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Novel monolithic array of Silicon Drift Detector systems designed for X-ray absorption fluorescence and low energy X-ray fluorescence

In recent decades, new and better detectors for X-ray spectroscopy have been developed, and, among these, many are based on Silicon Drift Detectors (SDD). We present a further improvement resulting from the dedicated optimization of the whole detector system: SDD detector design and production technology, ultra-low noise front-end electronics, dedicated acquisition system and digital filtering.
Two new detector systems based on monolithic arrays of SDD have been developed.
The first detector system is designed for Low Energy X-Ray Fluorescence (LEXRF), in particular for the TwinMic beamline at Elettra Sincrotrone Trieste. It is composed of 4 trapezoidal monolithic arrays of SDDs, each having 8 square cells; the system has a total non-collimated area of 1230 mm² and it is optimized to work in vacuum in an energy range of 200-4000 eV.
The second detector system, designed for the Jordan's synchrotron light source SESAME, is optimized for X-Ray Fluorescence (XRF) and X-ray Absorption Fine Structure (XAFS). It is composed of 8 rectangular monolithic arrays of SDDs, each having 8 square cells. This system has a total non-collimated area of 576 mm² and it is optimized to work in an energy range of 3-30 keV.
The two detector systems were tested at the Elettra Sincrotrone Trieste on the TwinMic and XAFS beamlines. The results of the latest characterization tests carried out with the two systems will be presented.

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