

CT Experiment (E12-06-107) Run Plan Overview

January 15, 2018

Table 1: Kinematics for the run.

Q^2 GeV ²	E_e GeV	$\theta_{e'}^{HMS}$ deg	p_{HMS} GeV/c	θ_{SHMS} deg	p_{SHMS} GeV/c	notes
8.01	6.4	45.07	2.131	17.13	5.122	overlap with E94139, first 3 pass kinematics, 1% stat
14.76	10.6	41.8	2.736	12.02	8.753	First 5 pass kinematics 2-2.5% stat
12.43	10.6	31.5	3.978	16.08	7.502	Second 5 pass kine, run with 2% stat
10.02	10.6	24.48	5.259	20.55	6.209	Third 5 pass kine, run with 1.4% stat
10.02	10.6	24.48	5.259	17.55	6.209	proton angle scan, 2.5% stat (time permitting)
10.02	10.6	24.48	5.259	23.55	6.209	proton angle scan, 2.5% stat (time permitting)

All time estimates in the overview assume 50% Hall C + Accelerator efficiency, including configuration change time and a beam current of 65 μ A.

Last shift before Experiment begins:

1. All spectrometer magnets on to correct polarity and cycled to initial values. Spectrometers also at initial angles.
2. Check that no new obstructions have appeared since the spectrometer angles were certified. For example, ladders, RadCon survey ropes, etc.
3. Double-check HMS/SHMS Gas Cerenkov pressure is at correct value.
4. Verify there are no obstructions between the detectors (ie, no WC covers, no dangling cables, etc.) on both spectrometers.
5. Verify there are no unusual obstructions between the scattering chamber and the spectrometer front windows. Make sure any protective windows on the scattering chamber have been removed.
6. Lock up the hall.
7. Clean up the counting house. Make sure all terminals, consoles, and printers are alive and well.
8. Take a cosmic run and look for problems.

6.4 GeV data taking: 60 beam hours scheduled, need 8 hrs for calibration and 52 hrs (at 50% eff.) for production.

1. Calibrations \Rightarrow 8 hours

- Verify magnets properly cycled - Beam energy measurement - Harp scan
- Detector checkout with 3/4 trigger, and long run for detector calibration
- BCM Calibration (unless one was completed very close to the start of experiment)
- *ep* elastic coincidences, (Heepcheck) $Q^2=4.0 \text{ GeV}^2$, HMS at 4.263 GeV/c, 22.10 deg, SHMS at 2.928 GeV/c, 33.21 deg ,expected rate few Hz 65 μA current. (at least 3 hrs).
- verify timing of all triggers

2. $Q^2 = 8.0 \text{ (GeV/c)}^2$ production, goal: 10000 cnts

- LH + MT 12 hrs + 4 hrs
- C 36 hrs

10.6 GeV data taking: 300 beam hours scheduled, need 8 hrs for calibration and 292 hrs (at 50% eff.) for production.

1. Calibrations \Rightarrow 8 hours

- Verify magnets properly cycled - Beam energy measurement - Harp scan
- Detector checkout with 3/4 trigger, and long run for detector calibration
- BCM calibration
- *ep* elastic coincidences (Heepcheck), $Q^2=9.5 \text{ GeV}^2$, HMS at 5.5394 GeV/c, 23.20 deg, SHMS at 5.9250 GeV/c, 21.61 deg ,expected rate few Hz 65 μA current. (at least 4 hrs)

2. $Q^2 = 14.76 \text{ (GeV/c)}^2$ production, goal: 2000 cnts

- LH + MT 51 hrs + 17 hrs
- C 122 hrs

3. configuration change 5 hrs

4. $Q^2 = 12.43 \text{ (GeV/c)}^2$ production, goal: 2500 cnts

- LH + MT 12 hrs + 4 hrs
- C 24 hrs

5. configuration change 5 hrs

6. $Q^2 = 10.02 \text{ (GeV/c)}^2$ production, goal: 4500 cnts

- LH + MT 6 hrs + 2 hrs

- C 12.0 hrs
7. $Q^2 = 10.02 \text{ (GeV/c)}^2$ proton angle scan, goal: 2500 cnts
- C 12.0 hrs, proton angle scan 1, 2500 cnts
 - C 20.0 hrs, proton angle scan 2, 2500 cnts