

Hybrid pixel detectors –the Timepix ASIC family

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Hybrid pixel detectors are now ubiquitous in High Energy Physics experiments. This is because they are able to provide noise hit free data with very high timestamp precision. Following pioneering work in the Medipix Collaborations, the same technology is now used in multiple other fields ranging from photon science, to space-based dosimetry, to medical imaging and more recently to quantum applications. The Timepix family of pixel detector readout ASICs was designed in response to a request for time stamping at the pixel level for an envisaged gas detector-based Time Projection Chamber. In the first version of the chip each pixel could be programmed to measure one of 3 parameters: total counts, Time over Threshold (ToT), or Time of Arrival (ToA). Readout was frame-based. Successive designs have added data driven readout and much higher time precision. This talk will introduce the Timepix family of readout chips highlighting the key features for each generation. Some of the fundamental design constraints will be discussed along with potential future avenues for development.

Presenter: CAMPBELL, Michael (CERN)