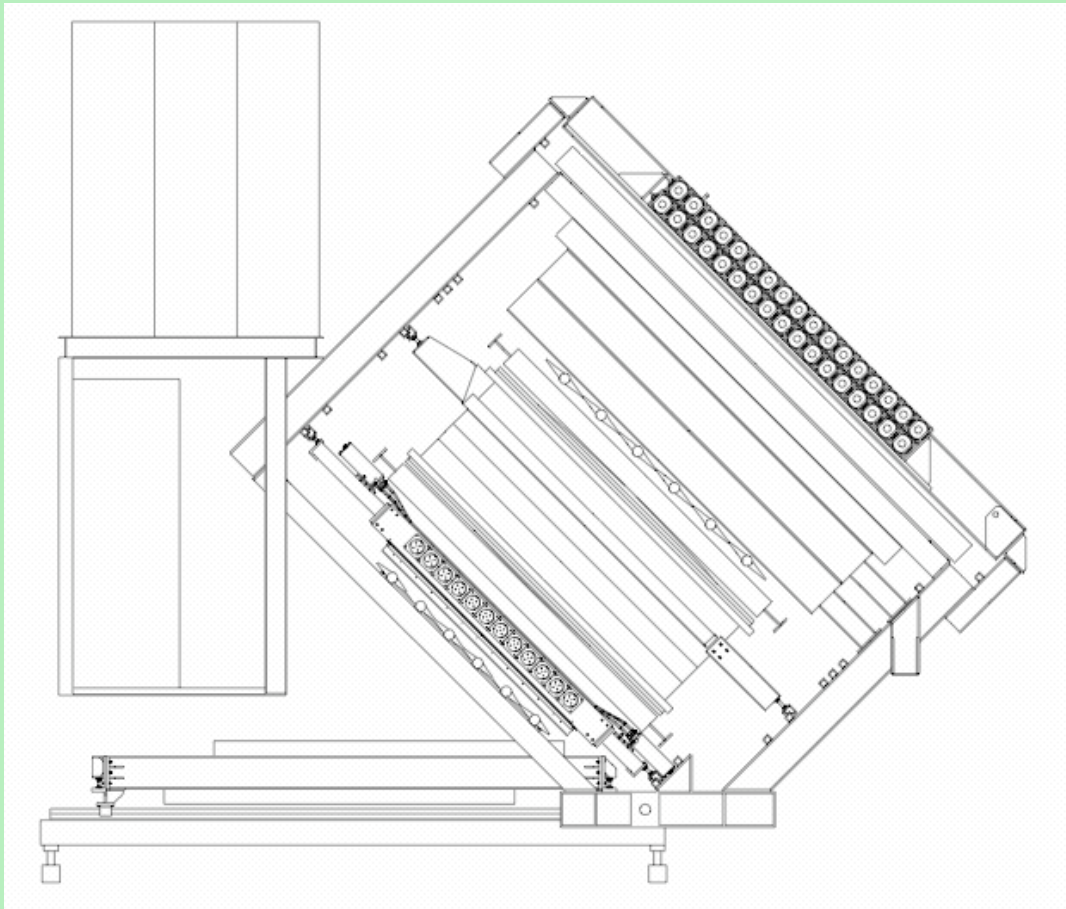


# Particle ID in HRS for $e, e' \pi(K)$

Bogdan Wojtsekhowski

- ⊙ The issues:  $e/\pi$  rejection online, PID stability
- ⊙ Examples of PID with A1/A2 counters and ToF in HRS
- ⊙ Preparation for Transversity

# Structure of HRS-L detector package



VDCs

S1

A2

S0

RICH

Short GC

S2m

C-12

FPP

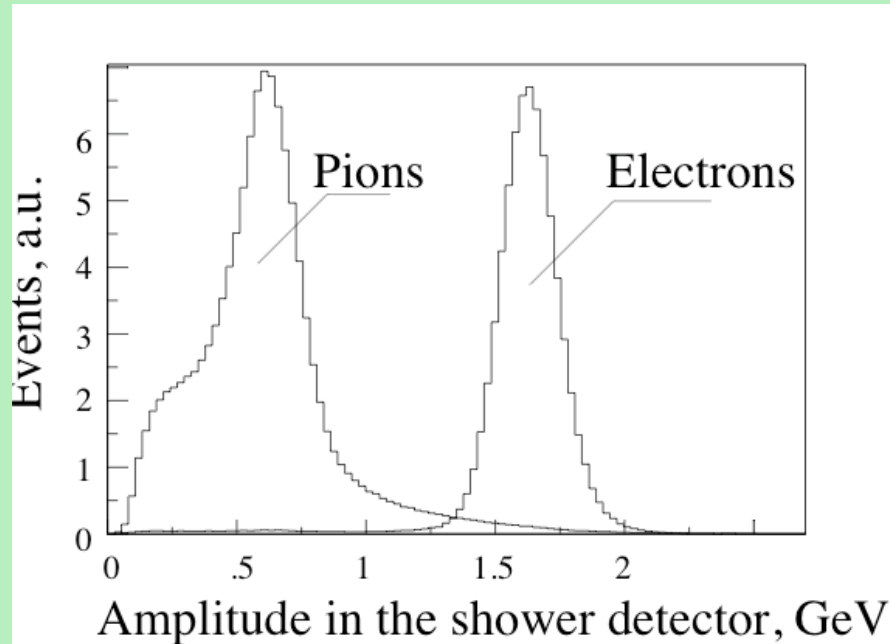
FPP

Lead-glass

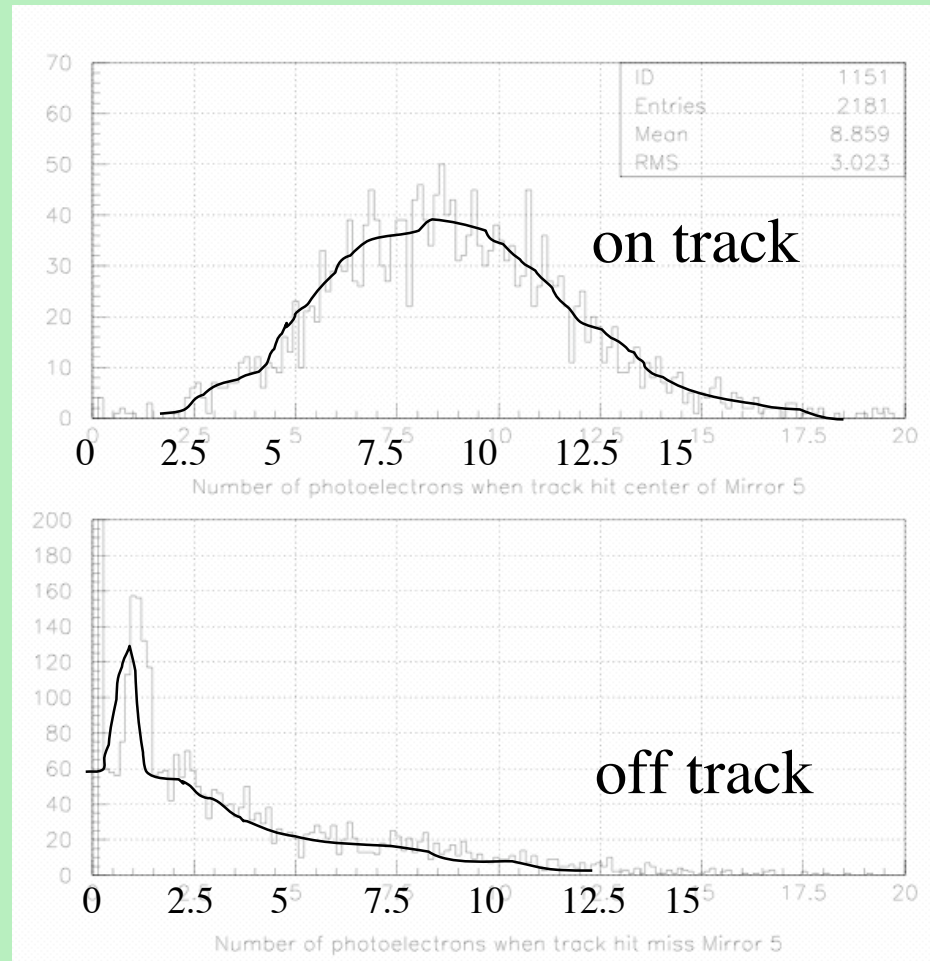
# Shower and Gas Cerenkov PID for HRS detector

## Gas Cerenkov

### Shower total amplitude

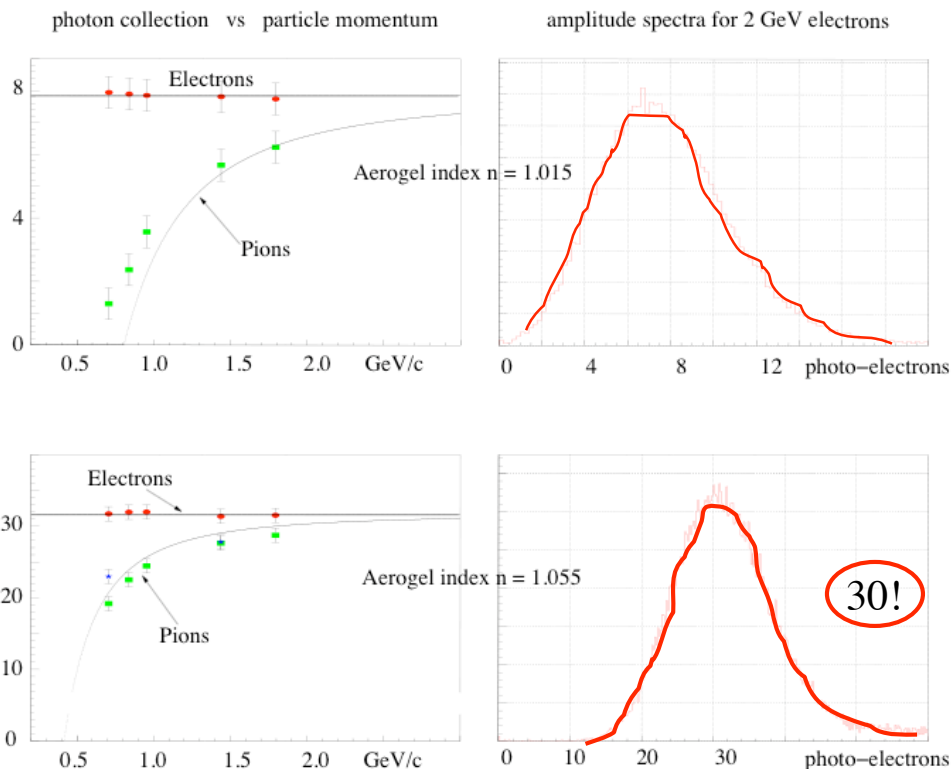
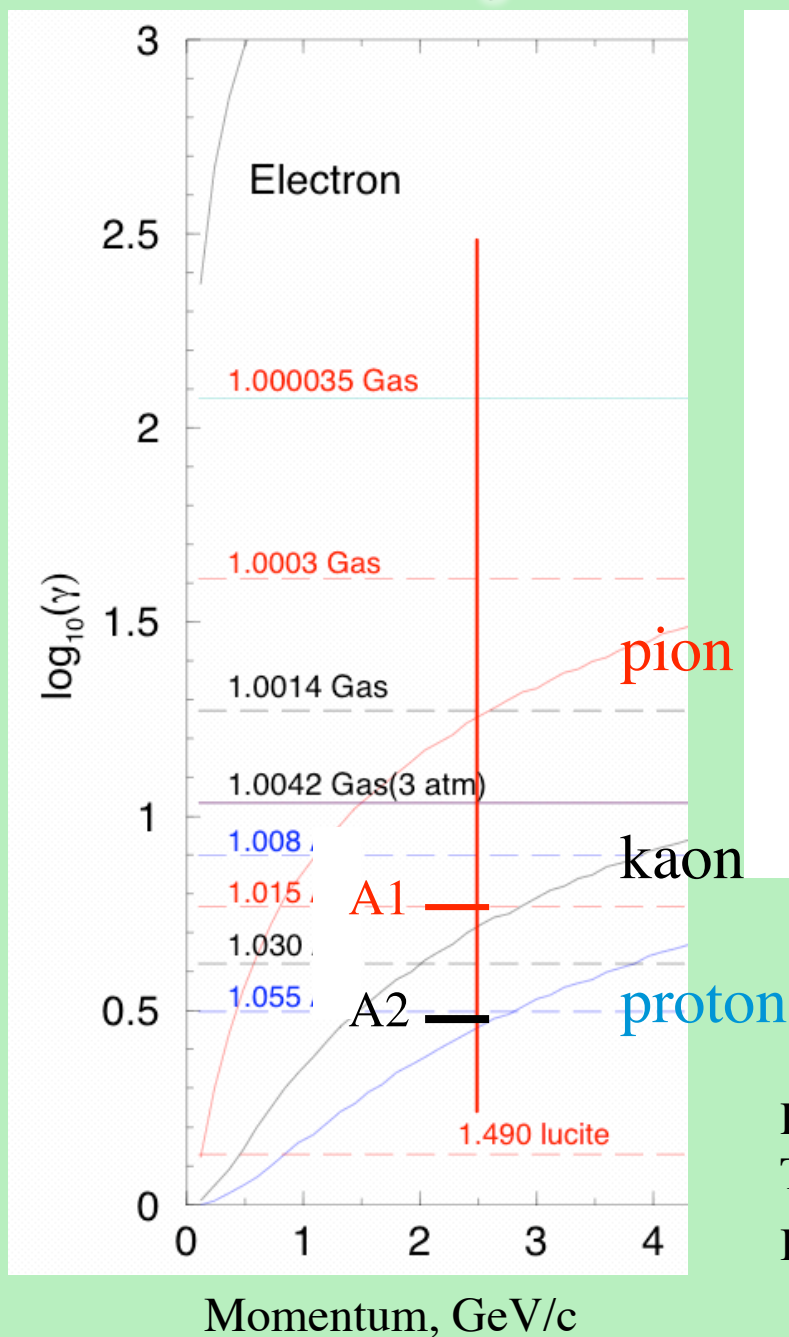


Electron rejection vs Pion eff.  $\sim 50/95\%$



Electron rejection  $\sim 1/(P_0+P_1) = 350$

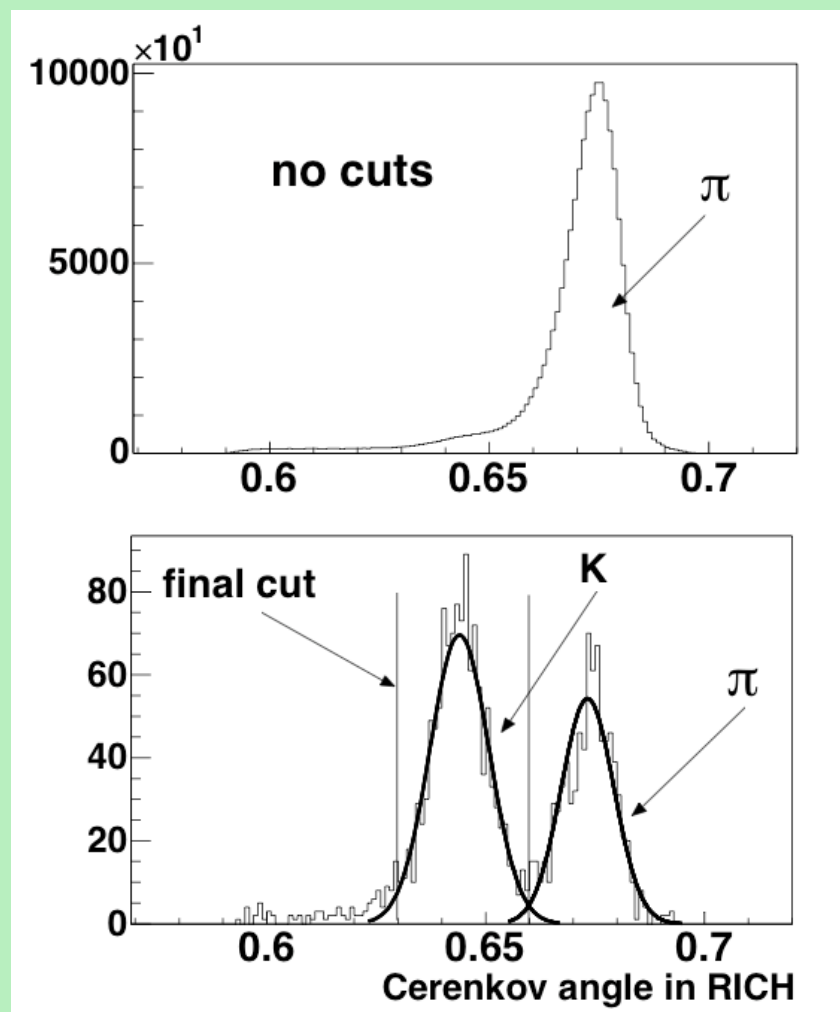
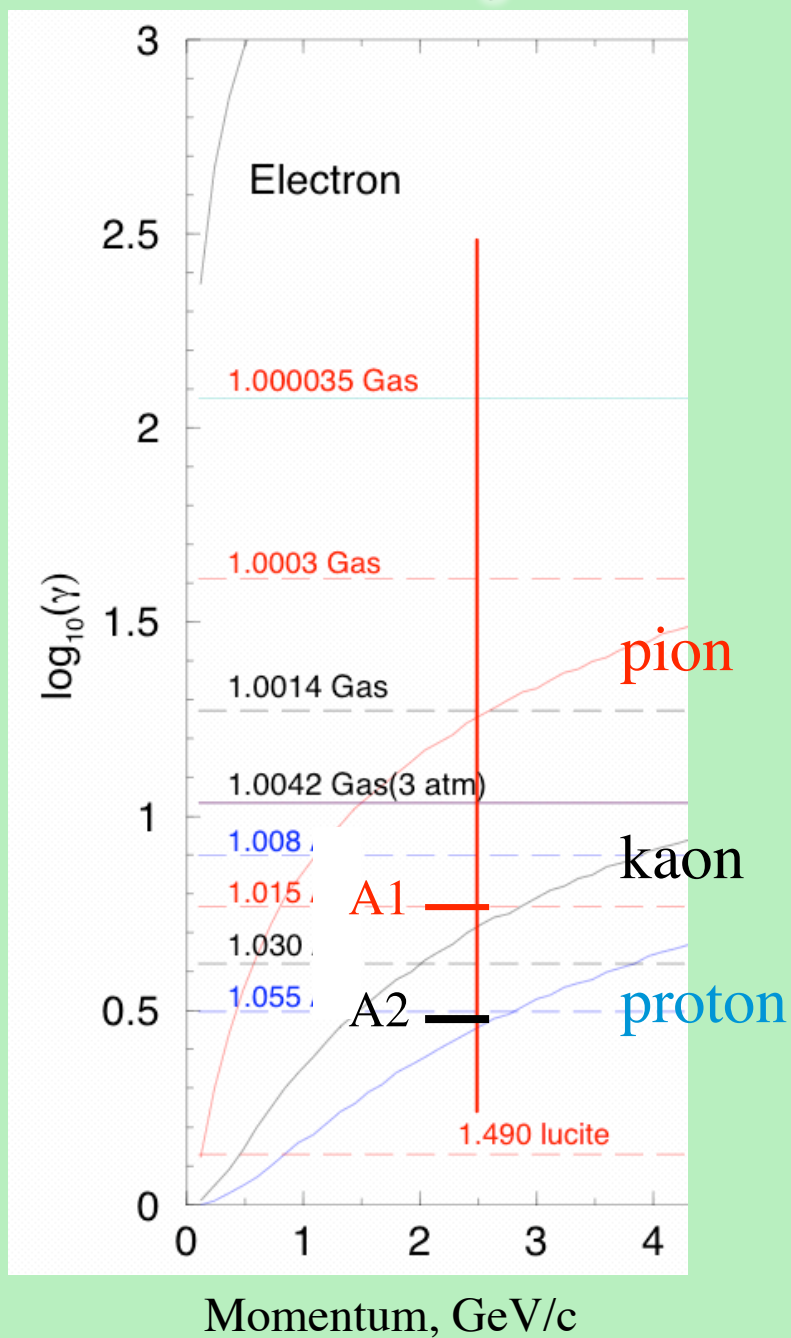
# Aerogel Cerenkov PID for HRS detector



Do you need A2 ? It is only for rejection of the protons  
The proton yield is < 1/10 of the pion one.

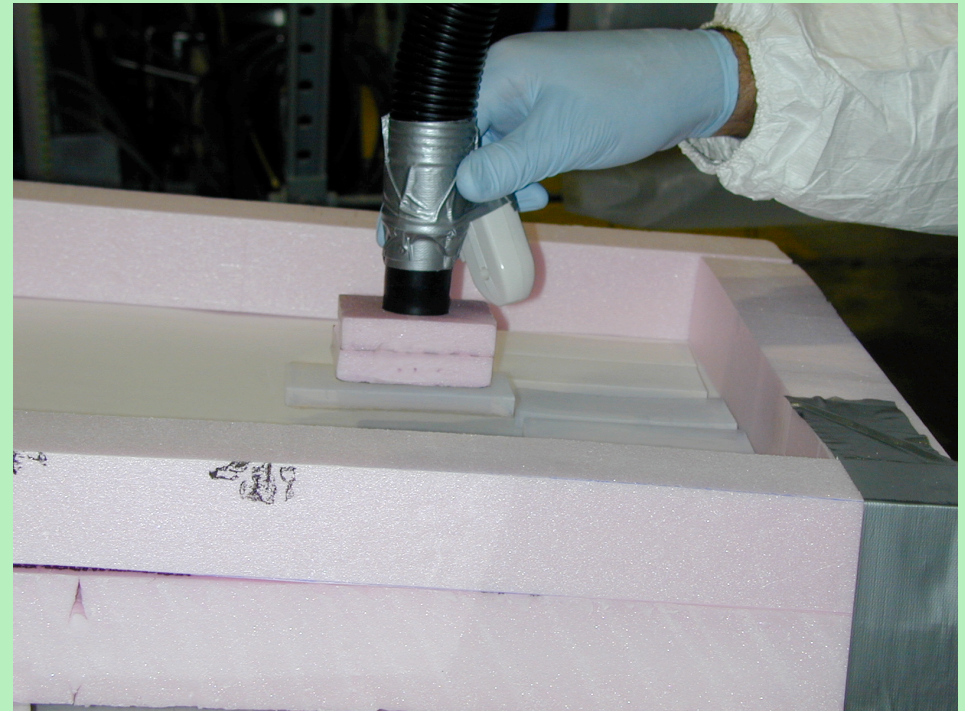
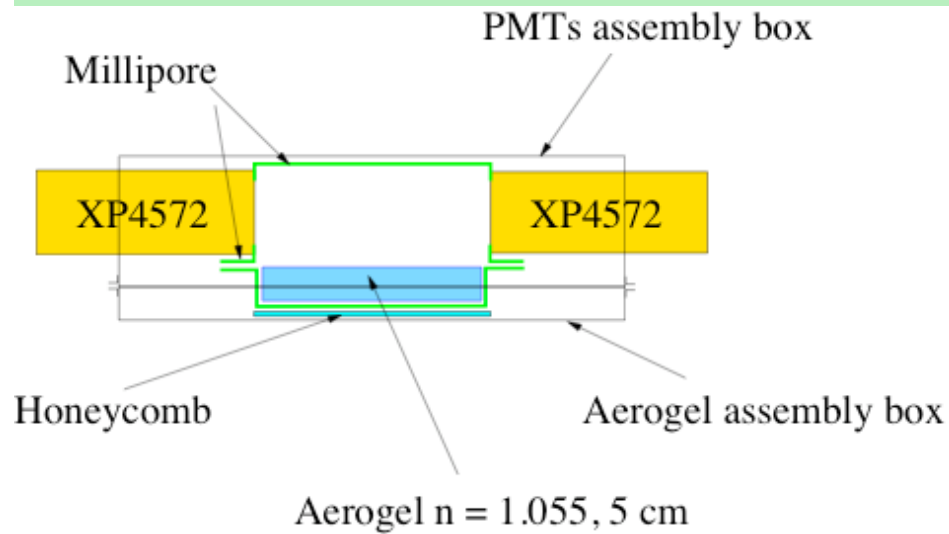
Better if the aerogel "1.055" replaced by "1.030"

# Aerogel Cerenkov PID for HRS detector



PID in 5q search ( $P \sim 1.5\text{-}2 \text{ GeV}/c$ )  
 Pion rejection in A1&A2  $\sim 200$

# Aerogel Cerenkov Counters for HRS detector

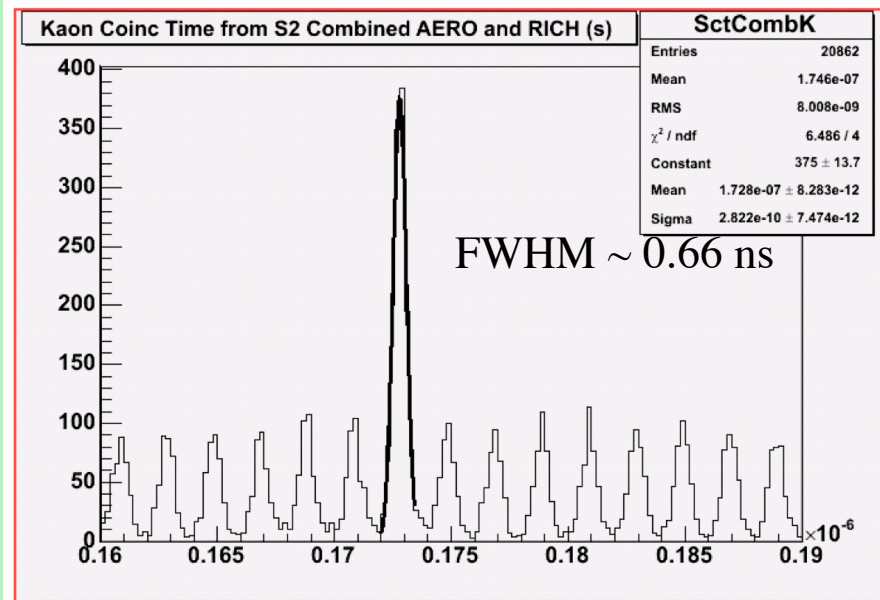


“vacuum hand” moves  
the  $n=1.015$  aerogel block

# Time-of-Flight and Beta PID for HRS detector

S2m & S2m

at  $L \sim 1-2 \times 10^{38}$  and HRS at  $6^\circ$



$\pi$  K p

For 2.5 GeV/c time differences:

$e - \pi \sim 0$  - need GC+LG

$\pi - K \sim 1.6$  ns  $\rightarrow 5 \sigma \sim 30$  rejection

$K - P \sim 4.4$  ns  $\rightarrow 15 \sigma$

At trigger rate of 1 kHz in HRS for  $L \sim 10^{37}$  and HRS at  $16^\circ$   
4+ ns beam structure allows good PID with TOF - accidental  
pions will be 2.4+ ns after kaons

# Summary

- ⊙ Rejection of the electrons  $\sim 1000$  - by Gas Cer & Lead-glass
- ⊙ Rejection of the protons  $\sim 100$  - by a cut on  $A2 > 2$  ph.electron
- ⊙ Rejection of the pions in kaon sample  $\sim 200$  - by a cut on  $A1\&A2$
- ⊙ Time-of-flight with 4 ns beam structure provides a simple and reliable PID for the luminosity which will be used for the Transversity experiment