

Tutorial 3

17 January 2018, Archamps

andrea.latina@cern.ch, guido.sterbini@cern.ch

hector.garcia.morales@cern.ch, nuria.fuster.martinez@cern.ch

TUTORIAL 3: FIRST PART

Adding dipoles in the FODO cell

- ▶ Consider now that in the cell of Tutorial 2 there are 4 sector dipoles of 15 m (assume 5 m of drift space between magnets). In the ring there are a total of 736 dipoles with equal bending angles. Install the four dipoles in the FODO cell. Do the dipoles (weak focusing) affect on the β_{max} and the dispersion? Compute the relative variation on the β_{max} on the two planes.
- ▶ From the phase advance of the FODO cell compute the horizontal and vertical tune of the machine?

TUTORIAL 3: SECOND PART

From the FODO phase advance to the machine tune.

- ▶ Change the beam to $E_{tot} = 3.5$ TeV. What is the new tune of the machine? Why?
- ▶ Suppose you want to set a tune of $(60.2, 67.2)$, use the MADX matching routine on single FODO to get it. What is the maximum tune that you can reach with such a lattice? (**HINT**: what is the maximum phase advance per FODO cell in thin approximation?...)