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Recent developments in the Silicon Tracking System of the CBM experiment towards starting system assembly

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The Silicon Tracking System (STS) is the main tracking detector of the CBM experiment. It is designed to reconstruct trajectories of charged particles with high efficiency, to achieve momentum resolution better than 2% inside a 1 Tm magnetic field, and to be capable of identifying complex decay topologies. The main STS functional building block is the detector module. It consists of a double-sided silicon sensor connected through a stack of low-mass microcables to the custom-developed readout ASICs on two front-end electronics boards. 876 modules are arranged in 8 tracking stations, where 1.8 million channels are read out with self-triggering electronics, matching the experiment's data streaming and online event analysis concept.
Currently, the construction of the STS detector advances on multiple fronts: finalizing and testing the mechanical design, testing of the cooling concept via a thermal demonstrator, and the assembly of 3 ladders comprising 30 modules with the final components and procedures for the so-called pre-series production phase. The latter task is essential for testing the assembly concept of the final detector and requires a thorough quality control to ensure reliable performance of the modules and a high production yield. For this purpose, multiple quality control steps have been implemented before and during the assembly of the components and the necessary hardware and software have been developed. This work will present an overview of the results of systematic testing of the STS modules and components, and the most significant achievements and challenges in the detector mechanical assembly and integration.

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