

Poster

Progress Toward Improving Analysis of TES X-ray Data Using Principal Component Analysis

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The traditional method of applying a digital optimal filter to measure x-ray pulses from TES devices is not the best way to achieve the best energy resolution when the signals have a highly non-linear response to energy, and the noise is non-stationary during the pulse. We present an implementation of a method to analyze x-ray data on TESs that is based around principal component analysis (PCA). Our method separates the pulse into orthogonal components that cause the largest variance. We typically recover pulse height, arrival time, differences in pulse shape, and the variation of pulse height with detector temperature. A linear combination of these components can then be correlated with energy difference. An added value of this method is that by reporting information on four components (as opposed to only their linear combination to represent energy) we generate a much more complete picture of the pulse received. Here we report on progress in developing this technique for future implementation on x-ray telescopes. We use an Fe-55 source to characterize our Mo/Au TESs. On the same data set, the PCA method recovers a spectral resolution that is better by a factor of 2x compared to digital optimal filters.