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Stitched Passive CMOS Strip Sensors

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As a result of a CERN market survey, CMOS sensors in pixel and strip geometries were developed. The CMOS process is an established commercial industry process, which a lot of foundries utilize to produce silicon type devices. Typical CMOS foundries are equipped for bulk productions, but only for sensors much smaller than what is needed in e.g. the strip region of the ATLAS Inner Tracker. To produce large enough sensors, the process of stitching is utilized. The sensor structure is divided up into different regions, which individual wafer masks can imprint side by side onto the wafer to form a coherent area. With this method, the sensors can be nearly wafer-sized. The effects of stitching on charge collection, electric field strength and configuration, detection efficiency and radiation hardness have to be investigated.

The sensors discussed in this talk are stitched passive CMOS strip sensors produced by LFoundry in a 150 nm process with three different strip designs. The results of electrical IV characterisations, TCT and ^{90}Sr-source measurements and the effects of radiation damages are discussed. The effects of the stitches on the sensors performance were also investigated.

The results of these measurements demonstrate that the stitching process works and introduces no negative effects on the sensors performance, before and after irradiation.

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