

Homework 1 - Monday

Task 1

Consider that electron beam of $E=1$ GeV needs to circulate in a compact ring with four bending magnets, like in Project 3. Estimate the necessary parameters of the bends (field, lengths) that can perform this task. Consider the cases when the bends are based on normal conducting technology, and when they are superconducting.

Task 2

Consider that a parallel electron beam of $E=1$ GeV is entering a beamline. It is necessary to focus this beam to a point 1m from the entrance. Estimate the necessary parameters of a quadrupole(s) (gradient, lengths) that can perform this task.

Task 3

Electron beam of $E=1$ GeV is circulating in 10m perimeter ring (half filled with bends). Estimate synchrotron radiation energy loss per turn and characteristic energy of the emitted photons. Make the same estimations for both cases considered in Task 1 (normal conducting and superconducting).

Task 4

Describe any scientific or technical (or related to accelerator science) invention/discovery in terms of the TRIZ approach, identifying a contradiction and a general principle that was used (could have been used) in this invention/discovery. (You can describe one of examples discussed during lectures or project work in your Working Group).