A sweep magnet for the NPS experiments

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1

Kinematics of SI pion (E12-13-007)

#	θγ	$\theta_{\rm e}$	D _{mag} , m	Bdl, Tm	D _{mag} -Calo,	angle range,
					m	degree
A	10.57	10.27	I.57	0.3	3-1.57	
В	16.20	11.70	I.57	0.3		
С	12.44	15.38	I.57	0.3		
D	7.93	24.15	I.57	0.3	I.43	4.7-11.1
E	16.57	15.65	I.57	0.3	I.43	
F	17.23	17.84	1.57	0.3	1.43	

Kinematics of DVCS (E12-13-10)

#	θγ	$\theta_{\rm e}$	D _{calo} ,m	Bdl, Tm	D _{mag} -Calo,	angle range,
					m	degree
3	16.2	11.7	3	0.3	I.43	
5	12.4	15.3	3	0.3	I.43	
7	21.7	11.7	3	0.3	I.43	
8	16.6	15.6	3	0.3	I.43	
13	6.3	27.9	6	0.3	4.43	3.1 - 9.6
16	6.3	17.3	6	0.3	4.43	· • • •

range of angles: $68 \text{ cm} / 300 \Rightarrow 12.8 \text{ degrees}$ range of angles: $68 \text{ cm} / 600 \Rightarrow 6.5 \text{ degrees}$

Kinematics of WACS (E12-14-003) /Pion

#	θγ	θ _p	D _{mag} ,m	Bdl, Tm	D _{det} ,	D _{magr} -Calo,	Bdl,Tm /
			0		m	m	D _{mag} -Calo, m
4A	14.2	40. I	2.45+0.2	0.3	9.0	6.15	0.3 / (9-1.57)
4B	17.9	33.7	1.65+0.2	0.4	7.0		
4C	22.5	27.8	1.65+0.2	0.5	5.0		
4D	26.9	23.7	1.10+0.2	0.6	3.5		
4E	34.0	18.9	1.10+0.2	0.6	3.0	1.7	0.61 Tm / 1.68
5A	11.0	41.7	2.45+0.2	0.25	11.0		9.3-12.7 deg
5B	13.8	35.3	2.45+0.2	0.35	9.0		
5C	16.9	30.0	1.65+0.2	0.4	7.5		
5D	19.7	26.3	1.65+0.2	0.5	6.0		
5E	29.9	17.8	1.10+0.2	0.6	3.25	1.95	0.70 Tm / 1.68

Horizontal field dipole

the beam side is free of coils the beam opening is +/- 1 degree open aperture to detector above 2 degrees! vertical aperture is 60 cm; horizontal is 30 cm



Horizontal field dipole



Field on the beam line with the septa w/o correctors and external shielding



Field on the beam line (+/- 0.9 deg.) with the septa plus correctors and the external shielding



Fringe field problem



Fringe field solution







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Horizontal field dipole, model SAM-DVCS



Horizontal field dipole, model SAM-DVCS



Iron weight is of 15 tons Coils weight is of 1.5 tons 16

Horizontal field dipole, model SAM-WACS



Cost example: APEX septum



12 tons, four flat coils, complicated poles:

construction cost \$134k built by Buckley (NZ)

Summary, Next

- The sweep/deflector magnet for the four NPS experiments could be made by using a horizontal field magnet.
- \succ The total weight of the magnet is 22 tons
- The coils using low current density 400 (700) A/cm², which will require of 110 kW (150 V) power.
- \blacktriangleright The distance from the pivot to magnet center is "fixed" to 157 cm.
- > NEXT: Field map for GEANT MC of experiments

Geometry check with HMS and beam line