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Temperature studies of PS Detector Modules for the Upgrade of the CMS Outer Tracker using a Burn-In Setup

The high-luminosity upgrade of the LHC will result in an increase of the typical instantaneous luminosity by a factor of about four. In order to cope with the new conditions, such as higher levels of radiation damage, larger pileup, and higher data load, the CMS detector will require substantial upgrades. As part of this upgrade program, the entire silicon tracking detector will be renewed. The detecting elements of the new CMS Outer Tracker (OT) are silicon detectors, so called pT modules, implementing a mechanism to contribute to the Level-1 trigger system. The modules have to operate at low temperatures (-35°C) to mitigate the increase in the leakage current resulting from exposure to high radiation levels.

In addition to thorough quality control, a burn-in procedure is needed to ensure the correct operation of each OT module at operation temperature, both during long term operation and after temperature cycles.

For this purpose, a burn-in system is being commissioned at DESY. This setup will perform thermal cycles from room temperature down to the operation temperature and conduct essential tests to ensure good performance of the modules. For the validation of this setup, the thermal contact and the thermal homogeneity throughout individual PS modules have been studied during operation.

In this contribution, the burn-in setup as well as the temperature studies of prototype PS modules will be presented.

Collaboration / Activity

CMS

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