Tutorial 2

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TUTORIAL 2: FIRST PART

Matching the FODO cell using a parametric plot.

- Consider the FODO cell of tutorial 1 ($L_{cell} = 100$ m, $L_{quad} = 5$ m and $f = 200$ m).
- Define the beam (proton at $E_{tot} = 7$ TeV), activate the sequence and try to twiss it powering the quads to obtain $\Delta\mu \approx 90$ deg phase advance in the cell using the thin lens approximation (use Fig. 1). What is the actual phase advance computed by MADX?

TUTORIAL 2: FIRST PART

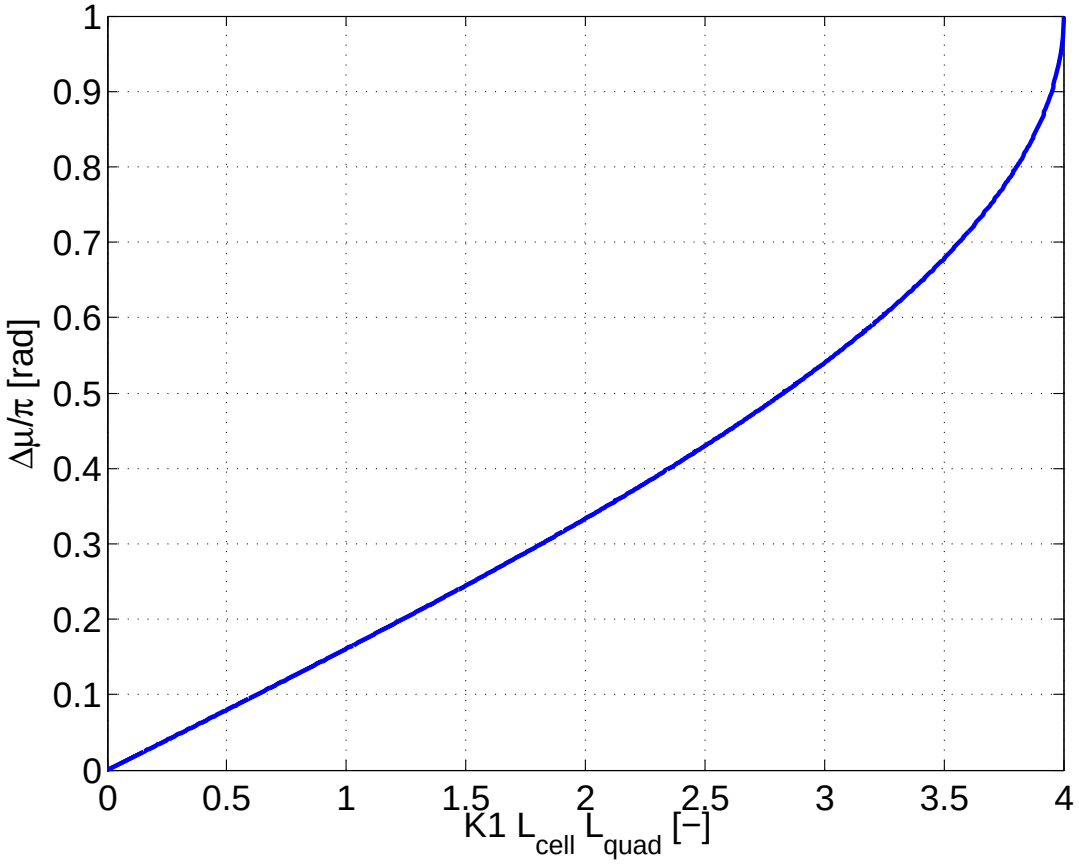

Figure 1: Phase advance versus quad strength, cell length and quad length. Thin lens approximation of a FODO.

Tutorial 2: Second Part

Tune and β-function dependence with K1.

- What is the β_{max}? Compare with the thin lens approximation (Fig. 2). Compute the maximum beam σ assuming ϵ_n=3 mrad mm, $E_{tot} = 7$ TeV?
- Halve the focusing strength of the quadrupoles, what is the effect of it on the β_{max}, β_{min} and on the $\Delta\mu$? Compare with the parametric plots in Fig. 1 and Fig. 2.

TUTORIAL 2: SECOND PART

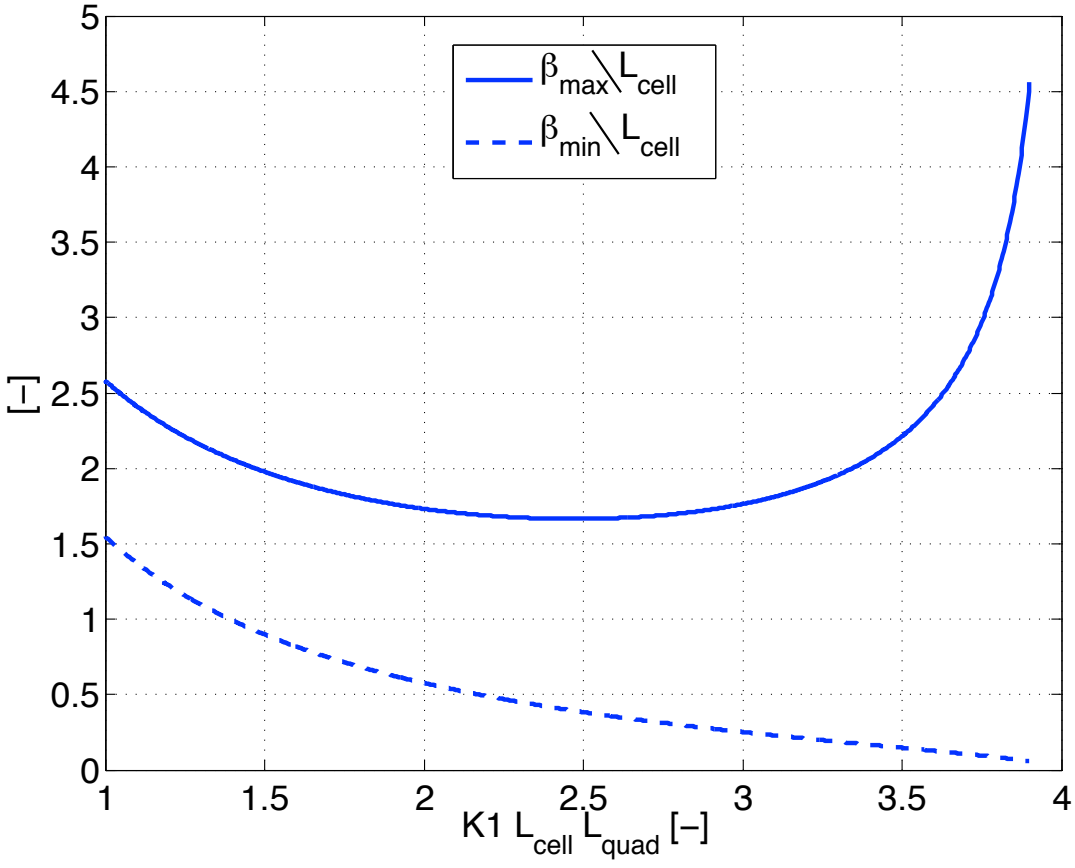

Figure 2: β-functions versus quad strength, cell length and quad length. Thin lens approximation of a FODO.