

Analysis of dE/dx in the straw tracker of SPD using fitted tracks

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Cuts in SpdMCTrackFinder

Cut (default)		Fraction of tracks that would be rejected by each cut separately			
		pions	kaons	protons	electrons
particle generation	≤ 2	0.021	0.001	0.186	0.763
momentum [GeV/c]	> 0.004	0	0	0	0.469
beta*gamma	> 0.05	0	0	0.002	0.006
N of ITS hits	≥ 1	0.051	0.015	0.353	0.818
N of ITS + TS hits	≥ 3	0.001	0.001	0.108	0.106
<i>All combined</i>		<i>0.060</i>	<i>0.015</i>	<i>0.394</i>	<i>0.973</i>

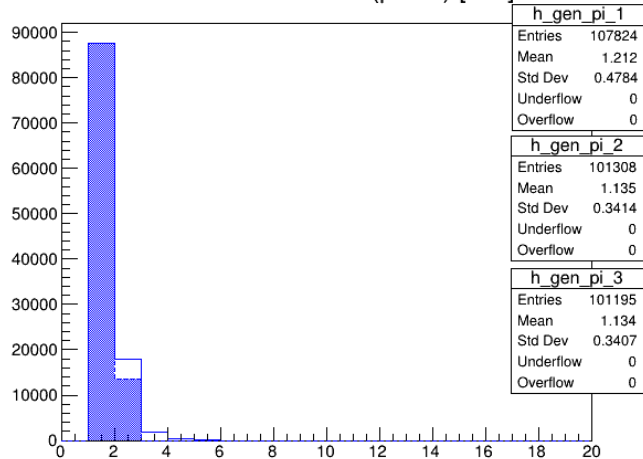
Remarks

I compare distributions for 3 sets of tracks:

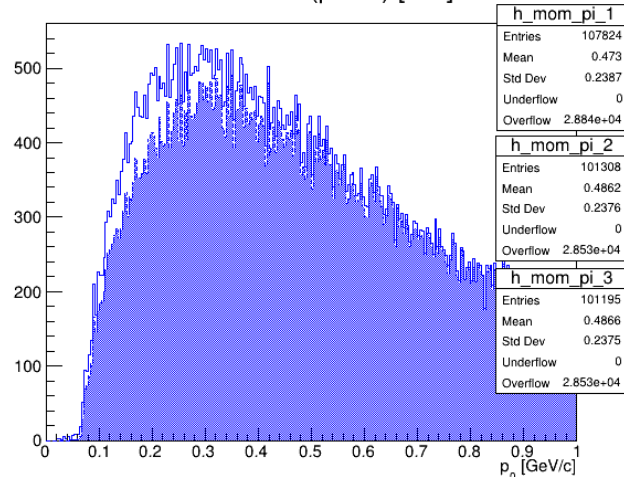
1. MC-truth tracks [unfilled histograms]
2. Tracks accepted by SpdMCTrackFinder [hatched histograms]
3. Tracks that additionally have fitted momentum defined (in the first point) [filled histograms]

(Only tracks that have at least one hit in the straw tracker were considered in all cases.)

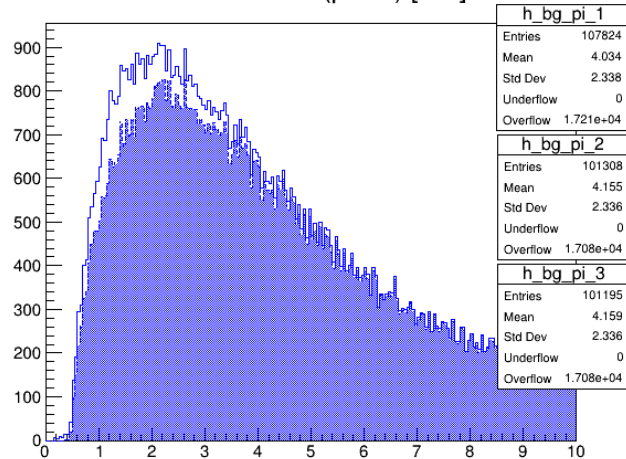
Particle Generation (pions) [MC]



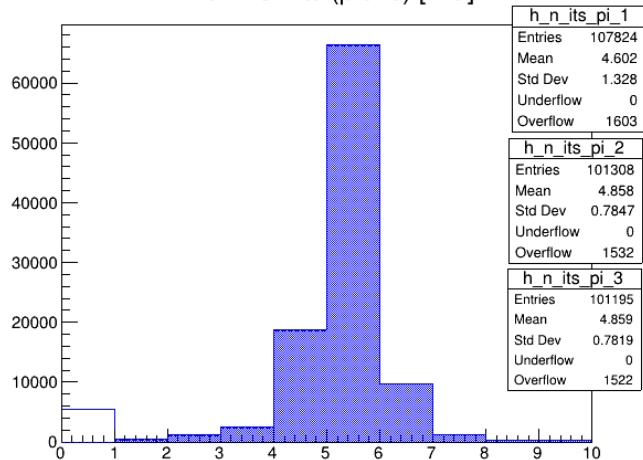
Momentum (pions) [MC]



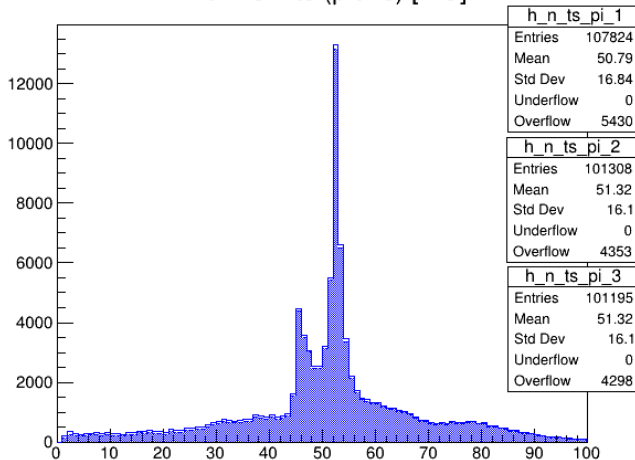
Beta*Gamma (pions) [MC]



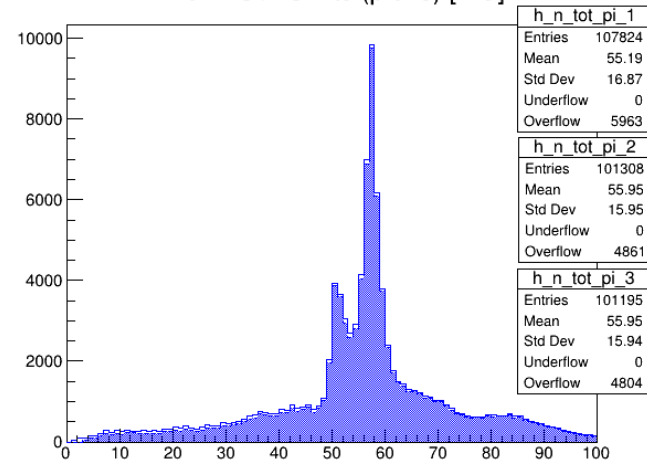
N of ITS hits (pions) [MC]



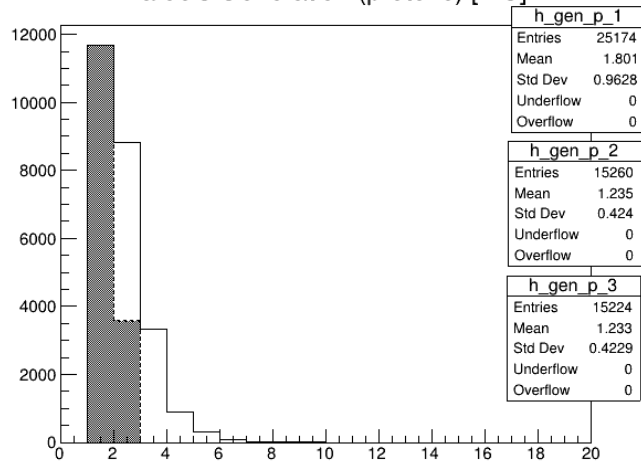
N of TS hits (pions) [MC]



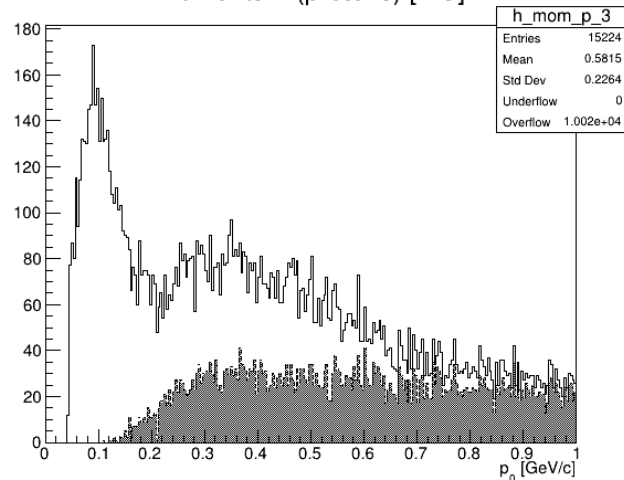
N of ITS+TS hits (pions) [MC]



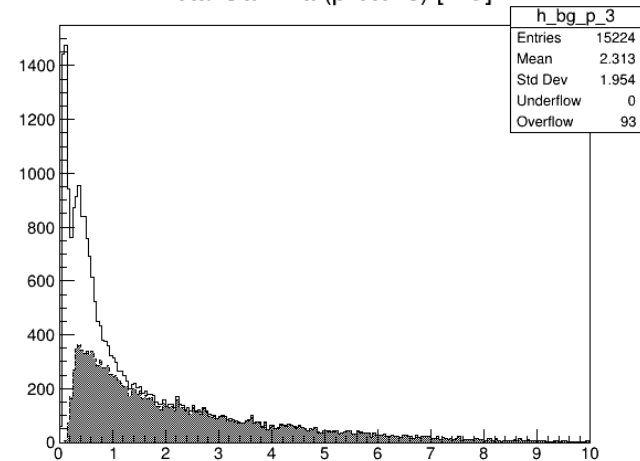
Particle Generation (protons) [MC]



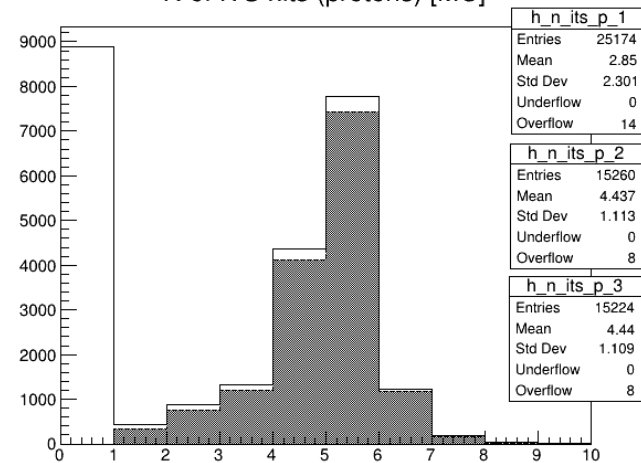
Momentum (protons) [MC]



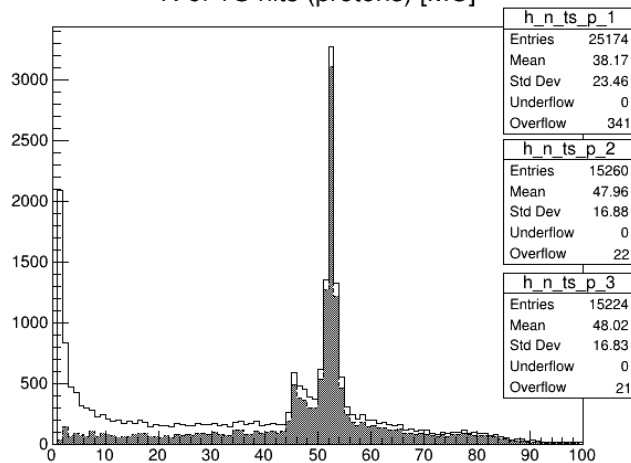
Beta*Gamma (protons) [MC]



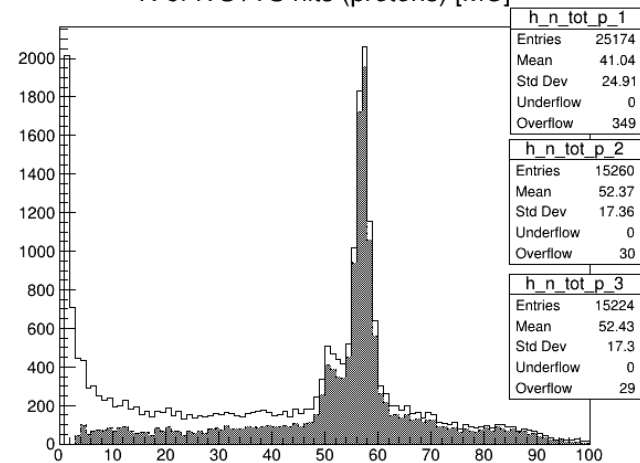
N of ITS hits (protons) [MC]



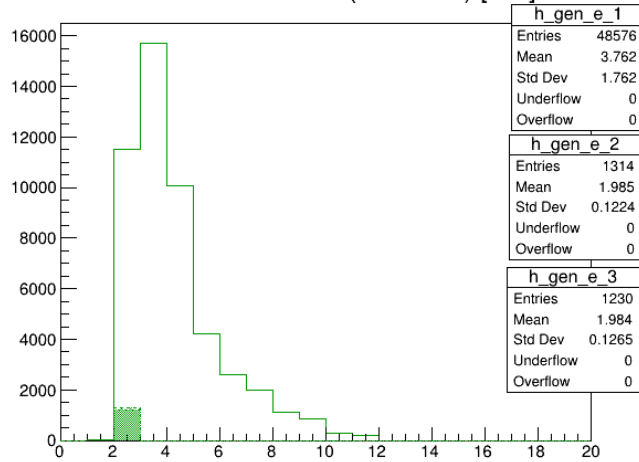
N of TS hits (protons) [MC]



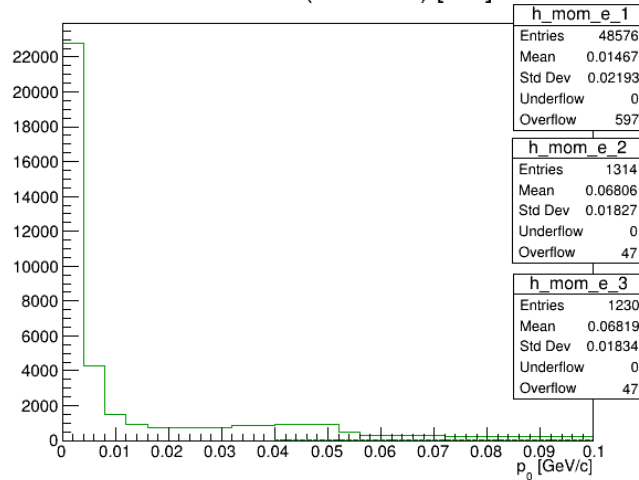
N of ITS+TS hits (protons) [MC]



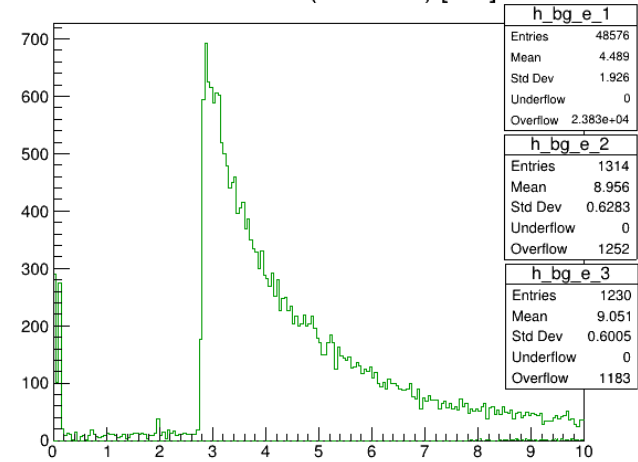
Particle Generation (electrons) [MC]



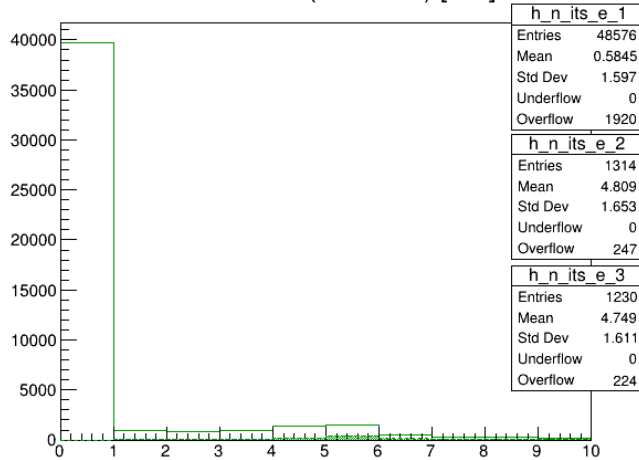
Momentum (electrons) [MC]



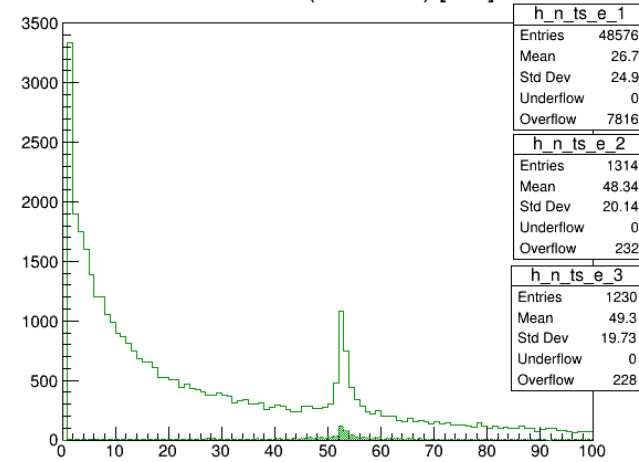
Beta*Gamma (electrons) [MC]



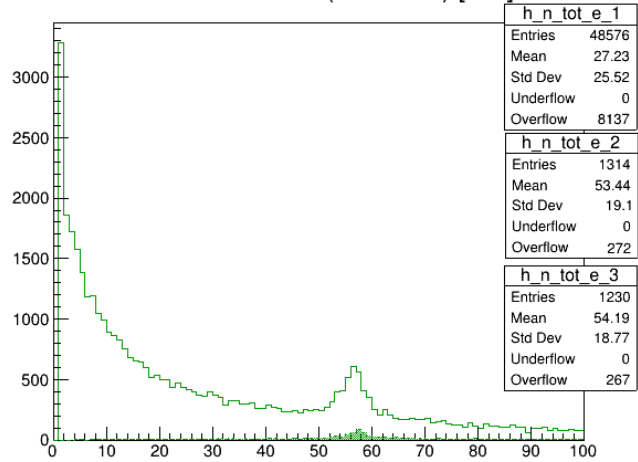
N of ITS hits (electrons) [MC]



N of TS hits (electrons) [MC]



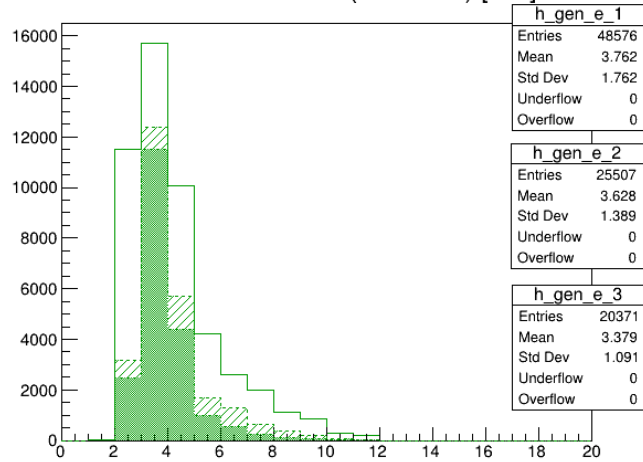
N of ITS+TS hits (electrons) [MC]



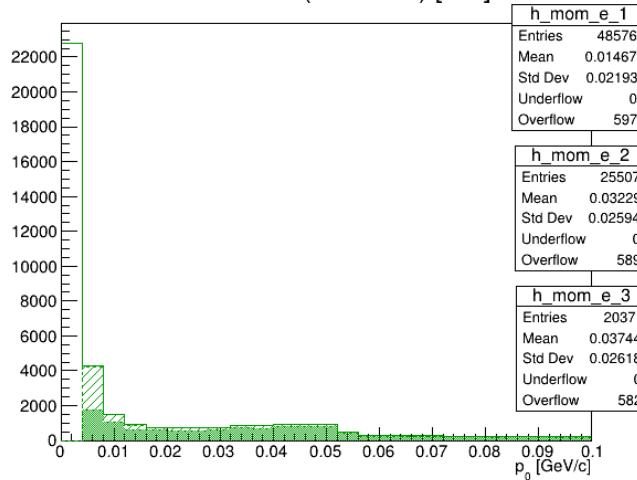
Relaxed cuts

- max particle generation = 20
- min number of ITS hits = 0

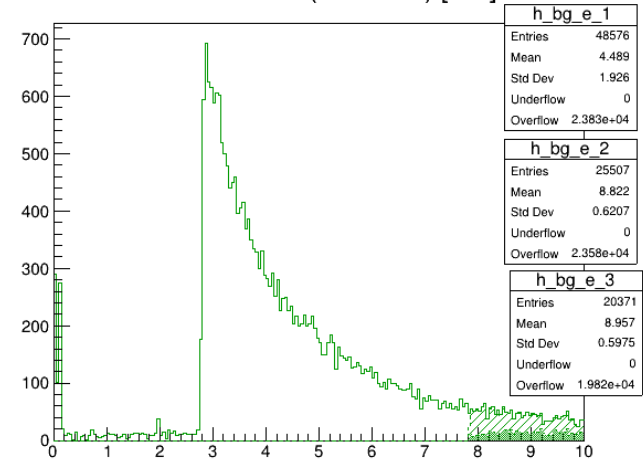
Particle Generation (electrons) [MC]



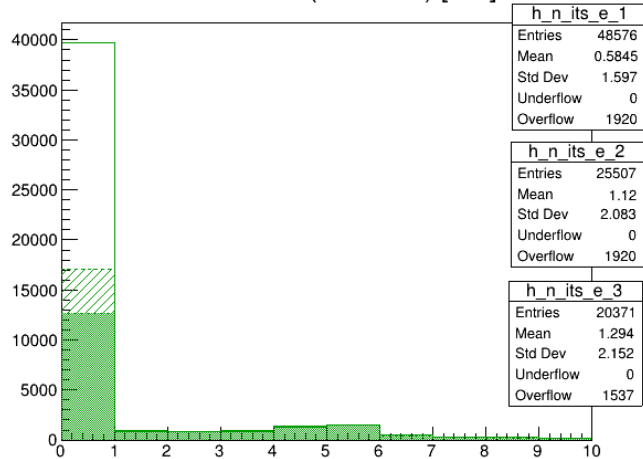
Momentum (electrons) [MC]



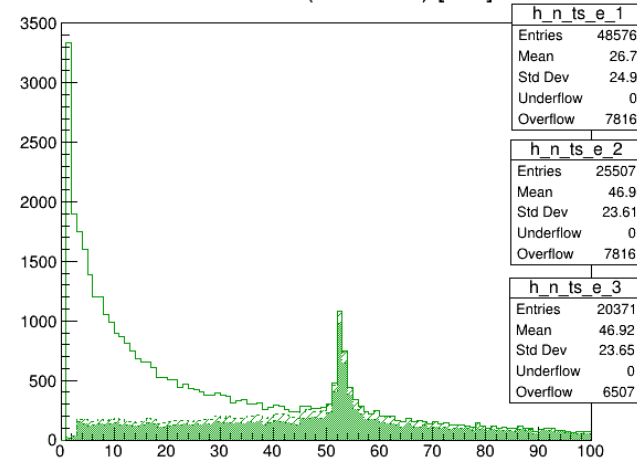
Beta*Gamma (electrons) [MC]



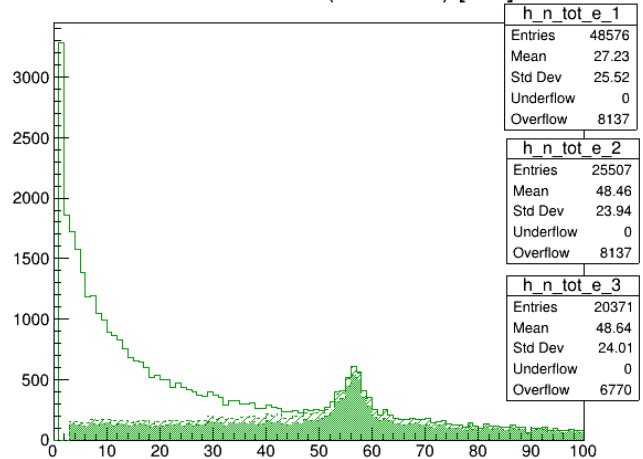
N of ITS hits (electrons) [MC]



N of TS hits (electrons) [MC]

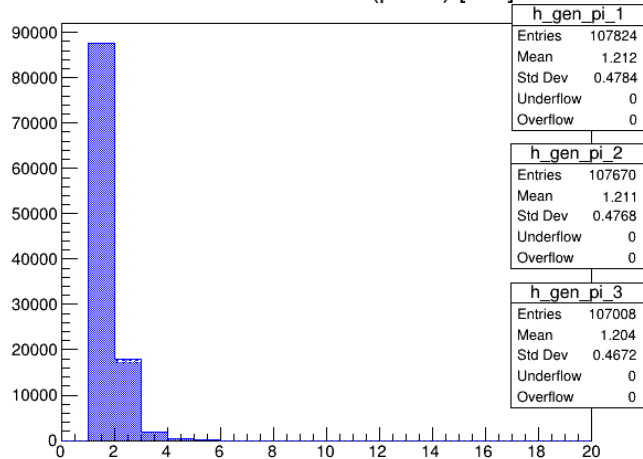


N of ITS+TS hits (electrons) [MC]

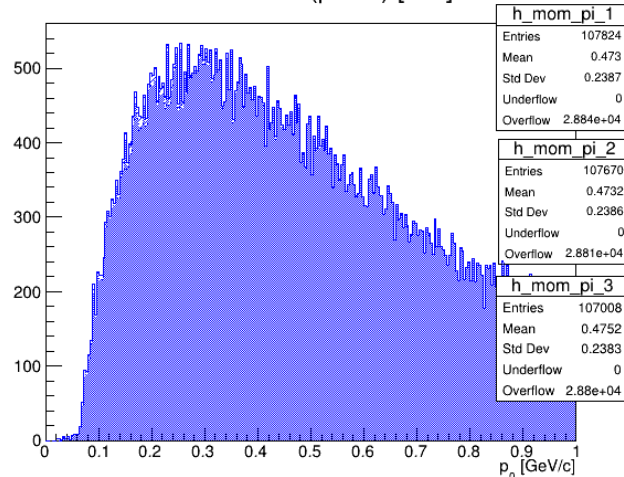


42% of electrons «survive»

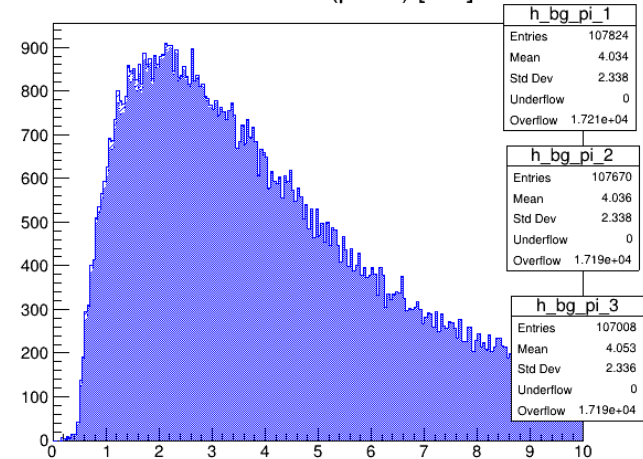
Particle Generation (pions) [MC]



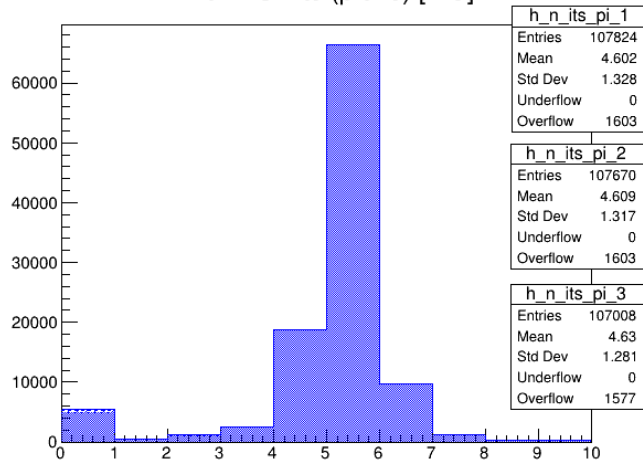
Momentum (pions) [MC]



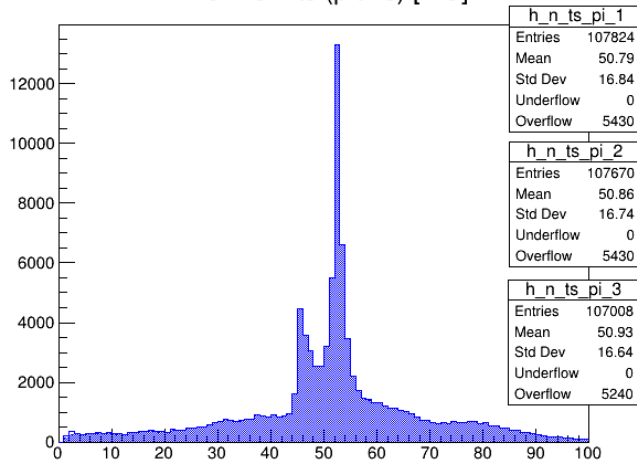
Beta*Gamma (pions) [MC]



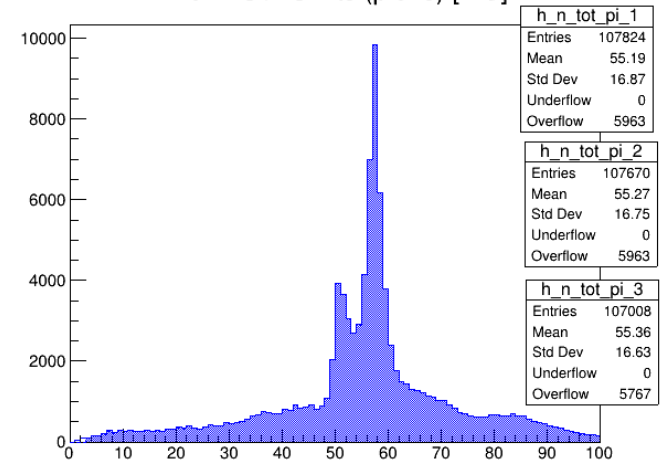
N of ITS hits (pions) [MC]



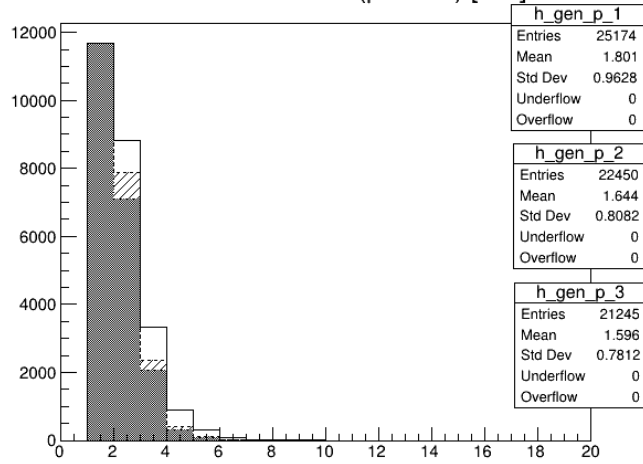
N of TS hits (pions) [MC]



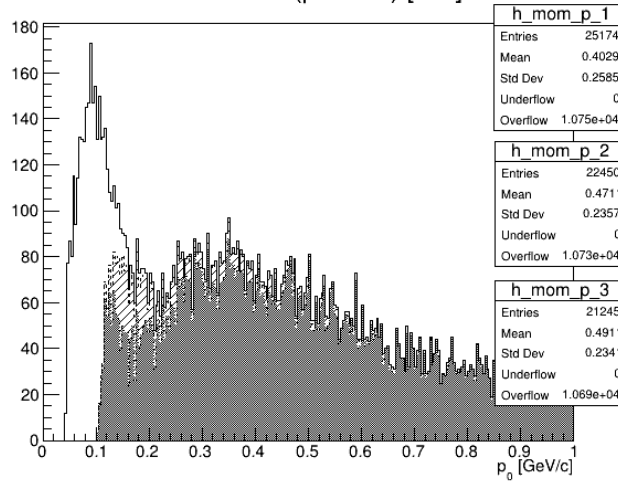
N of ITS+TS hits (pions) [MC]



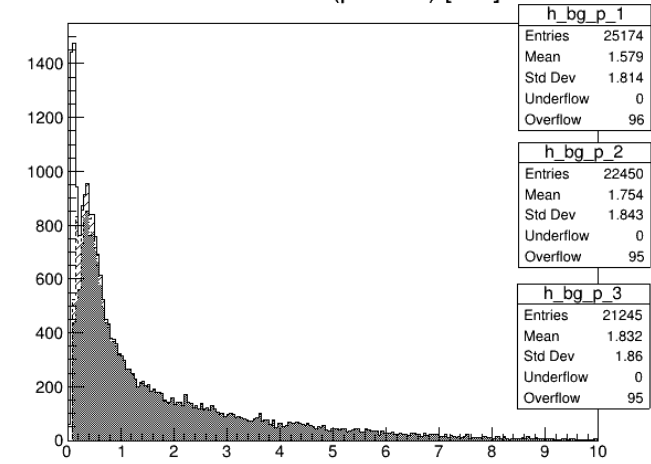
Particle Generation (protons) [MC]



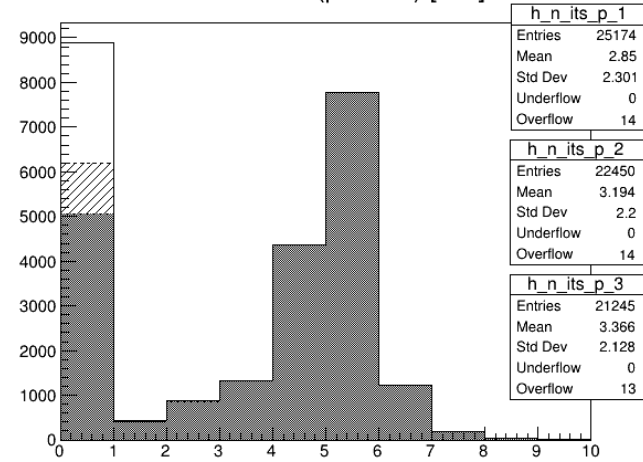
Momentum (protons) [MC]



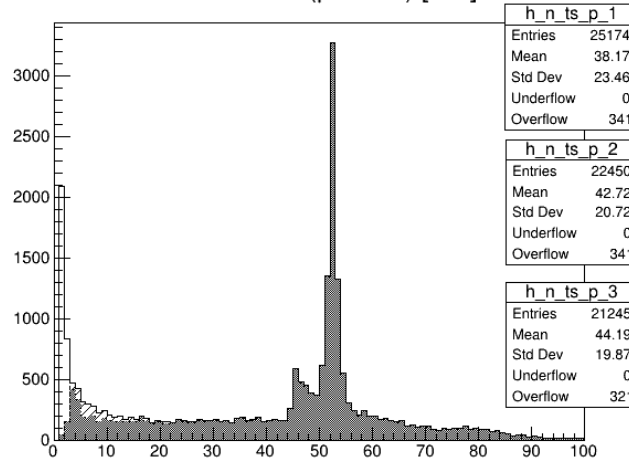
Beta*Gamma (protons) [MC]



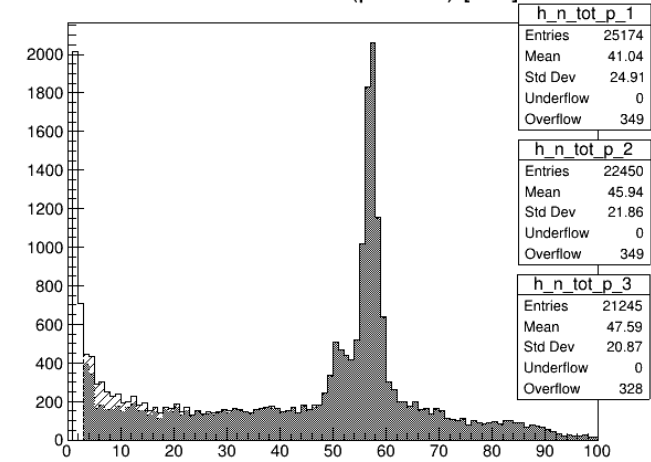
N of ITS hits (protons) [MC]



N of TS hits (protons) [MC]

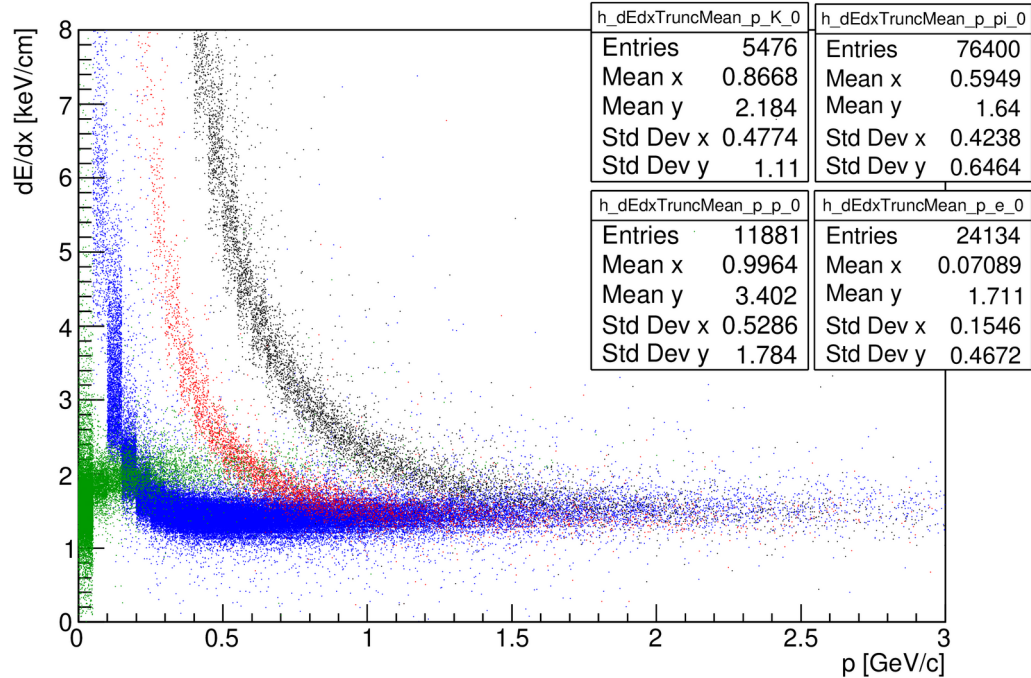


N of ITS+TS hits (protons) [MC]

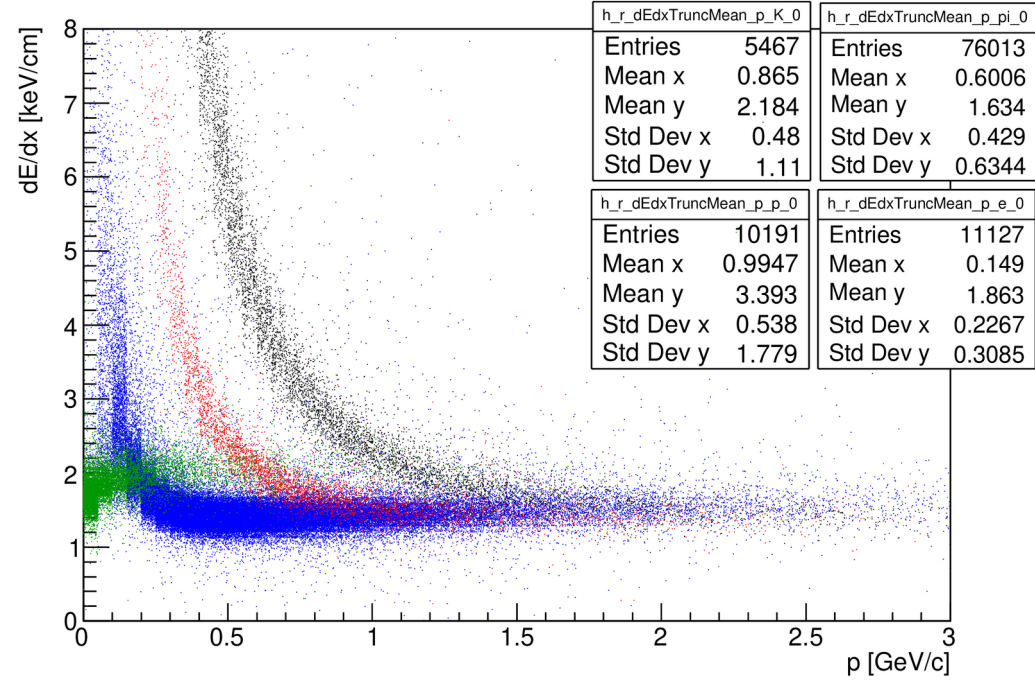


Truncated mean dE/dx: mc-truth vs reco

dE/dx (trunc. mean 35%) (pions)



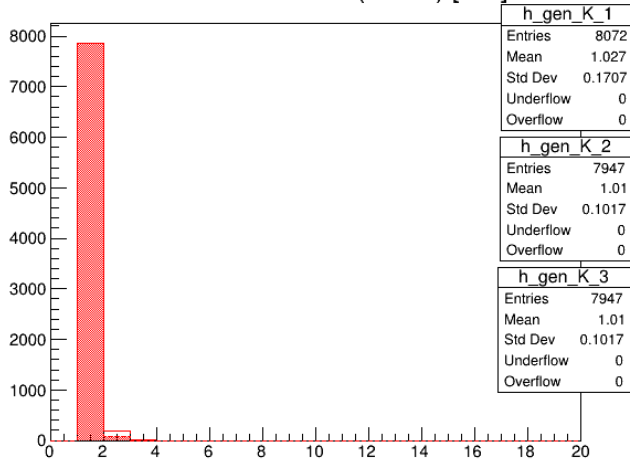
dE/dx (trunc. mean 35%) (reco) (pions)



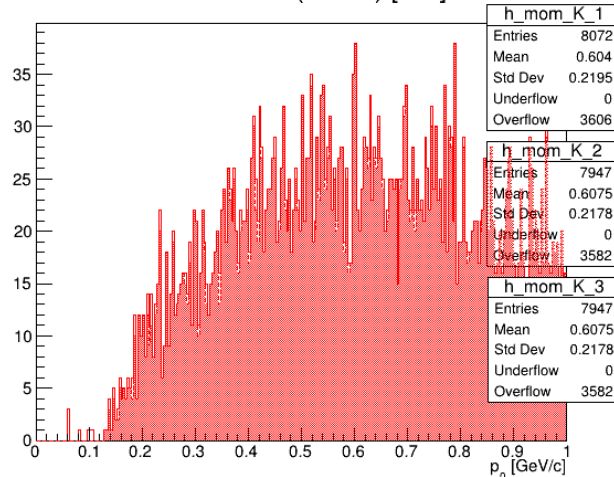
backup

- Earlier, I wrongly calculated the momentum:
 - `fitpars->GetFinalState()` is defined only for tracks going out from primary vertex.
 - Now I use `fitpars->GetFirstState()`.

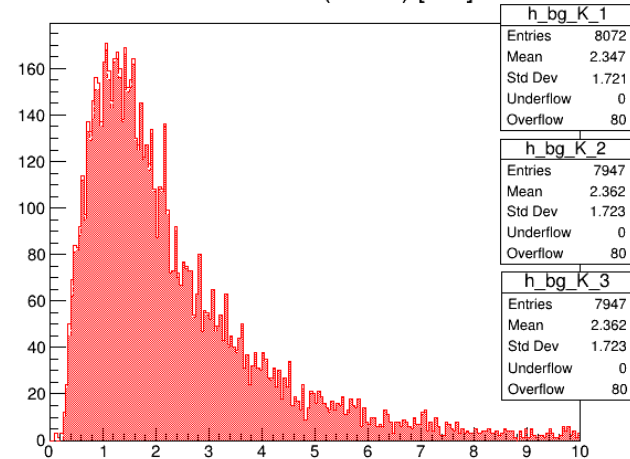
Particle Generation (kaons) [MC]



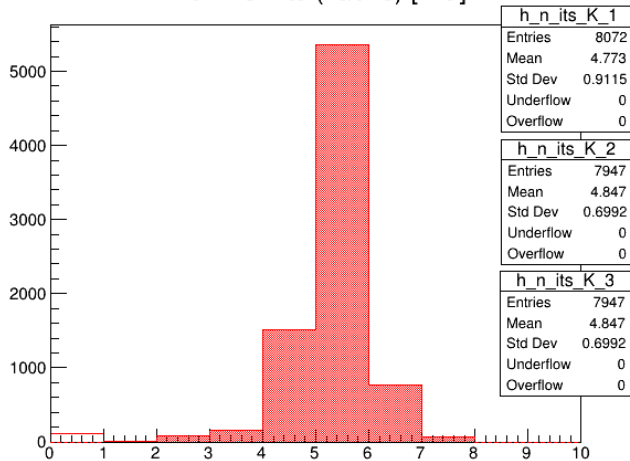
Momentum (kaons) [MC]



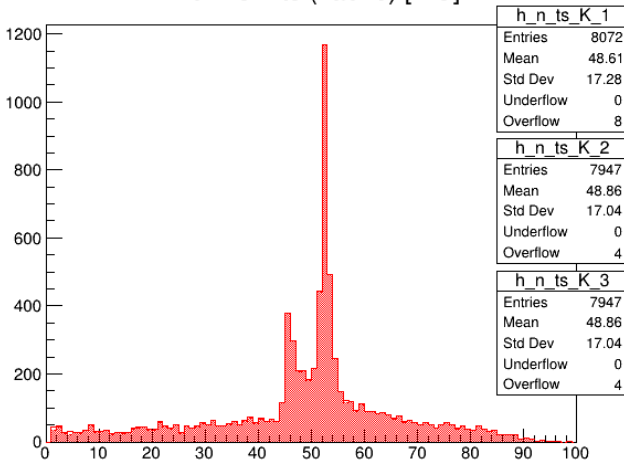
Beta*Gamma (kaons) [MC]



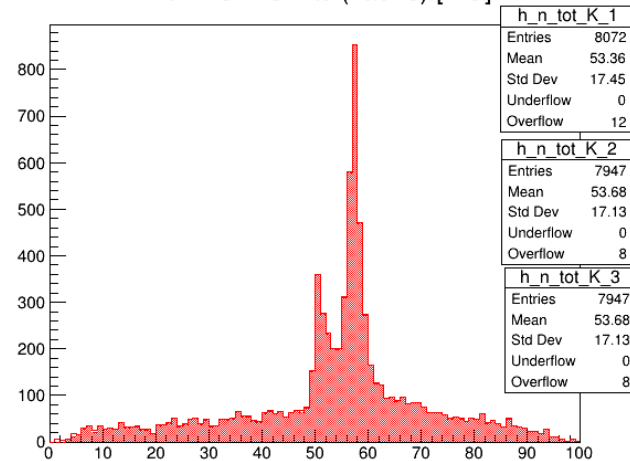
N of ITS hits (kaons) [MC]



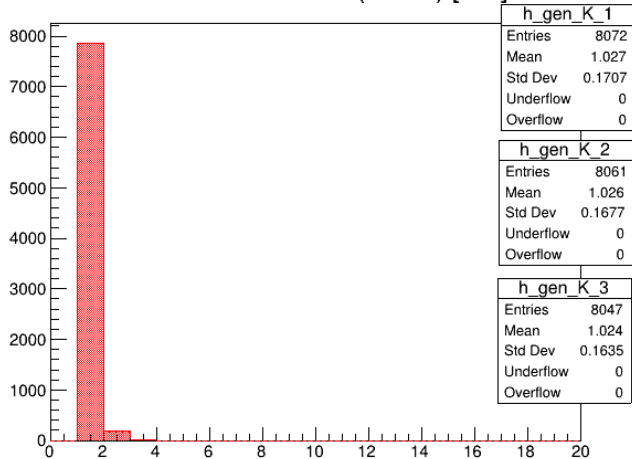
N of TS hits (kaons) [MC]



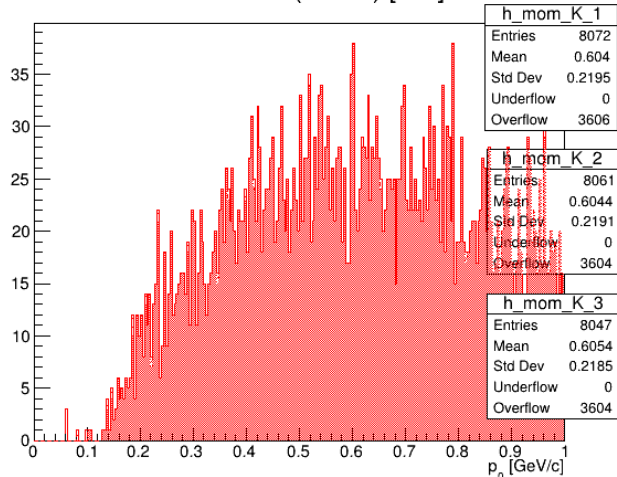
N of ITS+TS hits (kaons) [MC]



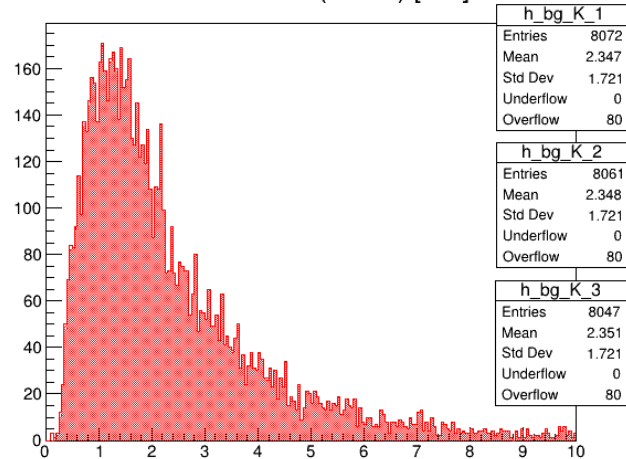
Particle Generation (kaons) [MC]



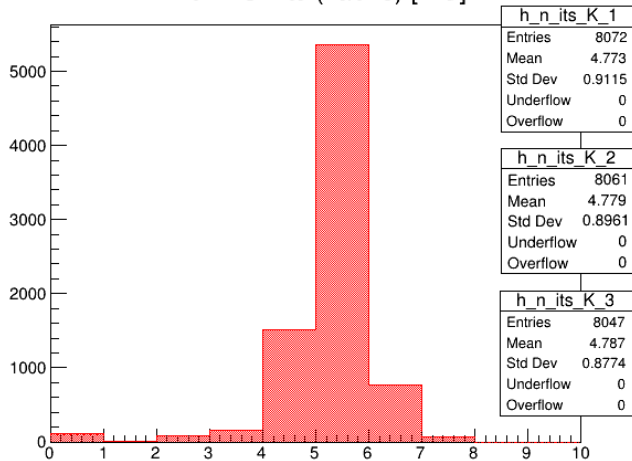
Momentum (kaons) [MC]



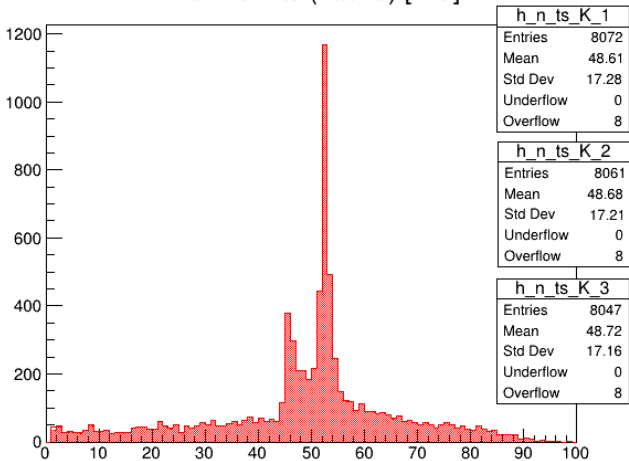
Beta*Gamma (kaons) [MC]



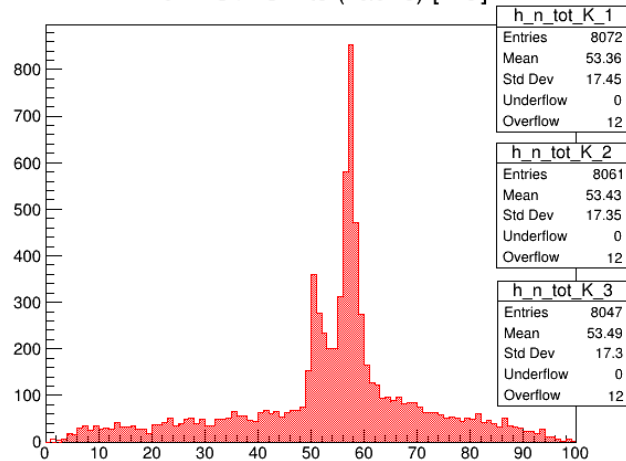
N of ITS hits (kaons) [MC]



N of TS hits (kaons) [MC]



N of ITS+TS hits (kaons) [MC]

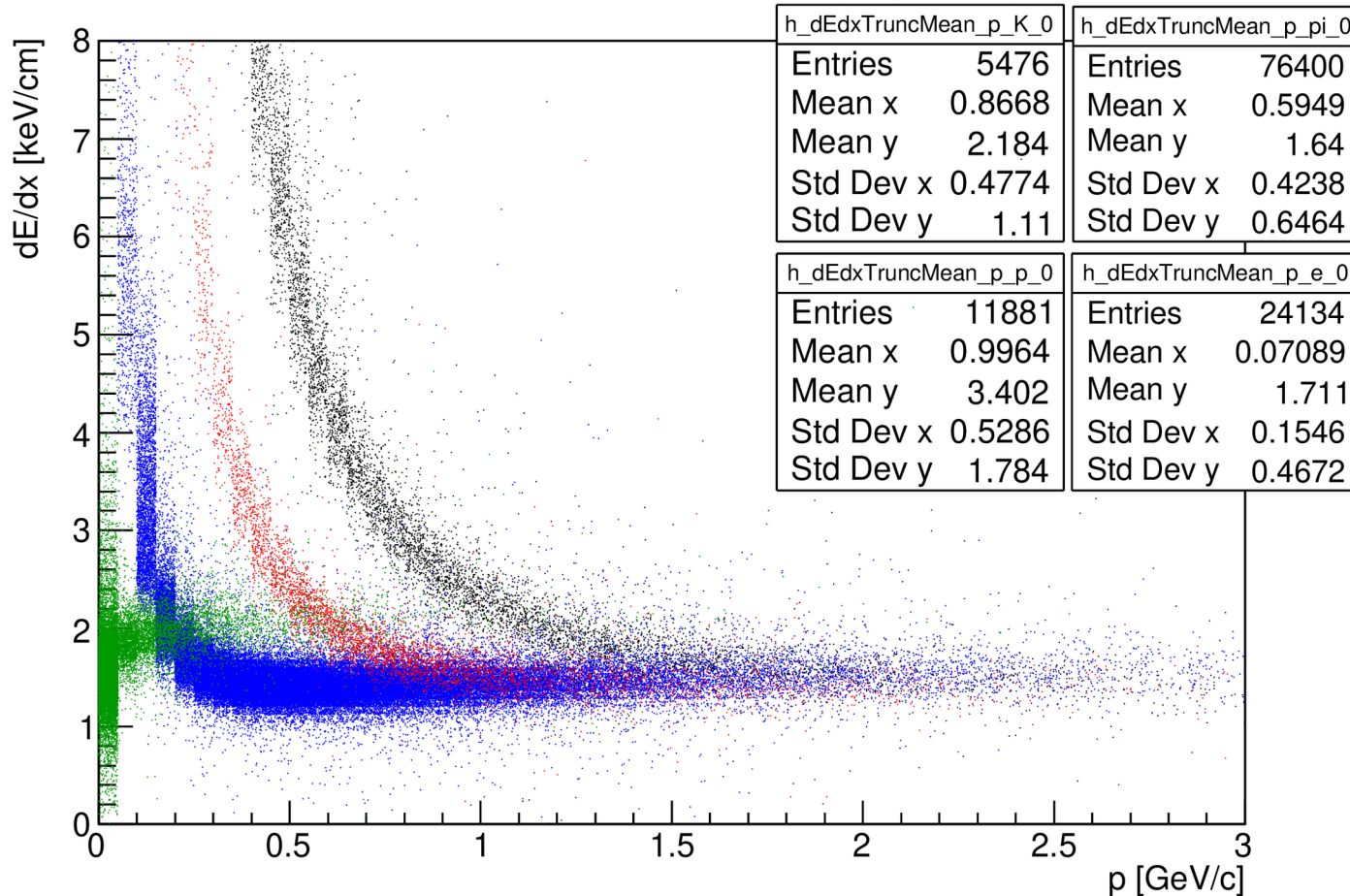


- Sometimes the following error appears during reconstruction:

```
-E- <SpdGFMagneticField::get> NAN position: nan -nan nan
```

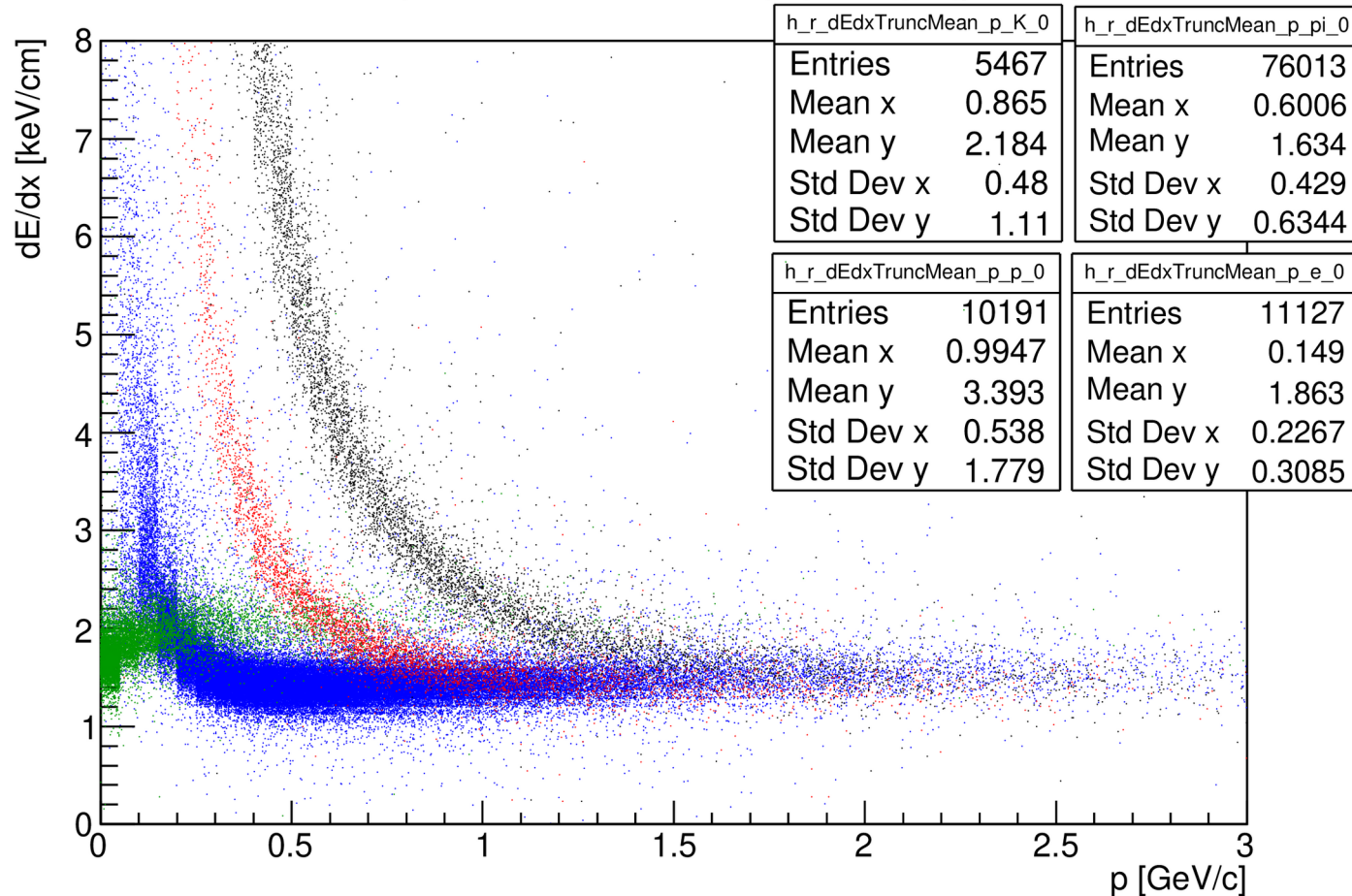

Truncated mean dE/dx: mc-truth

dE/dx (trunc. mean 35%) (pions)



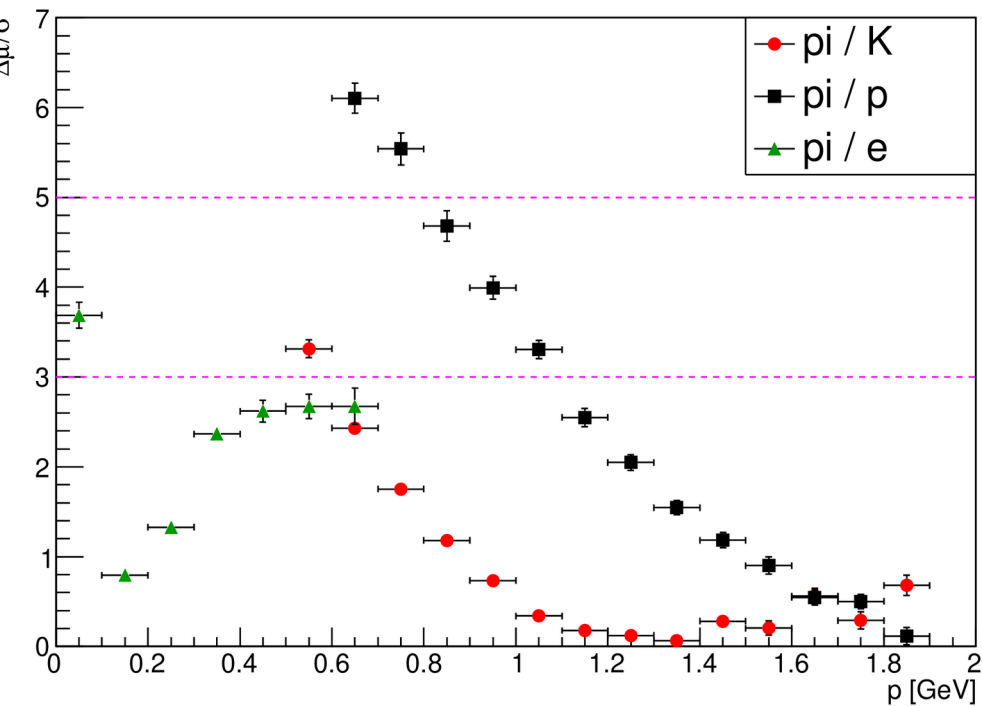
Truncated mean dE/dx: reco

dE/dx (trunc. mean 35%) (reco) (pions)

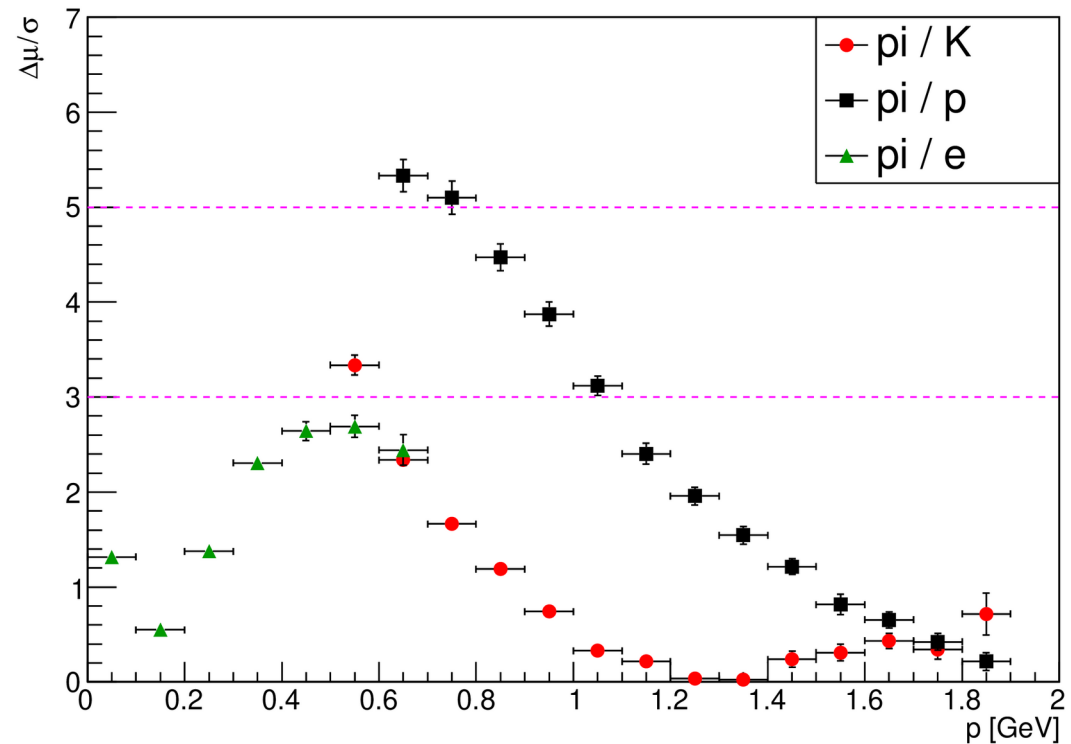


mc-truth vs reco

pions resolution

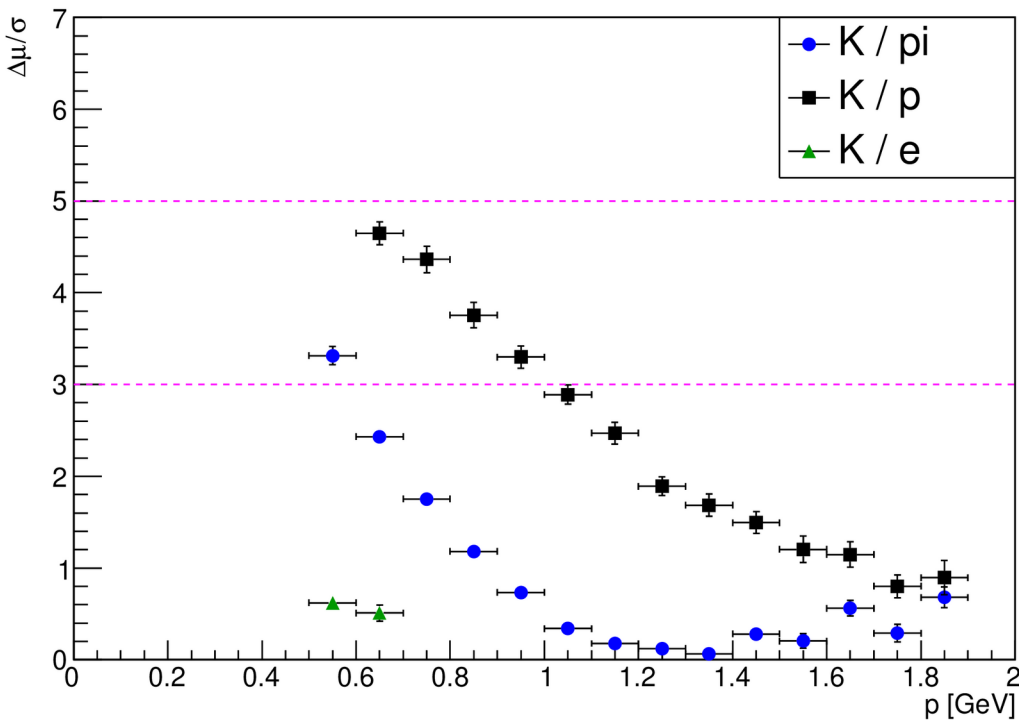


pions resolution



mc-truth vs reco

K resolution



K resolution

