The ALICE experiment is studying strongly interacting hadronic matter using nuclear-nuclear, proton-nucleus, and proton-proton collisions at the CERN LHC. To deal with the increased interaction rates expected for Run-3, the ALICE detector will be upgraded during the LHC shutdown 2019/20. The upgrades include a new, high-resolution, low-material Inner Tracking System (ITS) based on Monolithic Active Pixel Sensors (MAPS) developed by the ITS collaboration [1]. A total of 25k sensors are distributed in 7 concentric barrels (at radii from 22 to 400 mm), sub-divided into 320 modules (50 – 100 mm length) and provide a detection area of 10 m² segmented into more than 12.5 G Pixels. The new ITS will improve the impact parameter resolution, provide better tracking efficiency and p_t resolution and acceptance at low p_t, and allow for fast insertion and removal.

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**ITS upgrade READOUT SYSTEM ARCHITECTURE**

The ITS upgrade requires a new readout system designed to read the ITS data up to a rate of 100 kHz (400 kHz) for Pb-Pb (pp) collisions. The readout system connects to the sensors using differential copper links for the data, control and clock signals, receives radiation hard triggers and control/configuration data from the counting room, and delivers sensor data to the counting room using bi-directional optical fibers. The current design for this readout system foresees a modular Readout Unit (RU), each connected to one sensor, resulting in a total of 192 RUs. The RUs will be located 5 m from the end of the slabs in the experimental hall. This location is characterized by radiation environment resulting in a total ionizing dose of <10 krad and a high-energy hadron flux (capable of causing single-event upsets in the RUs) of <1 Hz.cm^-2. The RU design consists of an FPGA to deal with control of the sensors, handling the trigger and data collection, formatting, forwarding using the “Gigabit Transceiver Optical Link” (GBT). The GBT, developed at CERN for the LHIC experiment upgrades [2], consists of the GBTx serialiser/deserialiser ASIC, the VTRx/VTTx optical transceiver/transmitter module, and the GBT-SCA slow control ASIC.

**REFERENCES**


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