Minutes of spin meeting 08/20/08

In response to Fanglei's presentation last week about the emittance growth due to tune jump, Thomas presented the calculations from different approaches. He estimated the emittance growth due to beta wave introduced by the tune jump quads in analytical formula and MADX simulation (extraction lattice without snakes). Thomas pointed out that to maintain 10% emittance growth over the whole ramp, the growth should be about 0.1% for each of them. Since the analytical formula only apply to a one turn jump, it should be viewed as the upper limit of the growth. There is some discrepencies between the two models and Thomas believed that the MADX should be closer to reality. The results showed that two quads solution gives smaller beta waves, but the locations of the two quads are not so critical: the amplitudes of the beta waves are the same for the two quads located at I5/J5 and J5/L5. Three quads solution is not better than two quads solution. The results suggests that it is important how many turns the tune jump is and how far the tune jumps are separated. The results also indicate that the emittance growth for each jump is more than 0.1% as the upper limit. The real simulation done by Fanglei with multi-particles should give answers closer to reality. Michiko suggested to design some experiments so that we can measure emittance growth as function of jump time.

Nick then presented his progress with high vertical tune near injection with 2.0T cold partial snake and 1.5T warm partial snake. From $G\gamma = 4.5$ to 7, the vertical tune can be held above 0.95 and within the spin tune gap. The setting is not sensitive to horizontal tune settings: the horizontal tune can be changed from 8.60 to 8.72 by using regular tune quads. This is expected only if the compensation quads do their jobs well. It should be pointed out that in the past, Nick only calculated tune path for 2.5T cold snake case and it is true that vertical tune can not be pushed as high as 8.95 without large beta wave. The tune quads settings used for 2.0T and 2.1T since 2006 were scaled down from that solution and put in use. As Nick showed in these new calculations, it is indeed possible to push vertical tune into spin tune gap for the weaker partial snake. Nick then compared the injection lattices with bare AGS (only combined function dipoles) from MAD8 and BEAM++. They gave quite different tunes and chromaticities. BEAM++ uses field map to track particles. It remains to be seen why the difference is so large.

Haixin