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Ageing tests of the Hybrid Modules for the ALICE ITS Upgrade

The ALICE experiment foresees a comprehensive upgrade during the ongoing long LHC shutdown. A key element is the replacement of the Inner Tracking System (ITS) with a newly constructed silicon based detector. The new "ALPIDE" chips made from Monolithic Active Pixel Sensors ($50 \mu\text{m}$ thick) have already shown excellent performances in terms of power consumption and spatial precision. Once installed in the ALICE detector they will allow a remarkable improvement of the tracking and vertexing capabilities.

Several institutions were involved in the assembly of the modules (HICs, Hybrid Integrated Circuits) of the new ITS. Through a unified procedure, the chips were aligned (with $< 5 \mu\text{m}$ precision) and glued on aluminium based Flexible Printed Circuits ($175 \mu\text{m}$ thick). The aluminium pads of the chips were then bonded to the FPC for power supply and I/O connections. Dedicated hardware and software were developed in order to qualify the modules at different stages after the assembly. Some HICs underwent more invasive tests designed to check their mechanical strength. These include ageing tests: keeping modules in a temperature- and humidity-controlled environment, their ageing in the ALICE cavern can be simulated. The pixel response and the quality of the HICs before and after different ageing periods were measured and compared, drawing conclusions on their stability over time during the data taking period.

In this contribution the HICs qualification procedure will be presented and particular emphasis will be given to the ageing tests. The methods adopted will be described in detail and the collected results will be presented and discussed.

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