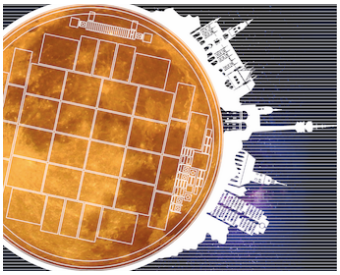

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Experimental Characterization and Future Sensor Developments for ARDESIA, a 4-Channels Fast SDD X-ray Spectrometer for Synchrotron Applications

ARDESIA is an SDD-based multichannel x-ray spectrometer optimized for synchrotron applications, such as X-ray fluorescence (XRF) and X-ray absorption fine structure (XAFS) techniques. The spectrometer was developed to simultaneously achieve high count-rate (>1 Mcps/chanel) and high energy resolution (below 150 eV FWHM at shaping time faster than 200 ns) for soft x-rays detection.
The module is based on a 2x2 monolithic SDD array with a pixel pitch of 5 mm and a thickness of 450 μm, designed and produced by FBK. This array was produced with two different pixel shapes, one with square pixels to maximize the active area and the other one with circular pixels to minimize and homogenize the charge drift time all over the sensitive area. The SDD array is connected to a 4-channel monolithic CUBE preamplifier chip [2] whose extremely low white series noise guarantees good energetic resolution even at short pulse processing times. The complete module has dimensions of 16 mm x 16 mm and several modules can be combined together to cover larger area, if needed. We present the prototype of a complete instrument based on this detection module and we report on the first experimental characterization of this instrument at the LNF DAΦNE-Light DXR1 soft X-ray beamline. During this characterization, XRF tests on low atomic number elements were performed measuring the correspondent near absorption edge XANES spectra.
We also report on the current simulation and design work that is being carried on to develop thicker SDD sensors, having a thickness of 800-1000 μm.

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