T 95: Pixel, Det/Sys LHCb, HGT

Time: Wednesday 17:30–19:00 Location: WIL/A317

T 95.1 Wed 17:30 WIL/A317

Providing YARR Software Support to Operate ATLAS-ITk Read-out Chips with BDAQ53 Hardware — •Wael Alkakhi, Joern Grosse-knetter, Arnulf Quadt, and Ali Skaf — II. Physikalisches Institut, Georg-August-Universität Göttingen

During the ATLAS HL-LHC upgrade, the current inner detector is going to be replaced by an all-silicon Inner Tracker (ITk), using prototype and pre-production read-out chips, referred to as RD53A and RD53B respectively.

YARR is a DAQ system developed for the ITk detector. It is composed of a software communicating originally with several PCI-e FPGA hardware (HW) platforms. It was developed to read out different front-end (FE) chips with, recently, an extended support to other HW platforms. This work reports on providing the support for BDAQ53 FPGA platform, which was developed as a part of the BDAQ DAQ system, with its Ethernet connectivity. This enables YARR to read out both RD53A and RD53B (ITkPix-V1) FE chips, while preserving the original existing BDAQ53 firmware. In particular, this would be most helpful for several institutions of the ATLAS collaboration, having already a purchased BDAQ DAQ system. The work required to develop specific Hardware Abstraction Library (HAL) controller software blocs. Different RD53A and RD53B scans were successfully performed, validating the added BDAQ53 support.

T 95.2 Wed 17:45 WIL/A317

Developments in the ITk Pixel OB Demonstrator DCS — •Anne Gaa, Stan Lai, and Hans Joos — II. Physikalisches Institut, Georg-August-Universität Göttingen

The ATLAS experiment is developing the new Inner Tracker (ITk) in preparation for the High-Luminosity LHC Upgrade. The ITk pixel Outer Barrel demonstrator, as a system prototype, is in its final design review phase in preparation of the construction of the finished detector. The Detector Control System (DCS) is responsible for monitoring and controlling the detector and its sub-systems. The DCS uses WinCC OA, a SCADA software by Siemens, in a distributed system.

This talk discusses various improvements to the ITk pixel OB demonstrator DCS in the scope of its system tests. These include new monitoring panels for the modules mounted on the loaded local supports, the implementation of an archiving system for monitored data points, and the calibration of temperature and voltage monitoring.

T 95.3 Wed 18:00 WIL/A317

Electrical Tests with the ITk Pixel Outer-Barrel Demonstrator — •Hans Joos[1,2], Benedikt Vormwald[1], Leyre Flores Sanz De Acedo[1], Brian Moser[1], Stan Lai[2], and Anne Gaa[2] — [1]CERN — [2]II. Physikalisches Institut, Georg-August-Universität Göttingen

For the upgrade of the LHC to the High-Luminosity LHC (HL-LHC), the ATLAS tracking detector will be replaced with an all-silicon detector, the Inner Tracker (ITk), as the higher luminosity requires radiation hard components that can deal with higher occupancies and radiation. Given the close proximity to the interaction point, the environment is especially challenging for the pixel detector. The Outer-Barrel layers of the pixel detector will comprise quad chip modules that are combined into serially powered (SP) chains and loaded on ring and stave shaped low mass carbon-fibre local supports to reduce the material budget of the detector.

The integration from individual detector components to a final detector is one of the big challenges of the HL-LHC detector upgrades. In order to test the loading procedure and performance of the modules after loading, prototype modules were mounted on a stave local support and connected with realistic services to form a smallest "feature-complete" functional building block and demonstrator of the ITk Pixel Outer-Barrel detector.

This talk will explain the demonstrator setup and present the results of electrical performance tests of the demonstrator modules after loading and their behavior in SP chains.

T 95.4 Wed 18:15 WIL/A317

Measurements with a serial powering prototype for the ATLAS ITk Pixel Detector — •Thomas Senger, Florian Hinterkeuser, Matthias Hamer, Fabian Huegging, Jochen Dingfelder, Klaus Desch, and Hans Krüger for the ATLAS-Collaboration — Physikalisches Institut Bonn Germany

The high-luminosity upgrade of the LHC at CERN requires completely new inner detectors for ATLAS and CMS experiments. A serial powering scheme has been chosen to cope with the constraints of the new pixel detectors. A prototype consisting of up to 8 quad modules, based on the new readout chips (ITkPixV1.1) developed by the RD53 collaboration in 65 nm CMOS technology has been set up in Bonn. This talk presents the results of measurements with a full ITkPixV1.1 serial powering chain to better understand and validate the requirements for all active components in the ITk Pixel System.

T 95.5 Wed 18:30 WIL/A317

First data from the LHCb Beam Conditions Monitor in Run III of the LHC — Johannes Albrecht[1], Elena Dall'Occo[1], •Martin Bieker[1], David Rolf[2,1], Holger Stevens[1], and Dirk Wiedner[1] — [1]TU Dortmund University, Dortmund, Germany — [2]CERN, Geneva, Switzerland

The LHCb experiment is a single-arm forward spectrometer at the LHC that focuses on measurements in the b and c quark sector. Due to its unique geometry, featuring a sensitive tracking system located as close as 3 mm to the LHC beams, the detector is at risk of damage from adverse beam conditions. For this reason, the particle flux near the beam pipe is monitored by eight diamond sensors in a circular arrangement on either side of and close to the interaction point.

In preparation for the ongoing Run III of the LHC this so-called Beam Conditions Monitor (BCM) has been overhauled as part of a comprehensive upgrade of the LHCb detector. Besides the safety-related functions, measurements of the particle flux near the interaction point can serve as an estimate for the instantaneous luminosity.

The talk will present the first data acquired during the initial months of LHC operation in Run III with the upgraded BCM readout system. In order to evaluate performance metrics, such as the linearity of the sensor response, the BCM output is compared to data from other LHCb subdetectors.

T 95.6 Wed 18:45 WIL/A317

Module assembly for the ATLAS High Granularity timing detector — •Hendrik Smitmanns[1], Andrea Brogna[2], Doğa Elitez[1], Theodorus Manoussos[1], Lucia Masetti[1], Fabian Piermaier[2], Maria Soledad Robles Manzano[1], Steffen Schoenfelder[2], and Quirin Weitzel[2] — [1]Institut für Physik, Johannes Gutenberg-Universität Mainz — [2]PRISMA Detektorlabor, Johannes Gutenberg-Universität Mainz

To meet the challenges of the High Luminosity-LHC, especially the increase of pile-up interactions, the ATLAS detector needs to be upgraded. One of the foreseen upgrades consists of the installation of the High-Granularity Timing Detector (HGTD). The HGTD will mitigate the effects of pile-up in the ATLAS forward region, providing time information with a resolution of about 30 ps per track. The active area consists of 2-double-sided disks per end-cap. Two 2x2 cm^2 Low Gain Avalanche Detectors bump-bonded to two ASICs and wire bonded to a flexible PCB form the HGTD basic unit, the so-called module. 8032 modules have to be built in total. During the HGTD R&D phase, module prototypes are assembled and tested in order to optimize the procedures and be integrated for system level tests in the HGTD demonstrator. The module assembly procedure in Mainz and the results of the very first assemblies are presented.