Standard chi2 calculation:

$$\chi^2 = \sum_i \frac{(D_i - T_i^*)^2}{(\delta_i^{unc})^2}$$

Uncorrelated error

$$T_i^* = T_i + \sum_j \xi_j \delta_i^{cor,j}$$

Nuisance parameter

Correlated error

$$\delta_i^{cor,j} = \beta_{ij} T_i$$

Relative corr. error

Full covariance matrix approach (new)

$$\chi^2 = \sum_{i,j} (D_i - T_i) Cov_{i,j}^{-1} (D_j - T_j)$$

statistical uncorrelated correlated

$$Cov = C^{stat} + C^{uncor} + C^{corr}$$

$$C_{i,j}^{stat} = Corr^{stat} \delta_i^{stat} \delta_j^{stat}$$

Statistical correlations between bins

$$C_{i,j}^{uncor} = \delta_{ij} \delta_i^{unc} \delta_j^{unc}$$

Kronecker delta

$$C_{i,j}^{corr} = \sum_k \delta_i^{cor,k} \delta_j^{cor,k}$$

Sum over all correlated systematics