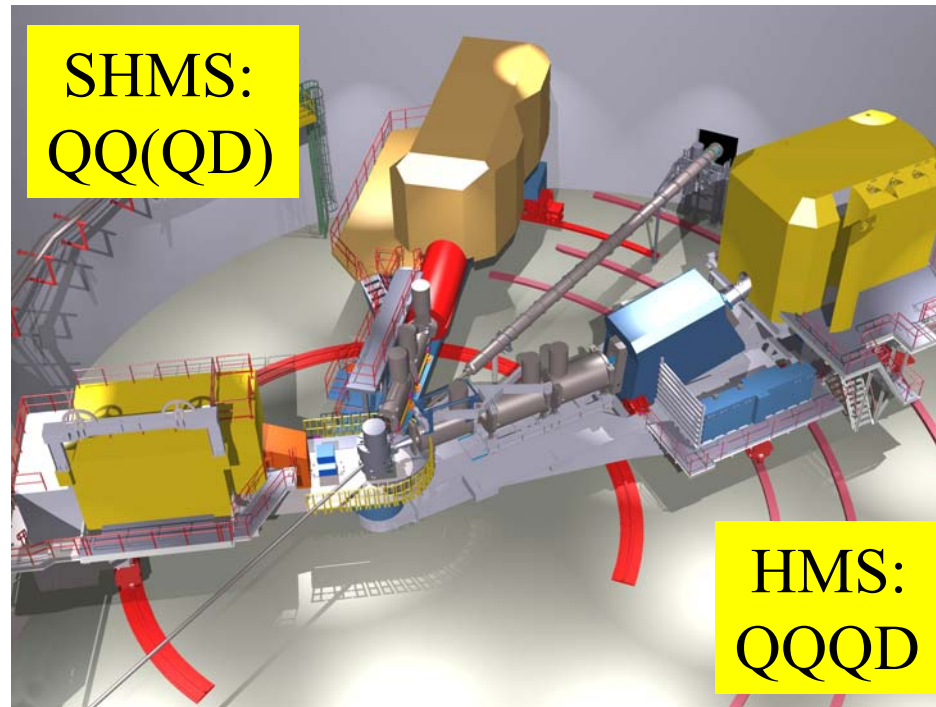




# 12 GeV



SHMS emulates the essential features of HMS:

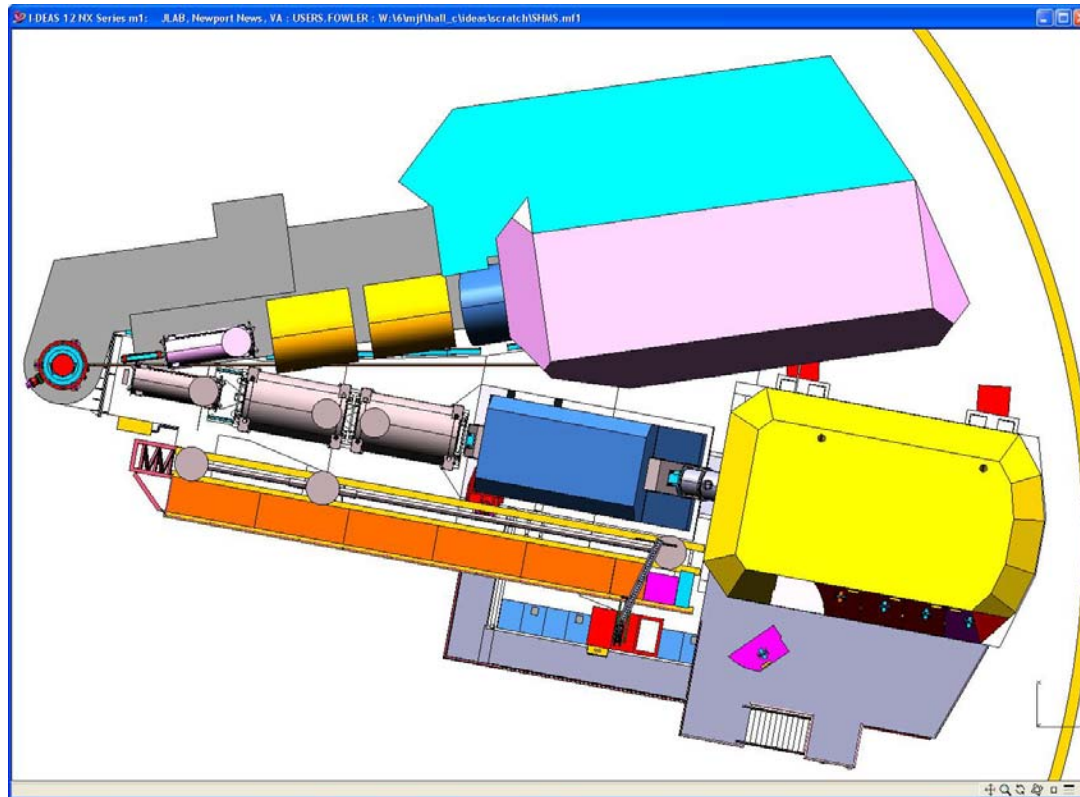
A rigid connection to the pivot, a precision rail system, vacuum, a simple and reproducible point-to-point optics design, a flat and easily understood acceptance, and a heavily shielded hut with redundant detectors allowing for detailed cross checks.

Main drawbacks:

- 1) limited solid angle (2-4 msr)
- 2) Forces in Combined Function Magnet
- 3) Complicated slider to change between tunes



# 12 GeV



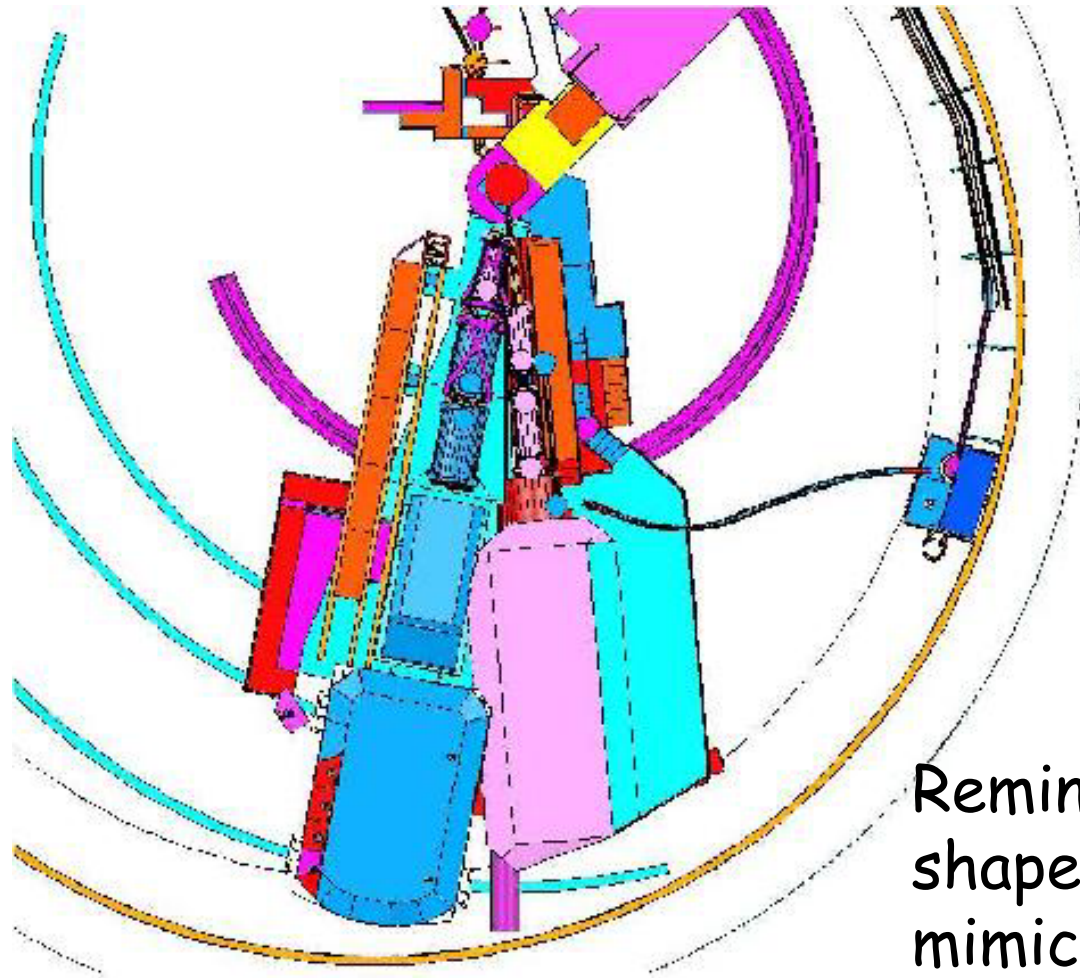
Option 2 (preferred): QQQD System with horizontal pre-bender and no slider  
3.8+ (5.2?) msr solid angle

Main drawbacks:

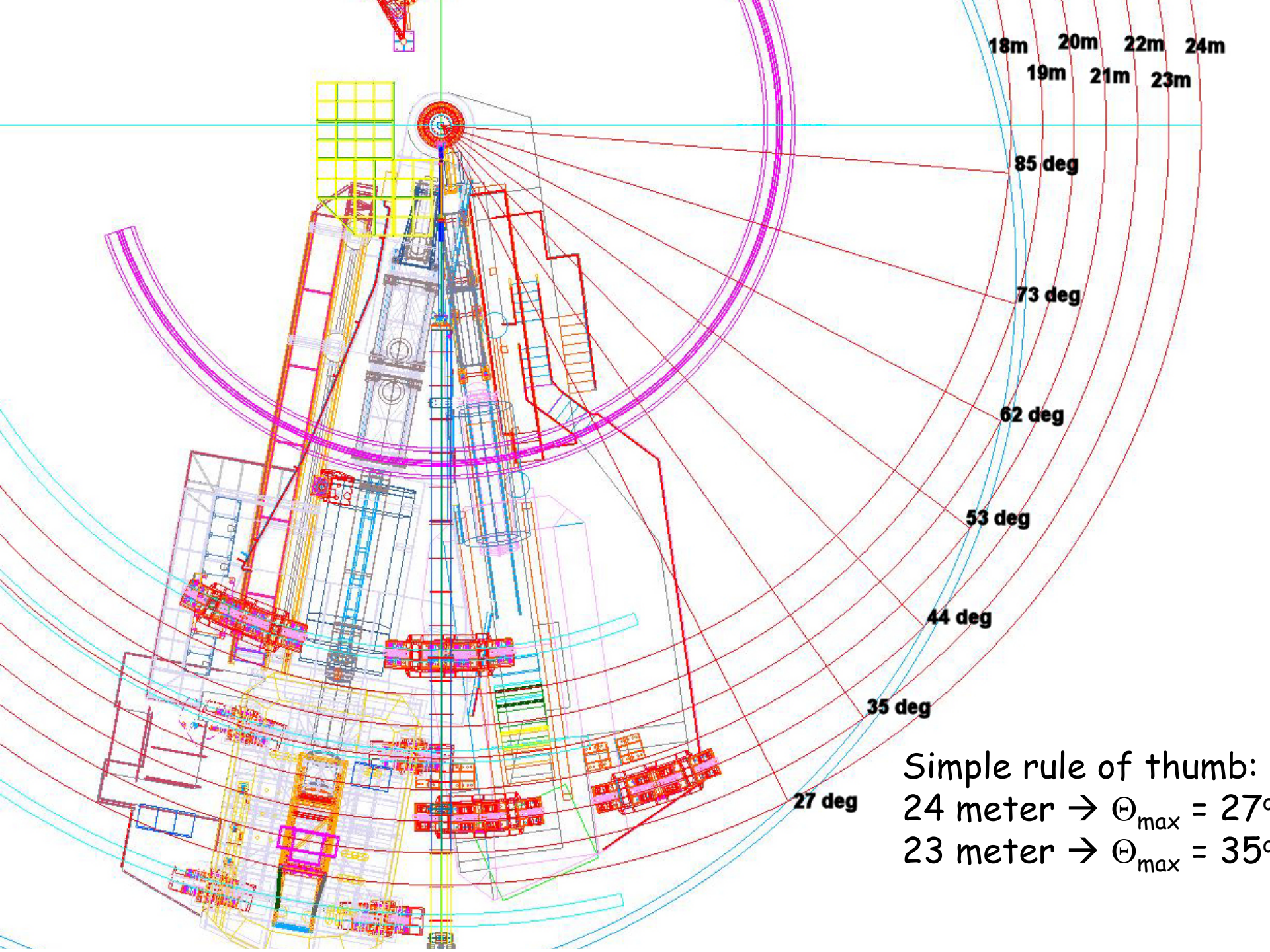
- ~~1) limited solid angle (2-4 msr)~~
- ~~2) Forces in Combined Function Magnet~~
- ~~3) Complicated slider to change between tunes~~

# Hall C at 12 GeV:

## Co-Existence of SHMS with HMS



Reminder: weird  
shape of hut to  
mimic wall at  $25^\circ$



18m 20m 22m 24m  
19m 21m 23m

85 deg

73 deg

62 deg

53 deg

44 deg

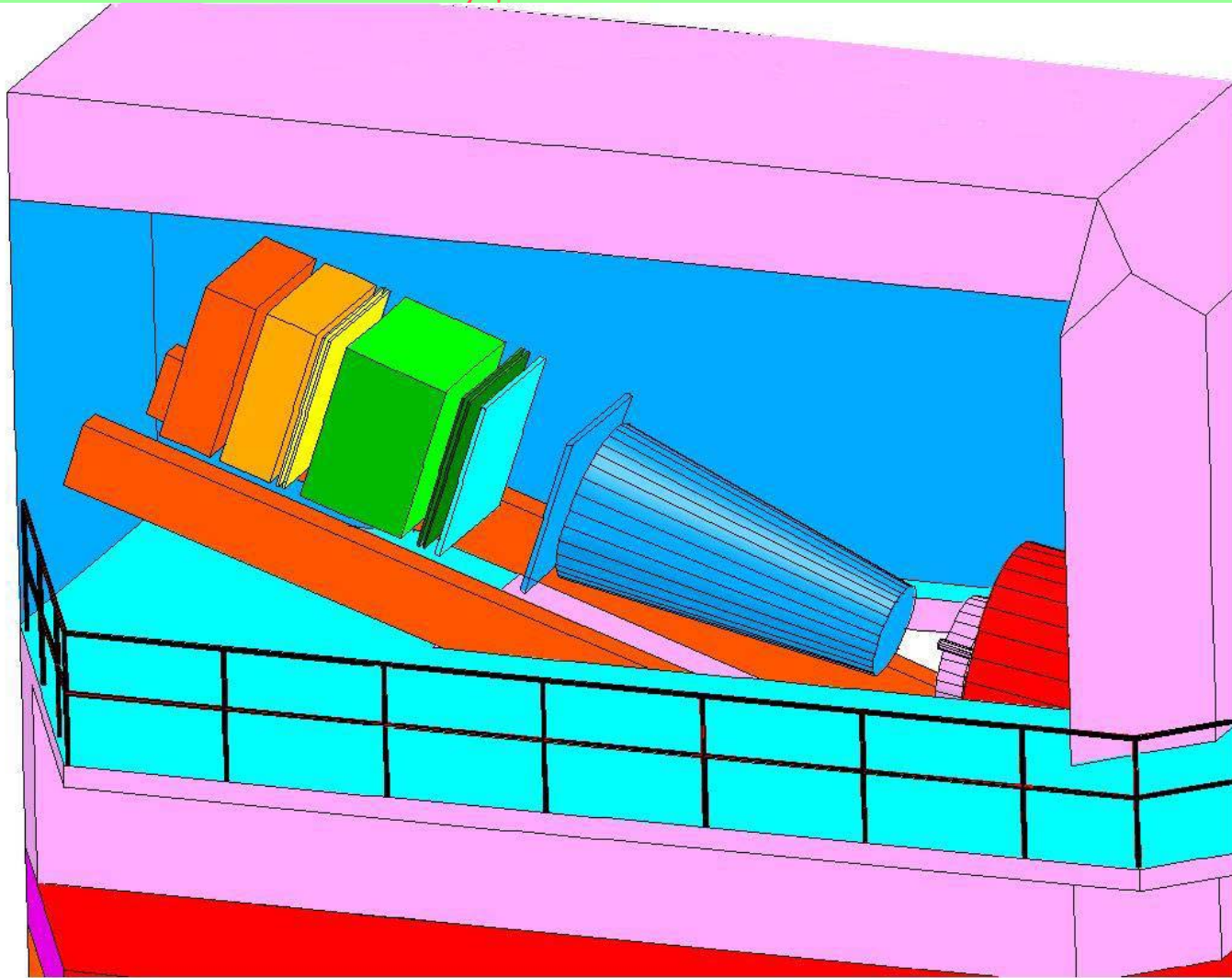
35 deg

27 deg

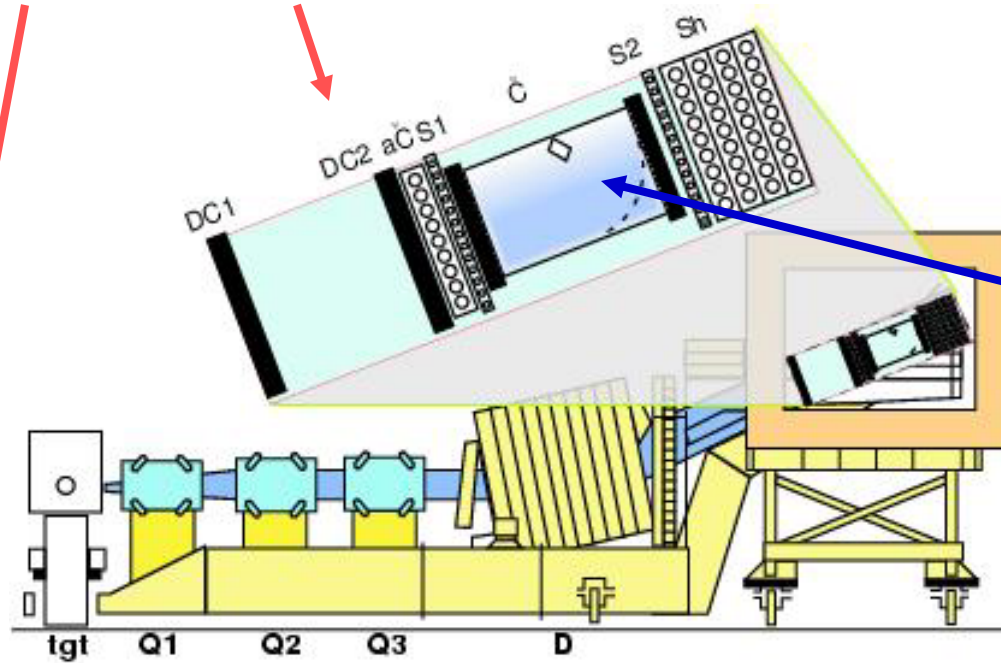
Simple rule of thumb:  
24 meter  $\rightarrow \Theta_{\max} = 27^\circ$   
23 meter  $\rightarrow \Theta_{\max} = 35^\circ$

# Hall C at 12 GeV: Detectors: Detector Package in the Shield House

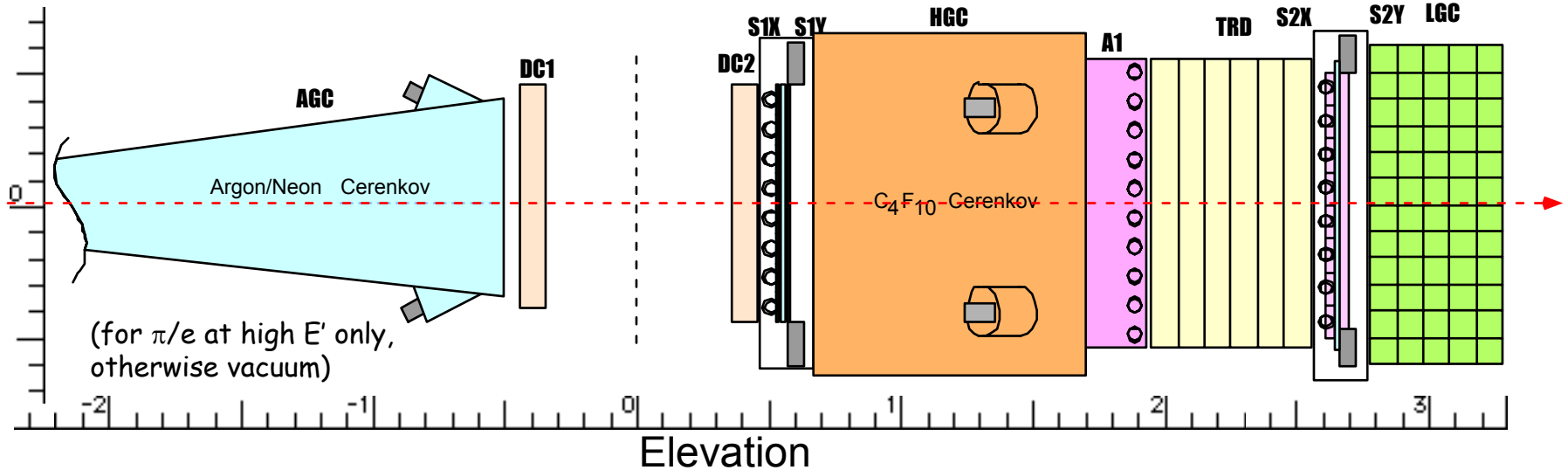
Original design actually assumed one more meter of space for detectors  
→ we probably were already o.k. at 30°



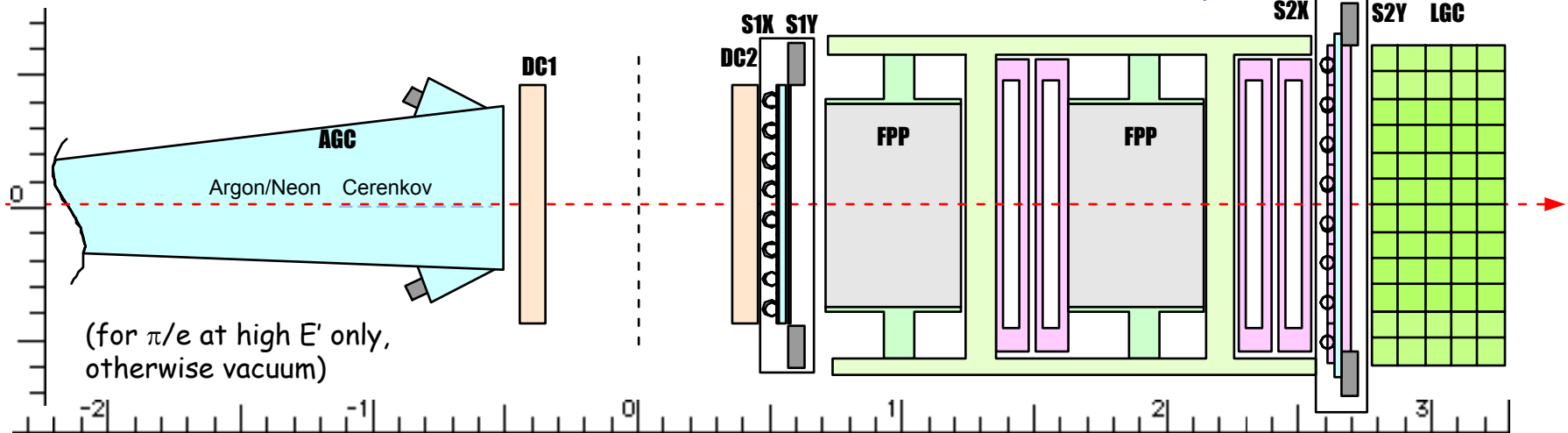
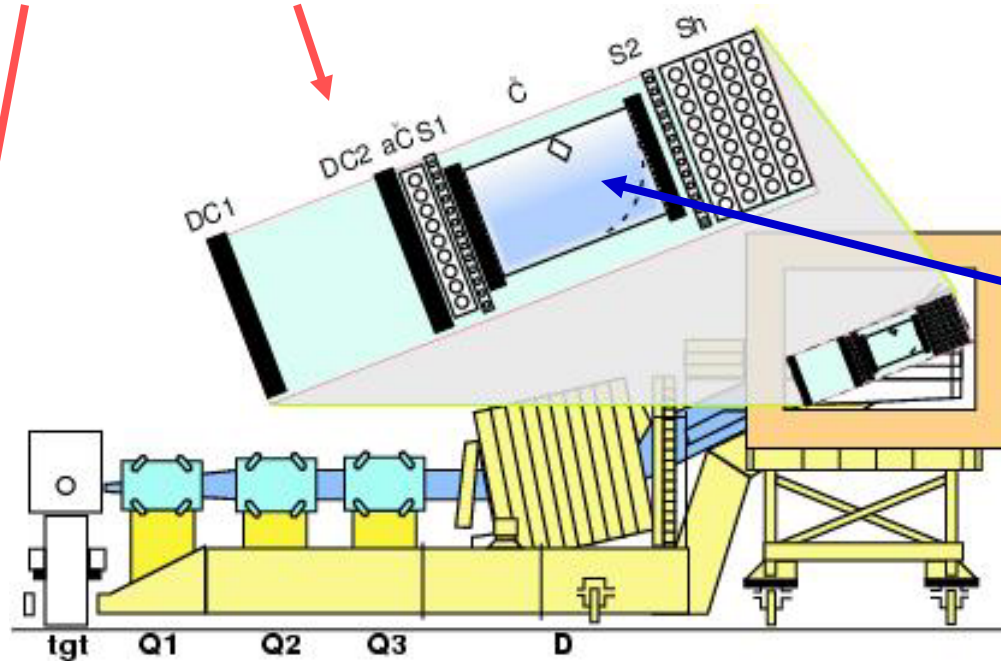
# SHMS/HMS: Detector Systems



Option: Replace Cherenkov with Focal Plane Polarimeter



# SHMS/HMS: Detector Systems



# Hall C at 12 GeV: Detectors:

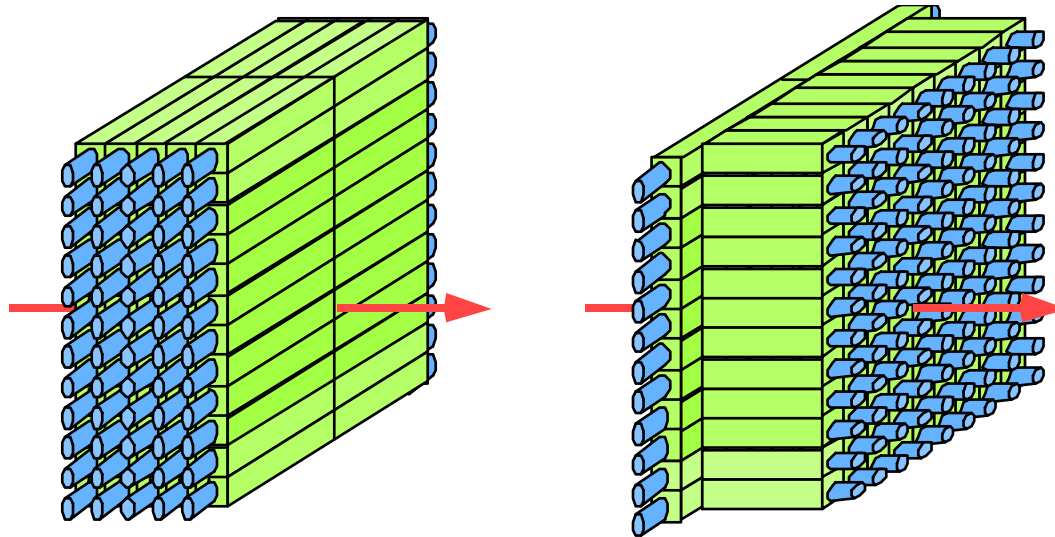
## Shower Counter Design Options

Calorimeter design may depend on availability of glass block shapes.

120 Ch. Five-layer Stack

-or-

132 Ch. Preshower + Projective



Need more space for  
calorimeter in case of  
fly eye's design



# Hall C at 12 GeV: Detectors:

## Atmospheric Pressure Cerenkov

I.e., 2.5 meter was already the assumption?

2.5 m long

Ne ( $n-1 = 67 \times 10^{-6}$ )

and/or

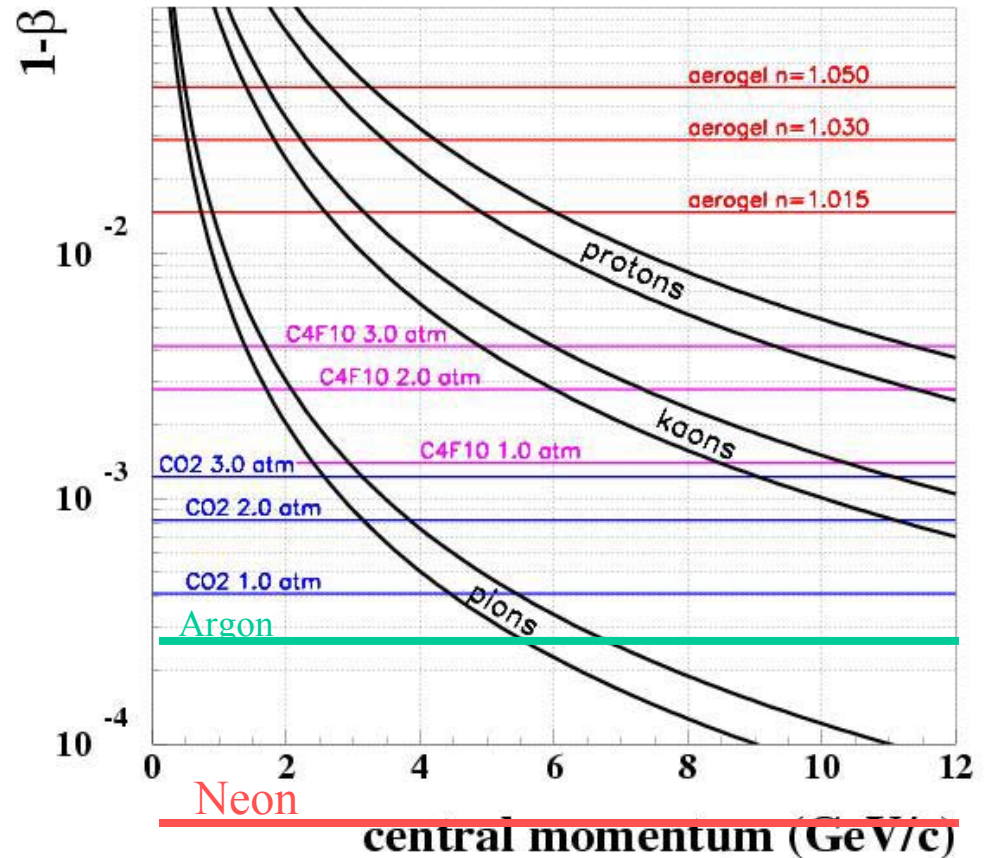
Ar ( $n-1 = 283 \times 10^{-6}$ )

Atmospheric pressure -  
thin windows.

Use only above 6 GeV.

Improves  $e/\pi$  (argon) or  
 $\pi/K$  (neon).

Expect  $\sim 10$  p.e.



Note: In this configuration SHMS can reach 5.5 degrees  
with HMS at 12.5 degrees for sure  
12.0 degrees probably  
11.5 degrees maybe

#### Horizontal Bender

- 3 degree bend
- front at 1.46 meter
- mid at 1.76 meter

#### Q1

- 20 cm aperture (radius)
- max. gradient 8.9 T/m
- mechanical front at 2.79 meter
- optical front at 3.07 meter
- optical length 2.14 meter (centered at 4.14 meter)
- optical back at 5.21 meter
- mechanical back at 5.49 meter

#### Q2

- 30 cm aperture (radius)
- max. gradient 12.7 T/m
- mechanical front at 5.69 meter
- optical front at 5.88 meter
- optical length 1.84 meter (centered at 6.80 meter)
- optical back at 7.72 meter
- mechanical back at 7.91 meter

#### Q3

- 30 cm aperture (radius)
- max. gradient 12.7 T/m
- mechanical front at 8.34 meter
- optical front at 8.53 meter
- optical length 1.84 meter (centered at 9.45 meter)
- optical back at 10.37 meter
- mechanical back at 10.56 meter

Q3

- 30 cm aperture (radius)
- max. gradient 12.7 T/m
- mechanical front at 8.34 meter
- optical front at 8.53 meter
- optical length 1.84 meter (centered at 9.45 meter)
- optical back at 10.37 meter
- mechanical back at 10.56 meter

Q

- 30 cm aperture (radius)
- max. field 4.5 T
- mechanical front at 11.07 meter
- optical front at 11.45 meter
- optical length 3.0 meter (centered at 12.95 meter)
- optical back at 14.45 meter
- mechanical back at 14.83 meter

focal plane

- at 18.1 meter (can later shift by +/- 0.5 meter)

- > space for low pressure Cherenkov between 15.0 meter and 17.5 meter
- > first drift chamber centered around 17.7 meter
- > second drift chamber centered around 18.5 meter
- > first hodoscope centered around 18.65 meter
- > further detector package from 18.8 meter to 20.6 meter  
(note: FPP package needs 1.8 meter total)
- > second hodoscope centered around 20.75 meter
- > calorimeter extends from 20.9 meters to 21.7 meters (fly's eye)

end of spectrometer

- one meter concrete thickness --> 22.7 meter

With 23.0 meter long spectrometer can reach back angle of 35.5 degrees

With 22.5 meter long spectrometer can reach back angle of close to 40 degrees

# shms2006U.file

Thu May 11 17

Major SHMS parameters for 05/10/2006 configuration (see Ro

Mode	3rd order
P0	12 GeV/c
G(Q1)	7.96424 T/m
G(Q2)	12.15187 T/m
G(Q3)	7.99202 T/m
B(D1)	3.500 T (3 degree)
B(D)	4.275 T (18.4 degree)
L(at P0 focus)	18.1 m
R11	-1.3803
R16	1.65616
T126	1.513E-02
Psi	4.5 degree
dp/p	+/- 10%
Solid angle	~ 5.22 msr

'05/10/06 Configuration, reduce DRF6 to 3.65 m, 05/11/06,