

Mechanical design of the TBPX detector for phase 2 upgrade of the CMS Inner Tracker

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A new silicon Tracker will be built for the phase 2 upgrade of the CMS experiment to fully exploit the increased luminosity delivered by HL-LHC.

The TBPX detector is the barrel of its innermost part, called Inner Tracker (IT), and it is made out of four cylindrical layers, each 400 mm long, located between 30 mm and 146.5 mm away from the beamline.

Its mechanical design, starting from the nominal position of pixel sensors defined by the CMS tracker layout developed for phase 2 upgrade, will be presented.

All the mechanical aspects of the project will be shown, taking into account the assembly phases, the services, the insertion procedures, and the connections with the rest of the IT.

The construction of the first prototypes of the carbon fiber ladders, which hold the pixel modules, and the carbon fiber external cylinder, which supports all the structure, will be described. Stainless steel pipes, with a thickness of 0.1 mm, properly welded in the junctions, follow precise cooling loop design inside the barrel and along the other detectors to ensure the correct temperature on the pixel modules.

Finally, we report preliminary results of a comparison between the first thermal tests performed on ladder prototypes and thermal simulations, using different tube housing materials and stainless steel pipes.

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