1 commissioning: 1.056 GeV beam, spectrometers at 15°, 2 cal. days

1.1 Settings requiring beam, evaluated at 60%

1. Beam diagnostics: harp scan, check the beam spot on the BeO target 1 h.
2. BPM/Harp Calibration 2 h.
3. EP beam energy measurement 3 h.
4. Arc Beam energy measurement 3 h.
5. Moller measurement 3 h.

Setting	Measurement	Target	E′	Collimater	Time	Notes
1	Optics data	7-foil 12C	1.042 GeV	Open	0.4 h	12C elastic
2	Optics data	7-foil 12C	1.042 GeV	Sieve	0.85 h	12C elastic
3	Optics data	7-foil 12C	0.965 GeV	Sieve	0.85 h	12C quasi-elastic
4	Empty target	Reference cell	1.010 GeV	Open	0.4 h	Evacuate 0 torr
5	N_2 elastic	Reference cell	1.063 GeV	Open	0.85 h	147 psig
6	Empty target	Reference cell	0.450 GeV	Open	0.4 h	Evacuate 0 torr
6	^{3}He	Pol. ^{3}He	0.450 GeV	Open	0.4 h	
7	^{3}He elastic	Reference cell	1.051 GeV	Open	0.4 h	Pressure curve: 37 psig
8	^{3}He elastic	Reference cell	1.051 GeV	Open	0.4 h	Pressure curve: 74 psig
9	^{3}He elastic	Reference cell	1.051 GeV	Open	0.4 h	Pressure curve: 110 psig
10	^{3}He elastic	Reference cell	1.051 GeV	Open	3.3 h	Pressure curve: 147 psig Check false asym ⋄
11	^{3}He elastic	Pol. ^{3}He 0° and 180°	1.051 GeV	Open	20 h	elastic assym.*
12	^{3}He delta	Pol. ^{3}He 270°	1.051 GeV	Open	0.85 h	transverse delta assym. † target polarized at 270°

1.2 Overhead: not requiring beam, not evaluated at 60%

1. target polarization measurements, every 4 hours, 20 min each: 2.5 hours total
2. Spectrometer momentum changes 3 hours.
3. Tagrget polarization rotation 0.5 h.

2 Production: 4.056 GeV beam, spectrometers at 25°

2.1 Settings requiring beam, evaluated at 60%

1. Arc Beam energy measurement 3 h.
2. Moller measurement 3 h.
3. optics, empty target, reference cell running: 1h at each setting: 6 hours total

	Target	Beam λ/2-plate	Target pol. direction	E′ (GeV)	Q^2 (GeV)^2	$\bar{W}$ (GeV)	$\bar{x}$	Rate Hz	T_{Tot} (Hours)	N_{good}	
4.2.3	Pol. ^{3}He	IN	0^o	1.84	1.37	1.94	0.31	59	1.25	125k	
4.2.4	Pol. ^{3}He	OUT	0^o	1.84	1.37	1.94	0.31	59	1.25	125k	
4.2.5	Pol. ^{3}He	OUT	270^o	1.84	1.37	1.94	0.31	59	1.25	75k	
4.3.3	Pol. ^{3}He	IN	0^o	2.00	1.50	1.84	0.36	54	1.25	100k	
4.3.4	Pol. ^{3}He	OUT	0^o	2.00	1.50	1.84	0.36	54	1.25	100k	
4.3.5	Pol. ^{3}He	OUT	270^o	2.00	1.50	1.84	0.36	54	1.25	75k	
4.4.3	Pol. ^{3}He	IN	0^o	2.17	1.63	1.73	0.42	49	1.7	110k	
4.4.4	Pol. ^{3}He	OUT	0^o	2.17	1.63	1.73	0.42	49	1.7	110k	
4.4.5	Pol. ^{3}He	OUT	270^o	2.17	1.63	1.73	0.42	49	1.25	88k	
4.5.3	Pol. ^{3}He	IN	0^o	2.35	1.76	1.60	0.50	37	2.5	115k	
4.5.4	Pol. ^{3}He	OUT	0^o	2.35	1.76	1.60	0.50	37	2.5	115k	
4.5.5	Pol. ^{3}He	OUT	270^o	2.35	1.76	1.60	0.50	37	1.25	60k	
4.5.6	Pol. ^{3}He	IN	270^o	2.35	1.76	1.60	0.50	37	1.25	60k	
4.6.6	Pol. ^{3}He	IN	0^o	2.55	1.91	1.44	0.60	21	1.7	70k	51
4.6.3	Pol. ^{3}He	OUT	0^o	2.55	1.91	1.44	0.60	21	3.4	140k	142
4.6.4	Pol. ^{3}He	OUT	270^o	2.55	1.91	1.44	0.60	21	2.5	105k	116
4.6.5	Pol. ^{3}He	IN	270^o	2.55	1.91	1.44	0.60	21	2.5	105k	99
4.6.7	Pol. ^{3}He	IN	180^o	2.55	1.91	1.44	0.60	21	1.7	70k	20
4.7.3	Pol. ^{3}He	IN	0^o	2.76	2.01	1.20	0.79	12	3.4	70k	73
4.7.4	Pol. ^{3}He	OUT	0^o	2.76	2.01	1.20	0.79	12	3.4	70k	52
4.7.5	Pol. ^{3}He	IN	180^o	2.76	2.01	1.20	0.79	12	3.4	70k	75
4.7.6	Pol. ^{3}He	OUT	180^o	2.76	2.01	1.20	0.79	12	3.4	70k	46
4.7.7	Pol. ^{3}He	OUT	270^o	2.76	2.01	1.20	0.79	12	3.4	105k	81
4.7.8	Pol. ^{3}He	IN	270^o	2.76	2.01	1.20	0.79	12	3.4	105k	77

2.2 Overhead: not requiring beam, not evaluated at 60%

1. target polarization measurements, every 6 hours, 20 min each: 3 hours total
2. Spectrometer momentum changes 3 hours.
3. Tagrget polarization rotation 1.5 h.

1. **Total estimated hours for 4 GeV: 71.5**
2. Total time spent at 4 GeV: about 170 hours.
3. Major problems include:
   (a) Right spectrometer dipole
   (b) DOE tour
   (c) CHL crash

3 Production: 5.056 GeV beam, 25°

3.1 Settings requiring beam, evaluated at 60%

1. Moller measurement 3 h.

2. optics, empty target, reference cell running: 1h at each setting: 6 hours total

	Target	Beam $\lambda/2$-plate	Target pol. direction	E′ (GeV)	Q^2 (GeV)^2	W range (GeV)	$\bar{x}$	Rate Hz	T$_{Tot}$ (Hours)	N$_{good}$	Achieved
5.1.3	Pol. ^{3}He	IN	0^o	3.2	3.0	1.2	0.81	3.4	8.4	110k	65
5.1.4	Pol. ^{3}He	OUT	0^o	3.2	3.0	1.2	0.81	3.4	8.4	110k	60
5.1.5	Pol. ^{3}He	IN	270^o	3.2	3.0	1.2	0.81	3.4	10	134k	70
5.1.6	Pol. ^{3}He	OUT	270^o	3.2	3.0	1.2	0.81	3.4	10	134k	70
5.1.7	Pol. ^{3}He	IN	180^o	3.2	3.0	1.2	0.81	3.4	8.4	110k	60
5.1.8	Pol. ^{3}He	OUT	180^o	3.2	3.0	1.2	0.81	3.4	8.4	110k	60
5.2.3	Pol. ^{3}He	IN	0^o	2.957	2.8		0.67	8.7	5.3	105k	112
5.2.4	Pol. ^{3}He	OUT	0^o	2.957	2.8		0.67	8.7	5.3	105k	111 (106)
5.2.5	Pol. ^{3}He	IN	270^o	2.957	2.8		0.67	8.7	5.3	115k	139 (125)
5.2.6	Pol. ^{3}He	OUT	270^o	2.957	2.8		0.67	8.7	5.3	115k	126 (98)
5.2.7	Pol. ^{3}He	IN	180^o	2.957	2.8		0.67	8.7	5.3	105k	111
5.2.8	Pol. ^{3}He	OUT	180^o	2.957	2.8	1.27-1.52	0.67	8.7	5.3	105k	112 (81)
5.3.3	Pol. ^{3}He	IN	0^o						3.3	96k	106
5.3.4	Pol. ^{3}He	OUT	0^o						3.3	96k	87
5.3.5	Pol. ^{3}He	IN	270^o						3.3	87k	100
5.3.6	Pol. ^{3}He	OUT	270^o						3.3	87k	100
5.3.7	Pol. ^{3}He	IN	180^o						3.3	96k	104
5.3.8	Pol. ^{3}He	OUT	180^o	2.732	2.6	1.5-1.7	0.56	14	3.3	96k	90
5.4.3	Pol. ^{3}He	IN	0^o						2.5	86k	
5.4.4	Pol. ^{3}He	OUT	0^o						2.5	86k	
5.4.5	Pol. ^{3}He	IN	270^o						1.7	67k	
5.4.6	Pol. ^{3}He	OUT	270^o						1.7	67k	
5.4.7	Pol. ^{3}He	IN	180^o						2.5	86k	
5.4.8	Pol. ^{3}He	OUT	180^o	2.524	2.4	1.7-1.85	0.46	18	2.5	86k	
5.5.3	Pol. ^{3}He	IN	0^o						1.7	78k	
5.5.4	Pol. ^{3}He	OUT	0^o						1.7	78k	
5.5.5	Pol. ^{3}He	IN	270^o						0.8	53k	
5.5.6	Pol. ^{3}He	OUT	270^o	2.333	2.2	1.85-2.0	0.4	21	0.8	53k	
5.5.3	Pol. ^{3}He	IN	180^o						1.7	78k	
5.5.4	Pol. ^{3}He	OUT	180^o						1.7	78k	
Total									127 h	78k	

3.2 Overhead: not requiring beam, not evaluated at 60%

1. target polarization measurements, every 6 hours, 20 min each: 7 hours total

2. Spectrometer momentum changes 3 hours.

3. Tagrget polarization rotation 2.5 h.

1. Total estimated hours for 5 GeV, 25^o: 142.5 h.

4 Production: 5.056 GeV beam, 32° ?? cal. days

4.1 Settings requiring beam, evaluated at 60%

1. Moller measurement 3 h.

2. optics, empty target, reference cell running: 1h at each setting: 6 hours total

	Target	Beam $\lambda/2$-plate	Target pol. direction	E′ (GeV)	Q^2 (GeV)^2	$\bar{W}$ (GeV)	$\bar{x}$	Rate Hz	T$_{Tot}$ (Hours)	N$_{good}$	comments
6.1.3	Pol. ^{3}He	IN	0^o							9k	Done
6.1.4	Pol. ^{3}He	OUT	0^o							9k	Done
6.1.5	Pol. ^{3}He	IN	270^o							9k	Done
6.1.6	Pol. ^{3}He	OUT	270^o							9k	Done
6.1.7	Pol. ^{3}He	IN	180^o							9k	Done
6.1.8	Pol. ^{3}He	OUT	180^o	2.625	4.0	1.22	0.85	0.6		9k	Done
6.2.3	Pol. ^{3}He	IN	0^o						24	35 (56)k	
6.2.4	Pol. ^{3}He	OUT	0^o						24	35 (56)k	
6.2.5	Pol. ^{3}He	IN	270^o						24	35 (56)k	
6.2.6	Pol. ^{3}He	OUT	270^o						24	35 (56)k	
6.2.7	Pol. ^{3}He	IN	180^o						24	35 (56)k	
6.2.8	Pol. ^{3}He	OUT	180^o	2.575	3.9	1.14-1.37	0.85	0.6	24	35 (56)k	
6.3.3	Pol. ^{3}He	IN	0^o						15	66k	
6.3.4	Pol. ^{3}He	OUT	0^o						15	66k	
6.3.5	Pol. ^{3}He	IN	270^o						12.5	55k	
6.3.6	Pol. ^{3}He	OUT	270^o						12.5	55k	
6.3.7	Pol. ^{3}He	IN	180^o						15	66k	
6.3.8	Pol. ^{3}He	OUT	180^o	2.379	3.6	1.36-1.58	0.75	2	15	66k	
6.4.3	Pol. ^{3}He	IN	0^o						10	62k	
6.4.4	Pol. ^{3}He	OUT	0^o						10	62k	
6.4.5	Pol. ^{3}He	IN	270^o						7	45k	
6.4.6	Pol. ^{3}He	OUT	270^o						7	45k	
6.4.7	Pol. ^{3}He	IN	180^o						10	62k	
6.4.8	Pol. ^{3}He	OUT	180^o	2.199	3.3	1.57-1.76		3	10	62k	
6.5.3	Pol. ^{3}He	IN	0^o						7	58k	
6.5.4	Pol. ^{3}He	OUT	0^o						7	58k	
6.5.5	Pol. ^{3}He	IN	270^o						5	38k	
6.5.6	Pol. ^{3}He	OUT	270^o						5	38k	
6.5.7	Pol. ^{3}He	IN	180^o						7	58k	
6.5.8	Pol. ^{3}He	OUT	180^o	2.031	3.1	1.76-1.91		4	7	58k	
Total									321h		

4.2 Overhead: not requiring beam, not evaluated at 60%

1. target polarization measurements, every 6 hours, 20 min each: 18 hours total

2. Spectrometer momentum changes 3 hours.

3. Tagrget polarization rotation 2.5 h.

1. **Total estimated hours for 5 GeV, 32^o: 353.5 h.**

5 Production: 3.026 GeV beam, spectrometers at 25°

Note that the individual times for this setting are NOT weighted by 60%, it is applied at the end

1. Moller measurement 2 h.
2. optics, empty target, reference cell running: 1h at each setting: 2 hours total

	Target	Beam $\lambda/2$-plate	Target pol. direction	E′ (GeV)	Q^2 $(\mathrm{GeV})^2$	$\bar{W}$ (GeV)	$\bar{x}$	Rate Hz	T_{Tot} (Hours)	N_{good}	
3.1.3	Pol. ^{3}He	IN	0^o	1.3338	0.76	1.8	0.31	115	0.8	350k	
3.1.4	Pol. ^{3}He	OUT	0^o						0.8	350k	
3.1.5	Pol. ^{3}He	IN or OUT	270^o						0.5	210k	
3.2.3	Pol. ^{3}He	IN	0^o	1.448	0.82			125	0.7	330k	
3.2.4	Pol. ^{3}He	OUT	0^o						0.7	330k	
3.2.5	Pol. ^{3}He	IN or OUT	270^o						0.5	230k	
3.3.3	Pol. ^{3}He	IN	0^o	1.567	0.89			140	0.7	310k	
3.3.4	Pol. ^{3}He	OUT	0^o						0.7	310k	
3.3.5	Pol. ^{3}He	IN or OUT	270^o						0.5	250k	
3.4.1	Empty	NA	NA					NA	0.1	NA	
3.4.2	N_2 (147 psig)	NA	NA						0.1	10k	
3.4.3	Pol. ^{3}He	IN	0^o	1.696	0.96			133	0.7	305k	
3.4.4	Pol. ^{3}He	OUT	0^o						0.7	305k	
3.4.5	Pol. ^{3}He	IN or OUT	270^o						0.7	290k	
3.5.3	Pol. ^{3}He	IN	0^o	1.836	1.041			130	0.8	380k	
3.5.4	Pol. ^{3}He	OUT	0^o						0.8	380k	
3..5	Pol. ^{3}He	OUT	270^o						0.5	216k	
3.5.5	Pol. ^{3}He	IN	270^o						0.5	216k	
3.6.3	Pol. ^{3}He	IN	0^o	1.987	1.126			85	0.8	218k	
3.6.4	Pol. ^{3}He	OUT	0^o						0.8	218k	
3.6.3	Pol. ^{3}He	IN	180^o	1.987	1.126			85	0.8	218k	
3.6.4	Pol. ^{3}He	OUT	180^o						0.8	218k	
3.6.5	Pol. ^{3}He	OUT	270^o						1	300k	
3.6.5	Pol. ^{3}He	IN	270^o						1	300k	
3.7.3	Pol. ^{3}He	IN	0^o						0.8	264k	
3.7.4	Pol. ^{3}He	OUT	0^o						0.8	264k	
3.7.3	Pol. ^{3}He	IN	180^o	2.15	1.22			90	0.8	264k	
3.7.4	Pol. ^{3}He	OUT	180^o						0.8	264k	
3.7.5	Pol. ^{3}He	OUT	270^o						1.5	445k	
3.7.5	Pol. ^{3}He	IN	270^o						1.5	445k	
Total									23.5h (40 h at 60%)		

5.1 Overhead: not requiring beam, not evaluated at 60%

1. target polarization measurements, every 6 hours, 20 min each: 1.5 hours total
2. Spectrometer momentum changes 3 hours.
3. Tagrget polarization rotation 1.5 h.

1. **Total estimated hours for 3 GeV, 25^o: 48 h.**