Detectors for Strangeness Physics at Higher Energies

Joerg Reinhold
Florida International University & Jlab

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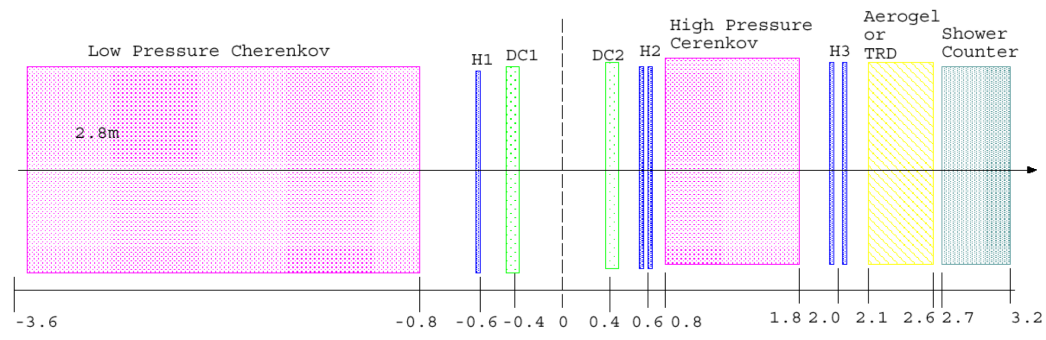
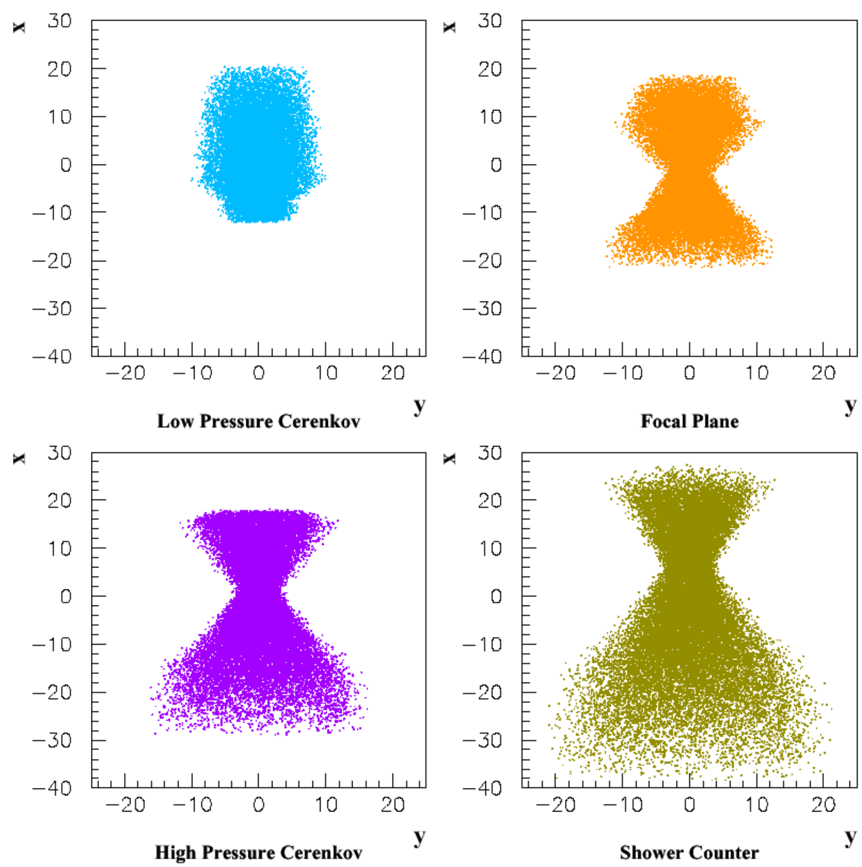
Relevant Spectrometer Parameters

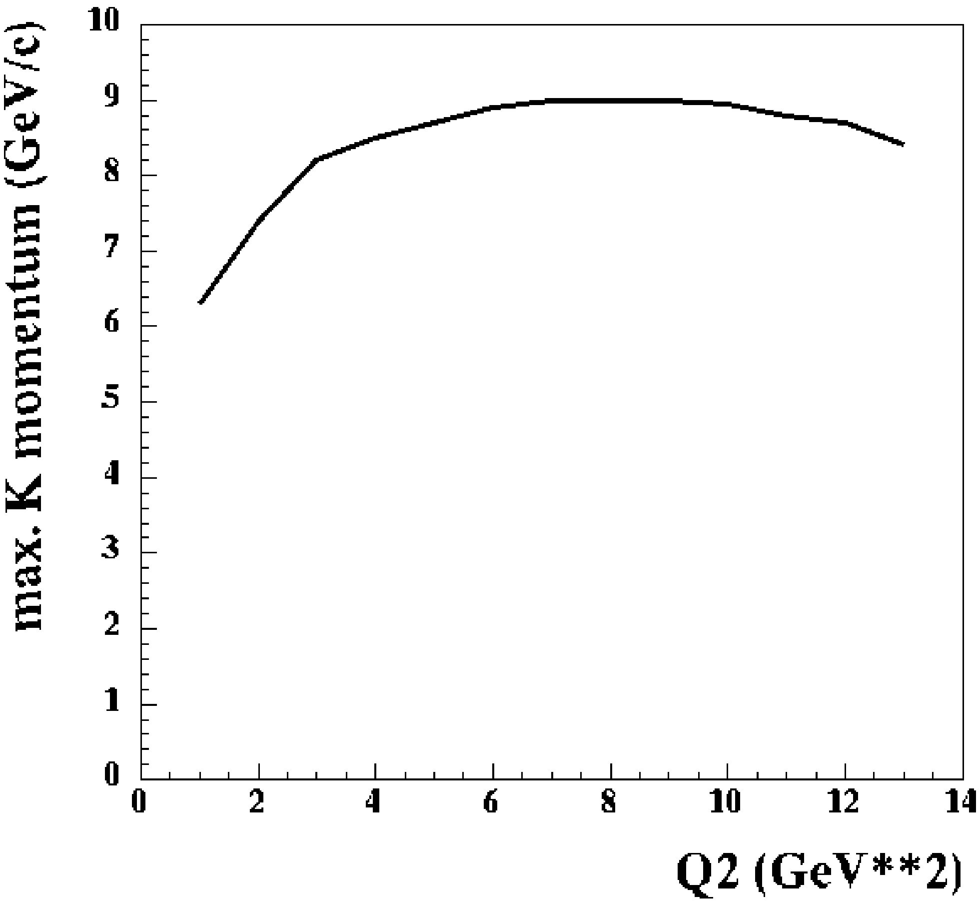


SHMS Parameters
•Max. central momentum 11 GeV/c
•Momentum acceptance +−10%
•Optical length 19m



Aerogel detector 70 cm x 40 cm
High pressure gas: 1 m long
Low pressure gas: 2 m long

High P_K Kinematics for $p(e,e'K^+)L$



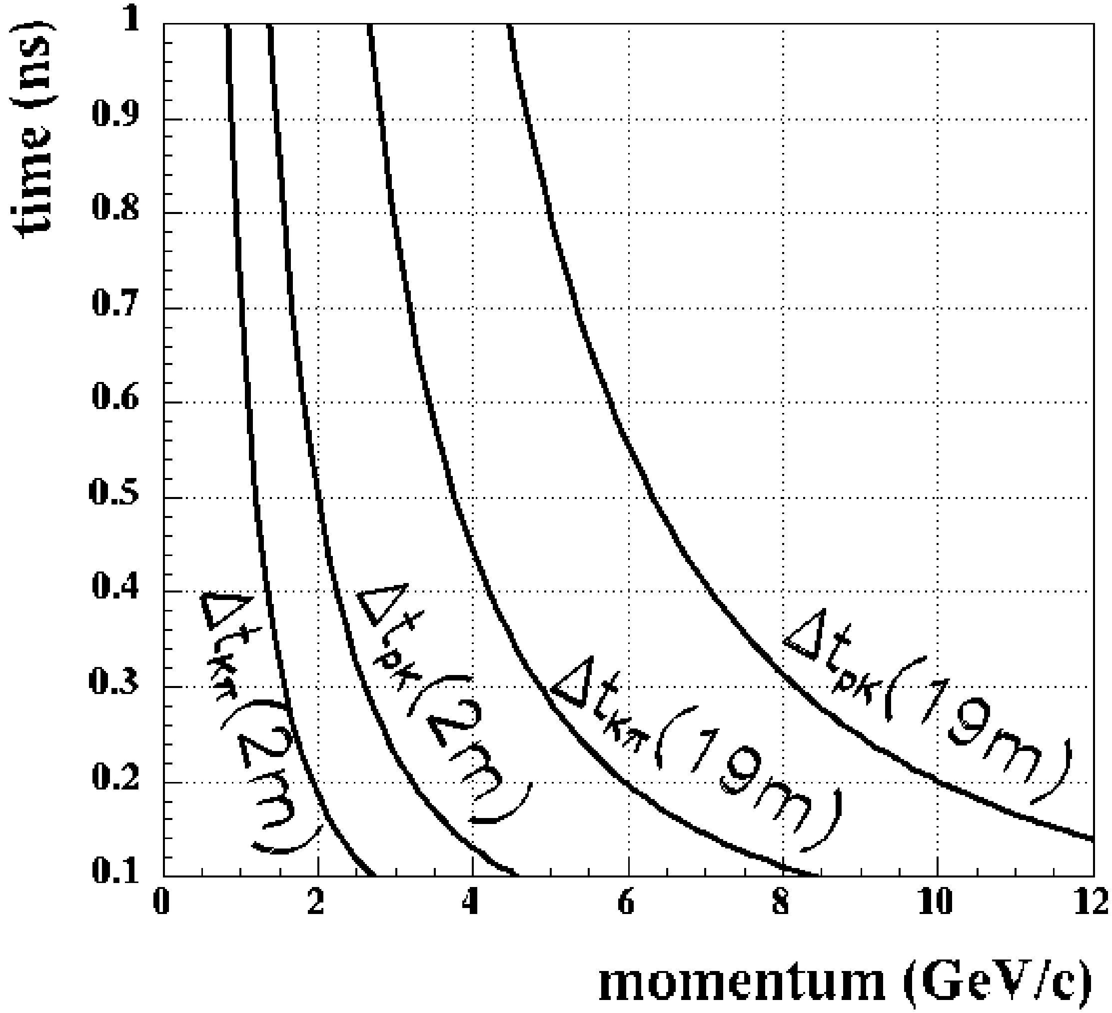
$E_{beam} = 11$ GeV

1 GeV < E' < 7 GeV

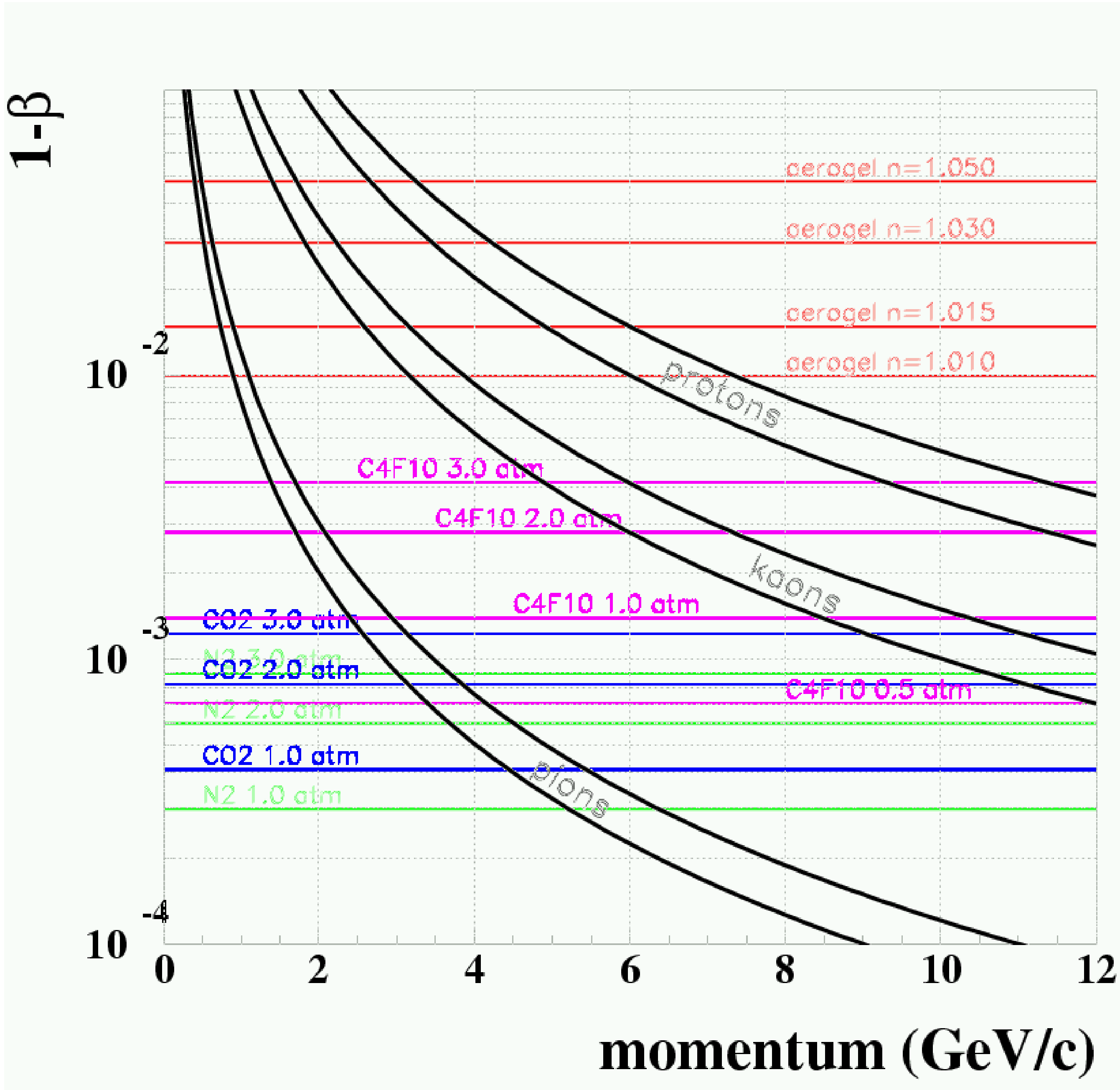
$Q_{HMS} > 10.5^o$

$Q_{SHMS} = 5.5^o$

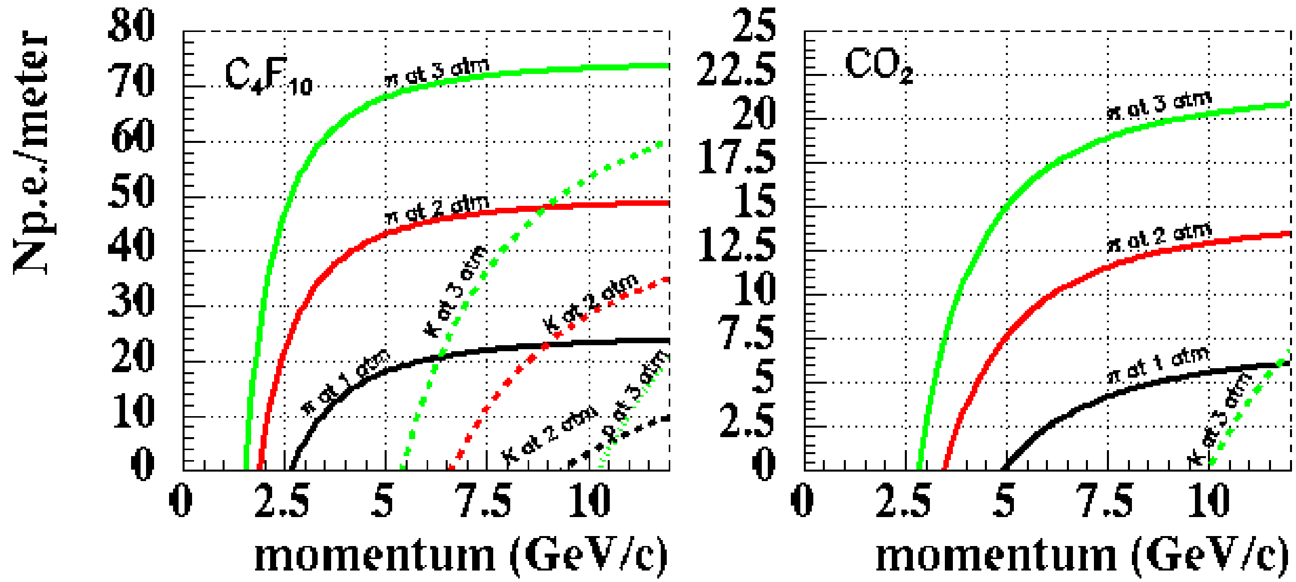
Time of Flight Limitations

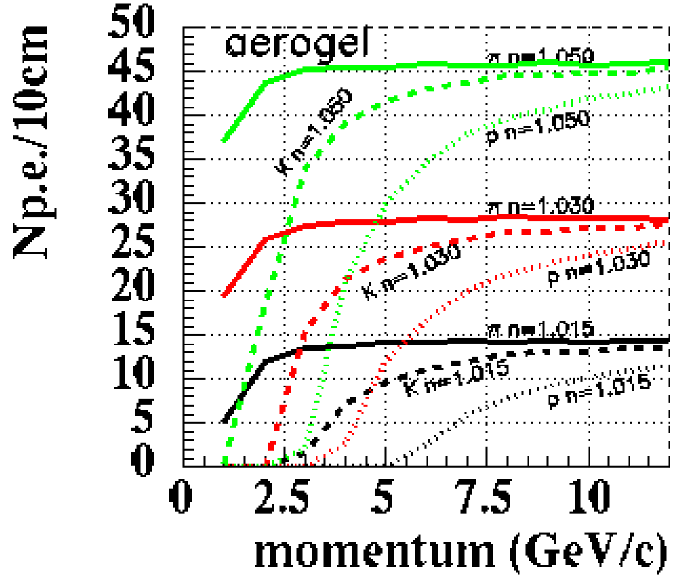


Cerenkov Thresholds



Number of Photoelectrons





Gas: $$\frac{Np.e.}{L} \approx \frac{90}{cm} \left\langle \sin^2 \vartheta_c \right\rangle$$

Aerogel MC for: 86cm x 50cm, 10PMTs

D.W. Higinbotham,
Nucl. Instrum. Meth. A 414 (1998) 332–339.

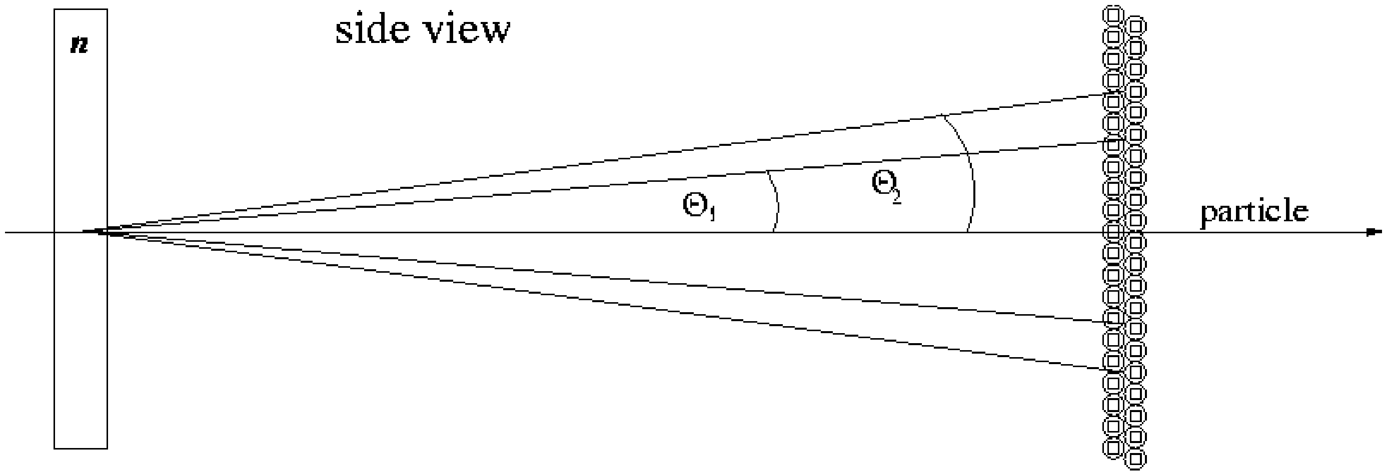
Aerogel Cost

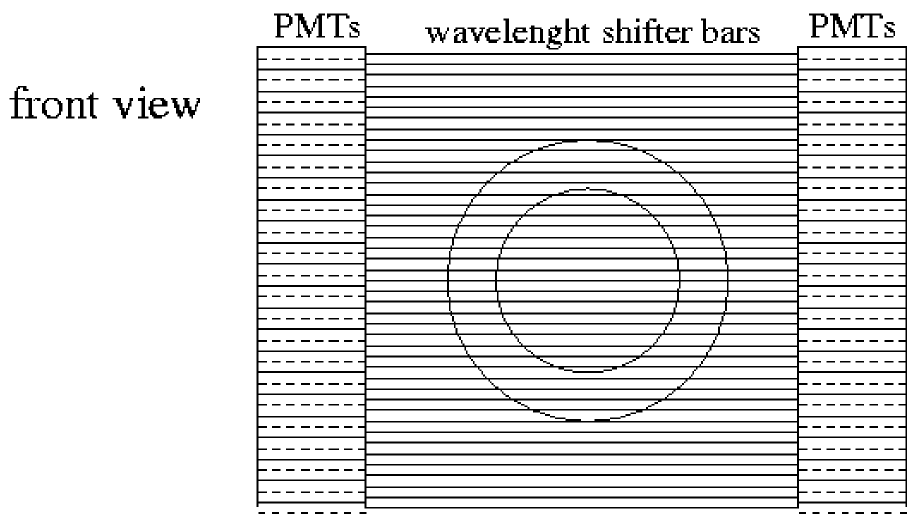
•50L aerogel (get 100L volume discount)	$40,000.–
•10 5" PMT Photonis	$15,000.–
•Millipore paper	$1,500.–
•Diffusion box	$10,000.–
• Total	$66,500.–

Summary

- Tof useless above 2–4 GeV/c
- Aerogel good up to 2.8 and 5.4 GeV/c for kaons and protons, respectively
- Only 1 aerogel at a time, if good TOF.
- Gap around 5.5–6.5(7.5) GeV/c
- Above 7.5 GeV/c a combination of C4F10 and CO2 radiators will work for all momenta up to 11GeV/c.
- CO2 with Pmax=1atm should do.

Poor Man's RICH





Poor Man's RICH Monte Carlo