Contribution ID: **25** Type: **Poster**

Control and Monitoring for a serially powered pixel demonstrator for the ATLAS Phase-II upgrade

Tuesday 3 September 2019 17:20 (20 minutes)

A serial power scheme will be used for the new inner tracking detector for the Phase-II upgrade of the ATLAS experiment. New elements are required to operate and monitor a serially powered detector, including a detector control system (DCS), constant current sources and front-end electronics with shunt regulators. A demonstrator for the outer barrel is built at CERN to verify the concept and operate multiple serial power chains. This includes all required elements from an interlock system to in-situ monitoring with the new DCS. In this talk we present how serial chains with up to 16 modules can be operated.

Summary

A new full-silicon tracker is in development for the ATLAS Phase-II upgrade which will be installed for operation at the High-Luminosity LHC. The pixel part will have about 10 times more modules than the current detector. The modules will be powered in series to reduce material and power loss in the services. The serial powering requires new approaches for powering and monitoring of the pixel modules. A demonstrator for the outer barrel part is being built and tested at CERN. This demonstrator includes all elements from pixel modules, the detector control system (DCS) and interlock, to power supplies and readout systems. It will include multiple serial power chains with up to 16 modules in one chain. The Front-End (FE) chips used for the demonstrator are the ones currently in use at the innermost layer of the current ATLAS pixel detector. They include the required shunt low drop out regulator (SLDO) to be operated in a serial power chain. In total 78 FE chips will be installed in the demonstrator with 14 quad modules and 32 double modules. In this talk we will focus on the operation and monitoring of the serial power chains in the demonstrator. The interlock system is a hardwired system that acts directly on the power supplies in case of an undetected failure. The DCS is used to supervise the detector and includes the Pixel Serial Power Protection (PSPP) chip. The PSPP is located parallel to the modules and monitors the temperature and voltage of the modules. It digitizes locally the monitored values and can be read out through an independent communication path. Furthermore a bypass included in the PSPP allows deactivating a single module in the chain while the remaining chain remains operational. This is used as a protection in case a single module should fail. The DCS computer runs a WinCC application, which collects the data from the PSPP and monitoring of the interlock signals. Also the power supplies are controlled through the same application. WinCC is the supervisory control and data acquisition (SCADA) system used for the common ATLAS DCS. Constant current sources are required to operate the serial power chain. A prototype for such a source is developed by an industry partner. The system is operated in as realistic conditions as possible, including the cable length of 100m. As a last element, the DCS interacts also with the cooling system. We will present the building, the system and the challenges faced in operation.

Author: TRONCON, Clara (Milano Universita e INFN (IT))

Presenter: TRONCON, Clara (Milano Universita e INFN (IT))

Session Classification: Posters

Track Classification: Power, Grounding and Shielding