

# B-tag weight for $m_{t\bar{t}}$ analysis

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## 1 B-tag weight

The b-tag weight is:

$$w = \sum_i^{N_{jets}^{tagged}} SF_i \sum_{j \neq i}^{N_{jets}^{untagged}} \frac{1 - \varepsilon_j SF_j}{1 - SF_j}$$

## 2 B-tag weight error

This leads to the following formula for  $\Delta w^2$ :

$$\Delta w^2 = \sum_i^{N_{jets}^{tagged}} \left[ \left| \frac{w}{SF_i} \right|^2 \Delta^2 SF_i \right] + \sum_{j \neq i}^{N_{jets}^{untagged}} \left[ \left| \frac{-\varepsilon_j w}{1 - \varepsilon_j SF_j} \right|^2 \Delta^2 SF_j + \left| \frac{w(1 - SF_j)}{(1 - \varepsilon_j SF_j)(1 - \varepsilon_j)} \right|^2 \Delta^2 \varepsilon_j \right]$$