Minutes of spin meeting 09/10/08

Nick presented the high vertical tune lattice with 2.1 Tesla cold partial snake near injection ($G\gamma = 4.5$ to 7). The constraints are on the beta functions along the ramp. As the results, the horizontal tune is slightly deviated away from the set value 8.70 (at 0.001 level). The vertical tune stays in the spin tune gap (calculated from analytical formula for given partial snake strength) as shown in the plot. Alfredo commented that the SPINK tracking code can also calculate the real spin tune to compare with the ideal case. Nick also showed the maximum beam sizes (half of 99% beam was plotted) as function of $G\gamma$. The largest vertical beam size is about 3.6cm for a 20π 95% normalized emittance (vertical beam pipe size is 3"). The dispersion contribution is not included but it is small at lower energies. Leif questioned what are these numbers for current lattice ($Q_y = 8.88$). Vincent has magnet setting files of existing machine for every ms. The beatron tunes and beta functions can be extracted. For this comparison, step size of 0.1 unit of $G\gamma$ should be more than enough. The discussion continued on if we should push horizontal tune even lower (say, 8.6) to reduce the time when the tune jump quads have to be on. The motivation is to reduce power supply requirement. Since the required power is not a problem at lower eneriges, we may only lower the horizontal tune at higher energies if needed.

Fanglei used Thomas' quadrupole strengths (the two quads contributed equally to vertical tune shift in the no snake lattice) and calculated the emittance growth for 500 Gaussian distributed particles. The vertical emittance growth is smaller but it is still twice as big as without quad error. Haixin suggested to calculate the strength from the lattice with two partial snakes. Since this is for one turn tune jump, Thomas commented that the horizontal emittance growth is not a concern. For a 50 turn tun jump and horizontal tune near 8.70, the adiabaticity is not a problem. This tracking study is important to determine our tune jump setup procedure: Can we determine the needed quad strengths from the vertical tune shift when turning them on individually. The next goal is to check if the emittance growth can be minimized by varying the number of turns in the tune jump. Thomas also suggested to reduce the tracking range down to half to cover only one tune jump for a faster turn around time.

The last a few minutes was a show and tell for the first circulating beams in the two rings of LHC this morning.

Haixin