Class Project 1: design a magnetic focusing system

Requirement:
Use quadrupole magnets (from permanent magnets) to focus a beam of electrons from a beam spot of 1 cm diameter (flat distribution) to 0.1 mm diameter. The kinetic energy of the electrons is 100 KeV.

Write a design report that contains the design of the magnets, their placement along the beam, and the GEANT4 simulation results that prove the design meets the requirement of focusing the beam.

Reference:
https://www.nobelprize.org/educational/physics/microscopes/tem/
https://en.wikipedia.org/wiki/Electron_microscope