Identifying $\gamma p \rightarrow \pi\pi KKp$

- Three Steps:
  - Find the proton
  - Find a Kaon
  - Identify the rest of the event
- Six Different Geometries:
  - No Cerenkov - C4F10 at 1ATM (n=1.0030)
  - Aerogel (n=1.01) - C4F10 at 2ATM (n=1.0045)
  - C4F10 (n=1.0015) - DIRC

Geometry Details

- BCAL TOF
  - 250ps resolution
  - 0.5% length resolution, 1% momentum resolution
- CDC dE/dx
  - 10% resolution (regardless of track length)
- FDC dE/dx (new)
  - 10% resolution (regardless of track length)
- Forward TOF
  - 70ps resolution
  - 0.5% length resolution, 1% momentum resolution

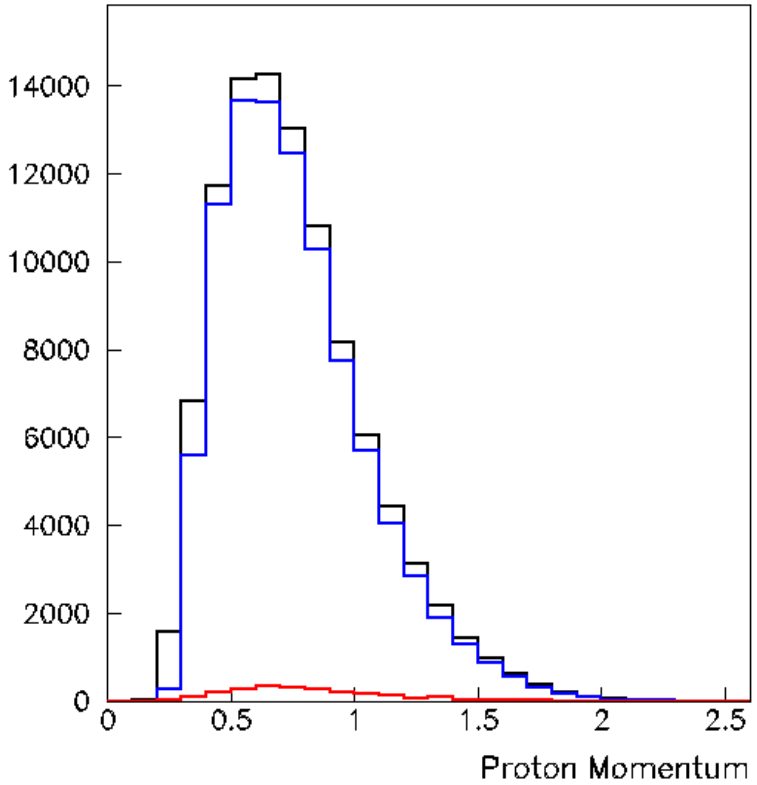
Geometry Details (cont.)

- Threshold CKOV options:
  - Pathlength ~80cm for gas options
  - Pathlength ~5cm for aerogel option
  - Npe = N0 * Pathlength * Sin2θ
  - N0 = 22cm-1
- DIRC option:
  - Angular resolution = 2.1mrad
  - Quartz (n=1.45)
  - (no material in GEANT)

Algorithm Details (step I)

- Start with the final state x-x-x+x+x+.
- Step I. Pick out the proton among the x+.
  - Require chi2pi > 3.84 (reject pi at 95% CL)
  - Require chi2K > 3.84 (reject K at 95% CL)
  - Require chi2p < 3.84

Starting Momentum
Correctly Identified Proton
Found Wrong x+

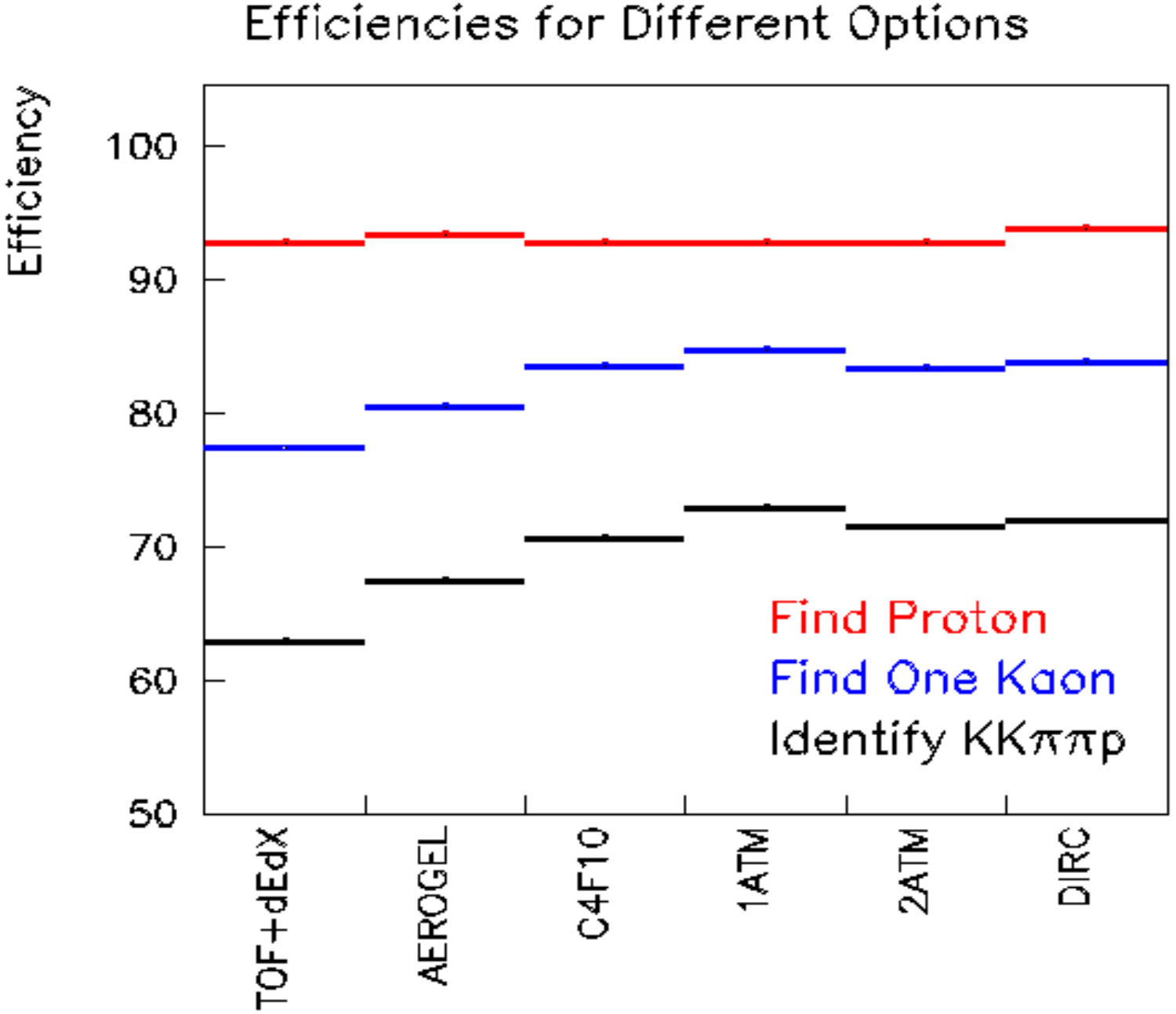


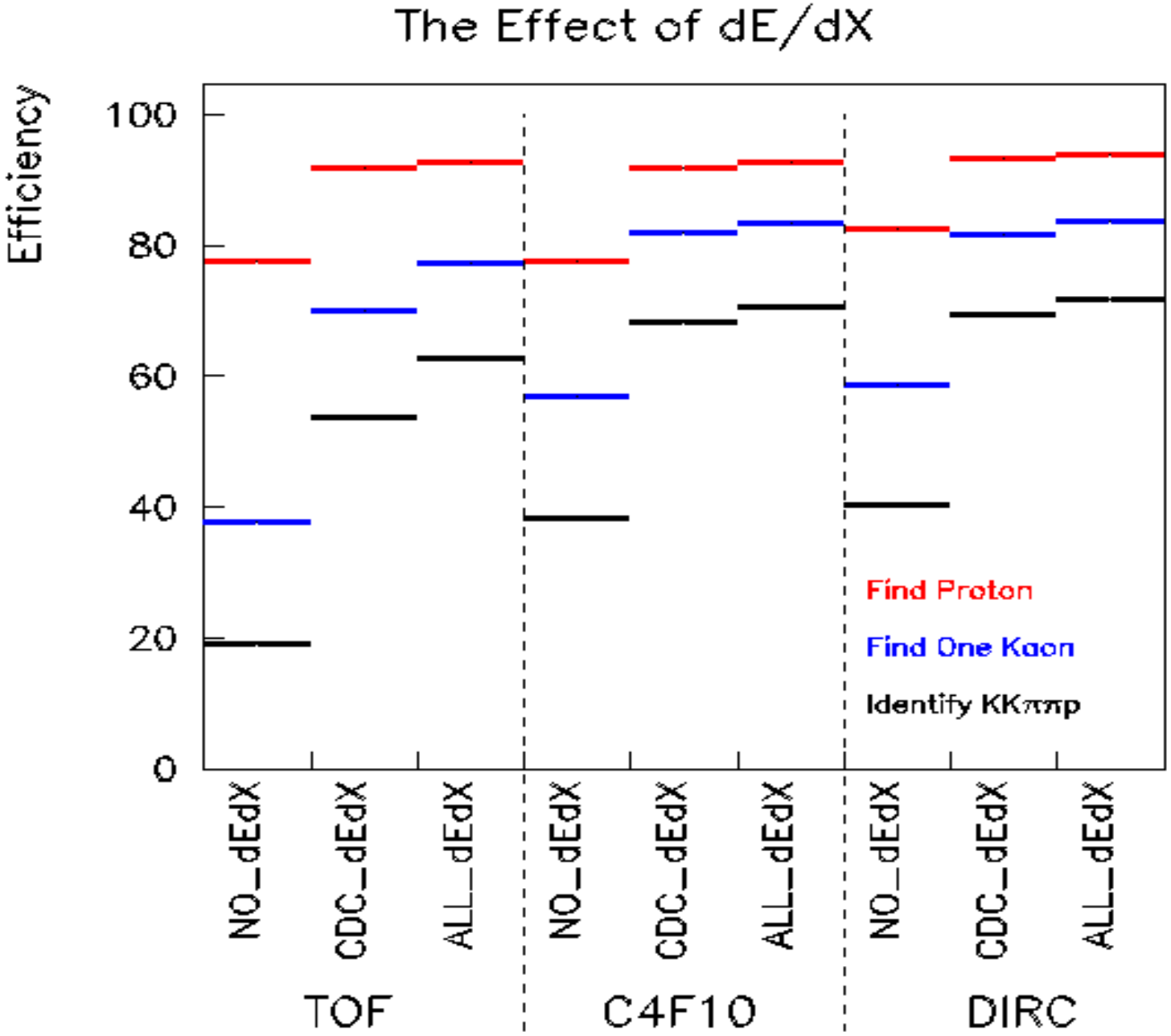
Algorithm Details (step II)

- Now we have x-x-x+x+p.
- Step II. Find a Kaon among the remaining x.
  - Find the most likely candidate.
  - Require chi2pi > 3.84 (reject pi at 95% CL)
  - Require chi2K < 3.84
- Now we have x-K-x+x+p or x-x-x+K+p.

Algorithm Details (step III)

- Suppose we have x-x-x+K+p.
- There are only three combinations left for the remaining x's (ignoring Kshort and Lambda):
  - K-pi-pi+
  - pi-K-pi+
  - K-K-K+
- Step III. Find the most likely of these by rejecting the other two at 95%CL.


Efficiencies for Different Options
Efficiency
100
90
80
70
60
50
Find Proton
Find One Kaon
Identify KKππp
TOF+dEdX
AEROGEL
C4F10
1ATM
2ATM
DIRC


The Effect of dE/dX
Efficiency
100
80
60
40
20
0
Find Proton
Find One Kaon
Identify KKπpp
NO_dEdX
CDC_dEdX
ALL_dEdX
NO_dEdX
CDC_dEdX
ALL_dEdX
NO_dEdX
CDC_dEdX
ALL_dEdX
TOF
C4F10
DIRC