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Test and extraction methods for the QC parameters of silicon strip sensors for ATLAS upgrade tracker

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The Quality Control (QC) of pre-production strip sensors for the Inner Tracker (ITk) of the ATLAS Inner Detector upgrade has finished, and the collaboration has embarked on the QC test programme for production sensors. This programme will last more than 3 years and comprises the evaluation of approximately 22000 sensors. 8 Types of sensors, 2 barrel and 6 endcap, will be measured at many different collaborating institutes. The sustained throughput requirement of the combined QC processes is around 500 sensors per month in total. Measurement protocols have been established and acceptance criteria have been defined in accordance with the terms agreed with the supplier. For effective monitoring of test results, common data file formats have been agreed upon across the collaboration. To enable evaluation of test results produced by many different test setups at the various collaboration institutes, common algorithms have been developed to collate, evaluate, plot and upload measurement data. This allows for objective application of pass/fail criteria and compilation of corresponding yield data. These scripts have been used to process the data of more than 2500 sensors so far, and have been instrumental for identification of faulty sensors and monitoring of QC testing progress. The analysis algorithms and criteria were also used in a dedicated study of strip tests on gamma-irradiated full-size sensors.

Collaboration

ATLAS

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