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Test beam analysis of irradiated passive CMOS strip sensors

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A significant challenge in producing the larger structures typical for silicon strip sensors is the limited reticle size of the CMOS process. This problem can be solved through the so called stitching of the reticles.
The sensors that are the subject of this talk are passive CMOS strip sensors, containing three different strip variants, designed by the University of Bonn. They were produced by LFoundry in a 150 nm process on a 3-5 kΩ cm float zone wafer, with additional backside processing by IZM Berlin.
To examine the radiation hardness of the stitches, samples have been irradiated with reactor neutrons to various fluences up to 1 $\cdot 10^{16}$ n_eq / cm^2. Possible effects of the stitching on spatial resolution, detection efficiency or charge collection efficiency and the general performance of the three designs have been studied in detail in several test beam campaigns at the DESY II test beam facility, where unirradiated as well as a number of irradiated CMOS strip sensors were thoroughly examined. In summary, we are able to demonstrate on a large number of samples that multiple stitching can be performed without any degradation of the sensor performance both before and after irradiation.

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