

Abstract Submitted
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Biases in Peak Fitting for Low-Statistics Data DANIEL GARLAND,
Michigan State University — In many areas of physics, the result of a measurement is a peak (signal) on top of a background (noise). For example in nuclear physics, the energies and intensities of γ -rays emitted by excited nuclei are important experimental observables. To extract this information from measured energy spectra, the peaks that correspond to the detection of de-excitation γ -rays are fitted with mathematical functions, for example with Gaussians. When a mathematical function is fitted to experimental data, the fitting method may introduce a significant bias on the estimated parameters. This is particularly important for low-statistics data, in which case the possible biases must be determined since they might introduce large uncertainties. In present work, Monte Carlo simulations of Poisson distributed data of a Gaussian peak with an exponential background are fitted with different methods and the results are compared to the true spectra to determine the biases. The different fitting methods analyzed with respect to the Gaussian peak and background involve χ^2 statistics and maximum likelihood methods. The Monte Carlo analysis shows a significant bias of the peak fitting for one of the most important parameters, the area of the peak.

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