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Front-End Electronics for the LHCb Upgrade Scintillating Fibre Tracker

The LHCb detector will be upgraded during the next LHC shutdown in 2018/19. The tracker system will have a major overhaul.

Its components will be replaced with new technologies in order to cope with the increased hit occupancy and radiation environment.

A detector made of scintillating fibres read out by silicon photomultipliers (SiPM) is studied for this upgrade.

Even if this technology has proven to achieve high efficiency and spatial resolution, its integration within a LHC experiment bears new challenges.

This detector will consist of 12 planes of 5 to 6 layers of 250 μ m fibres with an area of

5 \times 6 m². Its lead to a total of 500k SiPM channels which need to will be read out at 40MHz.

This talk gives an overview of the R&D status of the readout board and the PACIFIC chip. The readout board is connected to

the SiPM on one side and to the experiment data-acquisition, experimental control system and services on the otherside .

The PACIFIC chip is a 128 channel ASIC which can be connected to one 128-channel SiPM without the need for any external

component. It includes the analog signal processing and a 2 bits non-linear flash ADC for digitisation. The PACIFIC chip

design highlights a very fast shaping (\sim 10ns) and the ability to cope with different SiPM suppliers with a power consumption

below 8mW per channel.

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