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Characterizing of MIMOSIS-1 CMOS Monolithic Active Pixel Sensor Using a 25 MeV Proton Beam at Cyrce

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MIMOSIS, a CMOS Monolithic Active Pixel Sensor (MAPS), is currently under development at the Institut Pluridisciplinaire Hubert Curien (IPHC), Strasbourg, and it will be integrated into the Micro Vertex Detector (MVD) of the upcoming FAIR/GSI experiment, Compressed Baryonic Matter (CBM). The primary objective of the MVD is to provide precise particle tracking in a high-density track environment. To achieve this, MIMOSIS aims to deliver a spatial resolution of approximately 5 µm, a time resolution of 5 µs, a maximum rate capability of around 80 MHz/cmˆ2, and radiation tolerance exceeding 10ˆ13 neq/cmˆ2 and 5 Mrad.

The first full-scale prototype sensor, MIMOSIS-1, underwent testing at the CYRCé cyclotron facility at IPHC, which delivers a proton beam with energies ranging from 16 to 25 MeV. In this presentation, we will discuss the test results of the MIMOSIS-1 using a 25 MeV proton beam, with intensities reaching up to 3 pA and beam sizes as small as 2 mm, achieved through the use of collimators. The performance of the sensor was investigated regarding cluster size, and irradiation hardness, and limitations in data bandwidth due to high intensities. Furthermore, we will demonstrate the suitability of the CYRCé platform for testing our sensors and ability of our sensor to be used for beam monitoring and characterization.

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