

Design project topics

1. Design a medical ring accelerator of 20 meters long. Energy range 7-250 MeV.
 - a. Lattice Design
 - b. RF
 - c. Injection/Extraction
2. Write script for longitudinal dynamics with two cavities with fundamental frequency and 3rd harmonics. Study phase space manipulation of the beam by varying cavities voltages and phases.
3. Design of a linear optics for electron storage ring to achieve minimum emittance.

Coherent radiation generated by an electron beam can significantly boost the brightness of the synchrotron radiation (SR). The longitudinal coherence can be fully achieved in FELs while the transverse coherence can only be partially achieved by using a small emittance beam. Recently, people have proposed to design a storage ring with ultra-low geometric emittances. In such accelerators, the transverse emittance is below the diffraction limit (defined by $\lambda/4\pi$) so that full transverse coherence is achieved.

Considering designing a transverse diffractive limited storage ring (aka ultimate storage ring) for hard X-rays (1 angstrom wavelength). Use the code (Madx) we learned in the computer labs.

You may choose whatever lattice type you prefer, FODO, DBA, etc. Comment on the potential cost for such designs and possible ways to reduce the overall cost.