

# 12th Beam Telescopes and Test Beams Workshop



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## Charge Collection Studies for HV-MAPS

*Friday, April 19, 2024 11:10 AM (20 minutes)*

The High-Voltage Monolithic Active Pixel Sensor (HV-MAPS) technology, designed for high-rate applications, integrates precise spatial and time resolution by consolidating active detector volume and readout functions into a single chip. The TelePix1, an HV-MAPS test chip, incorporates in-pixel electronics, including an amplifier and a comparator.

This study explores the charge deposition and collection processes in HV-MAPS to guide further design considerations. The emphasis of this presentation is to disentangle the contributions of drift and diffusion to the signal. To achieve this objective, the Time-over-Threshold (ToT) and cluster size of sensors with varying thicknesses are examined, exploring their dependence on the depletion depth. Offline calibration is essential due to pixel-to-pixel variations, ensuring accurate sensor comparisons. The calibrated signal is investigated for a 4 GeV electron beam and electrons emitted from a Strontium-90 source. A significant contribution of diffusion to the signal size is observed for small depletion volumes.

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