

Homework #1

The Future Circular Collider, a 100 km long synchrotron accelerator at CERN is under planning by the High Energy Physics Community with proton-proton, electron-proton, electron-electron as well as heavy ion collision modes.

- How strong magnets are needed to keep 50 TeV proton beams on orbit at this facility?
- How high energy Pb^{82-} ion could such magnets keep on orbit?
- What is the velocity and Lorentz factor of a 50 TeV proton and a 200 GeV electron?
- How large would be the center-of-mass energy of an electron – proton collider with the above beam energies?
- How much energy is emitted by such a proton and electron beams during a turn?