

Design of the LHCb Sci-Fi tracker read-out electronics and the QA system

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There will be 524,000 channels of SiPM to be readout in the LHCb SciFi tracker, with the 64-ch PACIFIC ASIC. The frontend electronics should have 4 ASICs on each board, with SLVS differential outputs of 256-ch readout signals from the SiPMs of the SciFi. The frontend board (Carrier Board) was designed and evaluated its performance with test beam in 2018 by Tsinghua group. The board was designed as a 14-layers board, with 1.7 mm thickness, TU-862HF halogen-free material and the routing length match of SLVS differential outputs of 256-ch signals was controlled to be less than 3 mm. The first batch of 250 boards has been produced and delivered to CERN to assemble the first C-Frame of the SciFi tracker (SciFi milestone of 2018).

Besides, a quality assurance (QA) system for both the PACIFIC ASIC and the frontend board of SciFi tracker was developed. The QA system consists mainly of a PACIFIC readout board, a socket board, an adapter board and a charge injection board. An Altera Cyclone V FPGA is deposited for the readout board, with the firmware to realize the function of clock generation, ASIC configuration, data process, sensor readout, and so on.

In 2018.06, we delivered 3 QA systems to Heidelberg university, and the first batch of 1420 ASICs have been tested in June, 2018, and the test result was part of the evaluation of the SciFi electronics and would be very helpful for future classification of mass-produced ASIC in near future.

Type

Parallel talk

Sessions (parallel only)

Detector performance and upgrade

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