

Optics Procedure for 5.0T, 6deg Target Field

Instruction for Shift Leader:

For optics, we always use 100nA beam, rasters should be off except special specified. Usually take 2 runs for each configuration, each run for 1M events with LHe or 0.3M without LHe.

1. Pointing (Estimated time: 40 min)¹:

- a. Check whether the sieve status is IN. If not, tell the expert and ask for an escorted access to move the sieve slit.
- b. Check the HRS momentum setting. Make sure both of them are C12 elastic peak² (delta=0%, detail values will be given in the table). Make sure the septa current are correct for both arms. In case the HRS momentum need to be increase, you will need to CYCLE Q2, Q3 before set it to the new value.
- c. Ask the target operator to move the target to C12.
- d. Ask MCC to send 100nA beam at the position of (0,0), take one run.
- e. Ask the target operator (maybe with the help of target experts) to **drain OUT** the LHe. Keep taking data at the same time, 1M events each run.
- f. During the target experts is draining the LHe out, ask 3rd person to keep checking T1&T3 scaler rates to tell whether LHe is drained OUT.

2. Delta scan (Estimated time:120 min):

- a. Keep sieve IN, C12 target, no LHe.
- b. Set HRS momentum to C12 elastic peak(delta=0%), take 2 runs.
- c. Set HRS momentum to H elastic peak. Take 2 runs..
- d. **CYCLE** Q2, Q3, to back to delta=0%

3. Beam position cross scan (Estimated time: 30 min each position):

¹ The actual time used may be longer than the estimated time, but please notify the student experts if you haven't finished the stage within 1.5 times the estimated time.

² To calculate the elastic energy and septa current, use these 2 executable in ~adaq/GetElasE ~adaq/GetSeptaCurrent..

If possible, please combine this part with BPM calibration(sieve in, no Lhe).

- a. Keep the HRS momentum setting to be $\Delta=0\%$, and C12 target, no LHe.
- b. Follow the detailed configuration in the table, ask MCC to move the beam position, check the beam position on the Hall A General Tools screen.
- c. Ask 3rd person to take two runs for each configuration. For each run, ask 3rd person to do a spot++ check (type spot_L or spot_R on an adaq account) and halog the result.
- d. Move beam back to (0,0).

If liquid helium is in, take 1M events for each run, otherwise 300k..

For each setting, snapshot the scaller rates window once, replay one run for each arm, snapshot the target tab and focus tab at the righth delta. If beam position changed, take a snapshot for spot++.

Configuration	HRS P ₀ (GeV)	Septa I (A)	Event Amount	Run Number	
Pointing, Sieve IN, 40mil C12 target					
With LHe	2.251	725.4	1x1M	L	
				R	
Draining LHe	2.251	725.4	?x1M	L	
				R	
No LHe	2.251	725.4	1x0.3M		
Beam Position Scan, Sieve IN, 40mil C12 target					
Beam Position (0, 0)	2.251	725.4	1x0.3M	L	
				R	
(0, 4)	2.251	725.4	2x0.3M	L	
				R	
(4, 4)	2.251	725.4	2x0.3M	L	
				R	
(4, 0)	2.251	725.4	2x0.3M	L	
				R	
(-4, 0)	2.251	725.4	2x0.3M	L	
				R	
(-4, -4)	2.251	725.4	2x0.3M	L	
				R	
(0, -4)	2.251	725.4	2x0.3M	L	
				R	
Delta Scan, Sieve IN, 40mil C12 target, beam position (0,0)					
C12 elastic peak	2.251	725.4	2x0.3M	L	
				R	
H elastic peak	2.228	718.1	2x0.3M	L	
				R	