

Abstract content

LHCb is preparing the upgrade which is scheduled to be installed in 2018/19. The Scintillating Fibre (SciFi) Tracker will be designed to replace the current tracking system downstream of the magnet, required to run at an increased luminosity of $1 - 2 \times 10^{33} \text{ cm}^{-2}\text{s}^{-1}$ and to collect a total of 50fb^{-1} of data. The readout of the detector will be at 40MHz, applying a full software based trigger for every single bunch crossing. The SciFi Tracker consists of 12 planes covering a total surface of 350 m². Modules are based on 2.5 m long multi-layered ribbons made of 250 μm diameter scintillating fibres as the active medium and signal transport. Silicon photomultiplier (SiPM) arrays with 128 channels at a width of 250 μm are used for the readout. The signals from the SiPMs are digitized on an ASIC chip before reconstructing the track hit position within an FPGA on the front-end board. Several challenges facing this detector will be presented regarding the precision construction of the large active detector components, the radiation hardness of the scintillating fibres and the SiPMs, the high density readout electronics, and the necessary cooling systems.