

Quark Matter 2019 - the XXVIIIth International Conference on Ultra-relativistic Nucleus-Nucleus Collisions



Contribution ID: 408

Type: **Poster Presentation**

Module and ladder assembly techniques for the Silicon Tracking System of the CBM experiment at FAIR

Monday 4 November 2019 17:40 (20 minutes)

The Compressed Baryonic Matter (CBM) experiment is one of the scientific pillars of the Facility for Anti-proton and Ion Research (FAIR), which is presently under construction adjacent to GSI, Darmstadt. The Silicon Tracking System (STS) is the core detector of the CBM experiment, located inside the superconducting dipole magnet. The main task of STS is to reconstruct the tracks and measure the momentum of charged particles. The STS detector comprises of 896 low-mass detector modules, based on double-sided silicon microstrip sensors, distributed on 8 tracking stations. The stations are made from mechanical half units onto which 106 carbon fibre support structures, or ladders, are mounted which hold the modules.

We discuss the steps of module assembly, combining a silicon sensor, ultra-thin micro cables and self-triggering front-end electronics into the basic functional unit of the STS. A concept tool has been designed to study the feasibility of the ladder assembly with mechanical precision of better than 100 μm . The size of the tool has been chosen to mount five modules onto ladders, fitting the mSTS demonstrator of the mCBM test experiment at SIS18.

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Session Classification: Poster Session

Track Classification: Future facilities and instrumentation