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RAPID2 Readout for Gas Micro Strip Detector

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Gas filled multi-channel detectors are ideally suited for x-ray applications that require photon counting and position sensitivity. This type of proportional counters is superior in time resolving experiments where low dark noise and microseconds resolution are essential, eg. SAXS/WAXS for investigating polymer formation and XRD for studying mineral crystal growth. Gas Micro Strip Detector (GMSD) has excellent geometric characteristics. It has fine pitch micro-patterns formed by lithography and uniform flatness provided by the glass substrate. The performance of the GMSD can be enhanced by the use of the RAPID2 readout system. This advanced system consists of novel digital signal processing (DSP) and parallel readout electronics technology successfully developed at Daresbury Laboratory. It is capable of a stunning overall rate of over 40 million events per second when operated in 1D and 15 million events/s in 2D. RAPID2 employs ultra fast sampling and interpolation processes that can enhance the inherent spatial resolution defined by the geometric anode pitch on the GMSD. The readout algorithm collects comprehensive information on each photon interaction and thus makes an excellent diagnostic tool on detector response to x-rays. We will demonstrate these by testing and optimising the current RAPID2 readout electronics on a 1D sector (finger/keystone) GMSD.

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