



Contribution ID: 222

Type: **Poster presentation**

Integrated USB based readout interface for silicon strip detectors of the ATLAS SCT module

Tuesday, 5 July 2011 15:20 (1 minute)

An integrated portable USB based readout interface for the ATLAS semiconductor trackers (SCT) has been built. The ATLAS SCT modules are large area silicon strip detectors designed for tracking of high-energy charged particles resulting in collisions on Large Hadron Collider (LHC) in CERN. These modules can be also used on small accelerators for medical or industry applications where a compact readout interface would be very useful. The new interface which has been constructed provides integrated power, control and DAQ with online easy configurable communication between the detector module and the controlling PC.

The interface is based on the Field Programmable Gate Array (FPGA) and the high speed USB 2.0 standard. This design permits to operate the modules under high particle fluency while minimizing the dead time of whole detection system. Utilization of programmable device simplifies the maintenance and permits future expansion of the functionality without any hardware changes. The device includes the high voltage source for detector bias up to 500 V and it is equipped with number of devices for monitoring the conditions of measurement (temperature, humidity, voltage). These features are particularly useful as the strip detector must be operated in well controlled environment. The operation of the interface will be demonstrated on data measured with different particles from radiation sources.

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Session Classification: Poster Mini Talks VI

Track Classification: Applications