

Need for accelerators; Historical development of accelerators; Types of accelerators; Fixed target vs colliding beam accelerators; Luminosity; Components of accelerators including RF cavities and magnets.

Beam physics: beam confinement and guidance, and beam acceleration; wave equation; Brillouin diagram for empty cavity; Generation of an electric field in the loaded cavity; dispersion relations; Transit time factor and the energy gained in a linac. General ideas of Q value; power loss; surface resistance; shunt impedance, etc.; room temperature structures; superconducting structures (SC);

Longitudinal and transverse beam dynamics will be explored, including synchrotron and betatron particle motion.

Additional special topics including, synchrotron radiation, injection techniques, collective effects and beam instabilities.