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Application of ACTS for gaseous tracking detectors

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Based on the tracking experience at LHC, the project, A Common Tracking Software (ACTS), aims to provide an open-source experiment-independent and framework-independent software designed for modern computing architectures. It provides a set of high-level performant track reconstruction tools which are agnostic to the details of the detection technologies and magnetic field configuration, and tested for strict thread-safety to support multi-threaded event processing.

ACTS has been used as a tracking toolkit at experiments such as ATLAS, sPHENIX, FASER, ALICE etc. and has shown very promising tracking performance in terms of both physics performance and time performance. So far, the applications of ACTS are mainly focusing on silicon-based tracking systems. However, its application for gaseous tracking detectors, for example, drift chamber, is very limited. Therefore, an example gaseous tracking detector is still lacking in ACTS.

In this contribution, we will introduce the progress recently we have made in extending the current version of ACTS to support tracking with the gaseous detector like uRWell-based detector and drift chamber. The detailed implementation will be described. The application of this implementation to two future electron-positron collision experiments i.e. Circular Electron Positron Collider (CEPC) and Super Tau Charm Factory (STCF) will be presented. In addition, the efforts of adding an open-access drift chamber to the Open Data Detector will also be introduced to facilitate the development of common tracking algorithms in the future.

Significance

Part of the research is already published here as listed in the "References".

References

https://iopscience.iop.org/article/10.1088/1748-0221/18/07/P07026
https://indico.cern.ch/event/1252748/contributions/5521504/
https://indico.cern.ch/event/1295479/contributions/5635040/

Experiment context, if any

CEPC, STCF

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