

Contribution ID: 32

Type: **not specified**

Towards the Development of Cooling Demonstrator of the CBM Silicon Tracking System (STS)

Wednesday 19 June 2019 10:30 (20 minutes)

As the core detector of the CBM experiment, the Silicon Tracking System (STS) located in the dipole magnet provides track reconstruction & momentum determination of charged particles from beamtarget interactions.

Due to the expected irradiation damage (fluence - 10^{14} neq (1MeV)/cm²), the silicon microstrip sensors will dissipate < 6 mW/cm² at -10°C. Thus it is imperative to keep the sensors at or below -10°C at all times to avoid thermal runaway and reverse annealing by forced N₂ cooling. The corresponding electronics connected via microcables are placed outside detector acceptance and bi-phase CO₂ cooling will be used to remove ~ 40kW power dissipated.

To experimentally verify the aforementioned concepts under realistic mechanical constraints, a thermal demonstrator comprising upto 3 half-layers of STS is under development. This contribution will describe the recent R&D on several sub-components, such as CO₂ cooling plant and corresponding distribution system, optimised CO₂ heat exchanger plates, dummy silicon heaters and electronics board, thermal enclosure etc.

R&D on the feasibility of NOVEC mono-phase cooling as a backup for electronics cooling and using air nozzles for sensor cooling will also be mentioned. In addition, future plans on the demonstrator integration and design will be also presented.

This work is supported by GSI/FAIR.

Author: AGARWAL, Kshitij (Eberhard Karls Universität Tübingen)

Co-authors: SCHMIDT, Hans Rudolf (Eberhard-Karls-Universitaet Tuebingen (DE)); KIS, Mladen (GSI - Helmholtzzentrum für Schwerionenforschung GmbH (DE)); VASYLYEV, Oleg (Gesellschaft für Schwerionenforschung); KÜHL, Peter (GSI Helmholtz Centre for Heavy Ion Research - Darmstadt); KOCZON, Piotr (GSI Helmholtz Centre for Heavy Ion Research - Darmstadt); KAPPELL, Ralf Michael (GSI Helmholtz Centre for Heavy Ion Research - Darmstadt)

Presenter: AGARWAL, Kshitij (Eberhard Karls Universität Tübingen)