

Rate/width study: (Draft...still working on it)

We will use the following five targets: thin Pb, thin C, thick C, Ca, and Prod Pb

Beam currents to be used during Phase I: 50nA, 100nA, 200nA, and 400nA

Beam currents to be used during Phase II: 2uA, 5uA, and 50uA

Detector setup: Already aligned with UpStream (US) detectors in integrating mode and DownStream (DS) detectors in Counting mode. Discriminator thresholds have also been adjusted for good scaler counting.

There are two parts to Phase I. Each phase will have a different preamp. Phase 1A will use maximum pmt gain and phase 1B will use a lower gain. Phase 1B thin Pb and thin C will be bootstrapped to Phase IIA—here we run Phase IIA with same exact setup as Phase 1B and so can compare rate result directly without complications.

US dets will use 1M $\Omega$  preamp setting in both arms for the entire study.

DS dets are in counting mode during Phase I and switched to integrating mode with 0.21M $\Omega$  preamp in both arms for Phase II.

Plan:

During Phase I, the rates in DS detectors will be determined using scalers and counting DAQ, while the rates in US detectors are determined from asymmetry widths using the Parity DAQ. Low current runs will be taken at various beam currents for each target. Here we will map out the rates (and relative rates) we measure as we cycle through the targets at each beam current setting. We will use the SAMs (2+6 + 4+8 sum) to help monitor the beam current stability during Phase I. We will then lower the US pmt gains and repeat.

Operational plan:

- Access needed to switch US detectors to integrating mode and install needed preamps
- Setup 50nA beam current with MCC; set US and DS pmts to -2000 in both arms
- Move to thin Pb target. Look at DS scalers to get rate. Look at online viewer of US detector spectra to get ADC yield (and make sure not saturating)—take counting data run. Also take parity data run for 5 min duration to give 0.5% relative error on asymmetry width. Make sure SAM signals are healthy and use SAMs to monitor beam current
- Move to thick C, perform same measurements
- Change beam current to 100nA and repeat: thin Pb, thin C, and thick C
- Change beam current to 200nA and repeat for thin Pb and thin C (not thick C)
- Change beam current to 400nA and do thin C only

Go to low gain setting on US detectors, but leave DS at -2000 V. Perform Phase II B measurements:

- Change for 50nA beam current; perform measurement on thick C
- Change for 100nA beam current; perform measurements: thin Pb, thin C, and thick C
- Change beam current to 200nA; perform measurements: thin Pb, thin C, and thick C
- Change beam current to 400nA; perform measurements: thin Pb, thin C, and thick C

Done with Phase I