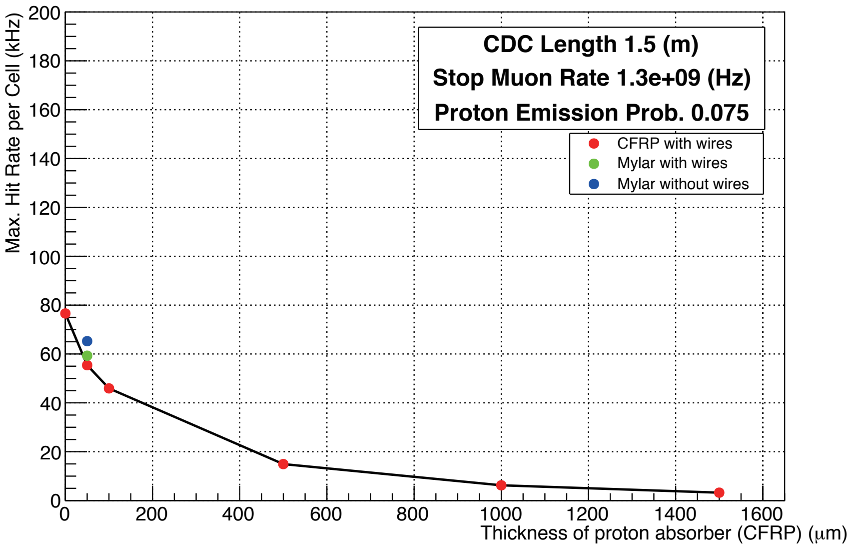

Figure 73: *Proton hit rate at the innermost layer as a function of the proton absorber thickness.*

11.5 Detector solenoid

The detector solenoid magnet produces a 1 T magnetic field for particle charge and momentum identification. The CyDet and the muon stopping target will be placed inside the detector solenoid. The current design of the detector solenoid is given in [38]. The detector solenoid has an inner bore of radius 970 mm and a length of 2500 mm. The inner radius of the coil is 1070 mm (with gap of 100 mm between the coil and the cryostat inner wall). The detector solenoid consists of 10 coils. Each coil thickness is 14.04 mm, with 9 layers in the radial direction and 125 turns in total. The length of one coil is 195 mm. A current density of 82 A/m^2 is required to produce a magnetic field of 1 T. The stored energy is about 4.4 MJ. The detector solenoid has an iron yoke. The thickness of the iron yoke is 100 mm, whereas the thickness of iron yoke in TS3 is 200 mm. When the CyDet is installed from the downstream side, the iron yoke at the downstream end will be removed. The radius of the outside of the iron yoke is about 1760 mm. Schematic layouts of the detector magnet with the CyDet are shown in Fig. 74.

11.6 Expected performance of the CyDet

The expected performance of the CyDet was evaluated using Geant4-based simulations. A fast tracking program with Kalman filtering using GENFIT has been developed by the Osaka University group and F. Ignatov (BINP) to examine and optimize the performance of the CyDet [11]. Originally, a Kalman filter with `GeaneTrackRep2` was used, but we changed this to `RKTrackRep` instead. This allows us to carry out multi-turn fitting. However, at this moment, we have used hits only from the first turn. Also, in Kalman filter fitting, the geometry of wires is not included, although that is included in event generation. The IHEP group in Beijing has also developed a tracking program based on their BES-III tracking code.

[11]It is pointed out by F. Ignatov that the Bremsstrahlung correction in GENFIT was not correct. It would be better to turn the Bremsstrahlung correction off in GENFIT in particular for low energy particles. This setting has improved the momentum resolution significantly, almost a factor of two, from 400 keV to 200 keV as shown below. At the same time, the number of events in the tails of the distribution has decreased. It should be noted that Bremsstrahlung is turned on for event generation.