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Study of MALTA2, a Depleted Monolithic Active Pixel Sensor, with grazing angles of CERN SPS 180 GeV hadron beam

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MALTA2 is a Depleted Monolithic Active Pixel Sensor designed to meet the challenging requirements of future collider experiments, in particular extreme radiation tolerance and high hit rate . It is fabricated in a modified Tower 180 nm CMOS imaging technology to mitigate performance degradation caused by irradiation up to 100 MRad of Total Ionising Dose and 3×10^{15} 1 MeV N_{eq}/cm^2 of Non-Ionising Energy Loss.
Samples of MALTA2 have been tested during the CERN SPS test beam campaign in 2023-2024, before and after irradiation of 1×10^{15} 1 MeV N_{eq}/cm^2. The sensors were inclined at a range of angles with respect to the beam. Particles crossing the sensor at an angle traverse a higher volume, potentially leading to improved charge collection after irradiation when the sensor is not fully depleted after irradiation.

In this contribution, the tracking efficiency, cluster size and spatial resolution as a function of grazing angles from 0 to 60 degrees will be presented. Additionally, an estimation of the depletion depth with these test beam measurements will be presented. Understanding the sensor depletion is key to study the charge collection properties through drifting in the bulk of the device and to understand radiation effects

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