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Monolithic Active Pixel Sensors

After more than a decade of R&D, CMOS Monolithic Active Pixel Sensors (MAPS) have proven to offer concrete answers to the demanding requirements of subatomic physics experiments. Their main advantages result from their low material budget, their very high granularity and their integrated signal processing circuitry, which allows coping with high particle rates. Moreover, they offer a competitive radiation tolerance and may be produced for low costs. Sensors of the MIMOSA series have offered an opportunity for nuclear and particle physics experiments to address with improved sensitivity physics studies requiring an accurate reconstruction of short living and soft particles. The STAR-PXL detector is the first vertex detector based on MAPS produced in 0.35 µm CMOS technology. While this experiment is successfully taking data, it was found that the 0.35µm CMOS technology is not suited for upcoming applications like the CBM vertex detector and the ALICE inner tracker system, which require faster and more radiation tolerant sensors. The exploration of a deeper submicron
CMOS technology was therefore initiated and it was shown that MAPS can be envisaged for detectors exposed to particularly demanding running conditions. The talk will overview achieved performances of MIMOSA / MISTRAL sensors and focus on their most recent developments, addressing the CBM-MVD, ALICE-ITS and ILD vertex detector.

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