Contribution ID: **14** Type: **not specified**

TB2S Ladder Assembly and Qualification for CMS Outer Tracker System

Wednesday 29 May 2024 14:30 (20 minutes)

The TB2S (Tracker Barrel 2S) is part of CMS tracker system. TB2S ladder is a specialized structure made with Carbon Fiber (CF) and Aluminum Carbon Fiber (Al-CF) materials designed to mount silicon modules on it, along with the necessary services inside the CMS tracker system. The TB2S ladder has two main features, firstly, it provides mechanical support to the silicon modules, and secondly, it cools down the silicon sensors and readout electronics installed on it. There are 48 contacts points (inserts) at the entire ladder, and each silicon module is supported by six points. One silicon module dissipates approximately 5 watts of power (totaling approximately 60 W for 12 modules on one ladder); the generated heat can be extracted through the ladder's cooling arrangements (inserts and cooling pipe). National Centre for Physics (NCP) will develop about 400 TB2S ladders and perform qualification tests. For this purpose, three prototypes were successfully developed at NCP. A dedicated thermal qualification setup has been developed at NCP to qualify the ladder' s thermal contacts. Pre-production of the ladders has started, and three pre-production ladders have already been assembled. An overview of the pre-production ladders will be reported in the presentation. The ladder metrology and thermal qualification results will be presented in detail.

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Session Classification: Talks