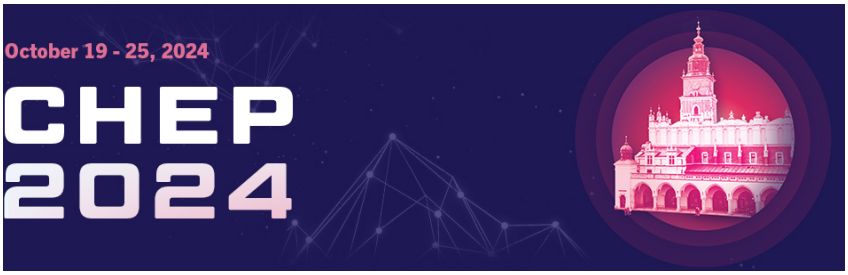

Contribution ID: **470** Type: **Talk**

Track reconstruction in the STCF detector

Thursday 24 October 2024 14:24 (18 minutes)

The Super Tau-Charm Facility (STCF) proposed in China is an electron-positron collider designed to operate in a center-of-mass energy range from 2 to 7 GeV with peak luminosity above $0.5\times10^{35}\mathrm{cm}^{-2}s^{-1}$. The STCF will provide a unique platform for studies of hadron physics, strong interactions and searches for new physics beyond the Standard Model in the tau-charm region. To fulfill the physics goals of the STCF experiment, good performance of reconstruction of charged tracks with momentum down to 50 MeV is required. The tracking system of the STCF detector consists of an inner tracker (ITK) with several independent layers and a large cylindrical drift chamber (main drift chamber, MDC). A track reconstruction software framework has been developed for the baseline STCF detector design. A global track finding algorithm based on Hough Transform, which handles the hits from the ITK and MDC together, hence less sensitive to missing local hits, has been implemented and optimized in this framework. The tracking toolkit of A Common Tracking Software (ACTS) is also explored for tracking in the STCF detector, where the Combinatorial Kalman Filter (CKF) implemented in ACTS is used to find the tracks based on the track seeds composed of ITK hits. In addition, innovative machine learning techniques have been explored to use in track reconstruction in the STCF tracking detectors. Different tracking methods and techniques have been compared to achieve good overall track reconstruction performance for the STCF experiment. In this contribution, we present the tracking system of the STCF detector and development and implementation of afore-mentioned various tracking algorithms in the STCF offline software and the simulated tracking performance.

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