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Status of the radiation hardness of CMOS Monolithic Active Pixels Sensors for the CBM experiment

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The Compressed Baryonic Matter Experiment (CBM) is one of the core experiments of the future FAIR facility. It will explore the phase diagram of strongly interacting matter in the regime of high net baryon densities with numerous probes, among them open charm. Therefore, a dedicated vertex detector is required which will be equipped with CMOS Monolithic Active Pixels Sensors (MAPS). A joined research activity of the Goethe University Frankfurt and the IPHC Strasbourg explores strategies to match the radiation hardness of these sensors with the requirements.

In the past, it could be shown that combining an improved high resistivity ($1 - 8 \text{ k cm}$) sensitive medium with the features of a $0.18 \mu\text{m}$ CMOS process can improve the radiation hardness of the sensors. In 2015, it was tried to further improve the radiation hardness by applying an external depletion voltage. Two prototype sensors were studied. Furthermore, the first full-integrated $0.18 \mu\text{m}$ CMOS-sensor FSBB was tested in beam and laboratory. We will show first results from irradiated samples at low operation temperatures.

On behalf of collaboration:

CBM

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