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## Absolute calibration of X-ray detectors at low energies

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For quantitative measurements, absolutely calibrated detectors are required. In the X-ray and soft X-ray range down to about 0.2 keV, two different approaches can be realized for energy-dispersive detectors like Si(Li) detectors, CCDs or Silicon Drift Detectors (SDDs): the calibration in the calculable undispersed radiation of a primary source standard, or the calibration against a primary detector standard.

- The electron storage ring BESSY II in Berlin is used by PTB as primary source standard. All parameters which are relevant for the calculation of the emitted radiation are determined with high accuracy. For detector calibration, BESSY II is operated with only a few stored electrons.
- A cryogenic electrical substitution radiometer serves as primary detector standard. The calibration requires monochromatic radiation of high spectral purity. This approach is also used to calibrate non-energy dispersive detectors like semiconductor photodiodes. These calibrated photodiodes are employed as transfer detector standards to calibrate other detectors as e. g. the hybrid-pixel Pilatus detector.

With both calibration approaches, relative uncertainties of about 1 % can be achieved for the detection efficiency or responsivity.

References:

Calibration and characterization of semiconductor X-ray detectors with synchrotron radiation  
M. Krumrey, M. Gerlach, F. Scholze and G. Ulm  
Nucl. Instr. and Meth. A 568, 364 –368 (2006)

The PTB high-accuracy spectral responsivity scale in the VUV and X-ray range  
A. Gottwald, U. Kroth, M. Krumrey, M. Richter, F. Scholze and G. Ulm  
Metrologia 43, S125 –S129 (2006)

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