



Laboratory and Computer

Lab 1. Measurement of Dipole Magnet

Laboratory Assignment #1

Measure magnetic fields of a dipole magnet with a Hall probe and characterize the properties of the bending magnet

Com 1. Calculation of Dipole Magnet

PC Assignment #1

Calculate magnetic fields of the dipole magnet using POISSON and compare the results with Lab 1.



Lab 2. Measurement of Quadrupole Magnet

Laboratory Assignment #2

Measure magnetic fields of a quadrupole magnet with a Hall probe and characterize the properties of the focusing magnet

Com 2. Calculation of Quadrupole Magnet

PC Assignment #2

Calculate magnet fields of the quadrupole magnet using POISSON and compare the results with lab 2.



Lab 3. Measurement of RF Cavity

Laboratory Assignment #4

Measure resonant frequencies and Q-factors of RF cavities with a vector network analyzer and measure different modes and harmonics

Com 3. Calculation of RF Cavity

PC Assignment #3

Calculate different modes and harmonics of RF cavities using URMEL.

Calculate different modes and harmonics of RF cavities using SUPERFISH.



Lab 4. Measurement of BCM and BPM

Laboratory Assignment #5

Measure and calibrate Beam Current Monitor (BCM) and Beam Position Monitor (BPM) using function generator and oscilloscope

Com 4. Calculation of Focusing Lattice

PC Assignments #4 and #5

Calculate doublet focusing

Calculate FODO lattice using ELEGANT



Details of the labs and computer simulations are in the Laboratory and Computer Assignment, with some additions.

Read all the requirements very carefully, additional information of using POISSON and of RF cavity can be found in the last pages of the Assignment. Always do the experiments safely: before turn on power, check the circuit one more time and make sure everything is right; do not touch any exposed electric thread or connector when energized.

Most computer simulation tasks can be done in a very simple way: copy all the files in \USPASexamples to your own directory and modify the input files with the right parameters. More detail documents of POISSON and SUPERFISH are in \LANL\Docs.

From the labs and computer works, you will excise design and measurement of bending magnet, focusing magnet, RF cavity and fundamental accelerator lattices, you will also learn basic beam diagnostic instruments.



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