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Status of CMS phase2 TBPX detector mechanics: Layer 3 prototype and final External Cylinder construction and testing, thermal tests on the mechanical structure

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During CMS Phase 2, the Inner Tracker will be upgraded. The Barrel Pixel part (TBPX), the closest to the Interaction Point, consists of 4 layers of sensors at different radii with respect to the beam pipe. Each mechanic layer is connected to the outer one through a carbon peek flange on one side and through carbon peek rings on the other side. The whole structure is supported by the External Cylinder, a carbon fiber sandwich semi-cylinder. To allow its insertion in the final position, the TBPX region, has been divided into 4 quarters, each one connected to the Tracker Forward Pixel. All TFPX and TBPX quarters will be pushed towards their final position ensuring the overlap of the sensors for all the TBPX layers.

In order to minimize the material budget, the structure is realized with radiation hard low density material, such as carbon fiber, carbon foam and carbon peek.

This talk presents the construction and the metrology campaign run on the Layer 3 prototype, the further solutions and test done to reach the desired precision.

Furthermore, the construction and metrology of the TBPX External cylinder, fundamental part for the entire project as layer support and reference, will be shown. Precision and rigidity requirements for this part guided us in the choice of material and layout.

This talk will also describe the thermal tests performed in INFN-Turin on the mechanical structure, compared with the values obtained by simulations. These tests focused into studying each thermal interface step by step, in order to understand the contribution of each thermal layer.

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