The XPAD3 (X-ray Pixel chip with Adaptable Dynamics) circuit is the next generation of 2D X-ray photon counting imaging chip to be connected to a pixel sensor using the bump and flip-chip technologies. This circuit, designed in submicronic (0.25µm) IBM technology, contains 9600 pixels (130um x 130um) distributed into 80 columns of 120 elements each. Its features have been improved to provide high counting rate over 1Mphotons/pixel/s, high dynamic range over 60KeV, very low noise detection below 100e, energy window selection and fast image readout below 2ms/frame. The analog part in each pixel gathers a low noise charge sensitive preamplifier, a voltage to current converter, and current comparators. The digital part of XPAD3 is meant to count hits in each pixel and to configure, calibrate, test and readout the chip. An innovative architecture has been designed in order to prevent the digital circuits from bothering the very sensitive analog parts placed in their neighborhood. This allows to read the chip during acquisition while conserving the precise setting of the thresholds over the pixel arrays.

Finally, the aim of this development is to combine several XPAD3 to form the PIXSCAN project (see poster "PIXSCAN: Pixel Detector CT-Scanner for Small Animal Imaging" at this conference).

A large surface (8 x 12 cm²) X-ray detector will also be developed using the XPAD3 for crystallography (including proteins) on synchrotron facilities (ESRF, SOLEIL, France).

Primary authors: Mr. PANGAUD, Patrick (Centre de Physique des Particules de Marseille (CPPM), France)
Co-authors: Mr. DELPIERRE, Pierre (Centre de Physique des Particules de Marseille (CPPM), France); Mr. DINKESPILER, Bernard (Centre de Physique des Particules de Marseille (CPPM), France); Mr. MENOUNI, Mohsine (Centre de Physique des Particules de Marseille (CPPM), France); Mr. MOREL, Christian (Centre de Physique des Particules de Marseille (CPPM), France); Ms. BASOLO, Stephanie (Centre de Physique des Particules de Marseille (CPPM), France); Mr. CHANTEPIE, Benoît (Centre de Physique des Particules de Marseille (CPPM), France)
Presenter: Mr. PANGAUD, Patrick (Centre de Physique des Particules de Marseille (CPPM), France)

Session classification: Poster session: detection modules and electronics

Track classification: • Electronics, read out, data acquisition

Type: poster