PID

Joerg Reinhold

TOF

- For historical (?) reasons beta-beta_K
- Only proper for particle of interest; esp. proton distribution is distorted.
- Better (?) m_h(TOF,p); should give gaussian distributions for all 3 particles

Cherenkovs

Various methods:

- Npesum<x
- Likelihood (Paul)
- Renormalize distributions (Tomislav) & Npesum<x

Npesum<x

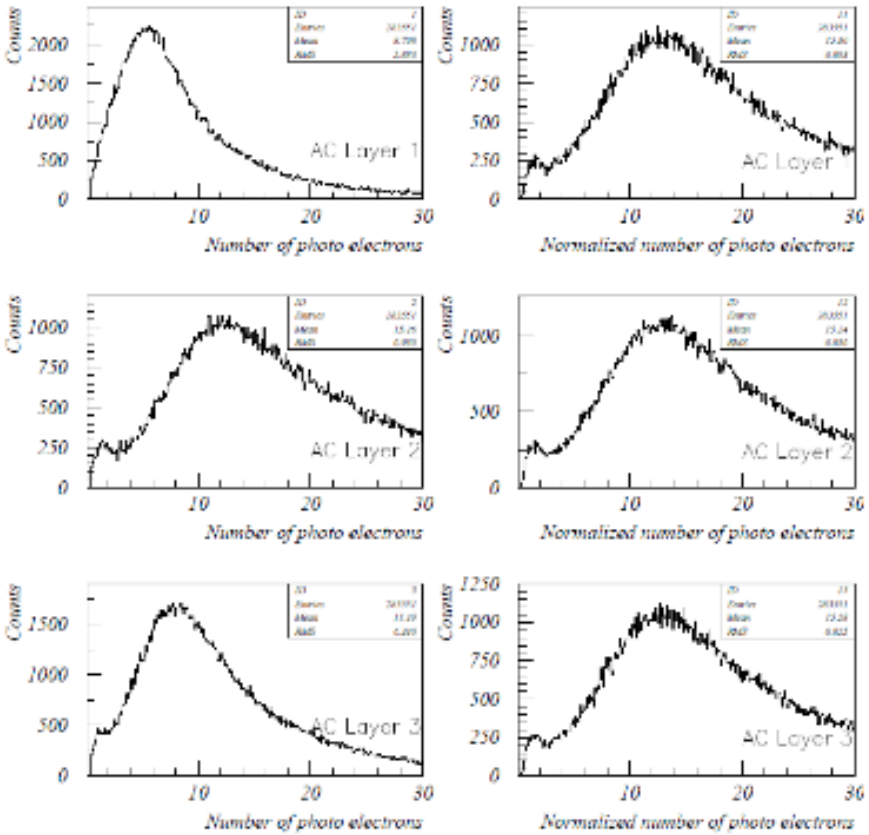
Issues:

- Performance of layers and segments differs.
- Position dependence (hits along the walls).

Better:

- 2/3 or discard hits on edges based on tracking

Cherenkov renormalization (Tomislav)

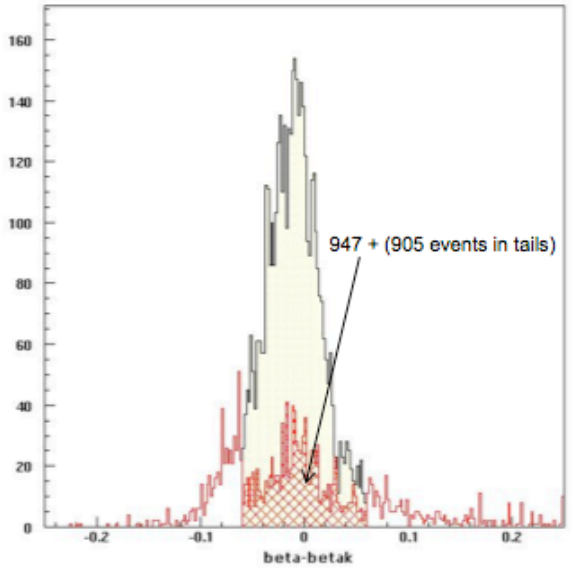


Likelihood

Paul May 2009:

Yellow distribution – Kaons selected by Standard PID

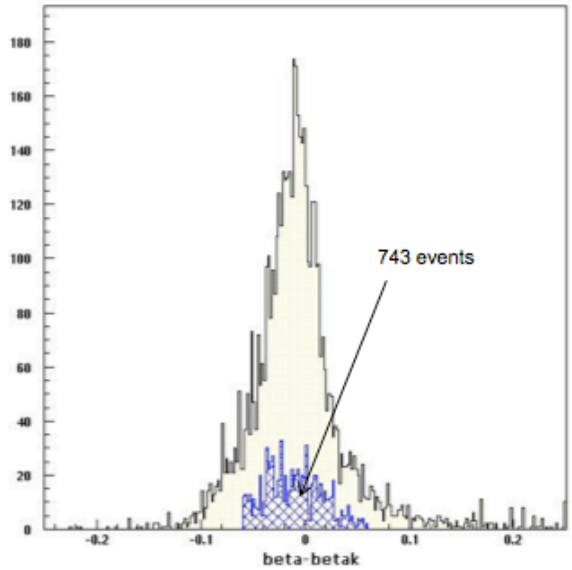
Red distribution – **Recovered** Kaons selected by Likelihood & No Standard PIDs



Indication of Kaon recovery not only in the tails, but under the standard beta-betak distribution

Yellow distribution – Kaons selected by Likelihood PID

Blue distribution – **Recovered** Kaons selected by Standard & No Likelihood PIDs



Presence of Kaons recovered by standard PID approach, where Likelihood method failed.

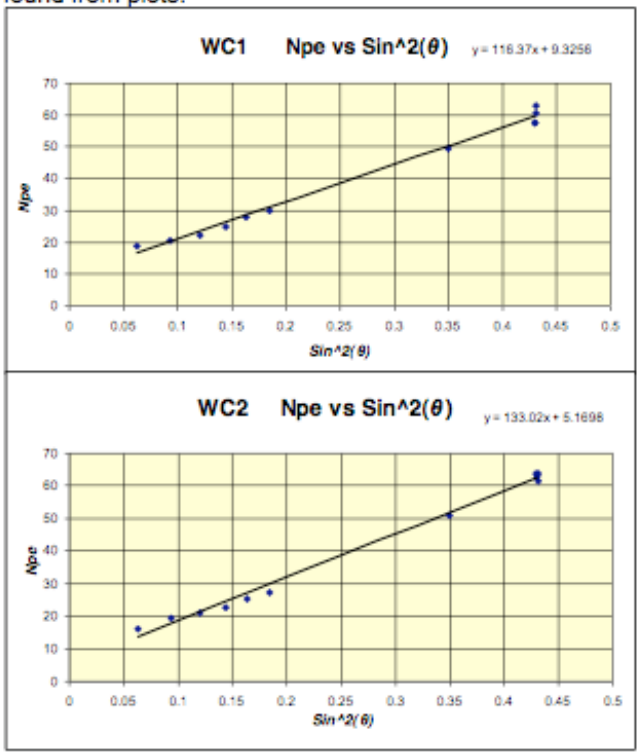
Likelihood works, but has not yet shown to be superior to naïve cuts. However, there are things we can learn from it.

WC Cuts Momentum dependent

Due to low Kaon yield, we extract Kaon's Npe from

$$Npe = N_0 \cdot \sin^2(\theta) = N_0\left(1 - \frac{p^2 + m^2}{n^2 p^2}\right)$$

Kaons are described by Poisson function with mean value found from plots.

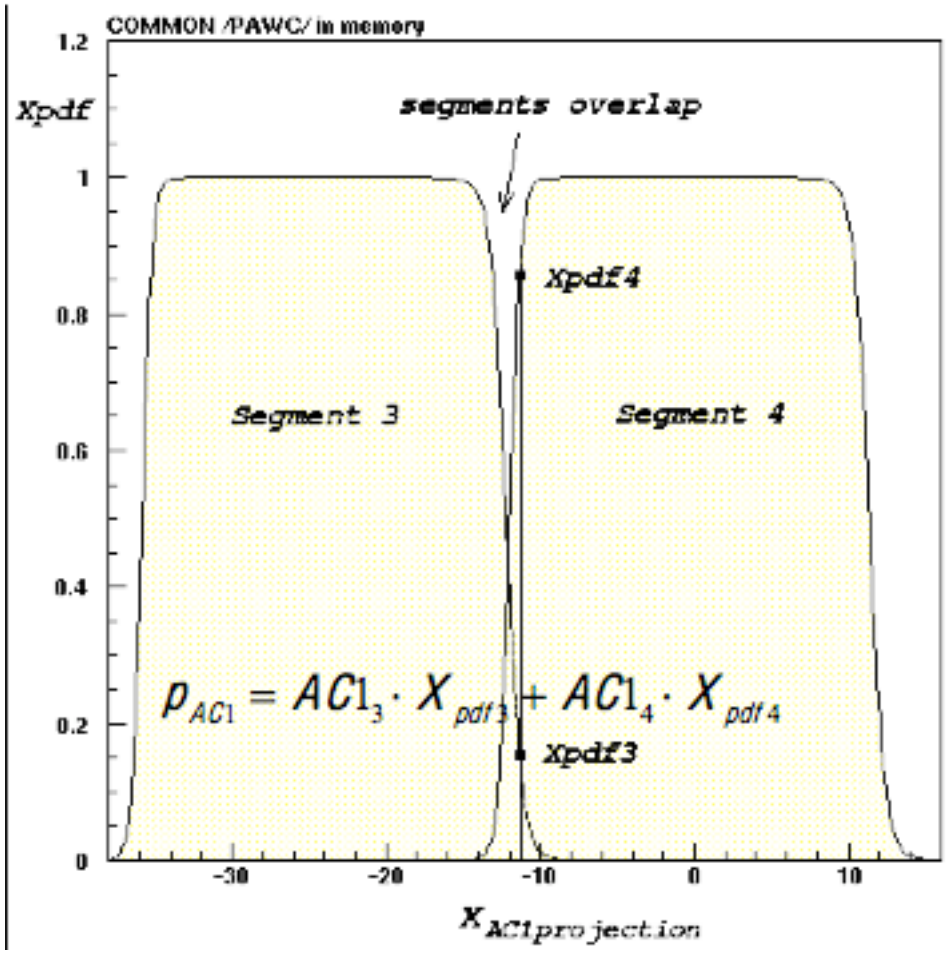


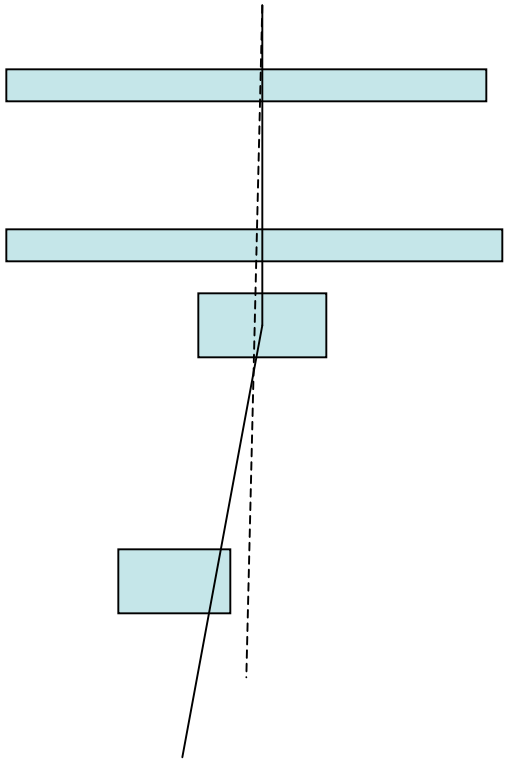
Suggestion:

- Plot N0 for each segment
- Use Tomislav's renormalization
- Uniform cut across focal plane
- Also would allow for easier likelihood PID (?)

Paul, May 2009

Link Tracks


COMMON /PAWC/ in memory
Xpdf
segments overlap
Xpdf4
Segment 3
Segment 4
$p_{AC1} = AC1_3 \cdot X_{pdf3} + AC1_4 \cdot X_{pdf4}$
Xpdf3
1.2
1
0.8
0.6
0.4
0.2
0
-30
-20
-10
0
10
$X_{AC1projection}$



To Do List
(Arthur, Arshak, and Jason)

AC:

- Check calibrations & update PARAM files
- Check detector track alignment & slops
- find centroid for pions for each PMT & segment sum as function of run# and beam I.

WC:

- Check calibrations & update PARAM files
- For pions and protons find momentum corrected centroids or N0 for each PMT & segment sum as function of run # and beam I.

CH2 Energy Loss Calibration

Singles rate $R \propto \rho \cdot \mathrm{d}$

Coin rate $R \propto (\rho \cdot \mathrm{d})^2$

monitor rates corellated with raster position

$\rho d(x,y,t) \propto R(x,y,t)$