• Chi-squared - robust version

$$\chi^2_{dof} = \frac{1}{N-1} \sum_{i=1}^{N} \left(\frac{x_i - \overline{x}}{\sigma_i} \right)^2$$

We expect χ^2_{dof} to be 1 to within a few $\sqrt{2/(N-1)}$

If not, then we have a problem: either error distribution is not Gaussian, or the values of σ_i are unreliable, or the underlying quantity x does not have a fixed value μ.

Therefore, if the error distribution is suspected to have slow-falling tails, such as the Cauchy distribution, or outliers are present, use σ_G to estimate the width of z_i and thus robust χ^2_{dof}, instead of the formula above.