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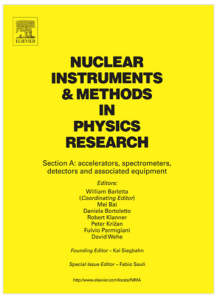


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# ASIC DEVELOPMENTS FOR RADIATION IMAGING APPLICATIONS: THE MEDIPIX AND TIMEPIX FAMILY

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## Introduction

Hybrid pixel detectors with on-pixel pulse processing were developed first for use at the LHC and a history of the early developments in what became commonly referred to as, “pixel detectors” can be found in [1]. These replaced strip detectors in the inner tracking layers of the vertex detectors where track density was so high that a 2-D geometry was required to permit correct pattern recognition. Moreover, because of the close proximity of sensor and readout electronics the input capacitance of a channel is low (10-100 fF) and input referred noise levels of around 100 $e^-$ rms are relatively easy to achieve even at shaping times consistent with proper allocation of a hit to one LHC bunch crossing (25 ns). As the operating threshold is set at around 1000-2000 $e^-$ the “images” of bunch crossing are essentially “noise hit free.” Because of readout bandwidth restrictions only selected or “triggered” events are read out from such detectors. Radiation *imaging* detectors on the other hand usually accumulate data on the detector prior to readout. In the early days of the first Medipix Collaboration we sought simply to generate “noise free” images on chip by accumulating hit counts on each pixel. Over the years this concept has extended to

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