

Cooling system test of ATLAS ITK strip end-cap at BABY-Demo CERN plant

Monday 17 May 2021 16:30 (20 minutes)

The Large Hadron Collider (LHC) during its High-Luminosity phase (HL LHC) is expected to deliver an integrated luminosity up to 4000fb^{-1} and to reach an instantaneous luminosity between 5 and 7 times larger than the design LHC luminosity.

The ATLAS detector needs to upgrade its current subsystem in order to cope with this new experimental conditions. One of the most relevant improvement of the ATLAS detector consists of replacing the actual inner tracker with a new all-silicon tracker called Inner Tracker (ITK). The innermost layers of ITK, closest to the beam pipe, it is composed by pixel sensors, while a strip tracker it is used for the outer layer. The ITK strip tracker consists of a central section, the barrel, composed of 4 concentric cylinders in the central region, and two end-caps in the forward regions, each containing six disks of silicon modules. The modules of the end-cap are mounted on support structures, called petals, with embedded cooling and data lines. Each disk contains 32 petals, each of them with 18 silicon modules. The cooling for ITK system is provided by bi-phase CO_2 . In particular, each strip end-cap is cooled in 12 half disk segment, and each half disk cools 16 petals for an average power consumption of 1100-1300 W.

This contribution describes the first results obtained from testing 1:1 scale mock-up of one half-disk cooling system of the ITK strip end-cap. The test was performed at CERN using the BABY-Demo cooling plant, and the performance of the cooling system in term of temperature stability and pressure has been measured at different CO_2 flow rate and set point of the cooling plant.

Primary authors: MANZONI, Stefano (Nikhef National institute for subatomic physics (NL)); NOITE, Joao (Tadeusz Kosciuszko Cracow University of technology (PL)); VAN EIJK, Bob (Nikhef National institute for subatomic physics (NL)); VAN DONGEN, Jesse (Nikhef National institute for subatomic physics (NL)); VREESWIJK, Marcel (Nikhef National institute for subatomic physics (NL)); PASQUALI, Federica (Nikhef National institute for subatomic physics (NL)); BALASUBRAMANIAN, Rahul (Nikhef National institute for subatomic physics (NL)); FER-RARI, Pamela (Nikhef National institute for subatomic physics (NL)); MCDOUGALL, Ashley Ellen (Nikhef National institute for subatomic physics (NL))

Presenter: MANZONI, Stefano (Nikhef National institute for subatomic physics (NL))