Detector geometry management system designed for Super Tau Charm Facility offline software

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A geometry management system (GMS) is designed for the Offline Software of Super Tau Charm Facility (STCF) in China. Based on the eXtensible Markup Language (XML) and Detector Description Toolkit for High Energy Physics Experiments (DD4Hep), the system provides a consistent detector-geometry description for different offline applications, such as simulation, reconstruction and visualization. It is being used for detector optimization and performance evaluation with a customized full detector simulation package (FullSim). The paper presents the design, implementation, and performance of the GMS.

Summary

A GMS was developed in OSCAR to provide a consistent geometry description for different offline applications and to set up a unified and user-friendly software environment for detector designers. In addition, a flexible geometry assembly of sub-detectors and an easy switching among different detector design options were achieved. Several packages were developed to make the workflow of the system easy and efficient. Moreover, performance evaluation and design optimization for STCF detectors were performed using the FullSim package along with the GMS. In the future, the GMS will be redesigned and re-developed to serve a wide range of applications, including reconstruction, visualization, and analysis.

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