Contribution ID: **7** Type: **Talk**

MALTA Monolithic Pixel Sensor Telescope : New developments and characterisation results

The MALTA sensor is a Depleted Monolithic Active Pixel Sensor (DMAPS) fabricated in Tower Semiconductor 180 nm CMOS imaging sensor technology. This sensor, produced on both high resistivity epitaxial and Cz substrates, is designed for enhanced signal efficiency and time resolution.

A custom-built telescope, with up to six MALTA tracking planes, has been developed for a testbeam campaign at SPS (CERN). This system features a dedicated custom readout, online monitoring integrated into DAQ providing realtime hit maps, time distribution and event hit multiplicity. Additionally, it incorporates a dedicated advanced configurable trigger system that enables triggering based on coincidences between the telescope planes and scintillator references.

The excellent time resolution performance facilitates rapid fast track reconstruction, due to its ability to maintain low hit multiplicity per event which reduces the combinatorics. This contribution will discuss the versatility of the telescope in testing various DUTs exemplified by Calypso and LGAD sensors. It will also cover results from spatial resolution studies and the novel rotational studies conducted inside an expanded cold box, underlining the system's versatility and technological advancements.

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