

Lightweight support structures and thermal management materials for silicon tracker detectors featuring tilted modules

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In parallel with the major upgrade planned for CERN's Large Hadron Collider (LHC), the trackers of the current experiments will be replaced by lighter and more efficient detectors capable of coping with the demands of the future High Luminosity LHC (HL-LHC). In this respect, layouts featuring tilted modules are currently under consideration for both ATLAS and CMS future trackers, as they would open the door to important savings in the overall silicon area and the corresponding services. However, such configurations would give rise to a series of new engineering challenges, the answer to which calls for innovative approaches in the design of the support structures, the cooling strategy and the overall integration. This talk will describe the work carried out at CERN's Detector Technologies group in these areas of research, focusing on two different subjects: Firstly, the development of an ultra-light carbon fibre truss structure manufactured using filament winding; Secondly, the thermal characterisation of advanced materials which could help circumventing the heat management difficulties imposed by the tilted arrangement of the modules.

Summary

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