

Position sensitive LGADs with single photon counting readout for X-ray detection

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In the past decade, hybrid silicon detectors with single photon counting readout have been a breakthrough for several hard X-ray experimental techniques.

However, they still cannot be used for X-ray energies below 2 keV, since the electronic noise becomes comparable to the charge generated by single X-rays.

The amplification provided by LGAD sensors improves the signal-to-noise ratio and the signal of a photon can be discriminated from the electronic noise even for low energies. This can extend the single photon counting capability to the soft X-ray energy range.

The gain, electronic noise, signal-to-noise ratio as well as the fill factor of 150 μm pitch microstrip sensors fabricated at FBK have been characterized using X-rays.

Although improvements in the segmentation and in the quantum efficiency for soft X-rays are required, these preliminary measurements show that LGADs are a promising technology for accessing the soft X-ray energy range using single photon counting readout.

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