Spin meeting minute, 7/19/2006

First, my apology for no spin meeting notice this week. The time was spent to discuss the plans to reach higher polarization for next run. From this year's data, we have about 5% polarization loss due to each of horizontal and vertical resonances. There is also an unexplained polarization of 10%. The plan consists of two parts: one is to recover the known losses and one is to understand losses.

There are several ideas for the horizontal resonances. First one is to put the horizontal tune into the spin tune gap by moving the tune close to 8 or 9. Among the two choices, close to 9 is preferred from the lattice point of view, but it would requires power supplies for both vertical and horizontal quads to run at high current. Using existing tune quads would require new PS and probably new power cables (40+ years old). One alternative is to use skew quads ("unskew" them) and polarized proton tune quads. One polarized proton quad near cold snake has already been used for cold snake compensation, but it can be changed to a piggy-bank power supply. For this solution, we need to run MAD to confirm it. Thomas also suggested another idea to reduce the horizontal effect: increase horizontal beta function at cold snake to reduce the effect of horizontal resonances. The idea is attractive since it does not require a lot resources.

The vertical polarization profiles with various cold snake strength is inconclusive. The profiles with 10% and 15% show no difference within errorbars. The vertical profiles indicate that there is still polarization loss due to vertical resonances. Mei suggested synchrotron sideband as possible source of the polarization loss, although their strengths are weak in general. A simulation with synchorotron motion included would be very helpful (see below).

For the unexplained the polarization loss, we discussed many possible reasons. The vertical tune is very close to integer, so that the 720Hz ripple in power line may be a significant source for tune ripple. We need better diagnostics and simulation for this effect. Mei asked if we have any data to show polarization as function of chromaticity along the ramp. The concern is that close to zero chromaticity may cause instability and emittance growth. We may not have systematic data set but many attempts during run to improve polarization by changing chromaticities. These data should be sorted out. Woody also raise question about the chromaticity near strong resonances such as 0+ and 36+. Very long coherences were observed after tunemeter kick at these locations. To combat these problems, we have two main tasks. First one is SPINK simulation with real situation (snake effect changing with energy, longitudinal motion included). The second one is improvement of instrumentation for next run.

1. The jet run at 31.2GeV in RHIC should provide A_N near injection energy with better accuracy (current one is with 30% systematic error).

2.We will do more ramp measurements with AGS CNI polarimeter. The target needs to stay in the beam center along the ramp and this can be achieved by feedforward beam positions from nearby BPMs.

3. Copy RHIC BBQ system into AGS for better tune/chromaticity/coupling measurement. Mei also suggested to do beam transfer function measurement in the AGS, although it may not be easy since the ramp in the AGS is very fast.

4. Develop application to do chromaticity measurement automatically along the ramp.

5. Woody suggested to improve control of quad current, which requires control group’s help.

We will continue on this discussion next week.

Haixin