

## Problems A1-1: Lattice Design

- 1) A transport lattice with no acceleration consists of FODO cells with quadrupole spacing  $L = 10 \text{ m}$  and focal length of  $f = 7 \text{ m}$ . How large is the phase advance per cell?
- 2) The first quadrupole is focusing. The quadrupole is moved up by  $1 \mu\text{m}$ . How much does the beam trajectory move in the third quadrupole?
- 3) Calculate the average beta-function in a thin lens FODO lattice as a function of  $\hat{\beta}$ ,  $\check{\beta}$  and  $L/f$