Contribution ID: **138** Type: **Parallel Talk**

Time projection chamber technology with 266nm UV laser track for the circular e+e- collider

Friday, 8 July 2022 11:15 (15 minutes)

The Circular Electron Positron Collider (CEPC) has been proposed as a Higgs/Z factory in China. The baseline design of a detector concept consists of a tracking system, which is a high precision (about 100 μm) large volume Time Projection Chamber as the main track device. The tracking system has high precision performance requirements, but without power-pulsing, which leads to additional constraints on detector specifications, especially for the case of the machine operating at Z-pole (91 GeV) with higher luminosity. The CEPC TPC requires longitudinal (z) time resolution of about 100 ns and the physics goals require dE/dx resolution of very good particle identification separation with cluster counting to be considered. A number of tasks are still remaining regarding the TPC research. Such tasks include the full simulations of the TPC performance in this background environment, further design of the low power consumption readout electronics, UV laser calibration methods and cooling options.
In this talk, a Nd:YAG Ultraviolet laser with a wave length of 266 nm has been used to study the TPC prototype for the future circular e^+e^- collider at Institute of High Energy Physics, CAS (IHEP). A smaller prototype TPC has been setup with a drift length of 500 mm. UV laser is coupled directly via mirrors into the setup and not via a fiber. To keep the laser tracks stable, the setup has to be stabilized against vibrations. It is placed on an anti-vibration pneumatic optical platform, where a central spring, a pendulum bar and an auto inflation system damp any vibration down to amplitudes of less than 1μm. The TPC detector, gaseous chamber, high voltage field-cage, FEE electronics and DAQ with 1280 channels readouts have been developed and measured at IHEP. Some update results of the commission with the low power consumption FEE ASIC readout (<5mW/ch), the spatial resolution (<100μm@σ_x), the gain, the laser track reconstruction and dE/dx the will be reported.

In-person participation

No

Primary authors: Dr DAI, Hongliang (Institute of High Energy Physics, CAS); QI, Huirong (IHEP); Mrs ZHANG, Jian (Institute of High Energy Physics, CAS); Ms YU, Liwen (Institute of High Energy Physics, CAS); Mr SHE, Xin (Institute of High Energy Physics, CAS); Dr CHANG, Yue (Institute of High Energy Physics, CAS); Dr YUAN, Zhiyang (Institute of High Energy Physics, CAS)

Presenter: QI, Huirong (IHEP)

Session Classification: Detectors for Future Facilities, R&D, novel techniques

Track Classification: Detectors for Future Facilities, R&D, novel techniques