MIRION TECHNOLOGIES

ESLX-S & LTS Detectors

Segmented Planar Silicon-Lithium Detectors for X-ray and Charged Particle Measurements

Segmentation techniques fit with all crystal designs: circular, rectangular, etc. ESLX-S detectors in a unique cryostat, offer high energy X-ray absorption or imaging capabilities.

ESLX-S detectors of DSSD type

FEATURES

- ESLX-S: For high performance X-ray measurements in Physics (PIXE, synchrotrons...), Non Destructive Assay and Medicine
- LTS: For high performance charged particles measurements in Physics (Conversion Electrons, Mini-Orange) and RMS (air monitoring)
- Mirion mature proprietary segmentation technique
- Wide range of shapes (pixels, strips) and segmentations (straight strips, circular, single or double sided)
- Excellent energy resolution (150 eV at 5.9 keV for ESLX-S, depending on geometries)
- Good behavior at high count rates
- Thickness up to 10 mm
- Minimum pitch 2 mm
- Crosstalk ≤1%
- Double sided segmentation capability, using Mirion thin window proprietary technology
- For ESLX-S: LN_2, cryogenerator or Peltier cooling
- LTS are used at room temperature but can be cooled by Peltier effect in case improved performances are required

DESCRIPTION

The Segmented Si(Li) detectors (ESLX-S and LTS) are manufactured using a proprietary technology allowing design of the unique segmented silicon detectors available worldwide.

Mirion has applied the photolithography proven techniques – usually employed in microelectronics – to Si(Li) diodes. Thus, all kinds of segmentation patterns are possible (straight or curved strips, pixels, etc.).

Mirion also offers a proprietary double sided thin window segmentation. This enables to build telescope systems consisting of several layers of Si(Li) detectors.

Segmentation offers many advantages:

- High efficiency through best area coverage: Suppression of dead zones between consecutive strips.
- Best granularity: Small pitch down to 2 mm.
- Fastest response: Good behavior at high count rates (up to 1 million pulses per second) due to fast preamplifiers without any compromise on signal to noise ratio.
- 2-sided photolithography capability, with pitches down to 2 mm.
- Excellent FWHM resolution: typically 150 eV at 5.9 keV on cooled ESLX-S devices for X-ray measurements.
- No measurable crosstalk.

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Segmentation techniques fit with all crystal designs: circular, rectangular, etc.

Several Si(Li) detectors may be associated in arrays to increase angular coverage or may be stacked.

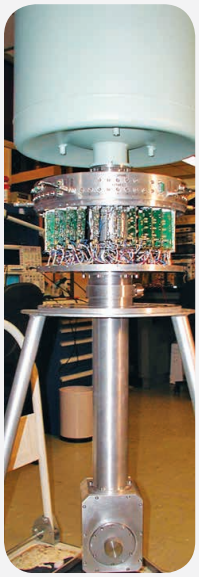
ESLX-S detectors in a unique cryostat, offer high energy X-ray absorption or imaging capabilities (gamma cameras).

ESLX-S detectors are cooled at liquid nitrogen temperature and withstand many thermal cycles.

Such characteristics make ESLX-S series the best choice for X-ray measurements in many applications such as physics experiments as well as non invasive detection.

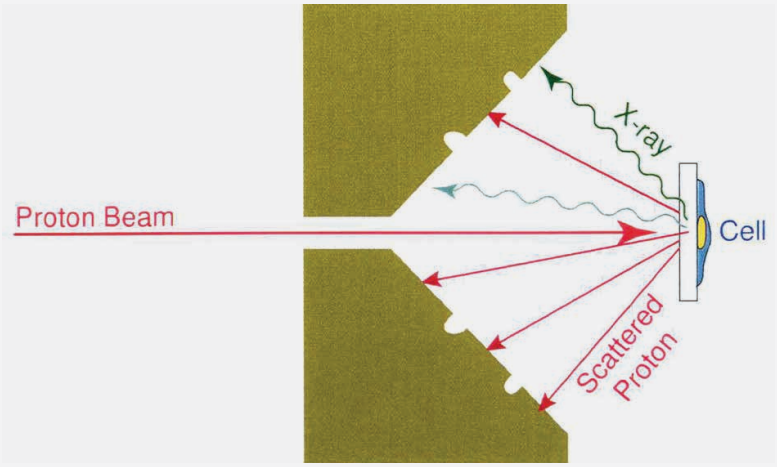
LTS detectors are operated at room temperature or are peltier cooled for improved performances compared to those at room temperature.

ESLX-S detector for PIXE

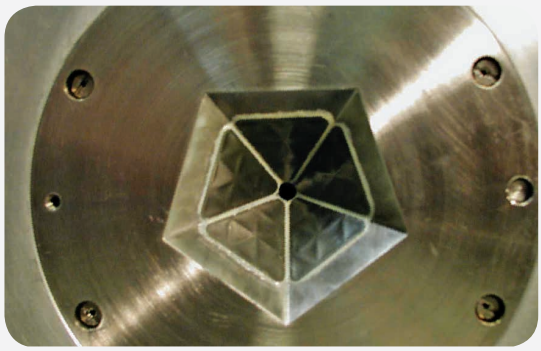


45-channel segmented Si(Li) detector within a dedicated LN_2 cryostat cooled.

Large-Solid-Angle and Multi-Element Detector



Operating principle of the 45 channel ESLX-S 2π detecting device with true well hole for the proton beam.



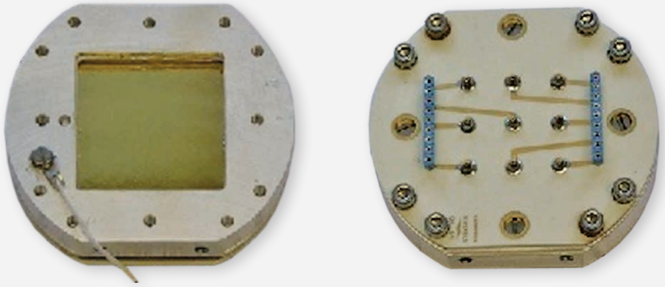
End cap of the 45 element ESLX-S detector with five individual 12 µm thick Be windows with the central true well for the proton beam.

ESLX-S detectors of DSSD type

Double Sided Strip Detector (DSSD) ESLX-S type with active area 3500 mm^2, active thickness 8 mm, each face segmented in 13 strips. The ESLX-S detector is cooled by the Mirion Cryo-Pulse® 5 electrical cooler.

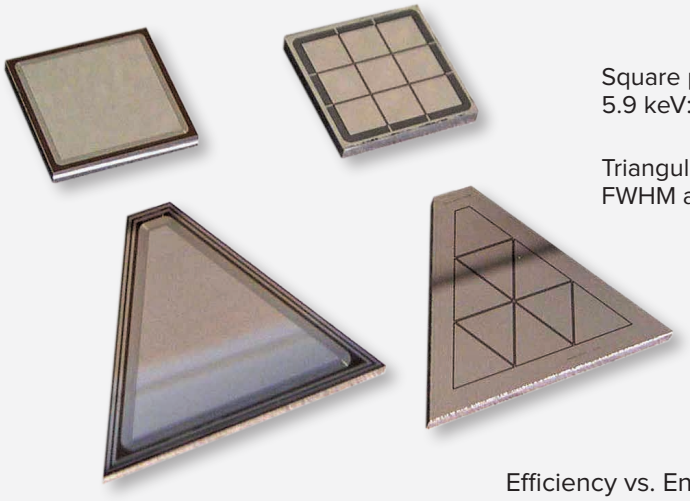
ESLX-S DSSD with an active area of 24x24 mm^2, active thickness 3.5 mm, both faces are segmented in 8 strips (3 mm strip pitch).
The detectors is cooled by LN_2 through a 5 liter all attitude Dewar.
Special ultra flat end cap (23 mm thick) to enhance the energy range of a Compton camera consisting of two Mirion HPGe DSSDs.

LTS detector: monolithic pixel design



Front and rear view of a 9 pixel LTS detector for charge particles.
Total active area 30x30, active thickness 5 mm, one face segmented in 9 pixels.

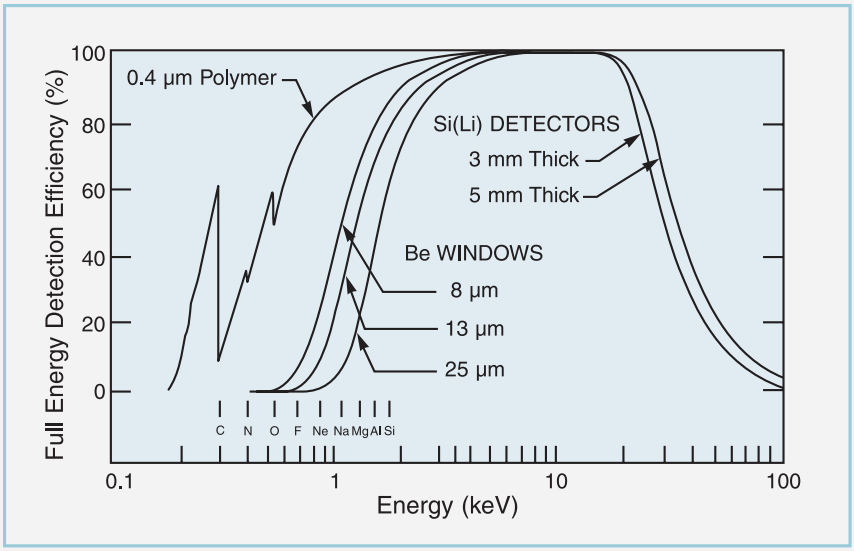
Examples of pixelized Si(Li) detectors



Square pixels 5x5 mm – FWHM at 5.9 keV: 180 eV.

Triangular pixels ~35 mm^2 area – FWHM at 5.9 keV: <200 eV.

Efficiency vs. Energy curves



Transmission curves for various types and thickness of windows. The polymer window curve does not show the effect of the support grid on overall efficiency.

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