

Rate/width study: estimated time needed ~4 hours

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

Beam currents to be used during Phase 1: 50nA, 100nA, 200nA, and 400nA

Beam currents to be used during Phase 2: 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 1. 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 2A—here we run Phase 2A with same exact setup as Phase 1B and so can compare rate result directly without complications.

US dets will use 1MOhm preamp setting in both arms for the entire study.

DS dets are in counting mode during Phase I and switched to integrating mode with 0.21MOhm preamp in both arms for Phase 2.

Plan:

During Phase 1, 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 1. We will then lower the US pmt gains and repeat—this provides the bootstrapping data.

Operational plan: phase 1A and phase 1B

- [1 hr] Access needed to switch US detectors to integrating mode and install needed preamps
- [10 min] Setup 50nA beam current with MCC; set US and DS pmts to -2000 in both arms
- [30 min] 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
- [10 min] Move to thin C, perform same measurement
- [10 min] Move to thick C, perform measurement
- [25 min] Change beam current to 100nA and repeat: thin Pb, thin C, and thick C
- [15 min] Change beam current to 200nA and repeat for thin Pb and thin C (not thick C)
- [10 min] 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 I B measurements:

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

Done with Phase I

Notes for bootstrapping:

- For Main detectors (US), thin Pb and thin C targets from phase 1B (at low current) will be compared to phase 2A's thin Pb at 2uA and thin C at 5uA using same pmt gain and preamp setting.
- For SAMs, thin Pb and thin C runs during phase 1 will be bootstrapped to phase 2B runs for thin Pb at 2uA and thin C at 5uA.