E160 Simulations

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Real Photon Collaboration Meeting

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J/ψ and ψ'

Method: Measurement of muon pairs from J/ψ decays and reconstruction of their mass and energy

Requirements:

- –good resolution in muon momentum determination (tracking of trajectories bent in magnetic field)
- – low background of other particles in hodoscopes (filtering out all particles produced in the target except muons)

Plan of the talk:

1) Choice of absorbing medium
2) Study of backgrounds in the spectrometer

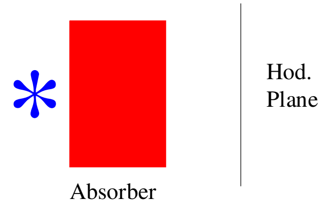
Factors in absorber choice:

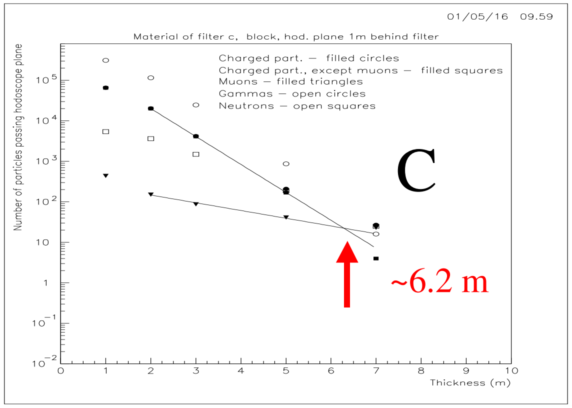
–stopping power (high density)
–multiple scattering (low Z)

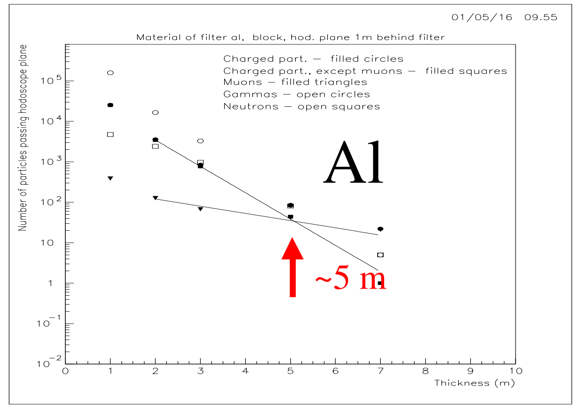
Conflicting properties, a compromise needed

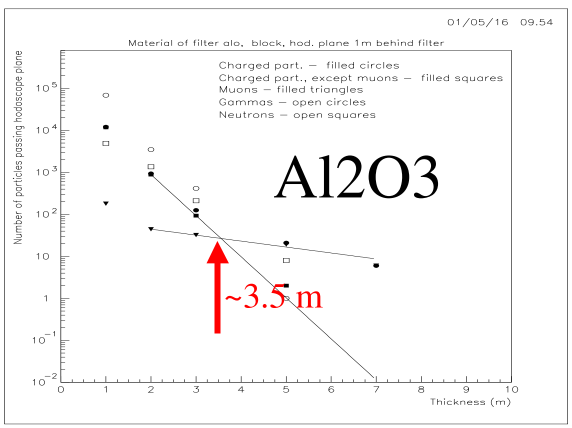
Absorber

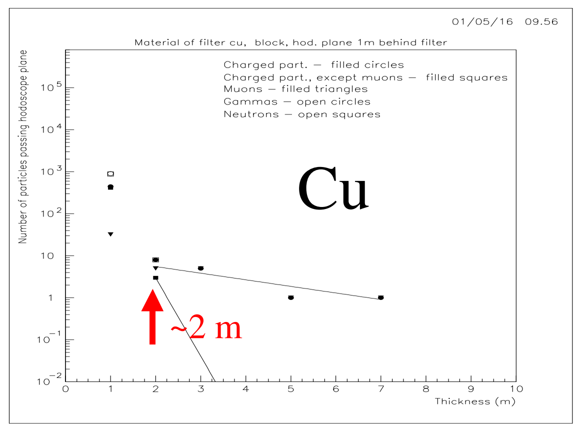
Hadronic interactions of 4e8 photons in the 1.2/b target:





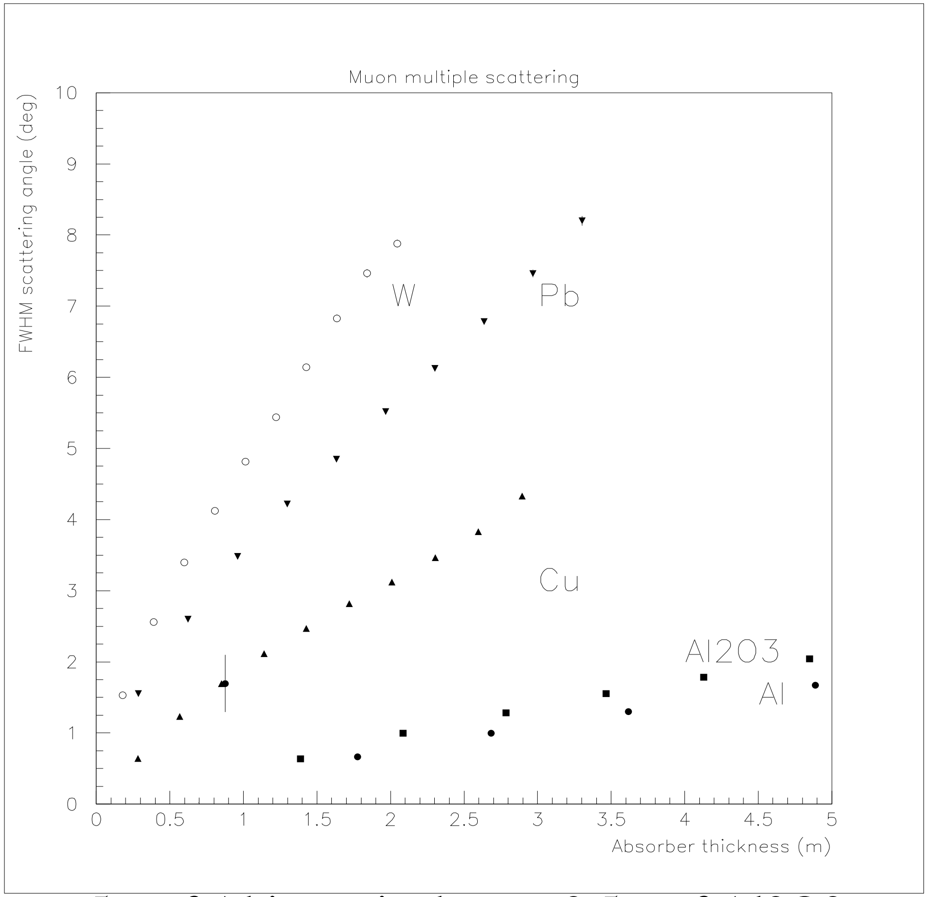






Multiple scattering of 10 GeV muons

FWHM angle at "knee" absorber thickness

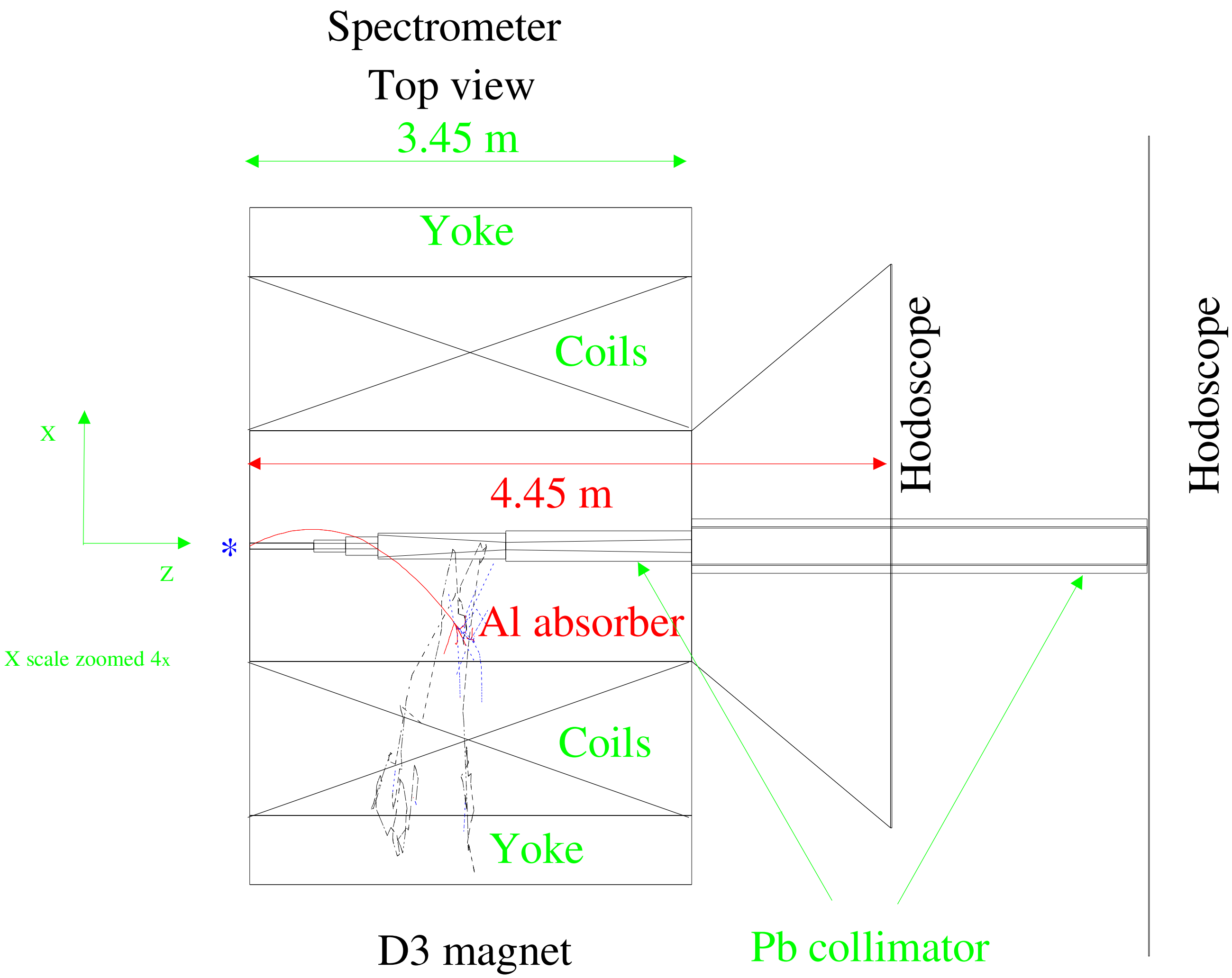


Cu ~ 3 deg

Al ~1.7 deg

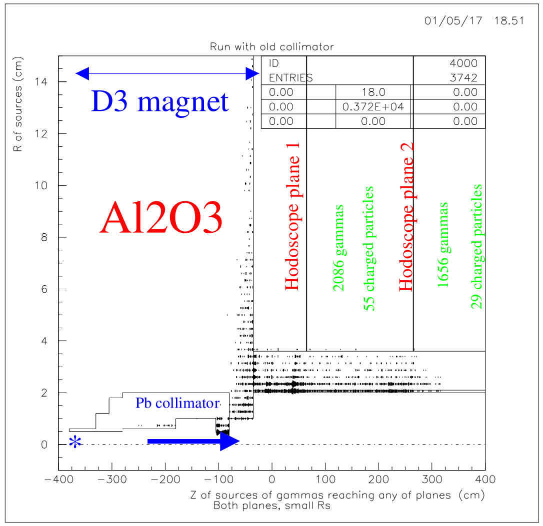
Al2O3
~ 1.5 deg

5m of Al is equivalent to 3.5m of Al2O3

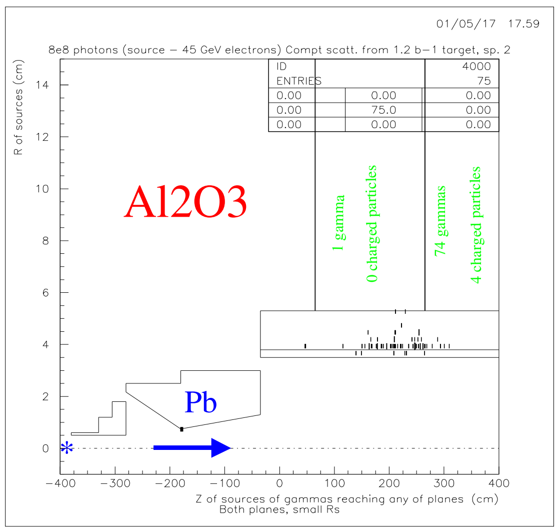

Spectrometer
Top view
3.45 m
Yoke
Coils
Hodoscope
Hodoscope
x
4.45 m
z
Al absorber
X scale zoomed 4x
Coils
Yoke
D3 magnet
Pb collimator

Collimator

8e8 photons Compton scattered from 1.2 1/b target



Initial design



Final design

Summary

Backgrounds

1) 8e8 photons Compton scattered from 1.2 1/b target

	Hod. Plane	15/35 GeV tune: Charged particles	15/35 GeV tune: Gammas	25/35 GeV tune: Charged particles	25/35 GeV tune: Gammas
Al2O3	1	0	47	0	13
	2	6	148	13	121
Al	1	0	3	0	1
	2	2	118	4	74

2) 8e7 photons interacting with 1.2 1/b target

	Hod. Plane	Charged particles	Gammas
Al2O3	1	9	15
	2	2	10
Al	1	19	20
	2	3	6

3) 2.5e5 electron pairs: plane 1: 5 gammas, plane 2: 2 gammas