Design of a drift chamber for an experiment at FCC-ee for IEEE Conferences

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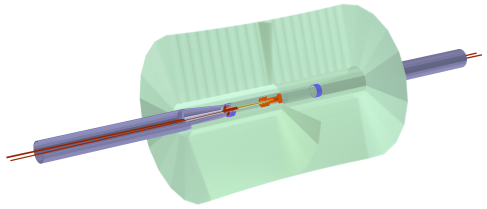

Fig. 1. The detectors at the interaction region for the FCC-ee IDEA concept.

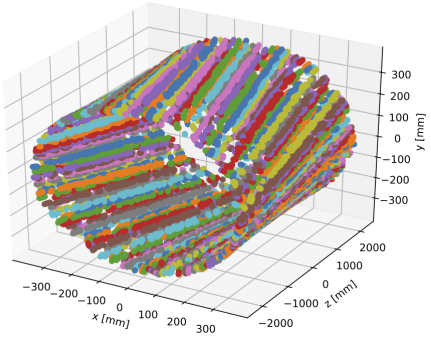

Fig. 2. The detectors at the interaction region for the FCC-ee IDEA concept.

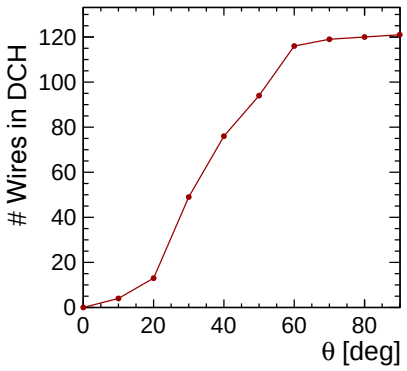

Fig. 3. The detectors at the interaction region for the FCC-ee IDEA concept.

***Abstract*—The physics aims at the electron positron option for the Future Circular Collider (FCC-ee) impose high precision requirements on the vertex and tracking detectors. The detector has also to match the experimental conditions such as the collisions rate and the presence of beam-induced backgrounds. A light weight tracking detector is under investigation for the IDEA (International Detector for Electron-Positron Accelerator) detector concept and consists of a drift chamber. Simulation studies of the drift chamber using the FCCSW (FCC software) are presented. Full simulations are used to study the effect of beam-induced backgrounds on such detector.**

I. Introduction

The FCC-ee high-luminosity circular electron-positron collider, with center-of-mass energies from 91.2 GeV to 365 GeV, allows for high-precision measurements of the properties of the Z, the W, the top quark and the Higgs boson. As a predecessor of a new 100 TeV proton-proton collider, the FCC-ee collider is foreseen to be placed in a 100 km tunnel. The IDEA detector, one of the two detector concepts under development for FCC-ee, has demanding requirements to match the experimental conditions. Its main components consist of: an ultra-light silicon-based vertex detector, an ultra-light drift chamber for track reconstruction and particle identification, a double-readout calorimeter, a 2 T solenoid magnetic field and an instrumented return yoke. The drift chamber is being investigated using GEANT4-based simulations. Its performance and the effect of beam-induced backgrounds are presented here-below.

II. Drift chamber

III. Simulation with the FCC Software

A. Geometry description with DD4hep

B. Segmentation

C. GEANT4 simulation

D. Digitization

IV. Impact of beam-induced backgrounds

V. Conclusion

Acknowledgment

References

[1] H. Kopka and P. W. Daly, *A Guide to LaTeX*, 3rd ed. Harlow, England: Addison-Wesley, 1999.

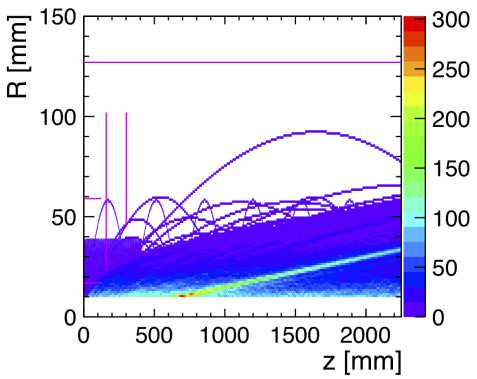

Fig. 4. The detectors at the interaction region for the FCC-ee IDEA concept.

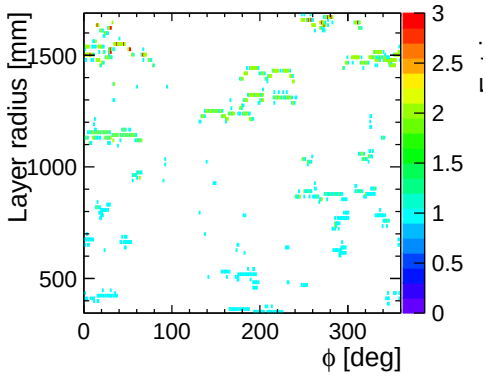

Fig. 5. The detectors at the interaction region for the FCC-ee IDEA concept.

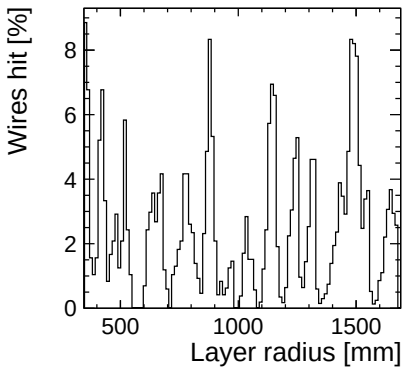

Fig. 6. The detectors at the interaction region for the FCC-ee IDEA concept.