A common requirement in spectroscopy is to measure the intensity of a weak peak sitting on a significant background. The statistical accuracy of the measurement can be improved by two approaches: collecting more counts, which improves the accuracy of both the signal and background estimates; and by improving the energy resolution of the measurement, which reduces the background under the region of interest. In traditional x-ray spectrometers, however, selecting a shaping time always emphasizes one approach at the expense of the other – e.g. a shorter shaping time increases throughput while degrading resolution. XIA has recently developed a time-variant filtering method which avoids this tradeoff. In this “multi-spectral” method the spectrometer inspects each event and, from a set of available filters, selects the one that will provide the best energy resolution. The measured energy is then placed into a specific spectrum associated with the selected filter. Each spectrum thereby receives events from a time invariant filter and therefore does not display changes in energy resolution with rate, avoiding a problem previously associated with time variant filtering schemes. At the end of the data collection, the multiple spectra are analyzed in parallel to extract spectral line intensities. We show, both theoretically and by an analysis of captured data, that data collection times can be effectively reduced by nearly a factor of two using this method, compared to an optimum single shaping time.