

Solid State Detectors for Present and Future X-ray Sources

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At the Paul Scherrer Institut, solid state detector development for the Swiss Light Source SLS is successfully done since several years. Results of these efforts are two large area detector systems: The MYTHEN detector is an array of microstrip detectors installed at the powder diffraction station of the material science (MS) beamline X04SA. It covers an angle of 60° and has a resolution of 0.005° . Powder patterns can be recorded in a fraction of a second, which opens a new field of experiments. The PILATUS 1M detector is a large area pixel detector with more than 10^6 pixels. Experiments benefit from the properties of the single photon counting detectors: No background from dark current, no read-out noise, very good efficiency in the energy range of 6-15 keV and readout-times below 10ms. Examples of some experiments are given.

In order to improve the pixel detector, a new read-out chip was designed, with much improved performance. It has a 20-bit dynamic range, a count rate capability per pixel of 1MHz and a pixel size of $0.172 \times 0.172 \text{ mm}^2$. Based on these components, the new PILATUS 6M detector for the protein crystallography beamline will be built.

For future applications, we have started a development program for a high speed digital X-ray imaging system. The system operates in single photon counting mode and should work at frame-rates of up to 1 KHz. The pixel-size will be approximately $50 \times 50 \text{ um}^2$, the system should have about 1000×1000 pixels.

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