

A General System for Processing X-ray Microcalorimetry Pulses into Spectra

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The processing of x-ray microcalorimeter pulses presents problems that are uniquely different from SDD detectors. Relatively long time constants, the need for much higher resolution pulse height determination, the rejection of pileup pulses, and nonlinear calibration for individual detectors require a very different approach. The benefits are high energy resolution over a broad energy range. We have developed a system that digitizes and processes x-ray microcalorimeter pulses from multiple TES detectors to deliver a spectrum in real time. Using data-flow processing, we are able to reject pileup pulses, correct for pathological pulses, determine pulse heights, and make energy corrections for individual detectors to provide a single additive spectrum. The system has demonstrated a resolution of under 5 eV over a 7500 eV spectrum using 8 detectors, each with complete SQUID electronics. We expect that the system can be expanded readily to 64 or 256 detectors. The system is currently being used to remeasure elemental x-ray lines. The optimal method of calibration will be discussed.