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Advanced X-ray Plxel Detector (AXPiDe v2.0): New Modular Multichannel Detector Based on SDD Available at the XAFS Beamline of Elettra

Thursday 29 August 2024 12:00 (15 minutes)

This contribution will report on a detection system specially designed and developed to fulfil the needs of X-ray Absorption Spectroscopy (XAS) experiments at the XAFS beamline of the ELETTRA synchrotron. It composed of 8 monolithic multipixel arrays of Silicon Drift Detectors (SDDs), each comprising 8 cells (3x3 mm2) fabricated on 450-µm-thick n-type high-purity silicon wafers with a Tungsten collimation system. This results in 64 independent cells for a total collimated area of 500 mm2. All arrays are connected to separate backend electronics and calibrated, aligned and summed through the acquisition software. Moreover, the system includes custom-made ultra-low-noise front-end electronics, a dedicated acquisition system, digital filtering, temperature control and stabilization. The sensor is optimized to operate in the energy range 3-30 keV. A dedicated acquisition software, Fluorescence Instrumentation Control Universal Software (FICUS), developed using NI LabVIEW allows the instrumental performances to be controlled, fine-tuned and monitored, and is fully integrated with the control system of the beamline for the data acquisition. Accurate characterization performed at room temperature at the XAFS beamline in Elettra demonstrated very interesting results in terms of energy resolution with a FWHM below 170 eV at the KI line of Mn 5.9 keV for the sum of all cells, high count rate and excellent peak-to-background ratio. All these specifications make it possible to collect high-data-quality XAS spectra on diluted elements embedded in heavy matrices, to improve the throughput of the beamline or to follow slow kinetic.

I plan to submit also conference proceedings

Yes

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