PHOTOELECTRONS NUMBER AND CROSS-TALK

Analytical approach of JLAB's cross-talk model.

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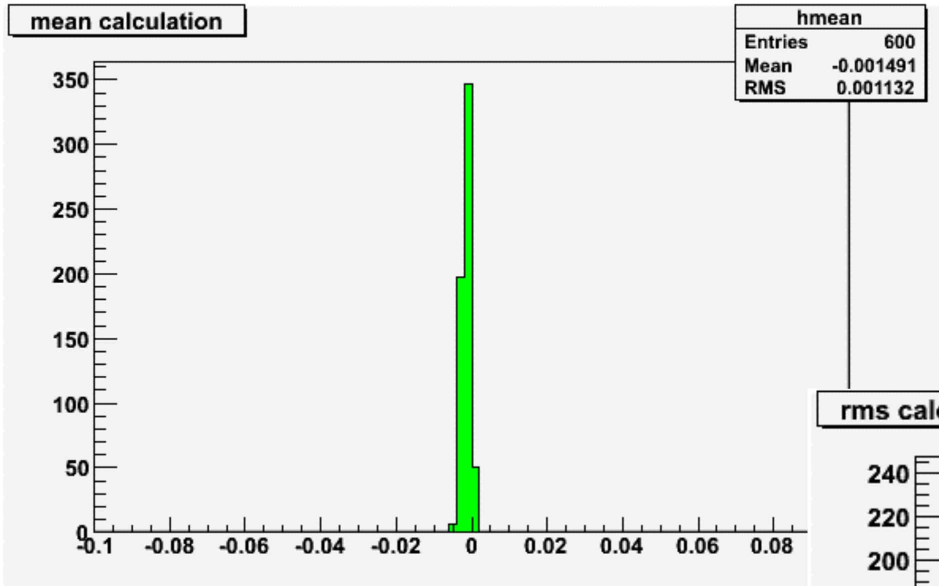
The convolution of two Poisson distributions was simulated for $\mu=0.5-10.$ and $\Delta\mu=0.01-0.3$. The relative difference for calculations and simulations is represented here.

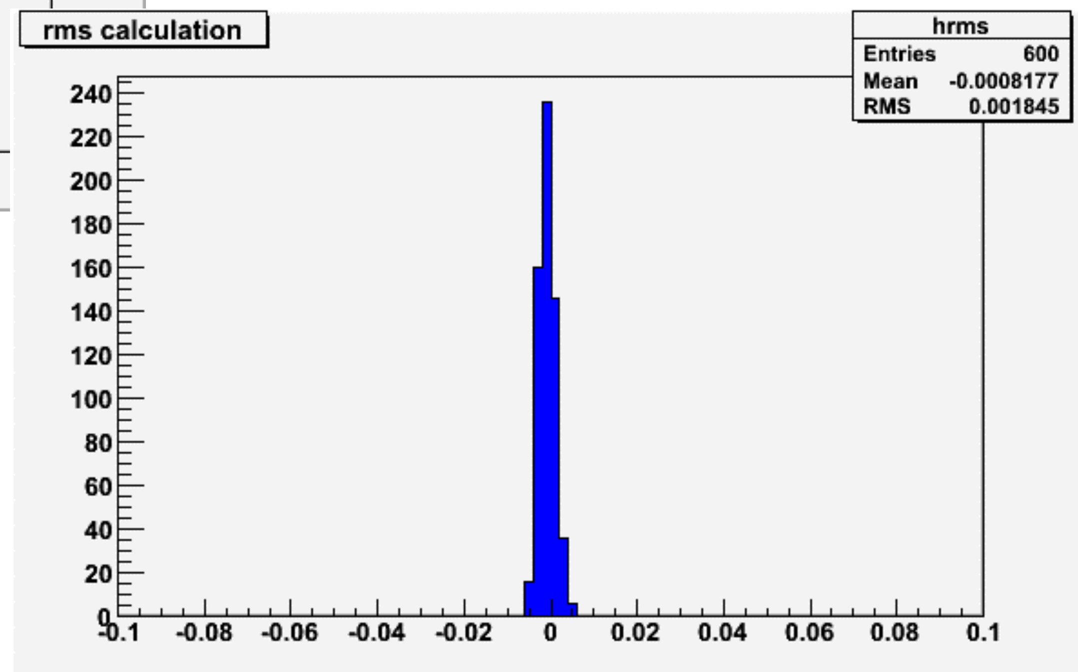
$(Mean-(\mu\times(1+\Delta\mu)))/Mean$



So: $Mean= \mu\ (1+\Delta\mu)$

$RMS=sqrt(\mu\times((1+\Delta\mu)^2+\Delta\mu))$

$(RMS-sqrt(\mu\times((1+\Delta\mu)^2+\Delta\mu)))/RMS$



For 600 combinations of μ and Δμ the convolution was generated and Mean and RMS were taken from histograms. Difference between the formulas and values Mean and RMS from histograms could be explained as the binning effect.

Generating function.

- $G(u)=\sum_{n=0}^{\infty} u^n \times \sum_{i=0}^{n}(\exp(-(\mu+i\Delta\mu))\times\mu^i\times(i\Delta\mu)^{n-i})/i!(n-i)!$
- After summing $G(u)=e^{-\mu}\times\exp(u\times e^{\Delta\mu\times(u-1)}\times\mu)$
- $<n>=G(1)'=\mu\times(1+\Delta\mu)$
- $D(n)=G(1)''+G(1)'-(G(1)')^2 = \mu\times((1+\Delta\mu)^2+\Delta\mu)$