

Minutes of the Lessons Learned for Parity Violation Experiments at JLAB
November 19, 2004

Attending

CC B207 – David Armstrong, Alex Bogacz, Yu-Chiu Chao, Joe Grames, John Hansknecht, Andrew Hutton, Reza Kazimi, Paul King, Kent Paschke, Matt Poelker, Ryan Snyder, Riad Suleiman

Teleconference – Doug Beck, Gordon Cates, Lisa Kauffman, Mark Pitt, Kaz Nakahara, Steve Williamson

The meeting was opened and proceeded according to the agenda.

Matt presented timeline (see web document) of parity quality beam development and operation for the HAPPEX and G0 parity violation experiments.

1. Matt – a large charge asymmetry is inconvenient for adiabatic damping studies
 - a. Doug – disagrees, believes larger orbit perturbations are sufficient, but may be problematic for parity-sized measurements.
 - b. Matt – from practical point of view, large charge asymmetry during such measurements are problematic.
 - c. Kent – agrees large charge asymmetry is problematic.
2. Matt – G0 position feedback appeared reliable.
 - a. Doug – noted that apparent reliability was a result of frequent quadrupole corrections by Kaz.
3. Kent – notes during HAPPEX-1 in 1998 with strained crystal observation that the Hall C charge asymmetry affected the Hall A position differences. Implemented TACO to keep Hall C charge asymmetry small (helicity correlated adjustments to seed laser drive current)
4. Matt – points out that HAPPEX-2 in 2004 with superlattice was reliable for He, but poor lifetime and subsequent spot moves for H resulted in unstable helicity correlations.
 - a. Kent – notes He faced less difficulty because Hall C was not yet running.
 - b. Dave – points out that it is not clear whether it is the direct effect of the Hall C beam or the indirect effect of many spot moves while running in parallel with HallC.
5. Matt – shows Kaz's G0 PAVI slide re: beam specifications requested and met
 - a. Dave – indicates that specs were achieved, but a result of much optics tuning.
 - b. Doug – hopes for more automatic optics control for next G0 run.
6. Matt – shows HAPPEX-2 specifications requested and met.
 - a. Kent – indicates that the specifications were sufficiently met.

Reza presented Injector Setup for G0 and HAPPEX (see web document)

1. Reza – indicated that the 1.3 pC bunch charge was the largest challenge and required modification of the longitudinal setup and modification of the transverse

- optics to decrease consequent sensitivities, particularly while maintaining parity quality beam. This was further exasperated by running alongside the Hall A hyper-nuclear experiment which put further constraints on the longitudinal setup.
2. Reza – noted that while the standard beam delivery requirements were set forth early, e.g., bunch charge, repetition rate, etc., the parity quality beam parameters were not until during the process of setting the injector.
 3. Reza – a significant factor in the setup involves the cryounit (CU, quarter cryomodule) and that the setup through the CU now centers the cavity geometrically, rather than electrically. He indicates this needs to be studied further.
 - a. Doug – wanted to know if the CU beam steering mentioned by Reza is related to the studied performed by Chao for adiabatic damping.
 - b. Reza – while they may mutually affect one another, the issues have been independent.
 - c. Mark – noted as G0 changed the IA, both charge asymmetry and position differences were enhanced in the CU region.
 - d. Reza – indicated that if the effects are related to beam loss, then the geometrical steering is an improvement, but if the effects are related to phase space (Chao’s studies), then there may be no improvement.
 - e. Kent – noted the charge asymmetry near the CU would typically be about 200 ppm, even if no upstream charge asymmetry. He further noted that the symmetric and anti-symmetric charge asymmetry peaks would change. He thinks that the position differences at the CU in the measured charge asymmetry. He pointed out that this charge asymmetry is not stable either.
 4. Reza – he would like more involvement from Ops, requiring some level of education and discussion with the experts. He would also like the capability for Ops staff to independently use the injector parity data acquisition system, without experts on-hand.
 5. Chao – noted that he learned from Ops that the steering into cryomodule is not well understood. He asked if this is an alignment problem.
 - a. Andrew – indicated that it is not an alignment problem, but rather the unbalanced vertical kick from the CU, also experience in the FEL. He suggested we may be able to “buck” this kick.
 - b. Matt – indicated that the CU is located in a densely populated region and there are not many diagnostics.
 6. Kent – asked if the position differences at the CU could result in a measurable energy difference.
 - a. Reza – suggested that if the beam is on average round then this is not likely to occur at the CU, specifically due to a path length difference.

Chao presented Fixing Transport from the Gun to 60 MeV (and maybe beyond).

1. Kent - wanted to know if hardware installation would be required if the December test were successful.
 - a. Chao – answered possibly, but this would depend upon the success of the test.

- b. Gordon – clarified that the December test is a model test and not a hardware test. Asked Chao if he is ready for the February shutdown if hardware installation is required.
 - c. Chao – answered not yet sure what is required.
 - d. Gordon – offered any help, if needed.
- 2. Kent – asked Chao if a plan would be developed following the December test.
 - a. Chao – answered yes, and based on the conversation will begin thinking about this now.
- 3. Doug – noted that it does not appear that the G0 1-pass test can proceed until Chao’s test is complete.
 - a. Matt – indicated that it is not clear yet from the schedule whether the 1-pass test can proceed in December.
 - b. Andrew – indicated that Chao’s test is necessary to determine how to proceed.
 - c. Doug – repeated that it is important for G0 1-pass test to occur soon and concerned that it will be delayed.
- 4. Mark – indicated that during first part of Chao’s December test he would be able to measure damping at higher energy, a requisite for proceeding with the G0 1-pass test.
 - a. Chao – indicated that it is fine for Mark to proceed in parallel with injector measurements during the December test.
- 5. Doug – inquired about the Hall C schedule for January; will Hall C be off.
 - a. Matt – indicated not certain yet. (HKS installation begins Jan 24, according to web-schedule)

Alex presented “Phase Trombone for HAPPEX”

- 1. Kent – asked how the settings for the phase trombone were set for HAPPEX-2
 - a. Andrew – indicated that ultimately, the phase trombone was not used for HAPPEX-2.
 - b. Kent – indicated that HAPPEX-2 needed to use a setup different than design, and consequently this was not compatible with the Phase Trombone calibration.
- 2. Matt – asked whether HAPPEX-2 would like to pursue more aggressively using the Phase Trombone.
 - a. Kent – answered yes.
 - b. Dave – answered yes, and we need to define the start-up optics in advance better.
 - c. Kent – concurred, indicating that the optics setup may first need to be stabilized.
- 3. Dave – Asked how long is required to calibration the Phase Trombone.
 - a. Alex – answered about 1 week.
 - b. Dave – indicated that studies to determine Phase Trombone as a function of final optics setup is important, e.g., if the raster size were to be changed, etc.
- 4. Dave – asked if this would work in Hall C.

- a. Alex – answered yes.
5. Matt – asked if Kaz effectively was running a “mini” Phase Trombone.
 - a. Kaz – indicated it was ad-hoc.
6. Matt- asked if this would work for G0.
 - a. Alex – answered yes, and that it might be easy to apply after the arc.
7. Gordon – inquired about the +/- 60 degree phase adjustment.
8. Alex – referred to the calibration, indicating that the sensitivity beyond +/- 60 degrees was small.

The meeting reached 2 hours in duration and all agreed to reconvene at a later date to complete the agenda.