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SCT Commissioning

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The Barrel and EndCaps of the ATLAS SemiConductor Tracker have been installed in the ATLAS cavern since summer 2007. All the electrical and optical services were connected and rapid tests performed to verify their continuity. Problems with the cooling circuits, meant that the time for detailed tests in 2007 was limited. These problems have now been resolved allowing the SCT to be operated and participate in combined ATLAS Cosmic ray data taking runs. The results of these runs have been used to determine the hit efficiency of the modules as well as providing invaluable constraints for the detector alignment.

Summary

The Barrel and EndCaps of the ATLAS SemiConductor Tracker have been installed in the ATLAS cavern since summer 2007. The in-situ noise performance of the Barrel was verified, showing that there was no significant degradation after detector installation. Tests with combined operation with the TRT showed no evidence of cross-talk. There were major problems with the heaters for the evaporative cooling system which prevented more extended operation in 2007. For the EndCaps, very quick tests without cooling were used to verify the continuity of the electrical and optical services.

The problems with the heaters used for the evaporative cooling system, will be briefly reviewed as well as the solution that has been implemented. This required the design of more robust electrical connectors. All the heaters have been modified and installed and operated without problems so far. The location of the heaters has been moved to a more accessible location so that they could be replaced during a winter shutdown if necessary. There have also been problems with leaks for two of the EndCap cooling circuits and ideas about how to fix these leaks will be discussed.

The Barrel SCT participated very successfully in the combined ATLAS Cosmic ray data taking. The procedures used to rapidly time-in the detector, relative to the Cosmic ray trigger will be described as well as the plans for the more detailed timing adjustments that will be made with the first pp data. The Cosmic ray data was used to determine module hit efficiencies and for detector alignment. The Cosmic ray data taken on the surface showed that the detector assembly was performed to a very high precision. The recent Cosmic ray data taken in the ATLAS cavern, also showed similar quality results, confirming that the good build precision of the detector was maintained during the final transport and installation in the ATLAS cavern. This is an important result as it will greatly simplify the alignment procedures. Extensive threshold scans were used to verify the noise performance of the modules and the results were consistent with those from earlier stages in detector assembly. In addition tests of combined operation of the TRT showed no increase in noise. These results verify the design of the grounding and screening. Leakage current measurements have been made for all detectors with good results. The thermal performance of the modules has been monitored using the thermistors on the modules. We also
anticipate having results from the EndCaps, and from combined tests with the pixel detector.

In conclusion the current SCT performance exceeds the design specifications and the detector is ready for the first physics runs this year. However several difficulties were encountered and the assembly and commissioning experience will be used to extract lessons for future silicon detector projects.

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