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System tests of the ATLAS ITk planar and 3D pixel modules

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In order to validate the design of the new all-silicon Inner Tracker (ITk) for ATLAS for the HL-LHC, a series of system tests has been performed, to assess the performance of prototype planar and 3D pixel modules arranged into serial power chains mounted on to realistic mechanical structures. In this report, the prototype loaded local supports and test infrastructure is described and the key results presented.

Summary (500 words)

A new all-silicon Inner Tracker (ITk) has been designed for the ATLAS experiment at the HL-LHC. As part of this, a new pixel detector consisting of a total area of approximately 12m², will be constructed with planar and 3D pixel modules, mounted onto ring and stave shaped low mass carbon-fibre fibre support structures. The data will be transmitted optically to the off-detector readout system. To save material in the servicing cables, serial powering is employed for the supply voltage of the readout ASICs. Together, these structures are arranged on larger structures to provide tracking up to a pseudo rapidity of 4.0. In order to validate the design of this new tracker, large scale prototyping programmes are being carried out by all subsystems. A series of system tests has been performed, with some of these prototypes, to assess the performance of modules arranged into serial power chains mounted on to realistic mechanical structures. In this report, the prototype loaded local supports and test infrastructure is described. The key results of the tests are presented.

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