Λ^0 Digits Embedding for the Inner Tracker Optimization

Ilnur Gabdrakhmanov

Joint Institute for Nuclear Research, Laboratory of High Energy Physics

Dubna March 5, 2020

Ilnur Gabdrakhmanov (Joint Institute for Nuclear Resear Λ^0 Digits Embedding for the Inner Tracker Optimization

Digit Level Embedding Stages

- \blacksquare Create Λ^0 ROOT storage from DCMQGSM generated data sets
- Generate decay events with the storage lambdas put to the primary vertices's positions from an exp file
- Filter only reconstructable decays
- Apply signal scale normalization ?
- Embed into real events
- Measure the efficiency of the each reconstruction stage
- Tune tracking algorithm accordingly

Scheme

Embedding Workflow



Run 4649 stat



Total Events: 203495

Vertex Found: 15743

■ Vertex Z in [-3..3] : 4132

Data

Run 4649 Vertex







Data



ParticlePair.fDCA12.ParticlePair.finvMass (ParticlePair.fDCA12 < 5 && 1<ParticlePair.finvMass && ParticlePair.finvMass<2)



ParticlePair.IPath:ParticlePair.InvMass (ParticlePair.IPath < 10 && 1<ParticlePair.InvMass && ParticlePair.InvMass < 1.2)

Figure: MC Mass:DCA12 distribution

Figure: MC Mass:Path distribution

Efficiency Kinematic distribution

Run 4649 Vertex





Figure: Exp Mass:DCA12 distribution

ParticlePair.fPath:ParticlePair.fInvMass (ParticlePair.fPath < 20 && 1<ParticlePair.fInvMass && ParticlePair.fInvMass < 2)



Figure: Exp Mass:Path distribution

Efficiency Kinem

Kinematic distribution

Cut selection



Efficiency General Efficiency

Track finder



Efficiency HitMaker

GEM HitMaker Efficiency Test

MC only

	BigZone	HotZone
Station $= 0$ iMod $= 0$	0.975684	0.989266
iMod = 1	0.884250	0.982759
Station = $1 \text{ iMod} = 0$	0.966203	0.988338
iMod = 1	0.794201	0.939690
Station = $2 \text{ iMod} = 0$	0.954382	0.981046
iMod = 1	0.765758	0.951376
Station = $3 \text{ iMod} = 0$	0.983941	0.970588
iMod = 1	0.956071	0.981878
Station = 4 $iMod = 0$	0.948309	0.956806
iMod = 1	0.799820	0.947141
Station = $5 \text{ iMod} = 0$	0.964614	0.972973
iMod = 1	0.942036	0.964838

Embedded

	BigZone	HotZone
Station $= 0$ iMod $= 0$	0.975684	0.989612
iMod = 1	0.884250	0.983110
Station = $1 \text{ iMod} = 0$	0.966203	0.988338
iMod = 1	0.796322	0.939690
Station = $2 \text{ iMod} = 0$	0.954382	0.981046
iMod = 1	0.765758	0.951376
Station = $3 \text{ iMod} = 0$	0.983941	0.970588
iMod = 1	0.956071	0.981878
Station = 4 $iMod = 0$	0.948309	0.958115
iMod = 1	0.799820	0.947141
Station = $5 \text{ iMod} = 0$	0.965322	0.972973
iMod = 1	0.942036	0.966245