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First results with novel pixel detectors based on wafer-wafer bonding

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Wafer-wafer bonding enables the fusion of two semiconductor wafers, without any additional material at the interface. In the context of pixel detectors, the method has the potential to enable limitless combinations of absorber materials with readout chips fabricated with CMOS technologies.

In this talk we present the status of our studies on the design, optimization and characterization of pixelated wafer-wafer bonded detectors.

In particular, we report on a CMOS readout chip bonded to silicon and gallium-arsenide. We will present the design of the detectors, their manufacturing principle, and compare their simulated performance to the measured characteristics such as leakage current, noise, and single photon collection efficiency in the X-ray domain. We will further highlight the current challenges of this novel technology and present our plans for future developments.

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