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ATLAS Silicon Microstrip Tracker Operation and Performance

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The SemiConductor Tracker (SCT), comprising of silicon micro-strip detectors is one of the key precision tracking devices in the ATLAS Inner Detector. ATLAS is one of the experiments at CERN LHC.
The completed SCT is in very good shapes with 99.3% of the SCT's 4088 modules (a total of 6.3 million strips) are operational. The noise occupancy and hit efficiency exceed the design specifications.
In the talk the current status of the SCT will be reviewed. We will report on the operation of the detector, its performance and observed problems, with stress on the sensor and electronics performance.
In December 2009 the ATLAS experiment at the CERN Large Hadron Collider (LHC) recorded the first proton-proton collisions at a centre-of-mass energy of 900 GeV and this was followed by the unprecedented energy of 7 TeV in March 2010. The Semi-Conductor Tracker (SCT) is the key precision tracking device in ATLAS, made from silicon micro-strip detectors processed in the planar p-in-n technology. The signals from the strips are processed in the front-end ASICS ABCD3TA, working in the binary readout mode. Data is transferred to the off-detector readout electronics via optical fibers.
The completed SCT has been installed inside the ATLAS experimental hall since 2007 and has been operational since then. Calibration data has been taken and analyzed to determine the noise performance of the system. In addition, extensive commissioning with cosmic ray events has been performed both with and without magnetic field. The sensor behavior in the 2 Tesla solonoidal magnetic field was studied by measurements of the Lorentz angle. After this commissioning phase, the SCT was ready for the first LHC pp collision run. We find 99.3% of the SCT modules are operational, noise occupancy and hit efficiency exceed the design specifications, the alignment is already close enough to the ideal to allow on-line track reconstruction and invariant mass determination.
In the talk the current status of the SCT will be reviewed, including results from the latest data-taking periods in 2009 and 2010, and from the detector alignment. We will report on the operation of the detector including overviews on services, connectivity and observed problems. The main emphasis will be given to the performance of the SCT with the LHC in collision mode and to the performance of individual electronic components. The SCT commissioning and running experience will then be used to extract valuable lessons for future silicon strip detector projects.

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