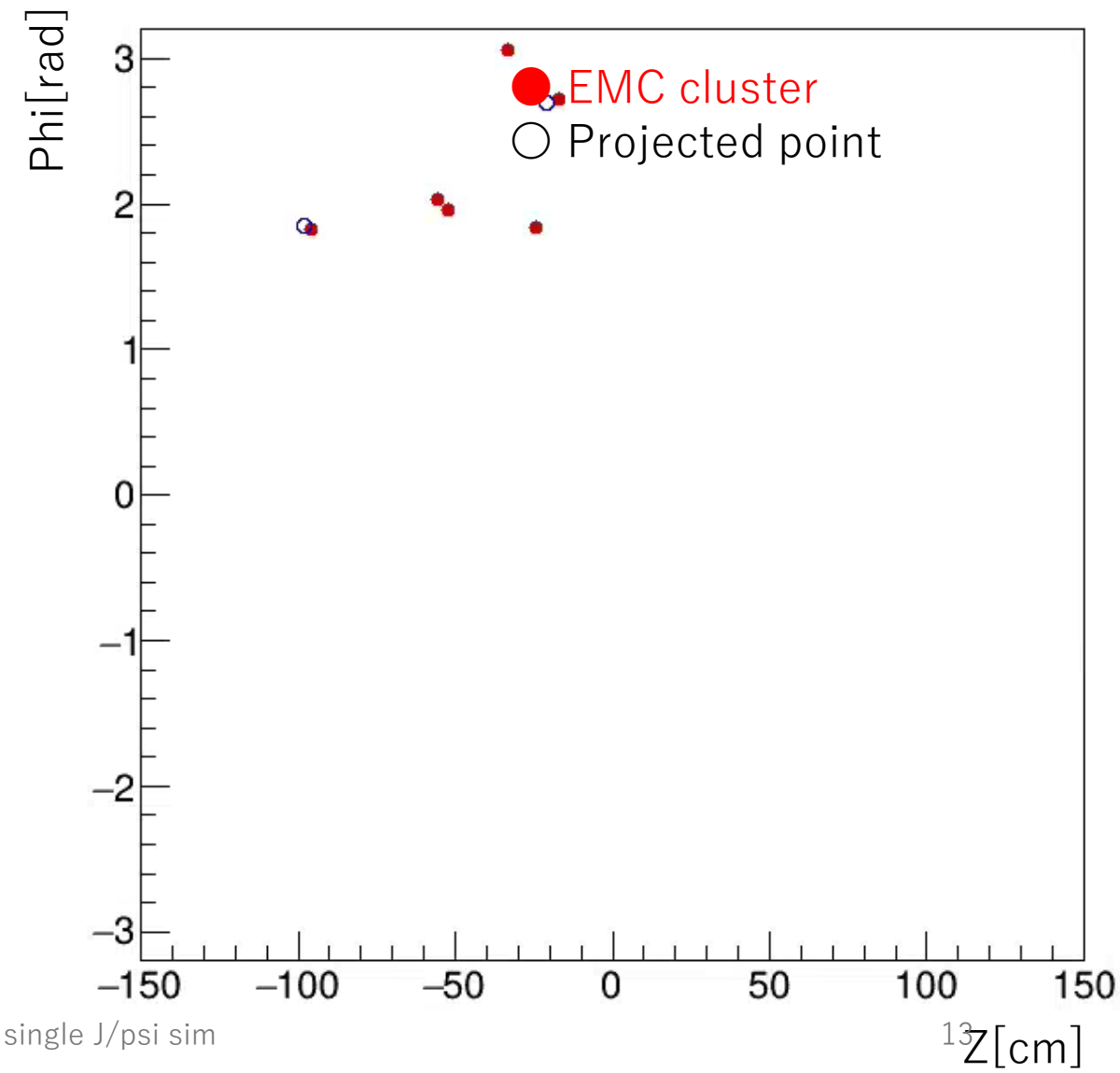


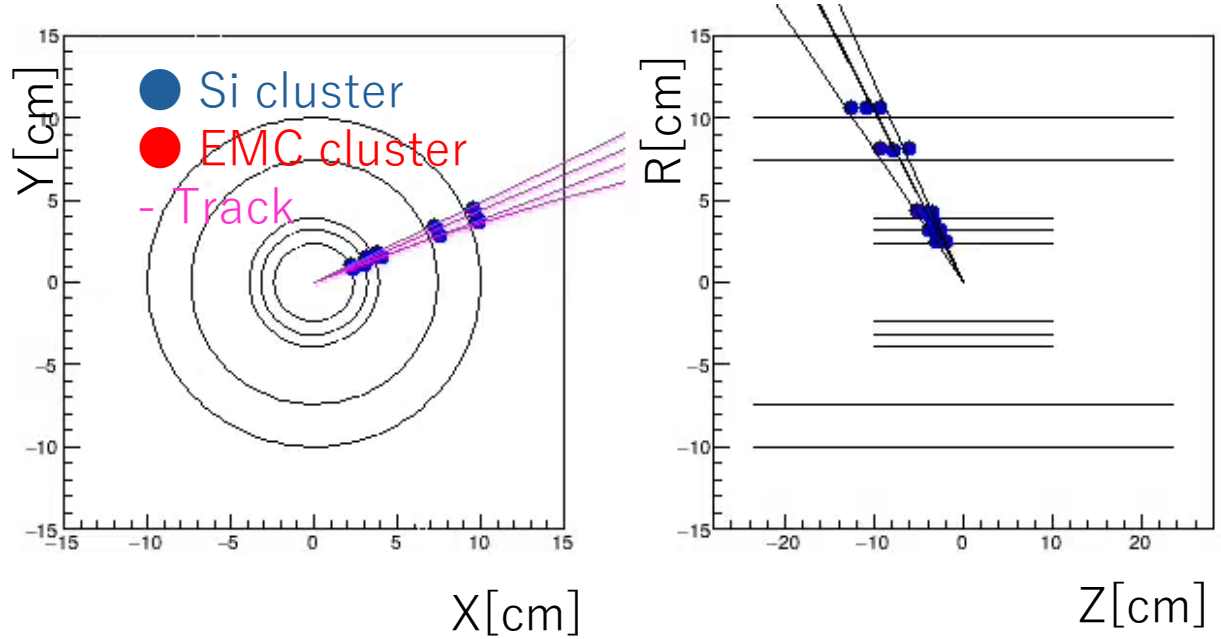

Si cluster
EMC cluster
Track
Y[cm]
X[cm]

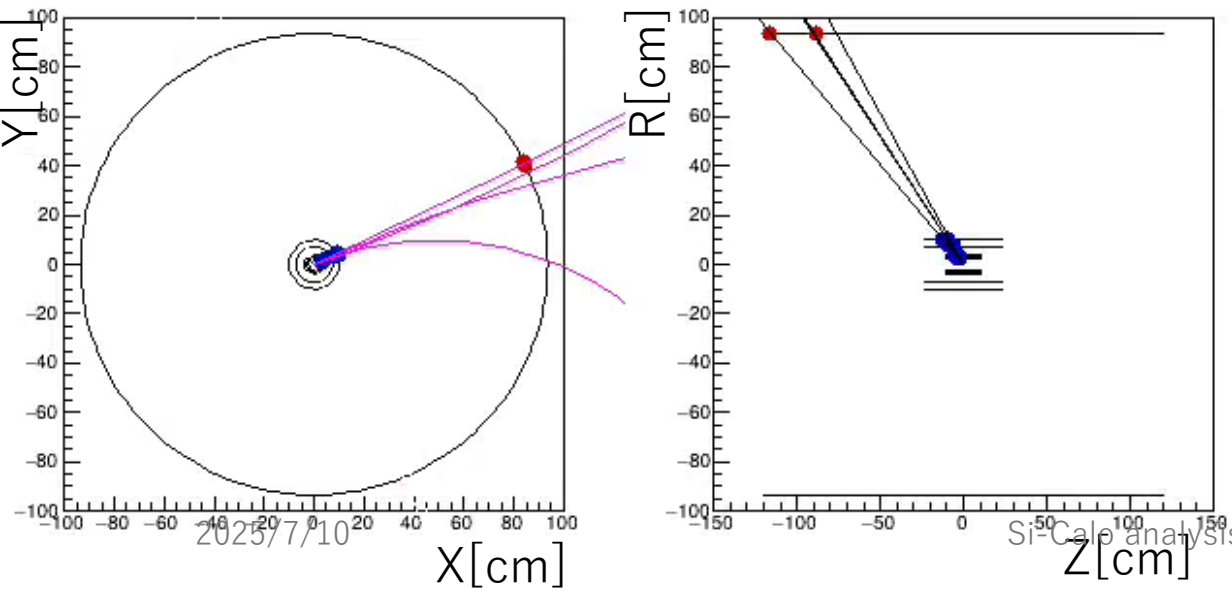
R[cm]
Z[cm]

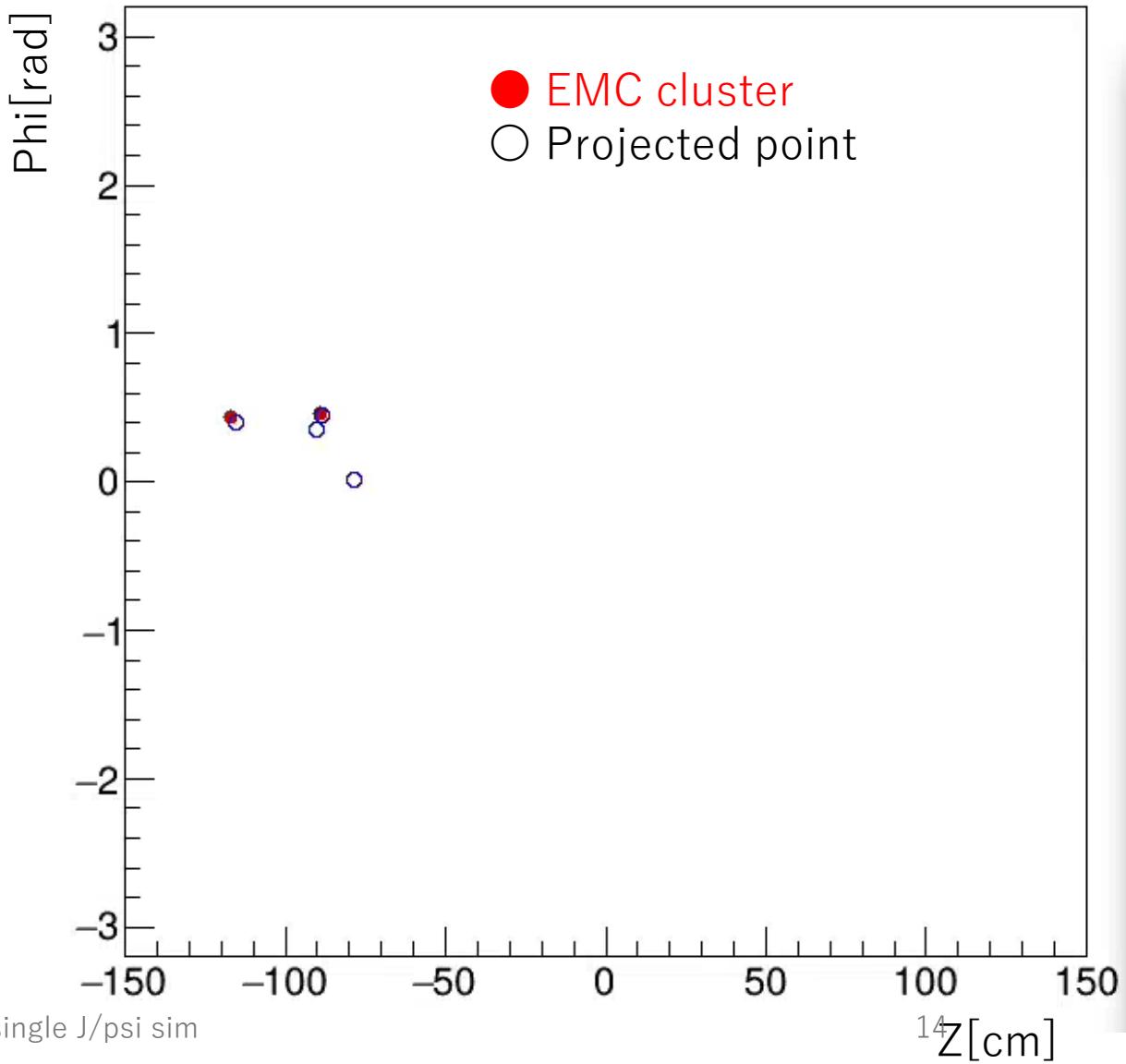

Y[cm]
X[cm]

R[cm]
Z[cm]

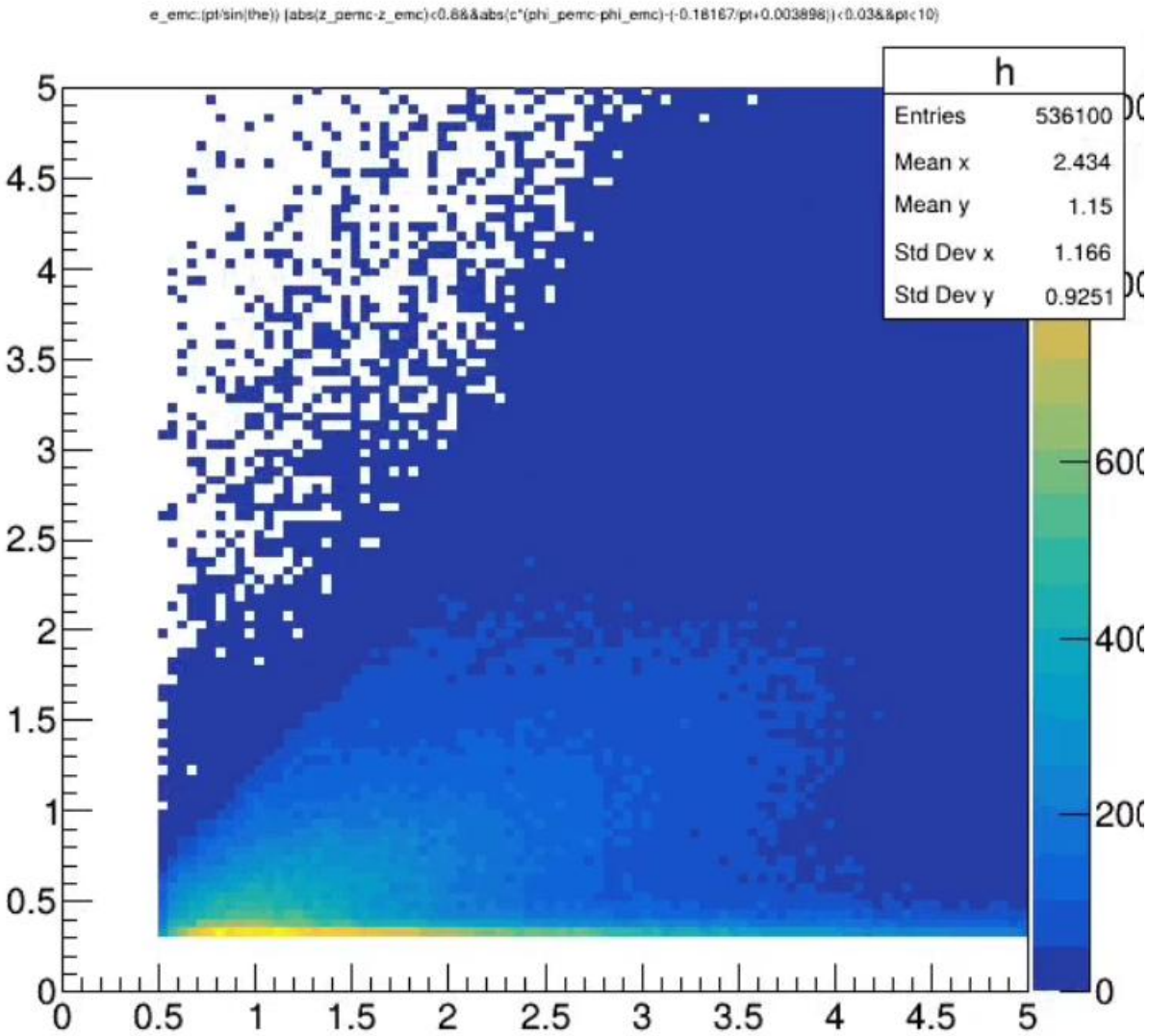

EMC cluster
Projected point
Phi[rad]
Z[cm]

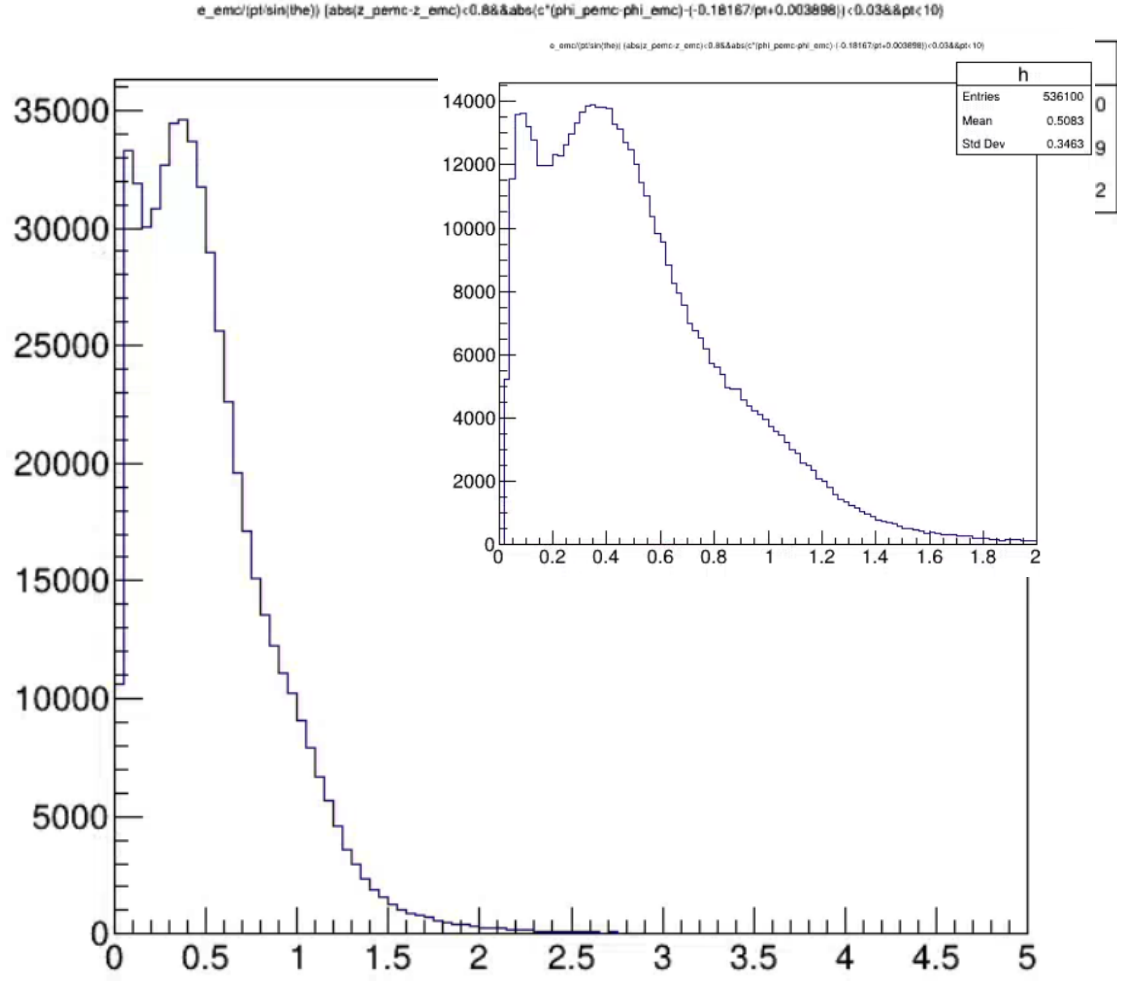

Si cluster
EMC cluster
Track
Y[cm]
X[cm]
R[cm]
Z[cm]


Y[cm]
X[cm]
R[cm]
Z[cm]

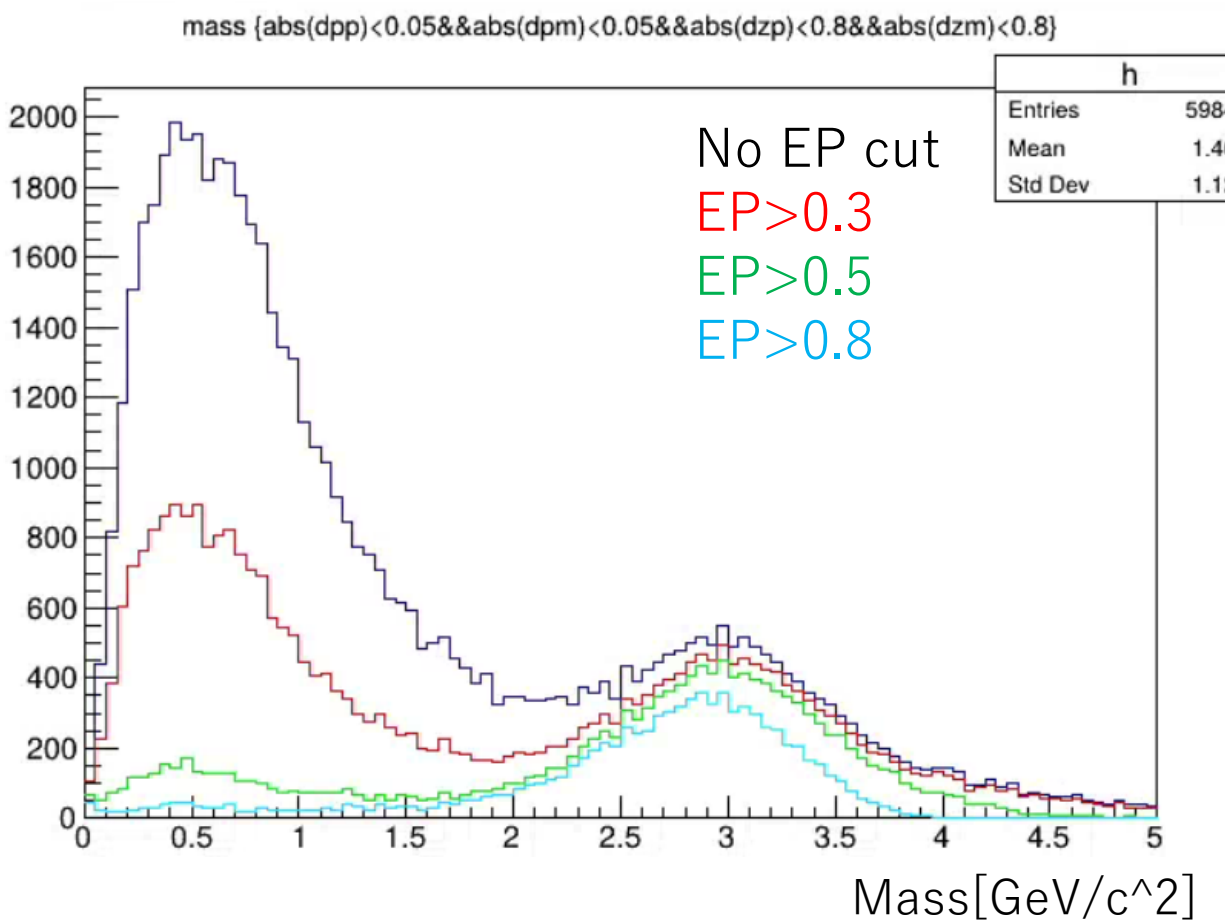

EMC cluster
Projected point
Phi[rad]
Z[cm]

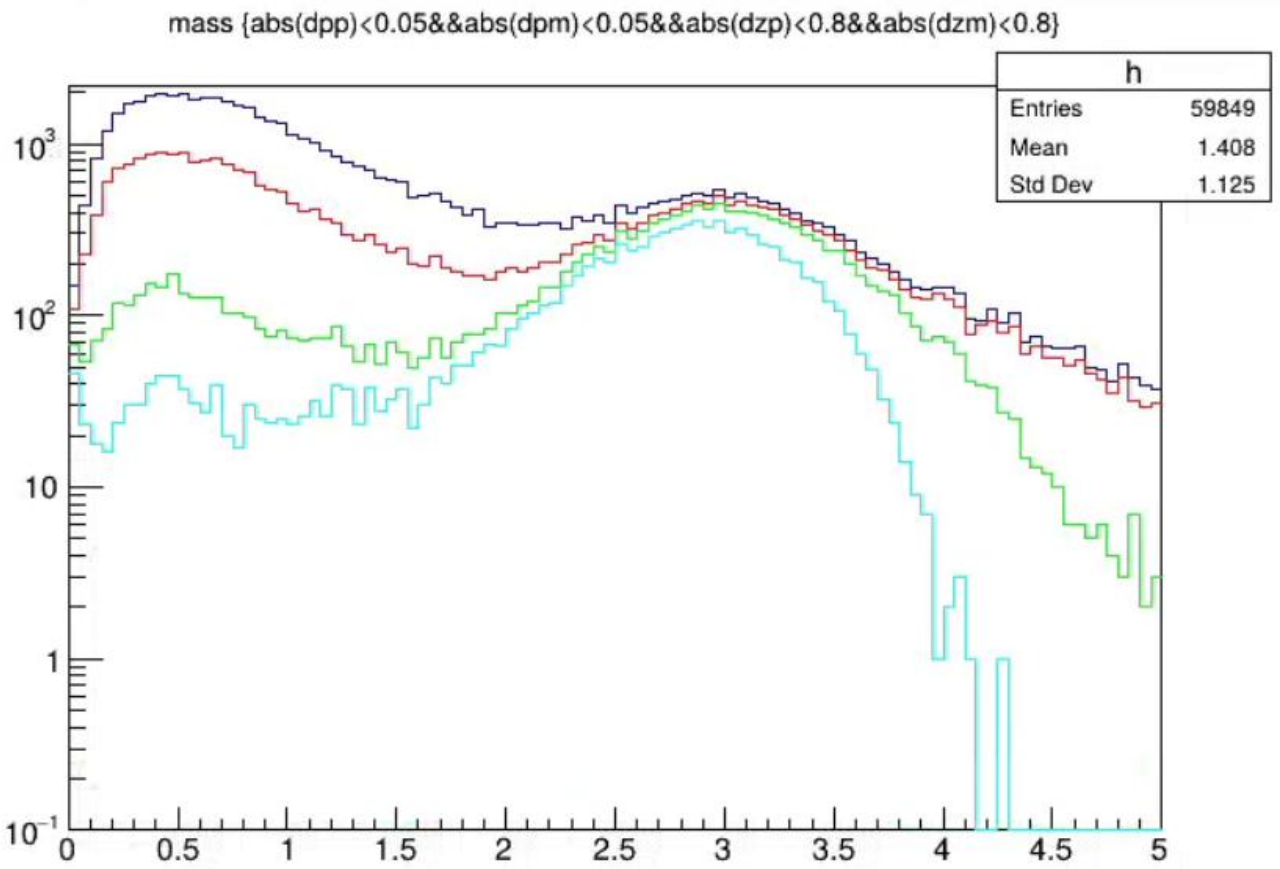
E/p distributions





Pair Mass





- J/psi peak is seen at Mass=3 GeV/c^2
- E/p cut successfully rejects the BG at 0.5 GeV