FITTING VIA MAXIMUM LIKELIHOOD

Motivation

- Sometimes fitting gets really convoluted with correlated errors, difficult statistics (e.g., Poisson), non-linear functions, or other impediments to standard methods.
- In that case, a brute-force method for minimizing chi-square or maximizing likelihood may save the day.
- Example: A CCN counter produces a set of counted particles N_i at stepped supersaturations (SS_i), with known sample volume V_i for each count. It is desirable to fit these measurements to a conventional form $N_i(SS_i) = C\,SS_i^k$, where C and k are constants. However, especially at low supersaturation, there may be small numbers of detected particles, so it is necessary to consider Poisson statistics when evaluating confidence intervals for the counts. But a count of 5 in a given channel does not mean that the Poisson distribution with mean 5 is appropriate, because the observed 5 may come from a true distribution with mean 4, for example.