Minutes of spin meeting 11/14/07

Woody presented his analysis of ORM data taken with bare AGS at both injection and extraction. Woody superimposed kicks from the same kicker (such as A2, B2, C2, ...) for the twelve super-periods, and they looked quite similar. The fitting of the data provides tunes close to the tunes derived from MAD model (within a few $\times 10^{-3}$). All these tell us that the bare AGS is quite symmetric and no major β wave exists. The very interesting results showed up when he analyzed the vertical orbits with horizontal kicks. It did show oscillation amplitude in the order of 0.8mm vs. 6mm in the original plane. Again, the vertical oscillations are super-period symmetric, which indicates that the coupling is distributed, not lumped. Woody then tried to model what could be the possible sources of the coupling. He analyzed a few cases with short, long or both kinds of mangeds rolling. For short or long magnets rolling, an angle of 1 mrad can reproduce the orbits. Vincent is going to provide the gold injection ORM data for both vertical and horizontal cases to Woody to check the situation. Woody suspected that the sagging of the magnets could be the source of the rolling, but it is hard to model and to confirm it by survey. Since we have six skew quads, one can check if the strength is enough to correct it globally. For each kind of AGS magnet, there is a spare one outside the ring, which can be used to do further magnet testing and survey.

Fanglei reported her spin tracking results for vertical polarization profile when crossing 36+, which we suspect there is residual polarization loss. She did spin tracking with particles on different vertical emittance ellipses with two cold snake strength: 10% and 14%. She also compared simulations with slow and fast acceleration rates. She does not have sextupoles on in the model, but the vertical chromaticity is close to zero in reality. The conclusions are:

1. The fast acceleration (such as extraction on the fly) can increase polarization by 3-5% for 10% and 14% cold snake, respectively.

2. There is almost no vertical polarization profile for 14% cold snake case, and a profile for 10% cold snake case (relative 10% polarization drop at 3σ vs beam center).

3. Taking into account of both horizontal and vertical emittance around 36+ν, the polarization loss is about the same for 14% and 10% cold snakes. And as Thomas pointed out, the earlier part of the energy ramp is in favor of a weaker partial snake from horizontal resonance reduction point of view.

The simulation may hint that there is no gain at 36+ν with various cold snake strength. But it should be checked with spin tracking. Alfredo is going to generate field map for 12% cold snake and Fanglei is going to perform the simulation. With injection on the fly, we may be able to relax contraint on the vertical tune near injection. Mei asked if that can give us more room to increase intensity. Haixin commented that Keith estimated that we can gain only about 10% in intensity based on his experience but Haixin was not sure if all tune space has been explored in the past.

Haixin