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The construction of first mechanical structure prototypes of Layer 1 and Layer 4 TBPX for CMS phase 2

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Abstract:

The TBPX project for CMS phase2, already presented in the Forum Mechanics 2021 online, is going ahead; in this talk the advance phases of the works and the first final prototypes are shown.

The procedures used to build, in Pisa, the first prototypes of the mechanical structures of Layer 1 and Layer4 TBPX will be presented.

Light structures cold plates made by 4 or 5 plies of high conductivity monodirectional carbon fiber (K13D2U+EX1515), glued to carbon foam rods constitute the ladders, the detector holders, in addition, end-flange, integrated cooling loops and small precision external features (Pillars) contribute to complete the layers of the TBPX system.

With a minimum material budget each layer must hold and put in position the TBPX pixel modules, guarantee an efficient thermal conduction through its integrated cooling pipes, connected to the CO2 general cooling system with a working temperature of -35 degrees, permit the precise connection to the outer and the inner layers, allow the routing of readout and power systems through openings and windows.

The procedures followed to build the several components will be shown: ladders, cooling tubes, end-flanges and Pillars, plus the tools designed for the assembly, the glue steps and the metrology done on components and on tools for the final quality control.

At the end the first results of the tests performed on the prototypes will be shown, together with the experience acquired during all these phases, which will be beneficial in sight of the next production.

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