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The commissioning of PIMEGA-540D: a Medipix3RX based Large Area Detector

PiTec is designing and producing, in collaboration with the Brazilian Synchrotron Light Laboratory (LNLS) at CNPEM, the PIMEGA large area X-ray detectors to supply the experimental demands of Sirius, the new 4th generation storage ring. The detectors are based on hybrid pixel technology, consisting of semiconductor silicon pixeled sensors assembled over arrays of the Medipix3RX (ASIC). The PIMEGA-135D modules are 2.4 Mpx detectors with 36 ASICs arranged in a 6x6 in either coplanar or overlapped configuration, with sensor thicknesses of 300 μm or 675 μm, depending on the target application. These modules can be easily stacked up to produce large detection areas.

The PIMEGA-540D (Figure 1) is a 9.4 Mpx detector composed of four PIMEGA-135D modules, assembled in a 2x2 configuration, each module is rotated by 90 degrees and positioned with an adjustable gap at the center for the direct beam.

The CATERETÊ beamline (Coherent and Time-Resolved Experiments) is the first beamline of Sirius to receive one fully mounted module of PIMEGA-540D This experimental station is under commissioning and is dedicated to coherent x-ray scattering applications, such as Coherent X-ray Diffractive Imaging (CXDI) and X-ray Photon Correlation Spectroscopy. During the commissioning of the PIMEGA 540D at the beamline, experiments involving the pixels' matrix equalization, full depletion analysis, energy calibration, and flat-field correction have been performed to test and calibrate the detector. This poster will present these experimental results and the main characteristics and scientific potentialities of these detectors.

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