Experiment 5

Tune vs Displacement of closed orbit

The amplitude dependence of tune informs us about field nonlinearities. We can use a closed orbit bump to locally displace the beam and measure the vertical and horizontal tunes as a function of the displacement. Linear dependence indicates a sextupole field, quadratic dependence an octupole field, etc.

1. Measure the vertical cubic nonlinearity of the superconuducting wigglers.
2. Use CESRV to identify a closed bump (VBUMPING) with peak displacement in a wiggler.
3. There are 3 wigglers between Q18W and Q19W. A bump with displacement in that region would yield a measurement of the combined field of all 3
4. To check the location of a bump with CESRV, at the CESRV prompt type CHANGE GROUP VBUMPING ⟨number⟩ and the result, (at least the theoretical result) will appear on the display.
5. Check to see if your candidate bump is closed and also to calibrate the bump, by taking orbits before and after changing the command value.
6. Measure tune vs displacement
7. Extract the cubic nonlinearity from your data and compare to expectations for a 2.1T wiggler with 8 20cm poles. You may do this with the help of CESRV.