X-Ray Detectors for Synchrotron Applications SRI 2012 satellite workshop



Contribution ID: 62

Type: not specified

Development of soft X-ray area detectors at DESY

Thursday 5 July 2012 16:25 (25 minutes)

With the increased brilliance of state-of-the-art Synchrotron radiation sources and the advent of Free Electron Lasers enabling revolutionary science with EUV to X-ray photons comes an urgent need for suitable photon imaging detectors.

With both Petra III and FLASH at DESY providing unique opportunities for experiments (also) with soft X-ray beams, DESY's Photon Science Detector Group is developing sensors to meet the diverse range of requirements presented by their users. These include a demand for soft X-ray area detectors with high frame rates, very large dynamic range, single-photon resolution with low probability of false positives, and (multi)-megapixels. Beyond involvement in the DSSC and Gotthard developments, as well as participation in the CAMP instrument, DESY is leading a collaborative effort with RAL and Elettra to develop the "Pixelated Energy Resolving CMOS Imager, Versatile and Large", short PERCIVAL, to fulfill the demand for high-performance soft-X-ray imagers.

PERCIVAL is a monolithic active pixel sensor (MAPS), i.e. based on CMOS technology. It will be back-thinned to access its primary energy range of 250 eV to 1 keV with target efficiencies above 90%. According to its preliminary specifications, the roughly 10x10cm², 4k x 4k monolithic sensor will operate at frame rates up to 120 Hz (commensurate with most FELs) and use multiple gains within its 25 micron pixels to measure 1 to ~ 10⁵ (500eV) photons.

Small-scale prototype systems are currently being manufactured. We will present the projected PERCIVAL performance parameters and project timeline. Continued input from the community is looked for during the workshop.

Author: Dr WUNDERER, Cornelia (DESY)

Co-authors: Dr MARRAS, Alessandro (DESY); Dr MARSH, Ben (RAL STFC); Prof. GRAAFSMA, Heinz (DESY); CHEVIAKOV, Igor (DESY); Dr STEBEL, Luigi (Elettra); Dr ZIMMER, Manfred (DESY); BAYER, Matthias (DESY); Dr GUERRINI, Nicola (RAL STFC); Dr GOETTLICHER, Peter (DESY); Dr GASIOREK, Przemysław (RAL STFC); Dr MENK, Ralf (Elettra); Dr COATH, Rebecca (RAL STFC); Dr TURCHETTA, Renato (RAL STFC); LANGE, Sabine (DESY); Dr FARINA, Simone (Elettra)

Presenter: Dr WUNDERER, Cornelia (DESY)

Session Classification: Soft X-ray area Detectors

Track Classification: Soft x-ray area detectors