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## Wafer level test of the readout chip of the CMS Inner Tracker for HL-LHC

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The CMS pixel detector for the High-Luminosity LHC (Inner Tracker) will be instrumented by hybrid pixel modules where the sensors are read out by the CMS Readout Chip (CROC), an ASIC developed in CMOS 65 nm technology. The CROC contains more than one billion transistors, with a digital architecture of unprecedented complexity for High Energy Physics and has the novelty to be powered from a constant current generator to allow chains of serially powered modules.

The Inner Tracker will be equipped by 13256 CROCs. Testing the CROC for the verification of all the critical functionalities has to be performed during production and it is fundamental to guarantee a reliable performance of the CMS pixel detector, and therefore the success of the experiment.

The CROC chips will be delivered by the foundry on 12" wafers with 138 chips, and each chip must be tested at wafer level, before it is sent to the company for dicing and hybridization.

In this talk, it will be presented the procedure currently put in place for the automatic test of the CROC chips while they are still on wafer, during the construction of the Inner Tracker.

The testing set-up relies on a semi-automated probe system, a custom design probe card hosting a mezzanine equipped with a micro-controller, and uses the CMS DAQ under development for the experiment.

The talk will illustrate the hardware, the software and the test procedures developed to validate the analog and the digital sections of the chip, and show the results from a first qualification campaign based on wafers from a production of the full-size prototype of the CROC delivered in August 2021.

### Collaboration

CMS

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