PosterID 346

Simulation result of CEPC OTK with CEPCSW

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The 2024 international workshop on the high energy Circular Electron Positron Collider

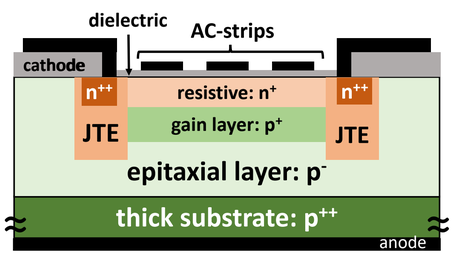
TSUNG-DAO LEE INSTITUTE

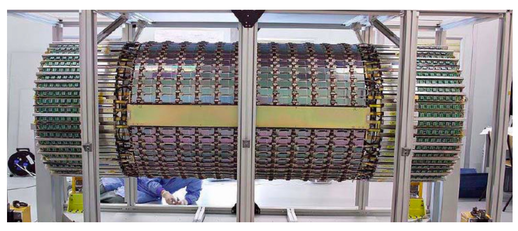
Physics Motivation

Event Disentangling ToF offers precise timing information to precisely distinguish k/p and k/pi in 0.5~2GeV and for more than 1.5GeV, respectively. The spatial and time resolution are nedded to reach 10μm and 30ps.

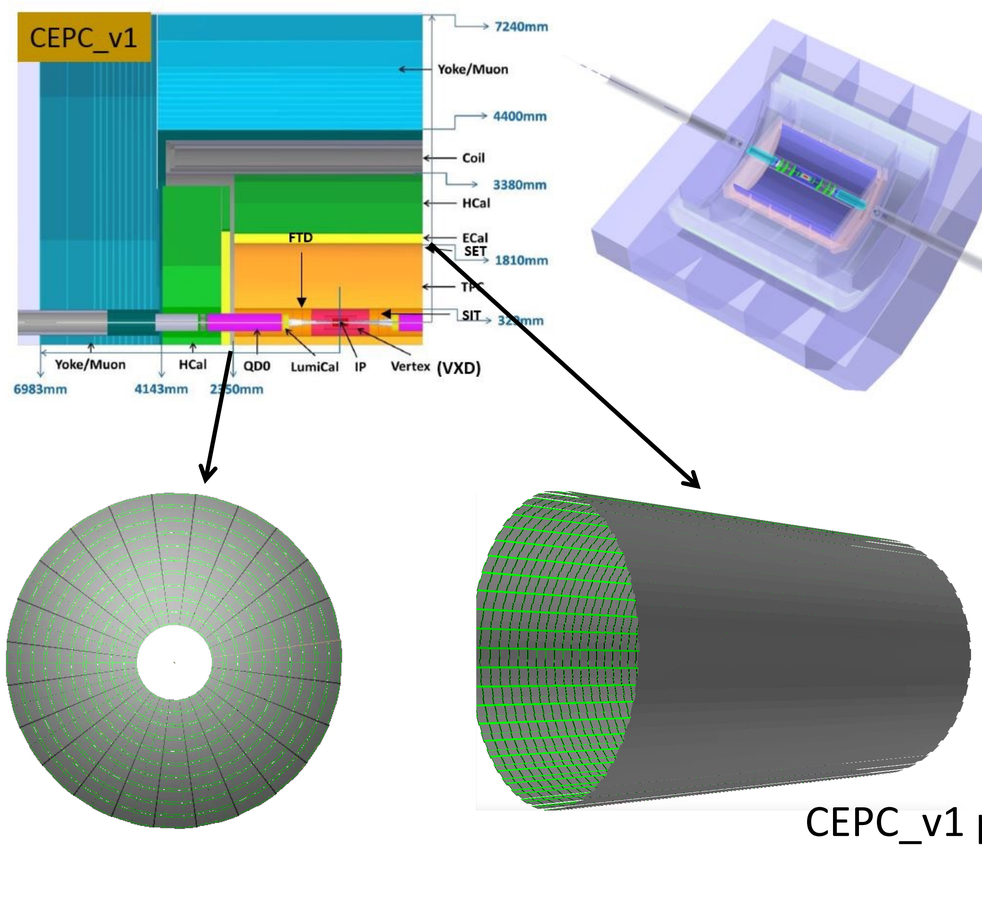
Detector

AC-LGAD (AC-coupled Low Gain Avalanche Detector) are mature detecors widly used like in ATLAS experiment, typically achieving fields of several hundred kV/cm in the gain layer. The spatial resolution can reach up to 10μm and resolution often less than 30 ps, making AC-LGADs crucial for applications like 4D particle tracking in future collider experiments.



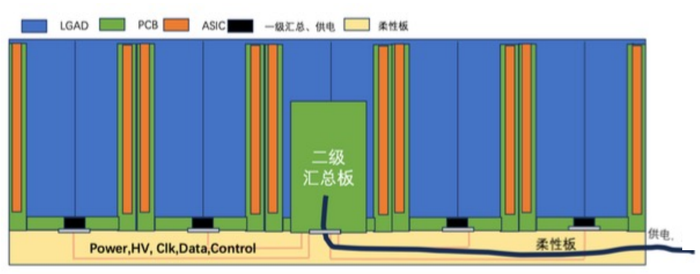


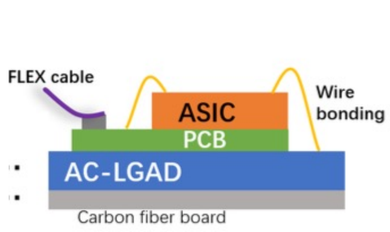
Geometric The AC-LGAD-based ToF and outer tracker will be positioned between the TPC and ECAL, covering an area of 90 m² with inner radius 400mm, outer radius 1800mm and length 5860mm.

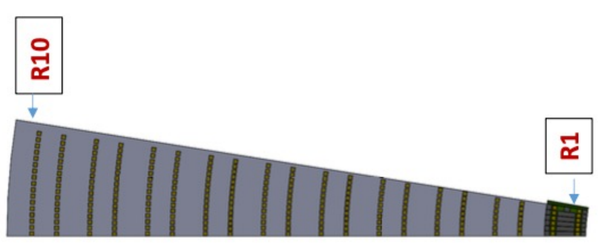


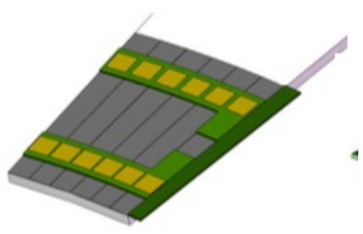
CEPC_v1 patch

Sub-structure The sub-structure consists of support, sensor, pcb boards, asic chips and electronics integration together with wires.





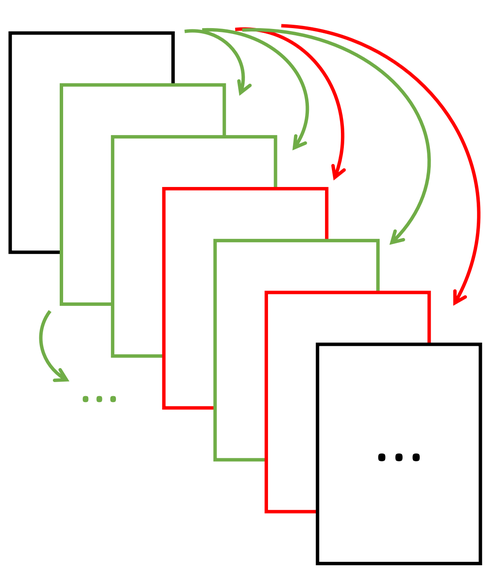


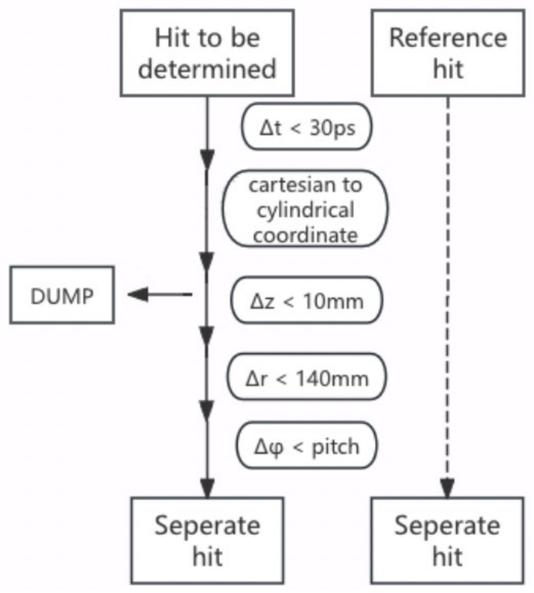


Simulation

CEPCSW The geometry design of OTK is added to /Detector/DetCRD/compact/CRD_common_v01/ and simulation truth details will be saved into OTKBarrelCollection and OTKEndcapCollection.

Hit Rate Utilizing new geomerty in CEPCSW, 10000 and 2000 hits are simulated for Higgs and Zpole background, respectively. Priliminary results are given with truth information with a algorithm as follows. Further developing in adding detailing structure to the detectors in the future will give out more precise result.

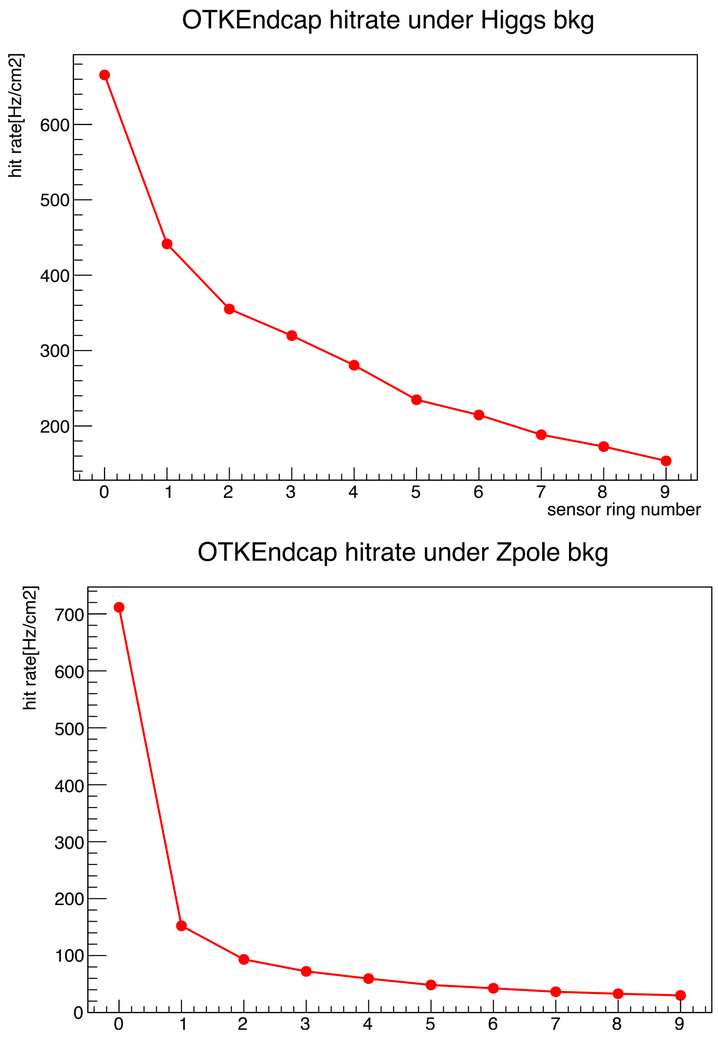




Results

Higgs By calculation, higgs bkg has maximum hit rate of 665.6Hz/cm², average hit rate of 253.7Hz/cm². The maximum electronic occupancy is 0.35%.

Zpole This bkg is still under optimization. Maximum hit rate is 711.594kHz/cm² and average 81.131kHz/cm².



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