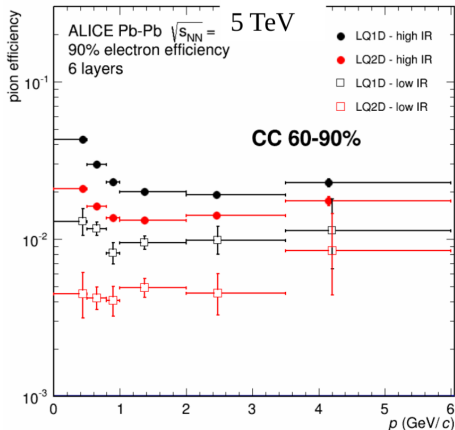
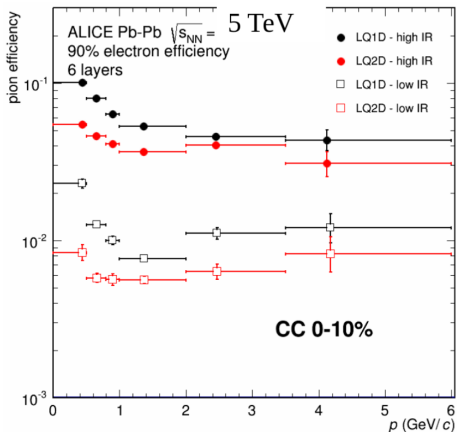


# Generation of TRD PID Reference Parameters for PbPb @ 5.04 TeV (LHC15o)

Katharina Garner, Universität Münster  
September 24, 2018

# Problem: Performance Differing for High and Low IR



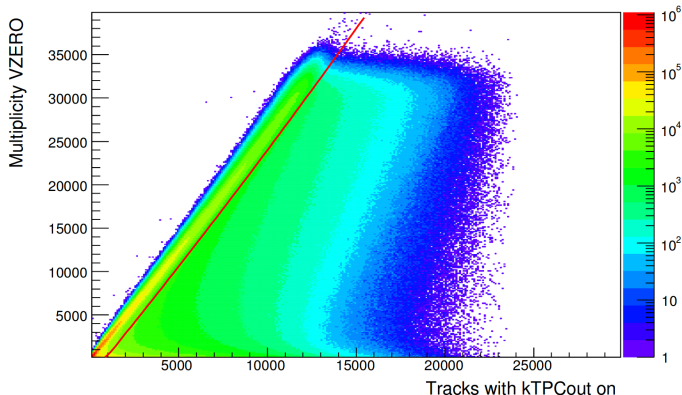
→ Introduce New Pile-Up Cut

(taken from [https://indico.cern.ch/event/590505/contributions/2382007/attachments/1383299/2105525/Pachmayer\\_trdPID\\_Oslo.pdf](https://indico.cern.ch/event/590505/contributions/2382007/attachments/1383299/2105525/Pachmayer_trdPID_Oslo.pdf), Y. Pachmayer)

# Utilisation of Further Pile-Up Cut

- V0 has lower readout time than TPC thus TPC sees more pile-up  
→ cut on multiplicity correlation of VZERO vs. TPCout
- exclude events towards the right of the red line defined by

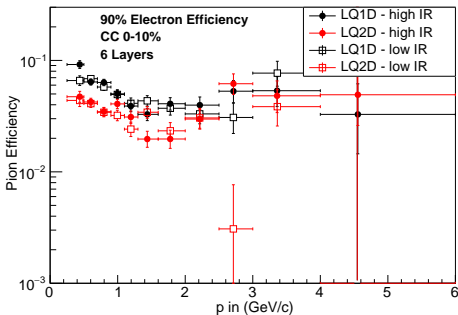
$$2 \cdot 10^{-5}(\text{kTPCout})^2 + 25(\text{kTPCout}) - 2200$$



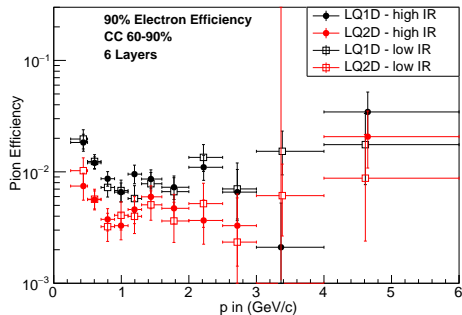
(taken from <https://alice-notes.web.cern.ch/node/592>, I.Arsene et al.)

# Performance With Additional Pile-Up Cut

LQ1(2)D\_5trl\_C0\_PionEffvsP



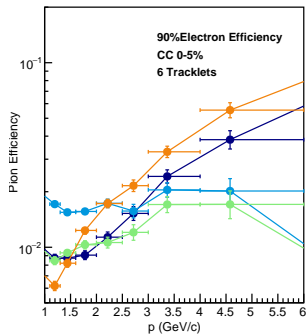
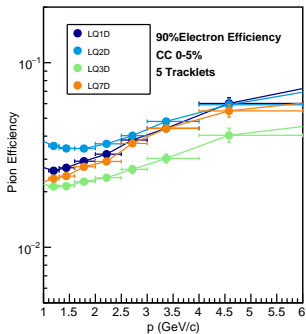
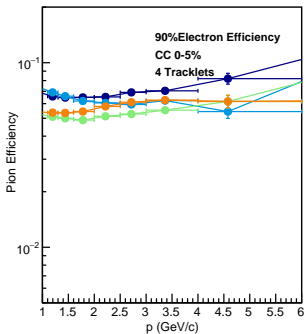
LQ1(2)D\_5trl\_C0\_PionEffvsP



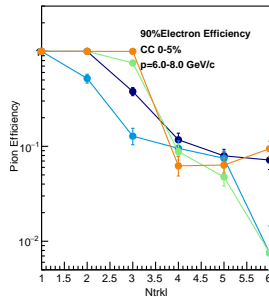
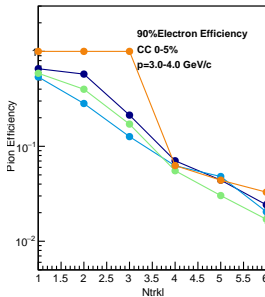
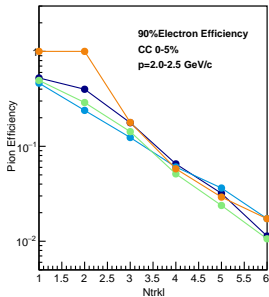
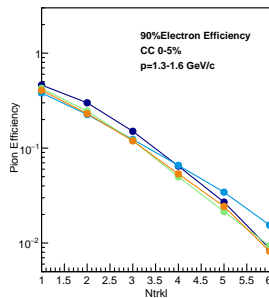
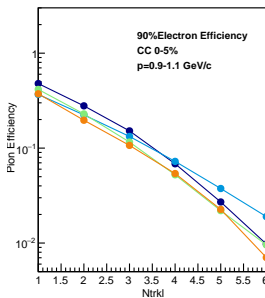
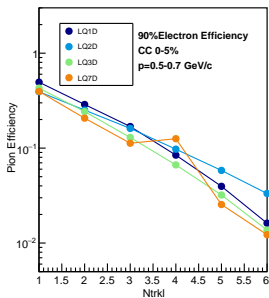
→ About 13 % of Event Multiplicity Cut Away  
(highIR: 13.6 %, lowIR: 0.1 %)

→ Roughly 4 Mio Events for Parameter Generation

# Performance wrt Particle Momentum



# Performance wrt Number of Tracklets



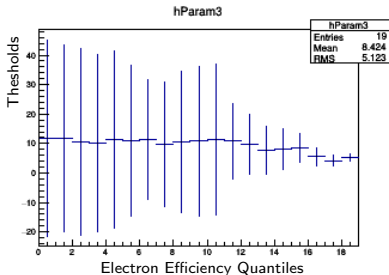
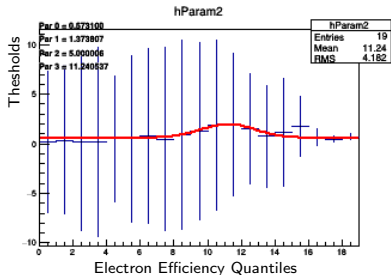
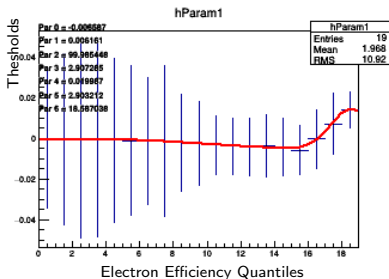
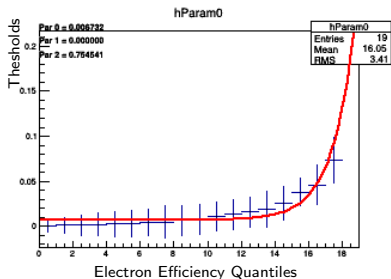
## Generation of Threshold Parameters

- derive charge loss  $Q$  distribution for each particle species from pure particle sample
- interpret multiplicity at  $Q$  as probability  $P(Q|e)$  that particle species loses  $Q$
- for each momentum interval derive likelihood distribution

$$\mathcal{L}(e|Q) = \frac{P(Q|e)}{P(Q|e) + P(Q|\pi)}$$

- derive thresholds determining at which  $\mathcal{L}(e|Q)$  to cut to get certain electron efficiency
- store fit function for threshold values vs.  $p$   
→ sometimes large fit outliers

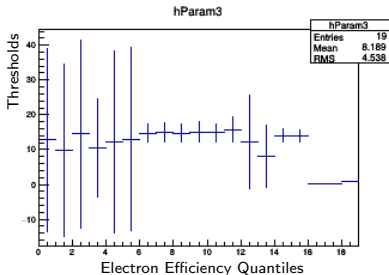
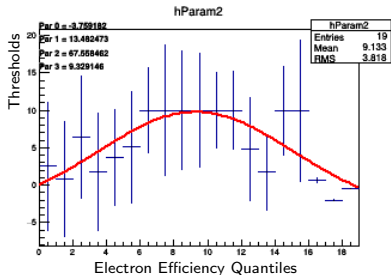
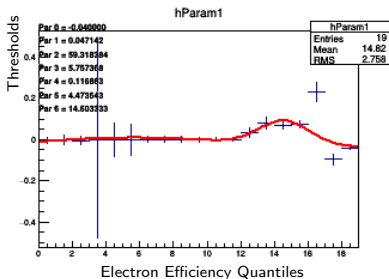
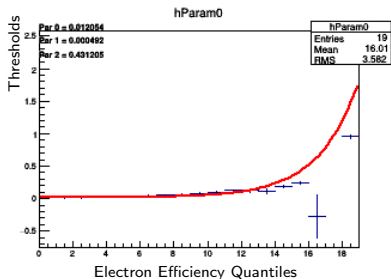
# Testing New Fit Methods for Fit of Threshold Parameters



Threshold Fit Function:  $f(p) = 1 - \text{Par0} - \text{Par1} \cdot p - \text{Par2} \cdot \exp(-\text{Par3} \cdot p)$

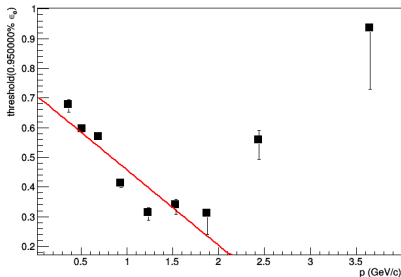


# Testing New Fit Methods for Fit of Threshold Parameters

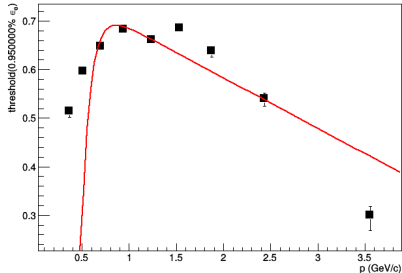


Threshold Fit Function:  $f(p) = 1 - \text{Par0} - \text{Par1} \cdot p - \text{Par2} \cdot \exp(-\text{Par3} \cdot p)$

# Testing New Fit Methods for Fit of Threshold Parameters



(3 Tracklets, LQ2D, CC=40-60%)



(5 Tracklets, LQ1D, CC=0-5%)

## Ideas:

- fix fitparameters to parameters from fit of previous electron efficiency quantile
- fit fitparameters vs. electron efficiency quantiles; fit quantiles again and fix to result from fit to parameters
  - so far better  $\chi^2$  but less good performance but kept in mind

# Summary

- new pile-up cut alignes performances for low and high interaction rates for LHC15o  
→ TRD PID reference parameters soon uploaded to AliPhysics
- new fit methods for thresholds under investigation but so far less good performance

## **reconstruction passes:**

high IR: pass1\_pidfix

245232, 245231, 245152, 245151, 245146, 245145

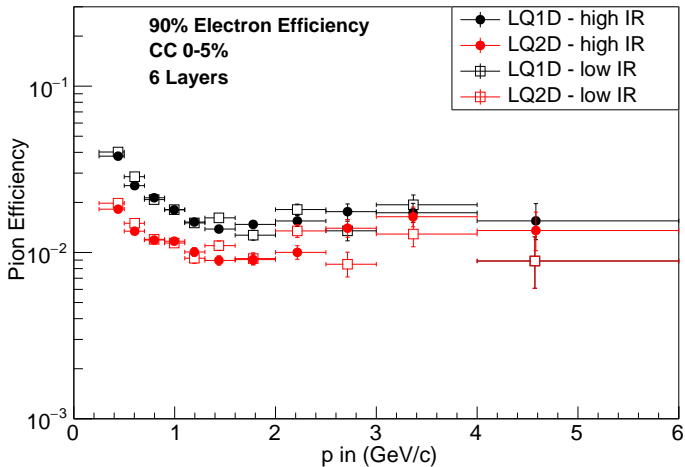
low IR: pass3\_pidfix

244918, 244975, 244980, 244982, 244983, 245064, 245066, 245068,  
246391, 246392

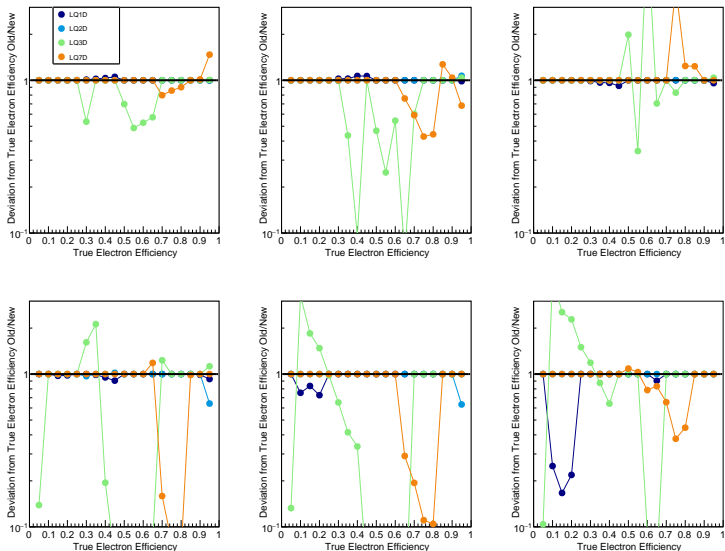
# BACKUP

# Performance With Additional Pile-Up Cut

LQ1(2)D\_5trl\_C0\_PionEffvsP



# Deviation: True Electron Efficiency for Old and New Threshold Fit Method



(values < 1 point to worse performance of new fit method)