Investigating Methods for Fitting the Neutron Missing Mass Spectra from the CLAS12 Detector[1] J.Buckley, University of Surrey, G.P.Gilfoyle, University of Richmond, L. Baashen, King Saud University, CLAS Collaboration - Neutron detection in the CLAS12 detector at Jefferson Laboratory requires a precise measurement of the Neutron Detection Efficiency (NDE). We determine the NDE from existing data by tagging neutrons created in the $ep \rightarrow e'\pi^+n$ reaction. We select $e'\pi^+$ events with no other charged particles and assume a neutron in the final state. The expected neutron position on the face of the calorimeter is calculated from four-momentum conservation and we search for a detected neutron near the expected position. The NDE is the ratio of detected to expected neutrons. These neutrons occupy thirty-six momentum bins in the range $p_m = 0.41 - 6.75$ GeV/c. There is background at high missing mass (MM) under the neutron peak so we fit the neutron MM Spectra using a Crystal Ball Function for the neutron peak and a polynomial background. The Crystal Ball function is a Gaussian distribution with a low-missing-mass, power-law tail. We expect the fit parameters to vary smoothly with momentum so each fit is started from the parameters of the adjacent bin. We obtained good fits across the full momentum range. We also investigated a Double Crystal Ball function, supporting a power-law tail at high missing mass and found little effect on the quality of the fits.
[1] Supported by the US Department of Energy.