Minutes of spin meeting 07/02/08

In response to comments and questions asked a few weeks ago about her spin tracking between $G\gamma$=4.5 to 7.5, Fanglei presented her new simulation results. One question needs answer from that meeting was if the resonances (both due to horizontal and vertical motion) near injection are isolated. If they are isolated, the polarization drop from each resonance crossing should be "additive"(e.g., a 10% loss from horizotnal resonances and a 6% loss from vertical resonances should result in a 84.6% total loss). At the time, the cases (both 50 and 200 particles) for 6% cold partial snake was not additive. To do fair comparison, Fanglei calculated the vertical components with various cold partial snake strength along the ramp between $G\gamma = 4.5$ and 7.5 for the zero emittance particle. There should be no polarization loss for this case, and it can be used as the reference vertical polarization component. Then she plotted the difference between vertical polarization of zero emittance and finite emittance (200 particles distributed in Gaussian). The plots clearly showed the polarization drop locations at horizontal and vertical resonance locations. Since the acceleration rate increases in the early part of ramp, the polarization loss at lowest energy can cause more harm due to the extremely low ramp rate. It is demonstated that the polarization loss is additive for all three cases by this definition. The tracking was done with a Gaussian distribution in longitudinal dimension. Mei asked if the betatron tune spread was taken into account in the spink tracking. Since the sextupoles were not turned on in the tracking, the natural chromaticity is expected to be used in the tracking. Given the momemtum spread introduced, the tune spread should naturally be introduced. Fanglei will check the output file to confirm that. Woody pointed out that if the natural chromaticity was used, then the effect from tune spread (if any) could be overestimated.

Haixin