

RD53 pixel chip developments for the ATLAS and CMS High Luminosity LHC

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The Phase-II upgrades of ATLAS and CMS will require a new tracker with readout electronics operating in extremely harsh radiation environment and high data rate readout.

The RD53 collaboration is a joint effort between the ATLAS and CMS experiments facing the challenges of developing hybrid pixel readout chips for the upgrades of the pixel detectors of both experiments.

A large size demonstrator, called RD53A, was produced in 2017 to qualify the chosen 65nm CMOS technology and compare different analog front-ends and digital architectures for the development of the final production ASICs (Integrated Circuit). The chip has been extensively used for sensor characterization and the design, test and verification of the system architectures of ATLAS and CMS.

The final chips for the two experiments are being designed based on these results, having as a reference a common virtual baseline chip, called RD53B, which is adapted to the needs of each experiment (e.g. chip size, analog front-end, triggering features). The RD53B-ATLAS version was submitted in March 2020 and it has been extensively tested, providing valuable results for the implementation of the RD53B-CMS version, which is being finalized in these days and planned to be submitted in March 2021.

A general overview of the chip architecture will be presented, as well as the first preliminary test results

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