Poisson distribution

A stochastic experiment is repeated many times. Let the expected number of successes be ${\nu}^{}_{}$. Then the probability of observing n successes would be

$$P_{\nu}(n)={{\nu^n~e^{-\nu}}\over{n!}}$$

The Poisson distribution is of interest especially for TCSPC: The expected number of photons in any TCSPC channel is given by the 'real' decay (including convolution with the IRF etc.), while the stochastic nature of the measurement process (either a photon is detected or it is not) introduces noise, which follows a Poisson distribution. In the limit of large ${\nu}^{}_{}$ the Poisson distribution approaches a Gaussian distribution with a width of $\sqrt{\nu}$ centred around ${\nu}^{}_{}$.

In the Gaussian limit least squares fitting may be applied, otherwise MLE fitting is preferable.

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