

(TH p199) $d\sigma = \sqrt{d\sigma_{\text{stat}}^2 + d\sigma_{\text{random}}^2}$

$\hookrightarrow Q\epsilon$ (circled in red)
 $\hookrightarrow \text{systematic (pt-to-pt)}$ (circled in blue)

(BL p171)

- $\sigma_{\text{run}}^2 (\text{abs}) = (Q \cdot \epsilon)^2 \times (\sigma_Q^2 + \sigma_\epsilon^2)$

\downarrow [src/setup/getDataTable.py]

$$\sigma_{\text{setting}}^2 (\text{rel}) = \frac{\sum \sigma_{\text{run}}^2}{(\sum_{\text{run}} Q\epsilon)^2}$$

\downarrow [src/setup/calcTotalEffectiveCharge.py]

(Per Bin) $\delta Y_{\text{data}} (\text{rel}) = \frac{\delta Y_{di}}{Y_{di}} = \sqrt{\sigma_{\text{setting}}^2 + \left(\frac{1}{\sqrt{n_i}}\right)^2}$

(Per Bin) $\delta Y_{\text{simc}} (\text{rel}) = \frac{\delta Y_{si}}{Y_{si}} = \left(\frac{1}{\sqrt{n_{i,w}}}\right) \cdot (\text{norm})$

\hookrightarrow (unweighted)

\downarrow [src/binning/calculate_yield.py]

$$SR_i = \delta\sigma_i = \sqrt{\delta Y_{\text{data}}^2 + \sum_{\text{optics}} \delta Y_{\text{simc},i}^2} \cdot \sigma$$