

Projects for PHY 554

Colliders

- i. Electron-positron colliders
- ii. Hadron colliders
- iii. Muon collider
- iv. Electron-hadron collider

Radiation

- i. Synchrotron radiation
- ii. Undulator radiation
- iii. Free Electron Lasers
- iv. Transition radiation

Cooling

- i. Radiation cooling of beams
- ii. Ionization cooling
- iii. Electron cooling
- iv. Stochastic cooling
- v. Coherent Electron Cooling

Beam dynamics

- i. Beam – beam effects in colliders
- ii. Nonlinear resonances
- iii. Space charge effects
- iv. Intra-beam scattering
- v. Touschek effect – beam lifetime

Sources of particles

- i. Thermionic gun
- ii. Photo-emission guns
- iii. Hadron beam sources
- iv. Polarized sources of electrons
- v. Polarized sources of hadrons
- vi. Sources of positrons
- vii. Sources of antiprotons
- viii. Sources of muons

Applications

- i. Light Sources
- ii. Medical accelerators
- iii. Accelerators for ion implantation
- iv. Accelerators for grain and food processing
- v. Industrial accelerators: welding, improving cables quality,