

Minutes of Parity Quality Beam Meeting 07/29/03

In attendance: Areti, Bevins, Bogacz, Chao, Hutton, Kazimi, Nakahara, Neveling, Paschke

PZT driver issues

Reza Kazimi reported on the status of 30 HZ PZT driver work. The source of observed noise in PZT induced orbit is traced to transient mechanical vibration of the mirror while being switched between the 2 states. Driving it with a sine wave should reduce this transient considerably. Reza will talk to John Hansknecht to make sure the combined XY output is still part of the deliverable for sine-wave driven signals.

Linac skew quad calibration

Y. Chao reported on last week's machine study aimed at quantifying zone-by-zone coupling strength in the linacs and calibrating individual skew quad effects. Both are needed to achieve localized multipass control of XY coupling, thereby minimizing projected emittance growth and making accurate betatron matching possible. The test was a proof of principle with 6 skew quads in North Linac set to positive and negative values, and difference orbit taken. Offline analysis showed it is possible to measure individual skew quad signals at 20% level with single pass data, with the absolute error likely to decrease when coupling effects become smaller. One skew quad (1L18) didn't show any effect on XY coupling. It may have been wired as a dipole instead of a skew quad. Hari Areti, Lee Broeker, and Simon Wood will take the opportunity of August Down to physically examine the behavior of all skew quads. Transparencies are attached at the end.

Hall C data on orbit correlation with various polarization-inducing devices.

Kaz Nakahara gave a detailed report on recent Hall C orbit measurements. The effort of IA alignment has reduced the position correlation by 2 orders of magnitude. His summary is given below. His transparencies are attached at the end.

[quote] -----

The primary concern as far as our injector studies goes is to make sure the optical setup on the lasertable is not producing significant intensity asymmetries and position differences.

During the run last winter, we had two problems:

Problem 1: Our IA cell (which we use to feedback on our charge asymmetry) seems to be producing position differences.

Problem 2: Our PZT (on the lasertable) was not stable from day to day.

1. On the testlab lasertable, we were able to come up with an IA alignment method such that the position differences are significantly smaller than what we saw during last winter. Last winter, we saw upwards of few microns/IA Voltage, but now we are able to reduce that to 10's of nm/V. We were able to reproduce this good result on the injector lasertable. See attached file `iaslopes_jul3_4.ps` for a lasertable IA scan.
2. A few IA scans were done with us monitoring the charge asymmetries and position differences in the injector as well as in HallC. The charge asymmetries have enough range that we can use the IA to feedback. But the position differences are now significantly larger (~ 0.5 microns/V, though this value also depends on which BPM in the injector we look at).
3. A set of PZT scans were done. The position differences seem stable over time. See attached plots `4datasets_inj_allBPM_PZTX.ps.gz` and `4datasets_inj_allBPM_PZTY.ps.gz`.
4. Comparing the position differences that we see above to those seen in the Hall, we can estimate the present adiabatic damping factor. See attached plots `parasitic_pztx_17jul.ps` and `parasitic_pzty_17jul.ps`. In the case of the x position differences for PZTX scan, there is $\sim X20$ damping from the start of the 100keV region to the Hall. Similarly, the y position differences for PZTY shows about X10 damping. BUT, these values change when we look at the y position differences for PZTX, and x position differences for PZTY. Furthermore, the IA induced position difference damping is also different from the above values.
5. Finally, we look at the orthogonality of the beam over different BPM's in the injector. See `ortho_angles_17jul_scan2.ps.gz`. We see that the we quickly lose orthogonality after the first two BPM's in the injector.

As you and many others have suggested during the meeting, it would be useful to compare our results to the model predictions during next weeks meeting. In particular, do the beta-functions from the predictions show the same fluctuations from BPM to BPM in the injector? What adiabatic damping as well as orthogonality does the current model predict?

[end quote]-----

With speculation and debate centering on what caused various observations by Kaz going around the table, Andrew Hutton suggested that an examination of accurate Injector layout and effect of each element on the beam be made a topic of next week's meeting, as it appeared difficult to

resolve some of these (important) issues among those present without a commonly agreed Injector configuration.

A recipe to monitor helicity correlated orbit with less sensitivity to phase drift in the incoming beam has been communicated by Chao to Kaz & Kent Paschke. Kaz & Kent are studying detail of implementation at this point.

G0 related MD and task status

Alex Bogacz reported on the current status of G0 related work and upcoming MD plans. Most hardware & software projects are on track. The Earth field coil finalization and Injector setup based on it will start after the August Down. Alex is updating this list in real time, so contact him directly if there is a need for the most recent status.

Attachments

Chao:

http://www.jlab.org/~chao/Skew_quad_calib.pdf

Nakahara:

http://www.jlab.org/~chao/iaslopes_jul3_4.pdf

http://www.jlab.org/~chao/parasitic_pztx_17jul.pdf

http://www.jlab.org/~chao/parasitic_pzty_17jul.pdf

http://www.jlab.org/~chao/4datasets_inj_allBPM_pztY.pdf