



Heap Selections

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Overview

Desired Kinematics		done by singles only	do with coin (and maybe singles)
HMS angle (deg)	HMS Momentum (GeV/c)	SHMS angle (Deg)	SHMS momentum (GeV/c)
12.34	0.991	5.5	3.493
19.78	1.049	5.52	5.4218
23.41	1.167	6.26	5.512
24.45	1.395	6.28	6.265
31.02	1.707	6.35	6.538
33.92	1.749	6.53	6.719
34.15	2.202	6.64	7.913
34.23	2.243	7.13	8.035
42.91	3.067	7.31	
46.43	3.295	7.76	
57.7	3.761	8.26	
		8.28	
		8.35	
		8.53	
		8.64	
		9.26	
		9.31	
		9.76	
		10.28	
		11.26	
		11.31	
		11.76	
		13.26	
		13.58	
		15.58	
		17.58	

To the left is all the kinematics selected in Pion-LT experiment. Color is what is obtained with my proposed settings

Total time taken by beam energy (50% efficiency):

- 6.0 GeV: 335 minutes (5.58 hours)
- 8.0 GeV: 210 minutes (3.67 hours)
- 9.2 GeV: 250 minutes (4.17 hours)
- 9.9 GeV: 360 minutes (6 hours)

Every setting can be done in one shift!

Have time to add either more statistics or something like a momentum scan.

Using Spreadsheet

Along with these slide I have posted spreadsheet with the proposed settings.

(https://redmine.jlab.org/attachments/1226/PionLT_Elasticity_Selection_Nathan.ods)

Should be pretty self explanatory but some things to note:

- In singles runs you should ignore the columns about the other detector.
- Red and Yellow colors are warnings
- Blue, Magenta and Cyan mean that the run is within acceptance of a setting in physics data:
 - Angle ($\pm 0.05^\circ$) (Blue is done during Pi- running SHMS singles only)
 - HMS momentum ($\pm 10\%$)
 - SHMS momentum (-10% to +22%)

What is shown is the elastic setting, for the data taking set detectors to exactly the values that overlap with run plan.

9.9 GeV

Coin

9.9GeV	Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Max Current HMS (uA)	Max Current SHMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	SHMS Time to 50k (s) 50% Efficiency	(min)	HMS Time 50k (s) 50% Efficiency	(min)
	34.25	12.013	3.499	-15.694	7.279	6.42E-07	1.82E-11	70.00	7557805.87	17490922.15	0.01	0.01	1.00	0.01	0.01	16658.02	277.63	7197.91	119.97

HMS

9.9GeV	Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Ideal Current HMS (uA)	Max Current HMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	HMS Time 10k (s) 50% Efficiency	(min)	HMS events in 10 min 50% Efficiency
	31.00	11.168	3.949	-17.336	6.825	9.63E-07	3.68E-11	70.00	1245942.63	3737827.90	0.01	0.03	1.00	0.01	0.03	711.97	11.87	8.43E+03
	33.90	11.928	3.544	-15.857	7.234	6.70E-07	1.95E-11	70.00	2351317.38	7053952.14	0.01	0.01	1.00	0.01	0.01	1343.61	22.39	4.47E+03
	34.15	11.988	3.511	-15.740	7.267	6.50E-07	1.85E-11	70.00	2478415.62	7435246.85	0.01	0.01	1.00	0.01	0.01	1416.24	23.60	4.24E+03
	34.25	12.013	3.499	-15.694	7.279	6.42E-07	1.82E-11	70.00	2519268.62	7557805.87	0.01	0.01	1.00	0.01	0.01	1439.58	23.99	4.17E+03

SHMS

9.9GeV	Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Ideal Current SHMS (uA)	Max Current SHMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	SHMS Time to 10k (s) 50% Efficiency	(min)	SHMS events in 10 min 50% Efficiency
	6.65	1.231	9.244	-56.134	1.289	4.66E-04	2.29E-05	10.00	4.63	13.90	1079.05	2497.24	1025.00	1.05	2.44	19.00	0.32	7.31E+05
	7.15	1.409	9.149	-54.183	1.404	3.48E-04	1.28E-05	10.00	8.29	24.87	603.14	1395.84	513.00	1.18	2.72	17.01	0.28	8.16E+05
	7.3	1.464	9.12	-53.615	1.439	3.21E-04	1.08E-05	10.00	9.83	29.48	508.90	1177.74	257.00	1.98	4.58	10.10	0.17	1.37E+06
	7.75	1.633	9.03	-51.960	1.546	2.52E-04	6.61E-06	16.00	16.05	48.16	498.34	1153.31	257.00	1.94	4.49	10.31	0.17	1.35E+06
	11.75	3.364	8.107	-40.074	2.565	4.77E-05	1.71E-07	70.00	620.54	1861.61	56.40	130.53	33.00	1.71	3.96	11.70	0.20	1.19E+06
	13.25	4.074	7.729	-36.699	2.964	2.94E-05	5.77E-08	70.00	1839.02	5517.07	19.03	44.05	17.00	1.12	2.59	17.86	0.30	7.77E+05
	15.6	5.2	7.129	-32.292	3.589	1.53E-05	1.28E-08	70.00	8289.97	24869.90	4.22	9.77	3.00	1.41	3.26	14.21	0.24	9.77E+05
	17.6	6.142	6.627	-29.214	4.105	9.43E-06	4.07E-09	70.00	26071.64	78214.93	1.34	3.11	1.00	1.34	3.11	14.90	0.25	9.32E+05

9.2 GeV

Coin

9.2GeV Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Max Current HMS (uA)	Max Current SHMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	SHMS Time to 50k (s) 50% Efficiency	(min)	HMS Time 50k (s) 50% Efficiency	(min)
31	10.072	3.833	-18.455	6.236	1.11E-06	6.53E-11	70.00	2106463.50	4874958.39	0.02	0.05	1.00	0.02	0.05	4642.82	77.38	2006.16	33.44
32.50	10.46	3.63	-17.62	6.44	9.20E-07	4.62E-11	70.00	2977317.46	6890363.27	0.02	0.04	1.00	0.02	0.04	6562.25	109.37	2835.54	47.26

HMS

9.2GeV Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Ideal Current HMS (uA)	Max Current HMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	HMS Time 10k (s) 50% Efficiency	(min)	HMS events in 10 min 50% Efficiency
24.45	8.08	4.90	-23.13	5.16	2.91E-06	4.20E-10	70.00	109168.31	327504.92	0.14	0.32	1.00	0.14	0.32	62.38	1.04	9.62E+04
31.00	10.07	3.83	-18.46	6.24	1.11E-06	6.53E-11	70.00	702154.50	2106463.50	0.02	0.05	1.00	0.02	0.05	401.23	6.69	1.50E+04
33.90	10.79	3.45	-16.89	6.62	7.75E-07	3.42E-11	70.00	1340663.42	4021990.26	0.01	0.03	1.00	0.01	0.03	766.09	12.77	7.83E+03
34.15	10.85	3.42	-16.77	6.65	7.53E-07	3.25E-11	70.00	1410790.43	4232371.29	0.01	0.02	1.00	0.01	0.02	806.17	13.44	7.44E+03
34.25	10.87	3.41	-16.72	6.67	7.44E-07	3.18E-11	70.00	1441845.56	4325536.69	0.01	0.02	1.00	0.01	0.02	823.91	13.73	7.28E+03

SHMS

9.2GeV Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Ideal Current SHMS (uA)	Max Current SHMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	SHMS Time to 10k (s) 50% Efficiency	(min)	SHMS events in 10 min 50% Efficiency
7.75	1.42	8.44	-53.80	1.41	2.92E-04	1.05E-05	10.00	10.11	30.32	494.76	1145.02	257.00	1.93	4.46	10.39	0.17	1.34E+06
8.25	1.59	8.35	-52.07	1.52	2.27E-04	6.31E-06	16.00	16.82	50.45	475.73	1100.96	257.00	1.85	4.28	10.80	0.18	1.29E+06
8.35	1.63	8.33	-51.74	1.54	2.17E-04	5.71E-06	18.00	18.58	55.75	484.30	1120.81	257.00	1.88	4.36	10.61	0.18	1.31E+06
8.55	1.70	8.30	-51.07	1.59	1.97E-04	4.69E-06	22.00	22.63	67.88	486.19	1125.17	257.00	1.89	4.38	10.57	0.18	1.31E+06
8.65	1.73	8.28	-50.75	1.61	1.88E-04	4.25E-06	24.00	24.97	74.90	480.63	1112.31	257.00	1.87	4.33	10.69	0.18	1.30E+06
9.25	1.95	8.16	-48.84	1.74	1.44E-04	2.41E-06	44.00	44.03	132.09	499.66	1156.36	257.00	1.94	4.50	10.29	0.17	1.35E+06

8.0 GeV

Coin

8.0 GeV Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Max Current HMS (uA)	Max Current SHMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	SHMS Time to 50k (s) 50% Efficiency	(min)	HMS Time 50k (s) 50% Efficiency	(min)
19.80	5.03	5.32	-31.03	3.50	8.99E-06	8.14E-09	70.00	16898.29	39107.47	2.68	6.21	5.00	0.54	1.24	186.23	3.10	80.47	1.34
33.90	8.88	3.27	-19.01	5.59	1.03E-06	9.97E-11	70.00	1379659.65	3192926.61	0.03	0.08	1.00	0.03	0.08	3040.88	50.68	1313.96	21.90
36.60	9.41	2.98	-17.61	5.88	7.51E-07	5.80E-11	70.00	2371587.36	5488530.74	0.02	0.04	1.00	0.02	0.04	5227.17	87.12	2258.65	37.64

HMS

8.0 GeV Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Ideal Current HMS (uA)	Max Current HMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	HMS Time 10k (s) 50% Efficiency	(min)	HMS events in 10 min 50% Efficiency
19.80	5.03	5.32	-31.03	3.50	8.99E-06	8.14E-09	70.00	5632.76	16898.29	2.68	6.21	5.00	0.54	1.24	16.09	0.27	3.73E+05
23.40	6.19	4.70	-26.88	4.13	4.59E-06	1.85E-09	70.00	24784.16	74352.47	0.61	1.41	1.00	0.61	1.41	14.16	0.24	4.24E+05
24.45	6.51	4.53	-25.85	4.30	3.85E-06	1.28E-09	70.00	35820.85	107462.55	0.42	0.98	1.00	0.42	0.98	20.47	0.34	2.93E+05
31.00	8.24	3.61	-20.73	5.25	1.47E-06	1.93E-10	70.00	237568.34	712705.01	0.06	0.15	1.00	0.06	0.15	135.75	2.26	4.42E+04
33.90	8.88	3.27	-19.01	5.59	1.03E-06	9.97E-11	70.00	459886.55	1379659.65	0.03	0.08	1.00	0.03	0.08	262.79	4.38	2.28E+04
34.15	8.94	3.24	-18.87	5.62	9.95E-07	9.45E-11	70.00	485192.48	1455577.43	0.03	0.07	1.00	0.03	0.07	277.25	4.62	2.16E+04
34.25	8.96	3.23	-18.81	5.63	9.84E-07	9.26E-11	70.00	495147.83	1485443.49	0.03	0.07	1.00	0.03	0.07	282.94	4.72	2.12E+04
42.90	10.44	2.44	-14.96	6.43	3.92E-07	2.03E-11	70.00	2258654.63	6775963.88	0.01	0.02	1.00	0.01	0.02	1290.66	21.51	4.65E+03

SHMS

8.0 GeV Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Ideal Current SHMS (uA)	Max Current SHMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	SHMS Time to 10k (s) 50% Efficiency	(min)	SHMS events in 10 min 50% Efficiency
8.55	1.30	7.31	-54.55	1.33	2.61E-04	1.13E-05	10.00	9.39	28.17	532.46	1232.26	513.00	1.04	2.40	19.27	0.32	7.21E+05
9.25	1.50	7.20	-52.38	1.46	1.90E-04	6.00E-06	17.00	17.69	53.06	480.63	1112.31	257.00	1.87	4.33	10.69	0.18	1.30E+06
9.30	1.51	7.19	-52.23	1.47	1.86E-04	5.74E-06	18.00	18.49	55.46	486.85	1126.70	257.00	1.89	4.38	10.56	0.18	1.32E+06
9.75	1.65	7.12	-50.91	1.55	1.54E-04	3.89E-06	27.00	27.28	81.83	494.90	1145.35	257.00	1.93	4.46	10.39	0.17	1.34E+06
10.30	1.81	7.03	-49.35	1.66	1.24E-04	2.47E-06	42.00	42.96	128.88	488.82	1131.28	257.00	1.90	4.40	10.52	0.18	1.32E+06
11.25	2.11	6.87	-46.83	1.84	8.69E-05	1.17E-06	70.00	90.69	272.08	385.91	893.12	257.00	1.50	3.48	13.32	0.22	1.04E+06
13.25	2.78	6.52	-42.11	2.23	4.51E-05	2.83E-07	70.00	374.95	1124.86	93.35	216.03	65.00	1.44	3.32	13.93	0.23	9.97E+05

6.0 GeV

Coin

6.0GeV	Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Max Current HMS (uA)	Max Current SHMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	SHMS Time to 50k (s) 50% Efficiency	(min)	HMS Time 50k (s) 50% Efficiency	(min)
	29.1	5.029	3.32	-27.521	3.494	3.39E-06	2.92E-09	70.00	47106.87	109018.76	0.96	2.23	2.00	0.48	1.11	207.65	3.46	89.73	1.50
	51.65	7.974	1.751	-15.612	5.102	3.24E-07	5.17E-11	70.00	2660581.56	6157345.90	0.02	0.04	1.00	0.02	0.04	5864.14	97.74	2533.89	42.23

HMS

→ This second run is done twice with different momentum settings

6.0GeV	Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Ideal Current HMS (uA)	Max Current HMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	HMS Time 10k (s) 50% Efficiency	(min)	HMS events in 10 min 50% Efficiency
	12.35	1.451	5.227	-51.338	1.432	1.06E-04	3.51E-06	13.00	13.06	39.19	215.01	497.59	257.00	0.84	1.94	10.33	0.17	5.81E+05
	19.80	3.089	4.354	-37.77	2.408	1.60E-05	6.93E-08	70.00	661.63	1984.88	22.86	52.90	33.00	0.69	1.60	12.48	0.21	4.81E+05
	23.40	3.881	3.932	-33.145	2.856	8.16E-06	1.72E-08	70.00	2665.74	7997.21	5.67	13.13	9.00	0.63	1.46	13.71	0.23	4.38E+05
	42.90	7.105	2.214	-18.993	4.63	6.97E-07	1.66E-10	70.00	276208.97	828626.91	0.05	0.13	1.00	0.05	0.13	157.83	2.63	3.80E+04
	46.45	7.492	2.007	-17.492	4.841	5.03E-07	9.91E-11	70.00	462670.93	1388012.78	0.03	0.08	1.00	0.03	0.08	264.38	4.41	2.27E+04
	57.70	8.429	1.508	-13.792	5.348	2.04E-07	2.75E-11	70.00	1667297.78	5001893.34	0.01	0.02	1.00	0.01	0.02	952.74	15.88	6.30E+03
	59.35	8.536	1.451	-13.351	5.406	1.81E-07	2.35E-11	70.00	5853279.44	13546160.98	0.01	0.02	1.00	0.01	0.02	1114.91	18.58	5.38E+03
	67.65	8.991	1.209	-11.41	5.652	1.03E-07	1.19E-11	70.00	3852999.07	11558997.21	0.00	0.01	1.00	0.00	0.01	2201.71	36.70	2.73E+03

SHMS

6.0GeV	Th_e	Q^2	E_e	Th_p	P_p	Mott	Sig_p (fm^2/sr)	Beam Current (uA)	Ideal Current SHMS (uA)	Max Current SHMS (uA)	SHMS Detector Rate (kHz)	HMS Detector Rate (kHz)	Prescale factor	SHMS Daq (kHz)	Hms Daq (kHz)	SHMS Time to 10k (s) 50% Efficiency	(min)	SHMS events in 10 min 50% Efficiency
	10.3	1.052	5.439	-56.318	1.169	2.20E-04	1.43E-05	10.00	7.42	22.26	673.82	1559.41	513.00	1.31	3.04	15.23	0.25	9.12E+05
	11.25	1.232	5.343	-53.934	1.29	1.54E-04	7.31E-06	14.00	14.52	43.55	482.23	1116.01	257.00	1.88	4.34	10.66	0.18	1.30E+06
	11.3	1.242	5.338	-53.812	1.296	1.52E-04	7.07E-06	15.00	15.01	45.03	499.71	1156.47	257.00	1.94	4.50	10.29	0.17	1.35E+06
	11.75	1.33	5.291	-52.732	1.354	1.30E-04	5.21E-06	20.00	20.37	61.10	490.99	1136.30	257.00	1.91	4.42	10.47	0.17	1.33E+06
	13.25	1.638	5.127	-49.342	1.549	8.02E-05	1.99E-06	53.00	53.32	159.97	496.98	1150.15	257.00	1.93	4.48	10.34	0.17	1.34E+06
	13.6	1.712	5.088	-48.595	1.595	7.22E-05	1.61E-06	65.00	65.91	197.72	493.11	1141.20	257.00	1.92	4.44	10.42	0.17	1.33E+06
	15.6	2.147	4.856	-44.631	1.859	4.16E-05	5.20E-07	70.00	204.06	612.18	171.52	396.94	129.00	1.33	3.08	15.04	0.25	9.23E+05
	17.6	2.594	4.618	-41.139	2.122	2.57E-05	1.89E-07	70.00	561.44	1684.31	62.34	144.27	33.00	1.89	4.37	10.59	0.18	1.31E+06
	27.4	4.703	3.494	-29.019	3.314	4.32E-06	4.73E-09	70.00	29080.78	67301.22	1.56	3.61	1.00	1.56	3.61	12.82	0.21	1.08E+06