Contribution ID: **237** Type: **not specified**

Investigation of the tracker detector TPC with laser calibration and alignment

Friday, 1 September 2017 17:20 (25 minutes)

The precious tracker detector of Time Projection Chamber (TPC) has been extensively studied and used in many fields, especially in particle physics experiments of STAR TPC and ALICE TPC. Its low material budget in drift length and excellent pattern recognition capability make it a prefer ideal device for three-dimensional tracking and identification of charged particles. In high energy physics field, it has been as one option of ILD detector concept in the international linear collider as the tracker detector.

In the circular machine, likely CEPC concept, the tracker detector requirement of the position resolution is about 100μm in rΦ of the endcape. For a precise position resolution of the tracks in the TPC prototype, the calibration of the drift velocity, which in conjunction with the drift time provides the z position of the traversing particles, is essential.

Due to the un-stability of the electric field and the continouse ions back flow in the drift chamber, the drift velocity and electric field could influence significantly the detector performance. It ' s a problem in the precious resolution tracker detector's design. In this paper, the 266nm wavelength UV laser system including the laser rods , the reflection mirrors, and the fused silica windows has been designed and developed for the tracker detector. Along the ~500mm drift length of the TPC prototype, three layers of laser beam has been created and the divided 72 laser trackers will inject to the drift chamber separately. Every laser beam track has more than 10uJ/mm^2 to make more than 10 MIPs primary electrons. The details of the detector prototype integrated the UV laser system will be descried. To meet the high stability drift velocity's requirement, the calibration and alignment methods would be investigated. Finally, some preliminary results simulation and measurement, and discussion would be given.

Presenter: Dr QI, Huirong (Institute of High Energy Physics, CAS)

Session Classification: Development of accelerators and detectors

Track Classification: 11) Development of accelerators and detectors