Plan for FPP commissioning with unpolarized beam

1. Measure the carbon scattering efficiency for $T_p = 0.799$ for carbon thickness of 22.9 (9"), 30.5 cm (3"+9" doors), 41.9 cm (1 1/2"+6"+9"). Estimated time for measurement is 1.5 hours. Magnet and angle change is hour. See fpp_scat_1 in following pages for details.

2. Measure the carbon scattering efficiency for $T_p = 0.586$ for carbon thickness of 22.9 (9"), 30.5 cm (3"+9" doors), 41.9 cm (1 1/2"+6"+9"). Estimated time for measurement is 1.5 hours. Magnet and angle change is hour. See fpp_scat_2 in following pages for details.

3. Measure d(e,ep) quasi-elastic scattering at kinematics for elastic ep at $Q^2 = 1.1$ GeV^2 ($T_p = 0.586$). Want to measure instrumental asymmetries to 0.0015 level. Estimated time for measurement is 2.0 hours. See fpp_scat_3 in following pages for details.

4. Remove carbon doors to do alignment of FPP chambers with straight through tracks. Use d(e,ep) quasi-elastic scattering at kinematics for elastic ep at $Q^2 = 1.1$ GeV^2 ($T_p = 0.586$) with hadron Q3 defocussed. Estimated time for measurement is 1/2 hour. See fpp_scat_4 in following pages for details.

5. Measure the carbon scattering efficiency for $T_p = 1.012$ for carbon thickness of 22.9 (9"), 30.5 cm (3"+9" doors), 41.9 cm (1 1/2"+6"+9"), and 49.5cm (all doors). Estimated time for measurement is 2.0 hours. Magnet and angle change is hour. See fpp_scat_5 in following pages for details.

6. Measure the carbon scattering efficiency for $T_p = 1.332$ for carbon thickness of 22.9 (9"), 30.5 cm (3"+9" doors), 41.9 cm (1 1/2"+6"+9"), and 49.5cm (all doors). Estimated time for measurement is 2.0 hours. Magnet and angle change is hour. See fpp_scat_6 in following pages for details.

7. Measure the carbon scattering efficiency for $T_p = 1.599$ for carbon thickness of 30.5 cm (3"+9" doors), 41.9 cm (1 1/2"+6"+9"), and 49.5cm (all doors). Estimated time for measurement is 1.5 hours. Magnet and angle change is hour. See fpp_scat_7 in following pages for details.

Settings for fpp_scat_1

Measure the carbon scattering efficiency for $T_p = 0.799$ for carbon thickness of 22.9 (9"), 30.5 cm (3"+9" doors), 41.9 cm (1 1/2"+6"+9").

Beam Energy 4.045 GeV

Beam position $<$ .25 for x and y for 3A and 3B

Raster size 1.5x1.5mm

Beam Current 25-35μA. Set current to give maximum data rate with deadtime $<$ 60%.

Target 15cm LH_2

Spectrometer settings

Spectrometer	Momentum	Angle	Collimator
Electron	3.2457 GeV	19.46°	6msr
Proton	1.463 GeV	47.68°	6msr

Magnet settings

Spectrometer	Dipole	Q1	Q2	Q3
Electron	1.27742 T	2428.45 A	1389.92 A	1285.09 A
Proton	0.539753 T	1093.70 A	625.975 A	578.764 A

The electron quads are all set to negative polarity. The hadron Q1 and Q3 are set to positive polarity, but Q2 is set to negative polarity. For a first guess at current for electron dipole either scale from earlier run or use 909 A/T. Suugest that the electron dipole be set to 10^{-3} level and then quads scaled to match.

Data taking The T5 prescale should be one. The prescales for T1,T2,T3 and T4 should be set to give less than 5 Hz trigger rate for each. The T8 prescale should be set to maximum.

The trigger setup should be proton_1170-1700.settings .

For each carbon thickness run for 15 minutes. Have allowed 15 minutes for carbon door changes.

Settings for fpp_scat_2

Measure the carbon scattering efficiency for $T_p = 0.586$ for carbon thickness of 22.9 (9"), 30.5 cm (3"+9" doors), 41.9 cm (1 1/2"+6"+9").

Beam Energy 4.045 GeV

Beam position $<$ .25 for x and y for 3A and 3B

Raster size 1.5x1.5mm

Beam Current $\approx$7-14μA. Set current to give maximum data rate with deadtime $<$ 60%.

Target 15cm LH_2

Spectrometer settings

Spectrometer	Momentum	Angle	Collimator
Electron	3.459 GeV	16.12°	6msr
Proton	1.202 GeV	53.06°	6msr

Magnet settings

Spectrometer	Dipole	Q1	Q2	Q3
Electron	1.36131 T	2587.94 A	1481.20 A	1369.49 A
Proton	0.4434 T	898.511 A	514.260 A	475.574 A

The electron quads are all set to negative polarity. The hadron Q1 and Q3 are set to positive polarity, but Q2 is set to negative polarity. For a first guess at current for electron dipole either scale from earlier run or use 909 A/T. Suugest that the electron dipole be set to 10^{-3} level and then quads scaled to match.

Data taking The T5 prescale should be one. The prescales for T1,T2,T3 and T4 should be set to give less than 5 Hz trigger rate for each. The T8 prescale should be set to maximum.

The trigger setup should be proton_1170-4000.settings .

For each carbon thickness run for 15 minutes. Have allowed 15 minutes for carbon door changes.

Settings for fpp_scat_3

Measure d(e,ep) quasi-elastic scattering at kinematics for elastic ep at $Q^2 = 1.1$ GeV^2. Want to measure instrumental asymmetries to 0.0015 level. Estimated time for measurement is 2.0 hours.

Beam Energy 4.045 GeV

Beam position < .25 for x and y for 3A and 3B

Raster size 1.5x1.5mm

Beam Current $\approx$7-14μA. Set current to give maximum data rate with deadtime < 60%.

Target 15cm Deuterium

Spectrometer settings

Spectrometer	Momentum	Angle	Collimator
Electron	3.459 GeV	16.12°	6msr
Proton	1.202 GeV	53.06°	6msr

Magnet settings

Spectrometer	Dipole	Q1	Q2	Q3
Electron	1.36131 T	2587.94 A	1481.20 A	1369.49 A
Proton	0.4434 T	898.511 A	514.260 A	475.574 A

The electron quads are all set to negative polarity. The hadron Q1 and Q3 are set to positive polarity, but Q2 is set to negative polarity. For a first guess at current for electron dipole either scale from earlier run or use 909 A/T. Suugest that the electron dipole be set to 10^{-3} level and then quads scaled to match.

Data taking The T5 prescale should be one. The prescales for T1,T2,T3 and T4 should be set to give less than 5 Hz trigger rate for each. The T8 prescale should be set to maximum.

The trigger setup should be proton_1170-4000.settings .

Would like about 9x10^6 coincidence triggers.

Settings for fpp_scat_4

Remove carbon doors to do alignment of FPP chambers with straight through tracks. Use d(e,ep) quasi-elastic scattering at kinematics for elastic ep at $Q^2 = 1.1$ GeV^2 with hadron Q3 defocussed. Estimated time for measurement is 1/2 hour.

Beam Energy 4.045 GeV

Beam position $<$ .25 for x and y for 3A and 3B

Raster size 1.5x1.5mm

Beam Current $\approx$7-14μA. Set current to give maximum data rate with deadtime $<$ 60%.

Target 15cm Deuterium

Spectrometer settings

Spectrometer	Momentum	Angle	Collimator
Electron	3.459 GeV	16.12°	6msr
Proton	1.202 GeV	53.06°	6msr

Magnet settings

Spectrometer	Dipole	Q1	Q2	Q3
Electron	1.36131 T	2587.94 A	1481.20 A	1369.49 A
Proton	0.4434 T	898.511 A	514.260 A	285.0 A

The electron quads are all set to negative polarity. The hadron Q1 set to positive polarity, but Q2 is set to negative polarity. Set hadron Q3 to **negative** polarity for defocussing (The value in the table is also decreased by 60For a first guess at current for electron dipole either scale from earlier run or use 909 A/T. Suugest that the electron dipole be set to 10^{-3} level and then quads scaled to match.

Data taking The T5 prescale should be one. The prescales for T1,T2,T3 and T4 should be set to give less than 5 Hz trigger rate for each. The T8 prescale should be set to maximum.

The trigger setup should be proton_1170-4000.settings .

The goal is 10,000 events which scatter between 5 - 20° in the carbon analyzer for each carbon thickness. Estimate that it will take 10 minutes per carbon thickness.

Settings for fpp_scat_5

Measure the carbon scattering efficiency for T_p = 1.012 for carbon thickness of 22.9 (9"), 30.5 cm (3"+9" doors), 41.9 cm (1 1/2"+6"+9"), and 49.5cm (all doors).

Beam Energy 4.045 GeV

Beam position $<$ .25 for x and y for 3A and 3B

Raster size 1.5x1.5mm

Beam Current $\approx 50\mu$A.

Target 15cm LH_2

Spectrometer settings

Spectrometer	Momentum	Angle	Collimator
Electron	3.033 GeV	22.70°	6msr
Proton	1.710 GeV	43.17°	6msr

Magnet settings

Spectrometer	Dipole	Q1	Q2	Q3
Electron	1.19352 T	2268.97 A	1298.64 A	1200.69 A
Proton	0.631203 T	1279.01 A	732.035 A	676.824 A

The electron quads are all set to negative polarity. The hadron Q1 and Q3 are set to positive polarity, but Q2 is set to negative polarity.

Data taking The T5 prescale should be one. The prescales for T1,T2,T3 and T4 should be set to give less than 5 Hz trigger rate for each. The T8 prescale should be set to maximum.

The trigger setup should be proton_1700-4000.settings .

For each carbon thickness run for 15 minutes. Have allowed 15 minutes for carbon door changes.

Settings for fpp_scat_6

Measure the carbon scattering efficiency for $T_p = 1.332$ for carbon thickness of 22.9 (9"), 30.5 cm (3"+9" doors), 41.9 cm (1 1/2"+6"+9"), and 49.5cm (all doors).

Beam Energy 4.045 GeV

Beam position $<$ .25 for x and y for 3A and 3B

Raster size 1.5x1.5mm

Beam Current $\approx 50\mu$A.

Target 15cm LH_2

Spectrometer settings

Spectrometer	Momentum	Angle	Collimator
Electron	2.713 GeV	27.61°	6msr
Proton	2.068 GeV	37.46°	6msr

Magnet settings

Spectrometer	Dipole	Q1	Q2	Q3
Electron	1.06768 T	2029.73 A	1161.71 A	1074.09 A
Proton	0.763054 T	1546.18 A	884.948 A	818.205 A

The electron quads are all set to negative polarity. The hadron Q1 and Q3 are set to positive polarity, but Q2 is set to negative polarity. For a first guess at current for electron dipole either scale from earlier run or use 909 A/T. Suugest that the electron dipole be set to 10^{-3} level and then quads scaled to match.

Data taking The T5 prescale should be one. The prescales for T1,T2,T3 and T4 should be set to give less than 5 Hz trigger rate for each. The T8 prescale should be set to maximum.

The trigger setup should be proton_1700-4000.settings .

For each carbon thickness run for 15 minutes. Have allowed 15 minutes for carbon door changes.

Settings for fpp_scat_7

Measure the carbon scattering efficiency for T_p = 1.599 for carbon thickness of 30.5 cm (3"+9" doors), 41.9 cm (1 1/2"+6"+9"), and 49.5cm (all doors).

Beam Energy 4.045 GeV

Beam position $<$ .25 for x and y for 3A and 3B

Raster size 1.5x1.5mm

Beam Current $\approx 50\mu$A.

Target 15cm LH_2

Spectrometer settings

Spectrometer	Momentum	Angle	Collimator
Electron	2.446 GeV	31.96°	6msr
Proton	2.357 GeV	33.32°	6msr

Magnet settings

Spectrometer	Dipole	Q1	Q2	Q3
Electron	0.962814 T	1830.37 A	1047.61 A	968.597 A
Proton	0.869897 T	1762.67 A	1008.86 A	932.769 A

The electron quads are all set to negative polarity. The hadron Q1 and Q3 are set to positive polarity, but Q2 is set to negative polarity. For a first guess at current for electron dipole either scale from earlier run or use 909 A/T. Suugest that the electron dipole be set to 10^{-3} level and then quads scaled to match.

Data taking The T5 prescale should be one. The prescales for T1,T2,T3 and T4 should be set to give less than 5 Hz trigger rate for each. The T8 prescale should be set to maximum.

The trigger setup should be proton_1700-4000.settings .

For each carbon thickness run for 15 minutes. Have allowed 15 minutes for carbon door changes.