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A comparative response study of a Medipix3 Silicon Sensor Detector using X-rays and Electrons

The Medipix3 hybrid pixel detector has found use globally, with applications such as colour x-ray CT scanners and electron microscopy detectors. These detectors are typically characterised using x-rays, either at a synchrotron facility, or using x-ray flouresence. While this is a convenient and well understood characterisation method, as the application range of these detectors broadens it is important to understand their response to other particles. This work presents results of characterisation done using both x-rays and electrons at an energy range of 5-30keV. The x-ray characterisation was performed using x-ray flouresence. A novel technique is presented to perform characterisation with electrons -the electron mirror. A broad range of detector modes were investigated, including various gain modes and pre-amplifier settings. Additionally, the Medipix3 chip contains a unique feature called charge summing mode (CSM). In charge summing mode, incident hits in neighbouring pixels can be recorded and the sum of all charge assigned to the pixel with the greatest proportion at the pre-amplifier level. The effect of charge summing mode on the detector response is investigated for both x-rays and electrons.

Workshop topics

Detector systems

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