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Module development for the ATLAS Phase II Pixel Inner Tracker

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The ATLAS experiment will undergo substantial upgrades to cope with the higher radiation environment and particle hit rates foreseen for HL-LHC. The phase II upgrade will include the replacement of the inner detector with a completely new silicon-based tracker. The ATLAS phase II Inner Tracker (ITk) will consist of hybrid pixel detectors and silicon strip detector layers. The innermost five-barrel layers and several endcap rings will be equipped with hybrid pixel detector modules. The modules are consisting of bare silicon modules connected to flexible printed circuits. Bare silicon modules are made of a silicon pixel sensor connected to either four FE chips to form a quad module or one FE chip to form a single chip module. The ITk phase II pixel community has conducted many developments geared towards meeting the necessary module production quality and throughput. These include establishing quality checking routines of bare module components, tooling developments for their assembly as well as electrical testing infrastructure to assess their operability to specification. A dedicated program to set in motion this effort and streamline these various stages was established using the RD53A front-end chip. Subsequent test and assembly work is being carried out using the ITkPix chips which are final size FE chips. This talk will provide a detailed overview of these developments and their results in preparation for the ATLAS ITk pixel phase II upgrade module production.

Collaboration

ATLAS-ITK-pixel

Primary authors: SHARMA, Abhishek (CERN); MUNOZ SANCHEZ, Francisca

Presenter: SHARMA, Abhishek (CERN)

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