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# Highly-integrated light-weight mechanical structures of Silicon Tracking System for the CBM Experiment

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The Silicon Tracking System (STS) of the future CBM experiment faces unique challenges regarding its mechanical structure. To cope with low-momentum reaction products originating from the heavy-ion beam-target interactions at rates up to 10 MHz we came up with the original design of the detector; it features double-sided double-metal (DSDM) silicon sensors, extended (up to 500 mm) analogue read-out aluminium polyimide micro- cables, and light-weight but stiff carbon-fibre support structures. The detector within its enclosure (made of carbon-fibre sandwich plates) is to be placed in the aperture of a 1 Tm dipole magnet.
The STS detector integration features very high level of the integration of various unique components. The building blocks of STS are 876 modules consisting of the 320µm sensor read out from both sides by a set of 64 micro cables of various lengths; there are 199 unique configurations of the modules. They are arranged on the light-weight carbon-fibre mechanical support structures forming ladders of 8 or 10 modules each. There are 106 ladders (38 ladder types) forming 8 tracking layers on 18 aluminium support frames. Latter also host powering and back-end read-out electronics, as well ass NOVEC-based cooling interfaces to cope with about 40 KW of heat produced by the STS electronics. Extensive test routines are performed on each level of the detector assembly to ensure proper performance of its components; due to the densely-integrated nature of our detector, only limited intervention is possible after system assembly. Our current approach to these challenging tasks is presented in this contribution.
The integration techniques, design choices and test procedures are being validated on the set of prototypes featuring different aspects of the system performance. Our experience with the ultimate up-to-date test bench of the future detector, the fully-functional down-scaled prototype mSTS with 11 functional modules on two tracking stations will be discussed.

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