

Optics Procedure for 5.0T, 90deg Target Field

Instruction for Shift Leader:

Here is the optics plan for the new right septum. The chicane setting is for 5.0T, 0deg target field, the beam energy is 2.254 GeV.

For optics, we always use 50nA beam. The 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. Delta scan (Estimated time:240 min):

There is 2 ways to do the delta scan:

- 1) start from 0% → 2% → 4% → cycle to -4% → -2% → 0%
- 2) cycle to -4% → -2% → 0% → 2% → 4% → cycle to 0%

Option 2) might save some change over time at the beginning or at the end if can be combined with other plan. Please discuss with the expert which option will be followed.

- 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. Assuming use opting 1), set the LHRS delta to be 1%, 2%, 3%, 4%, **CYCLE Q2, Q3**, then -4%, -3%, -2%, -1%. simultaneously set RHRS momentum to be 2%, 3.5%, **CYCLE Q2, Q3**, then -3.5%, -2%. For each setting, set septa current to be the corresponding values in the table.
- c. For each configuration, take 2 runs, halog the scaler rate once, replay at least one run for each arm, halog the focus and target panel corresponded to the right delta value.
- d. If running out of time, we will skip 3.5% in right arm and 1%, 3% at left arm. This can save at least 1 hours.

2. Beam position cross scan (Estimated time: 60 min):

- a. Keep the HRS momentum setting to be delta=0% , and C12 target, no LHe.
- b. Follow the detailed configuration in the table, notify MCC that we need to turn on the slow raster and ask student expert to set the correct slow raster configuration.
- c. Ask 3rd person to take one 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.

3. Acceptance Study (Part 1, estimated time 10 min):

- a. Keep HRS and septa current configuration at $\Delta=0\%$, stay at C12 target.
- b. Ask MCC to turn on the fast raster with 2x2mm, and send 50nA beam with position (0,0), also notify MCC that we need to turn on the slow raster. Ask student expert to turn on the slow raster to 2cm diameter. Take 2 runs.
- c. Let MCC know that we need to turn off both fast raster and slow raster. Ask student expert to turn off the slow raster.

4. Pointing (Estimated time 30 min):

- a. Keep HRS and septa current configuration at $\Delta=0\%$, move to CH2 target.
- b. Ask MCC to send 50nA beam at the position of (0,0), take 2 runs.

5. Acceptance study (Part2, estimated time:50min):

- a. Ask MCC for an escorted access to move the sieve **OUT**. Student expert will go to the hall to move the sieve.
- b. Ask the MCC to send 50 nA beam at the position of (0,0), take 2 runs.
- c. Let MCC know we need to turn on the slow raster and also ask them to turn on fast raster with 2x2mm, ask student expert to turn on the slow raster, then take 2 runs with 1M event.

Optics Table for 5.0T, 90deg Target Field

If liquid helium is in, take 1M events for each run, otherwise 500k.

For each setting, snapshot the scaler rates window once, replay one run for each arm, snapshot the target tab and focus tab at the right 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, delta=0%					
With LHe, C12	2.251		?x1M	L	
				R	
No LHe, CH2	2.251		2x1M	L	
				R	

Configuration	HRS P ₀ (GeV)	Septa I (A)	Event Amount	Run Number	
Delta Scan, Sieve IN, C12 target, LHRS					
0%	2.251		2x0.5M	L	
1%	2.228		2x0.5M	L	
3%	2.183		2x0.5M	L	
Cycle to -3%	2.319		2x0.5M	L	
-1%	2.274		2x0.5M	L	
Delta Scan, Sieve IN, C12 target, RHRS					
0%	2.251		2x0.5M	R	
1%	2.228		2x0.5M	R	
3%	2.183		2x0.5M	R	

Configuration	HRS P ₀ (GeV)	Septa I (A)	Event Amount	Run Number Comments
Acceptance Study Part I, Sieve IN, C12 target, delta=0%				
Fast raster + Slow raster	2.251		2x0.5M	L
				R
Acceptance Study Part II, Sieve OUT, C12 target, delta=0%				
No rasters	2.251		2x0.5M	L
				R
Fast raster + Slow raster	2.251		2x0.5M	L
				R

Configuration	HRS P ₀ (GeV)	Septa I (A)	Event Amount	Run Number Comments
Beam Position Scan, Sieve IN, C12 target, delta=0%				
X axis	2.251		2x0.8M	L
				R
Y axis	2.251		2x0.8M	L
				R
diagonal	2.251		2x0.8M	L
				R