Update on ITSsa analysis of pi/K/p in pPb collisions @ 8.16 TeV

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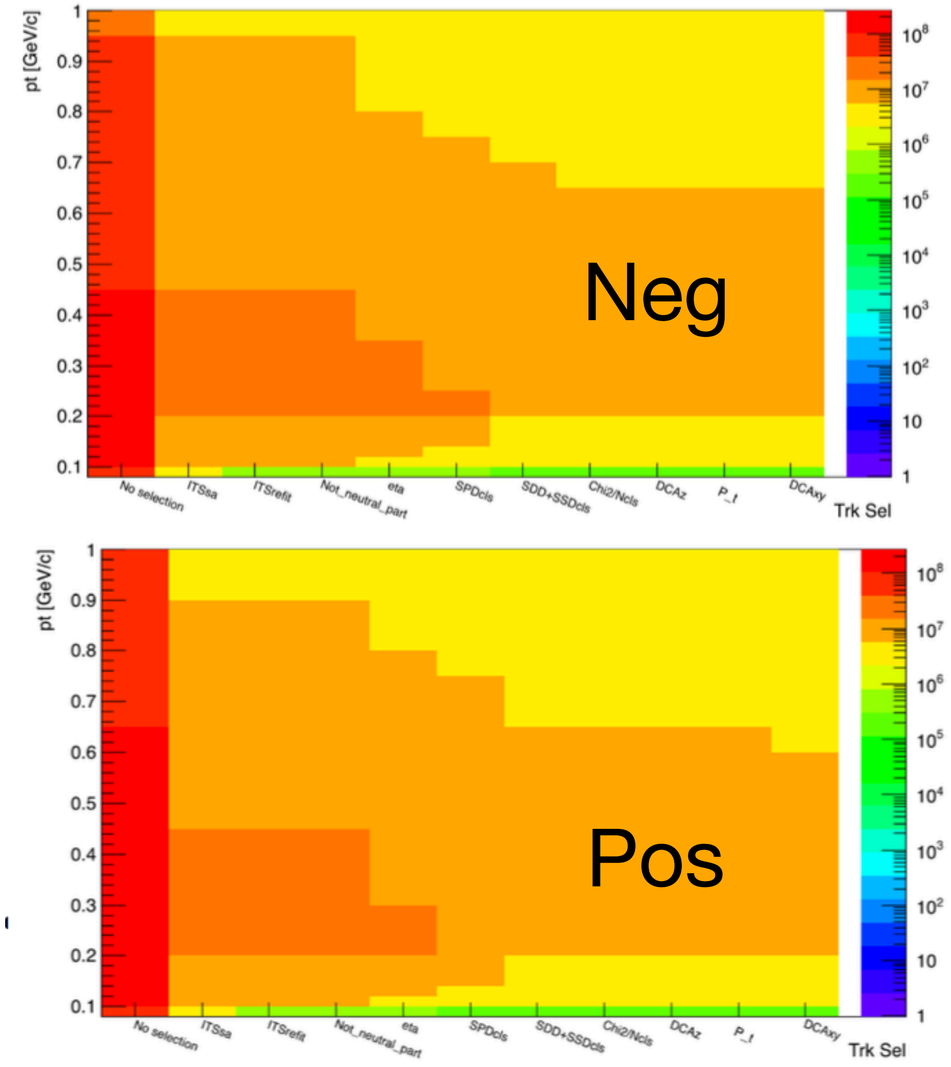
ITS standalone analysis: event selection (slide by M. Toppi)

Data info, event and track selections

- **Dataset**: p-Pb collisions @ 8.16 TeV
- **Period:** LHC16r (pass1_CENT_wSDD)
- **Run Number**: 266318, 266317, 266316, 266208, 266197, 266196, 266187, 265754, 265744, 265607, 265596, 265594
- **Total DATA events after selection with AcceptEvent method: ~14.6M Events**
- **MC production:** LHC17f3a_cent_fix (EPOS-LHC)
- **Total MC events after selection with AcceptEvent method: ~1.2M Events**

ITS standalone analysis: track cuts

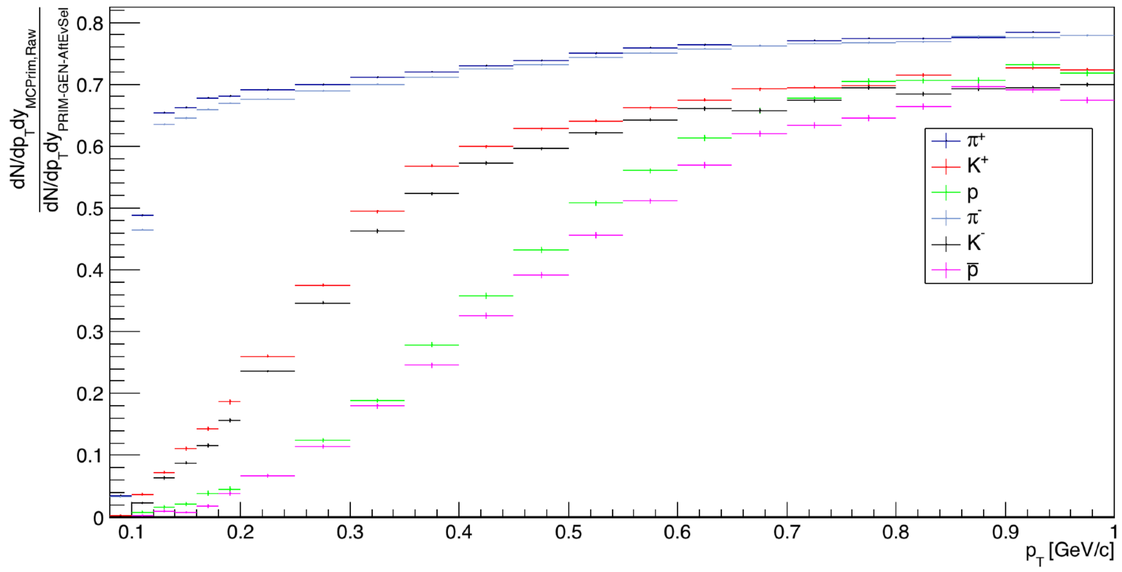


→ Based on *AliESDtrack::kITSpureSA* and *AliESDtrack::kITSrefit*;

→ Track cuts relative to ITSsa analysis implemented:

- » $-0.8 < \eta < 0.8$ + $-0.5 < y < 0$;
- » Number of clusters (Ncls) in SPD ≥ 1, Ncls (SDD+SSD) ≥ 3;
- » $\chi^2/\text{Ncls} < 2.5$;
- » DCAz cut: maximum accepted value evaluated using the expression $a\times(b + c/|p_T|^d)$, parameters are taken from *AliAnalysisTaskSEITSsaSpectra::CreateDCAcutFunctions()*;
- » DCAxy cut: same as above, DCAxy functions fit to be done.

ITS standalone analysis: track cuts



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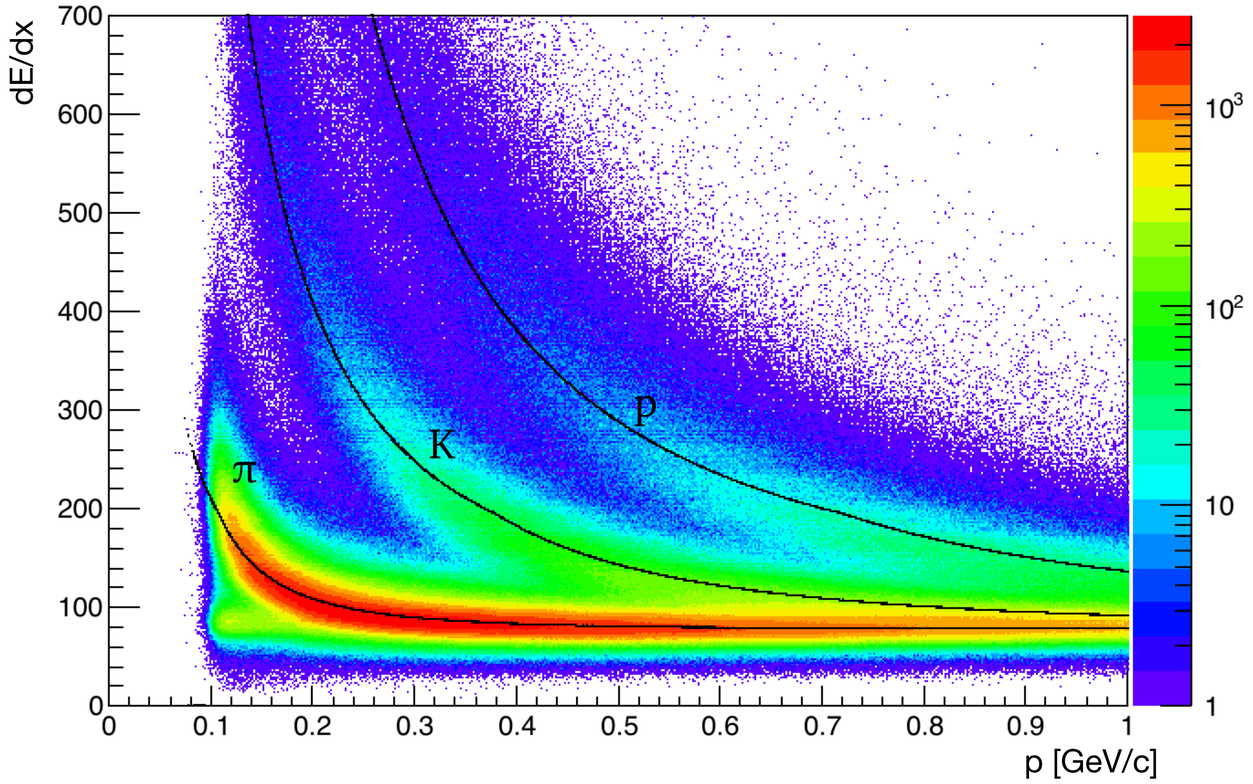
ITSsa main PID: using the dE/dx information (SDD + SSD)



➙ dE/dx from *track->GetITSSignal()* = truncated mean value of the energy loss;

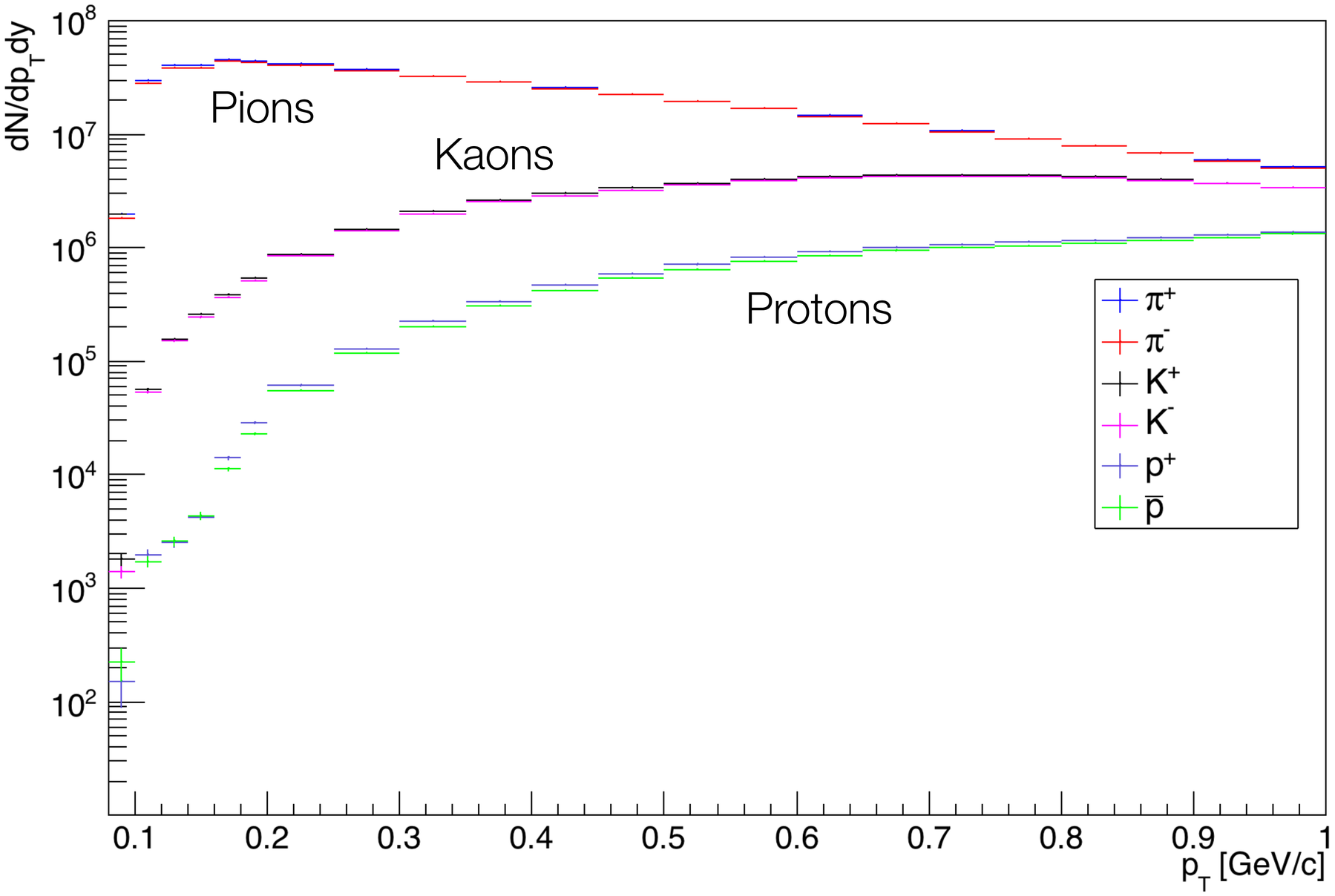
➙ truncated mean = mean of the two lowest dEdx values in case of 4 dEdx points measured, the weighted sum of the lowest and the second lowest values in case of 3 points measured;

➙ PID method: truncated mean cut,

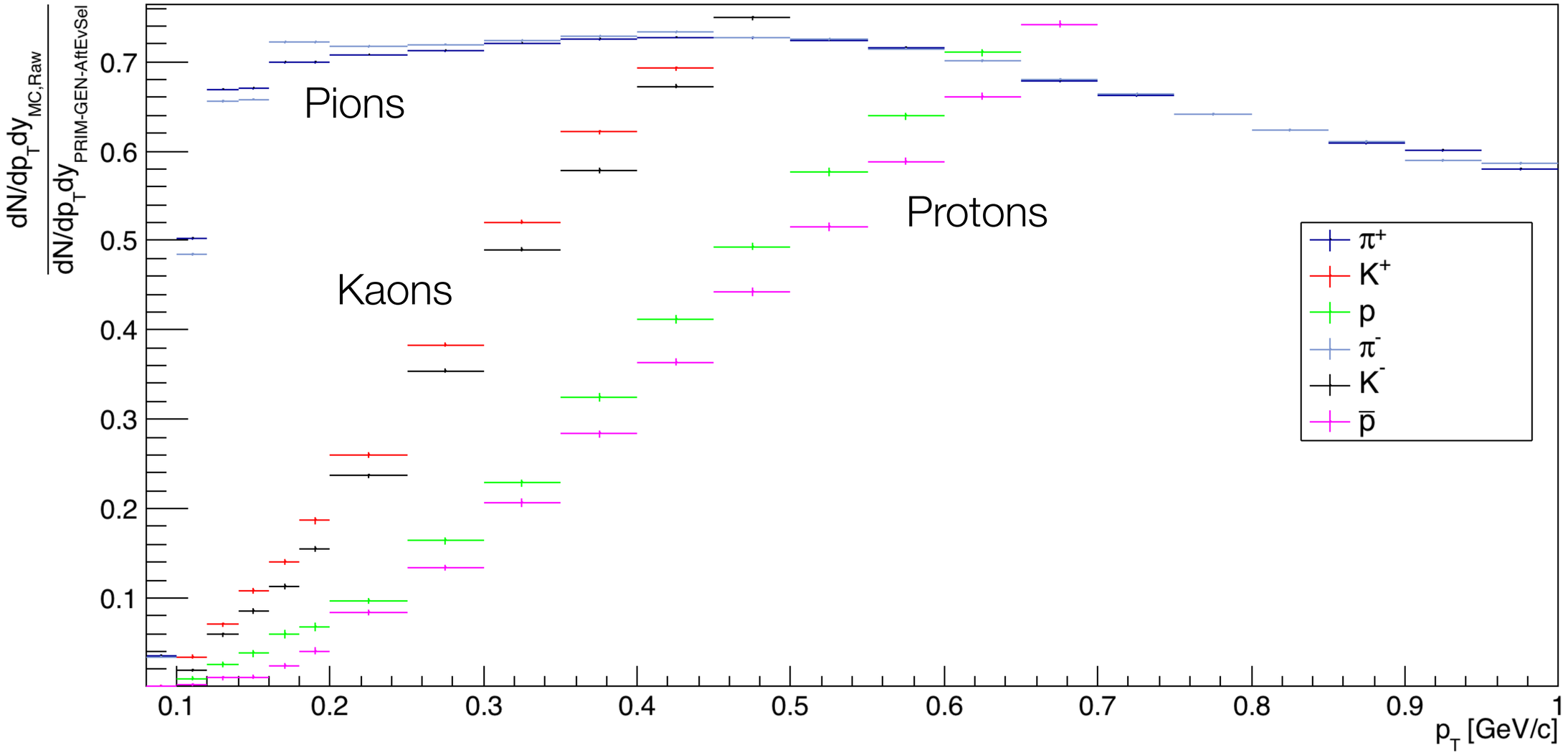
from *AliAnalysisTaskSEITSsaSpectra::GetTrackPid()*,

is a cut on the distance from the hybrid Bethe-Bloch parameterization (solid line):
fITSPIDResponse->BetheITSsaHybrid(trkP, mass);

ITSsa: the raw spectra

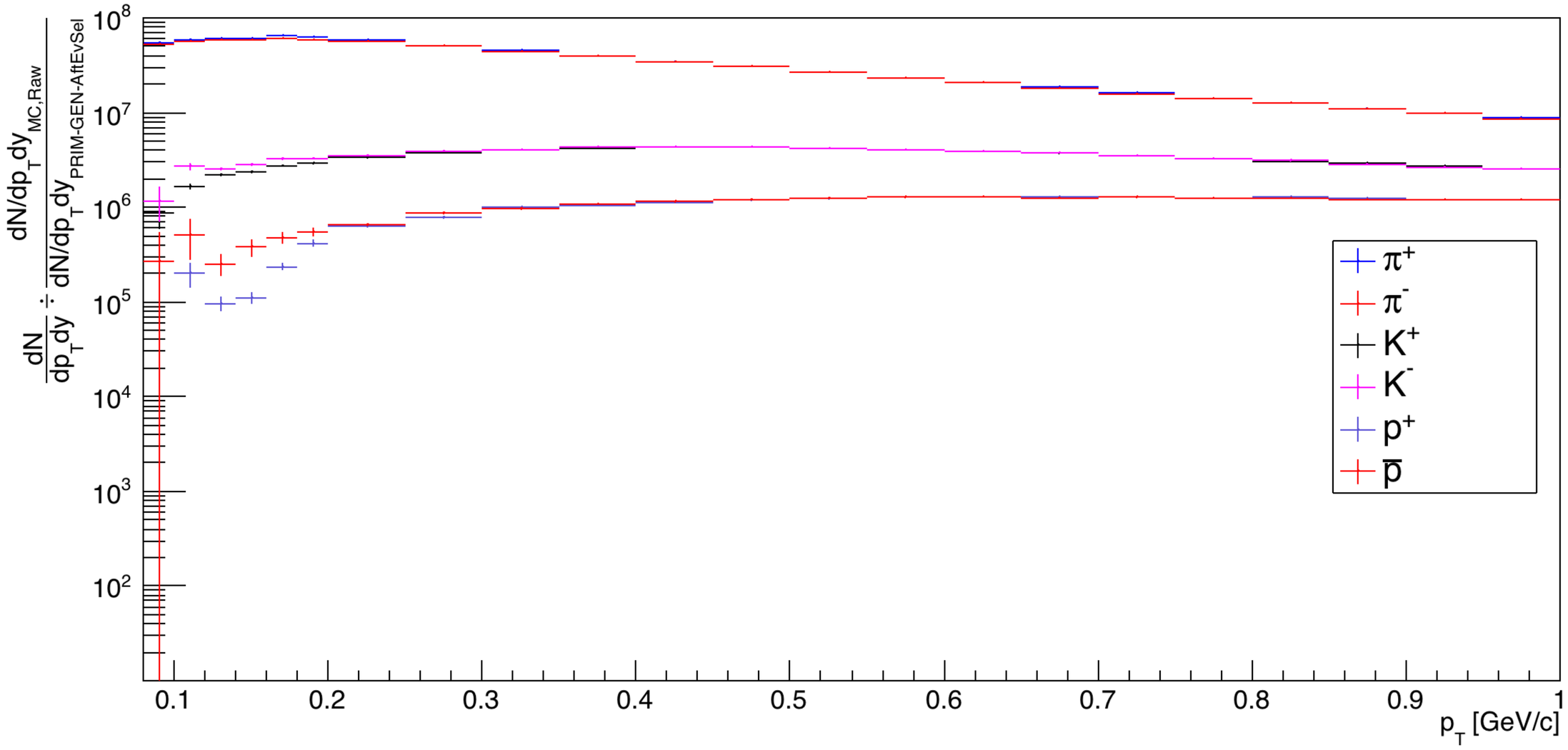


ITSsa: efficiency correction factor



Efficiency correction factor $C_i = \frac{dN/dp_T dy_{MC,RAW}}{dN/dp_T dy_{PRIM-GEN-AftEvSel}}$

ITSsa: raw spectra corrected for the efficiency



$$\frac{dN}{dp_T dy} \div \frac{dN / dp_T dy_{MC,RAW}}{dN / dp_T dy_{PRIM-GEN-AftEvSel}}$$

ITSsa: towards the PID systematics

In order to extract the PID systematics, the corrected spectra (efficiency) was obtained using the Bayesian PID method (with flat priors).

Description of the method can be found in:
CERN-THESIS-2015-028

For each particle with momentum p, the conditional probability density function for a vector of signals $S = \{s_{SDD1}, s_{SDD2}, s_{SSD1}, s_{SSD2}\}$ is simply the product of the corresponding normalized response function for each layer.

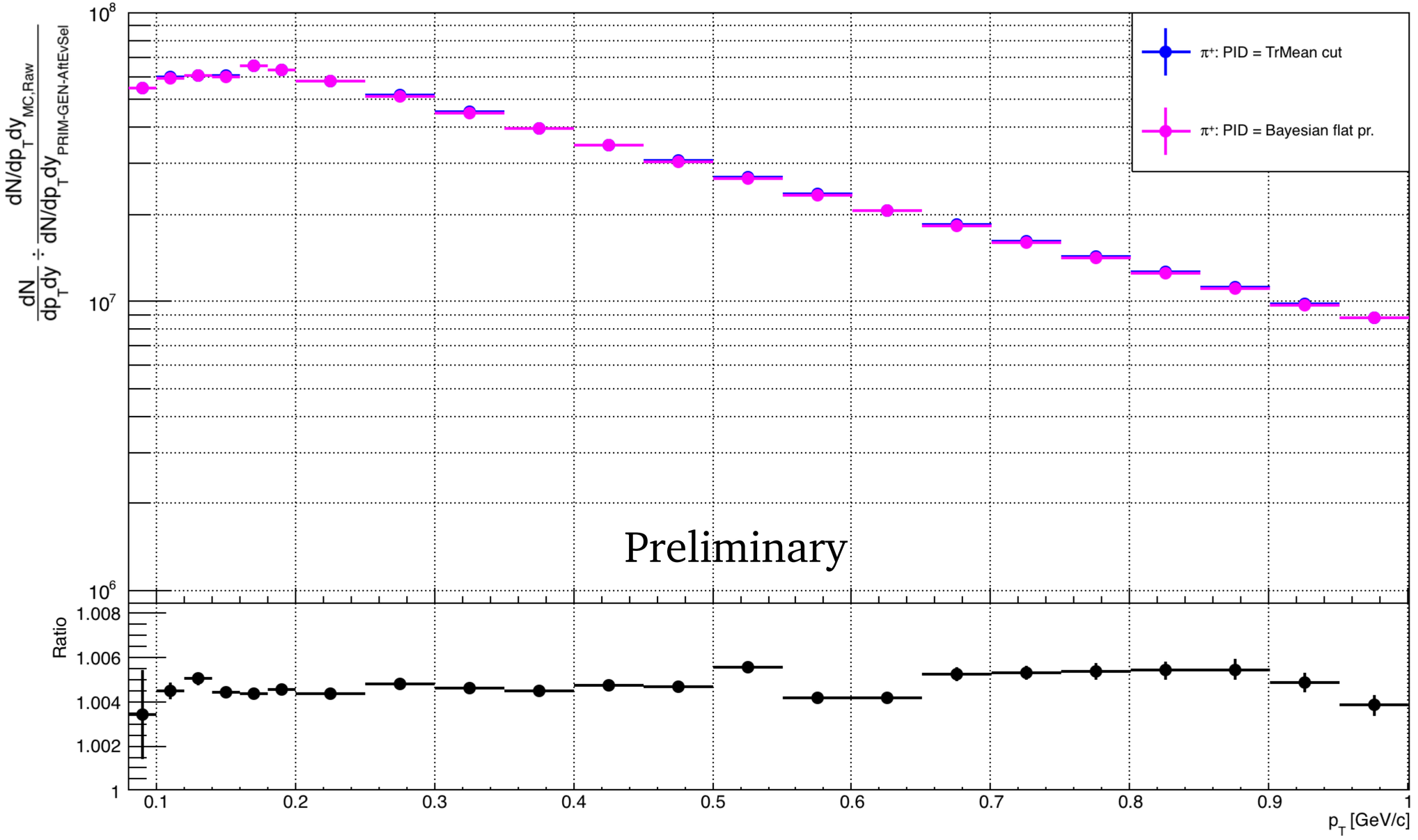
$$R(S|i) = \prod_{SDD,SSD} f_{Ni}(s|i) \quad (1)$$

Finally, we make use of the Bayes' theorem in order to get the probability for a track with a set signals S of being of type i:

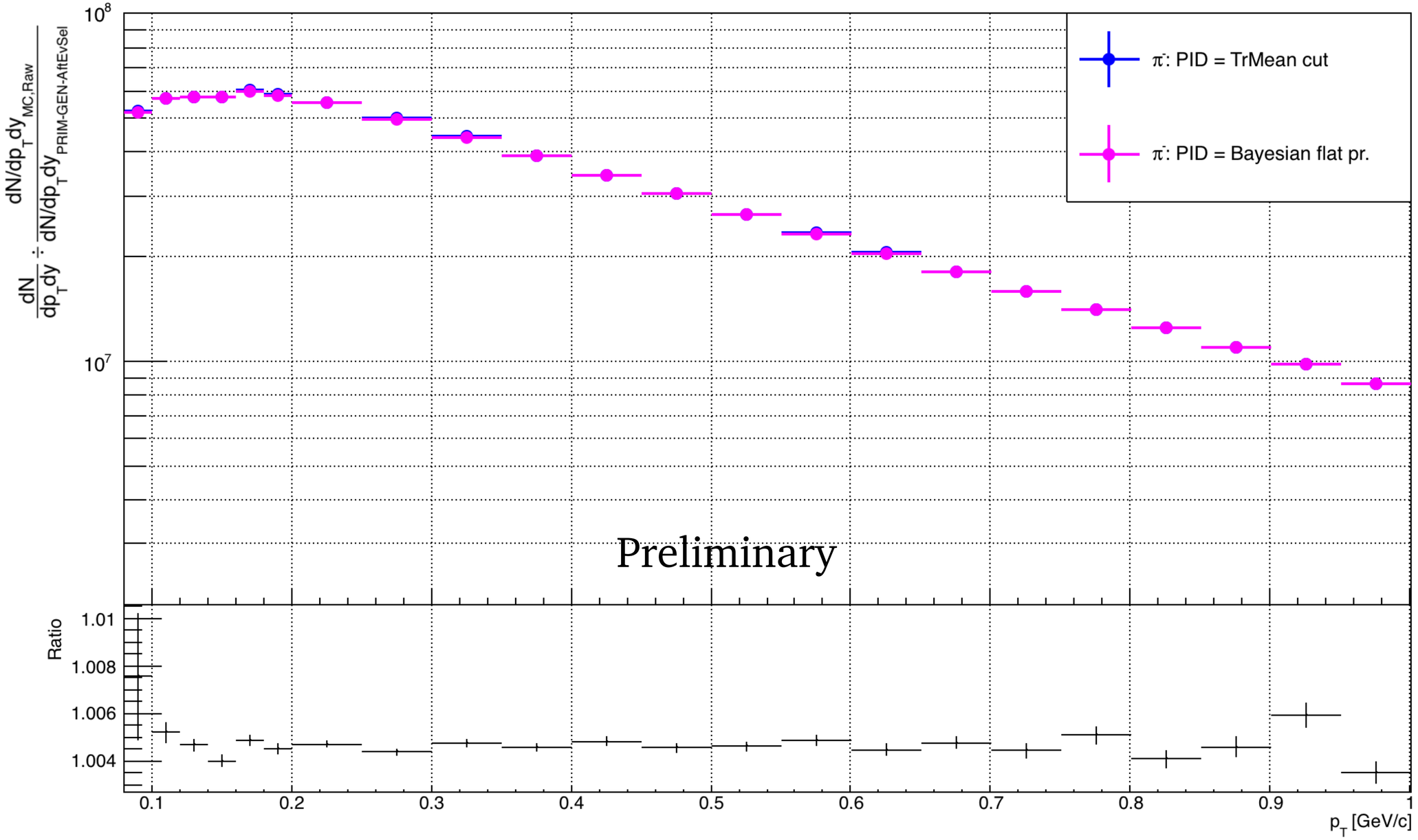
$$P(i|S) = \frac{R(S|i)\Pi(i)}{\sum_{t=\pi,K,p} R(S|t)\Pi(t)} \quad (2)$$

Taken from ALICE-ANA-2013-882

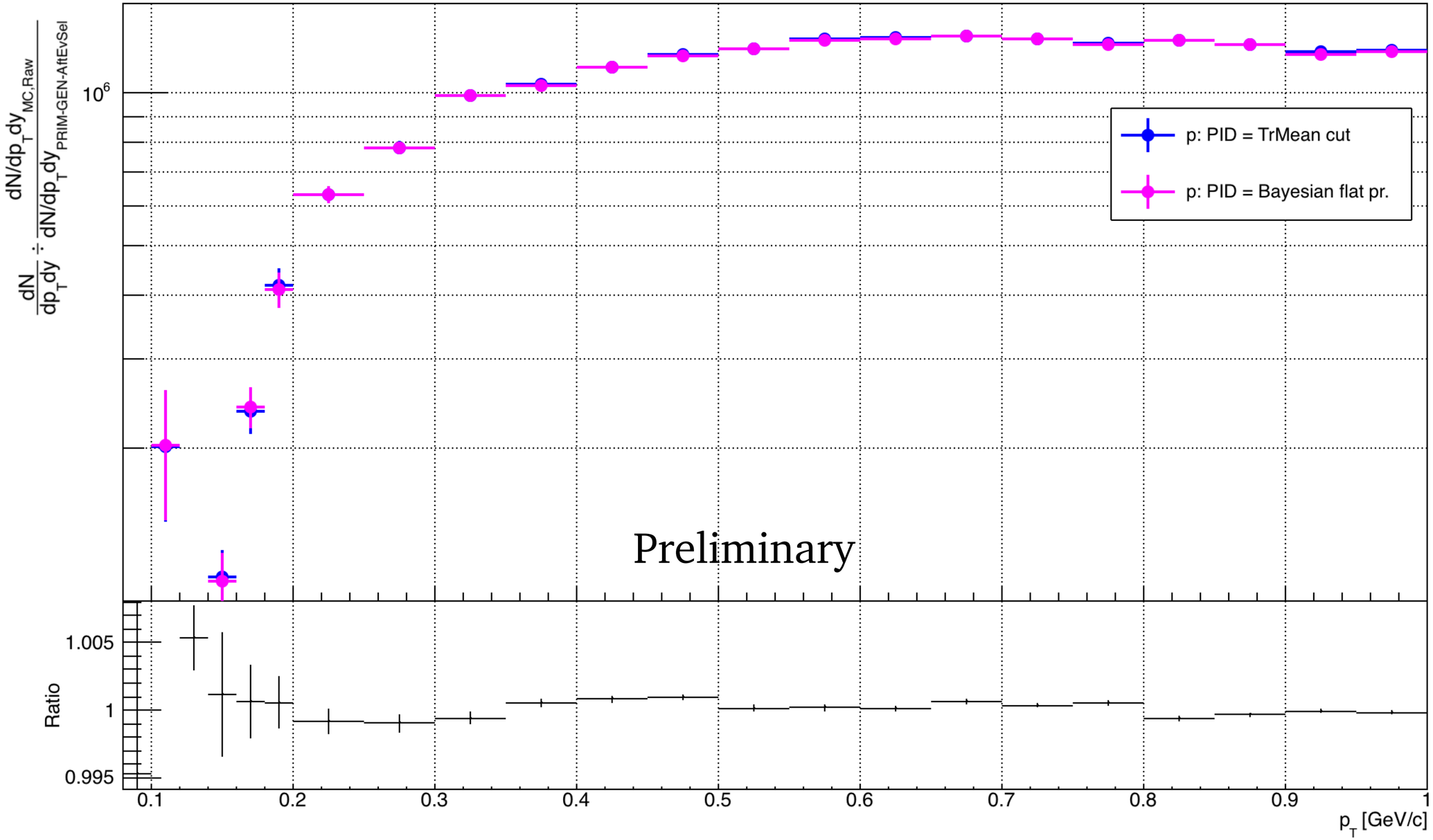
ITSsa: towards the PID systematics for π^+



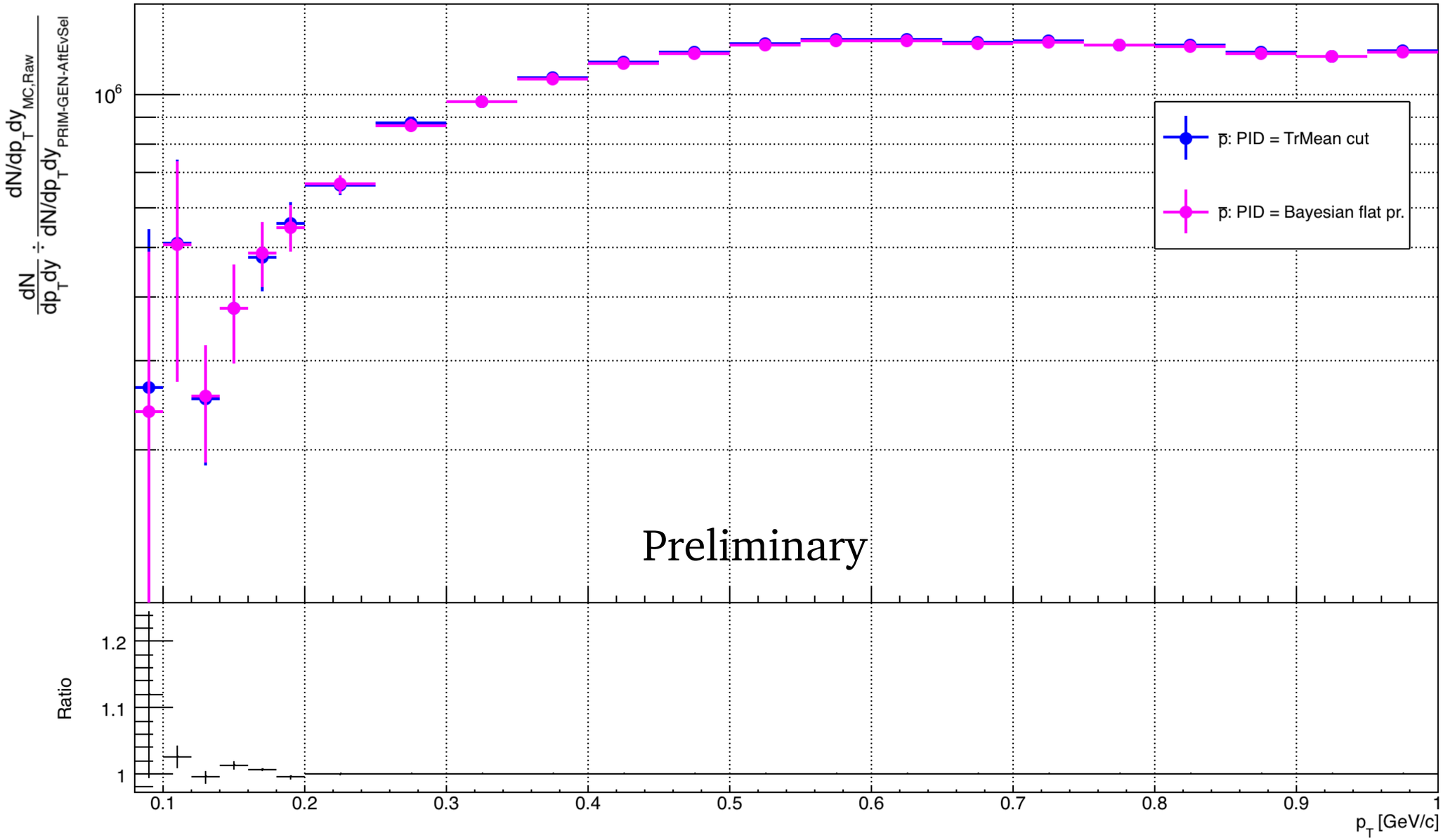
ITSsa: towards the PID systematics for π^-



ITSsa: towards the PID systematics for p



ITSsa: towards the PID systematics for anti-p



Next steps

- Complete the corrections (secondaries, feed down, etc);
- Calculate systematics for (PID, track cuts).