

## **A Read-out System for the Medipix2 Chip Capable of 500 Frames per Second**

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Medipix2 chip [1] was developed by Medipix Collaboration [2] for various imaging applications with a special interest in the field of X-rays. Its image matrix is made of 256×256 pixels that can be read-out through a Low Voltage Differential Signalling (LVDS) serial port or a 32-bit single-ended CMOS parallel bus. IFAE and CNM developed a readout system that can use both busses and is able to read a single Medipix2 chip through the parallel bus at a rate of 1 kHz. With a duty cycle of 50 %, the real sampling speed is 500 frames per second (fps). This implies that 1 ms is allocated to the exposure time and another millisecond is devoted to the read-out of the chip. In such configuration, the raw data throughput is about 500 Mbit/s. Eventually, data can be stored and analysed off-line.

The detectors used for these measurements are coupled to the Medipix2 chip via bump-bonds. We used both CdTe and Si pixel detectors with a pitch of 55 μm over an active surface of 14×14 mm<sup>2</sup>. Medipix2 chip was designed to operate with both negative (electrons) and positive (holes) charges, thus in our study we were able to use CdTe to collect electrons and n-type Si for holes.

The present paper shows that, with the parallel readout option provided by Medipix2 chip, it is possible to design a very fast X-ray imaging camera for various imaging applications, such as material engineering, biological cellular processes, etc., where high frame rate acquisition is desirable.

### **References**

- [1] - X. Llopart et al., presented in IEEE Nuclear Science Symposium and Medical Imaging Conference, San Diego, CA, USA, November 4-10, 2001. IEEE Trans. Nucl. Sci. 49, pp. 2279-2283, 2002.
- [2] - Medipix2 Collaboration website: [www.cern.ch/MEDIPIX](http://www.cern.ch/MEDIPIX).