

System Integration of the CBM Silicon Tracking System*

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For the system integration task, a top-down approach has been chosen, starting from the physics requirements of the CBM experiment: interaction rates, radiation environment, tracking aperture and detector segmentation. A functional plan of the STS and its surrounding structural components is being worked out from which the STS system shape is derived and the power need, cooling, the connector and cable space requirements, live span of components, and installation/ repair aspects etc. are determined.

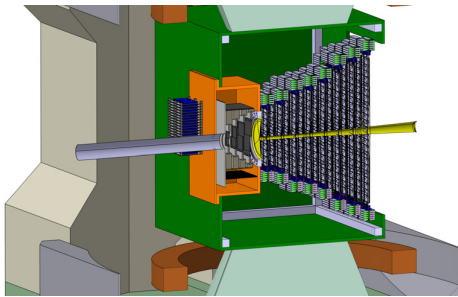


Figure 1: Detailed view of the STS in its envelope, MVD, beam pipe and target

Mechanics

The Silicon Tracking System (STS) of the CBM experiment will be installed into the superconducting dipole magnet, sharing the confined space with the target, the micro-vertex detector (MVD) and the beam pipe. The STS stations will be surrounded by a thermal enclosure to minimize radiation damage to the silicon sensors. This envelope is the supporting structure for the STS detector as well as for the MVD detector, which is located in its own vacuum vessel, the target and the beam pipe. The MVD vacuum chamber is mounted to the front side of the STS. The MVD detector itself is mounted on a flange, it can therefore be removed without opening the STS volume. The MVD flange also supports the target. Figure 1 shows a sectional view of the STS isolation envelop (green) with the eight half stations of the STS. The beam pipe (yellow) and the MVD vacuum vessel (orange) are integrated into the isolation volume.

The STS envelope will be installed into the magnet from the upstream beam side. It is mounted on rails with prolongations which allow the insertion into the magnet. The

position of the rails and the maximum dimensions of the STS envelope are predetermined by the dimensions of the magnet. The dipole magnet is being designed by a separate workgroup. The so called H-type magnet allows STS envelope dimensions to be $1400 \times 2000 \times 1100 \text{ mm}^3$.

Services

All Services like HV, LV, data and monitoring signals and cooling lines will be routed through the front panel into the STS envelope. This allows the dismantling of a half station through the open side panel of the STS box. The exact position will be optimized in order to minimize the interference between the MVD and the STS while dismantling one of the detectors for service work. The services have to be fed through the front panel such that its thermal isolation properties are preserved.

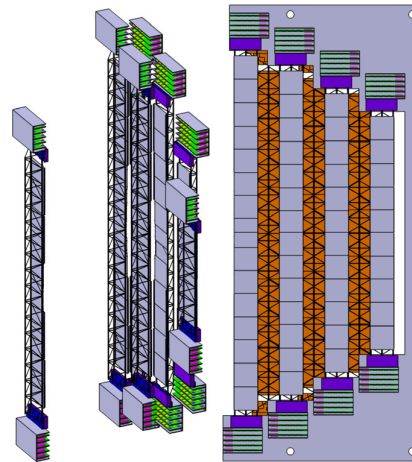


Figure 2: STS ladders assembled to a half station

Installation and maintenance

The installation procedure of the STS will consist of the assembly of ladders equipped with modules (sensors and front end electronic) to a half station (see Fig. 2). The half station will be installed into the STS box. After installation of the services the STS will be inserted into the magnet.

In the case of maintenance it is required to remove the STS, to get access to an arbitrary half station without dismantling the others and then to remove an arbitrary ladder leaving the other ladders in place.

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