

Tag & Probe

(1) Inclusive

Assume: Z sample background-free (e.g. already subtracted)

events with ≥ 1 triggers: N_1
" " ≥ 2 " " N_2

$$N_1 = (2\varepsilon_t - \varepsilon_t^2) \cdot \mathcal{A} \cdot N_{\text{true}} \quad \text{w/ } \mathcal{A} = \text{geometrical acceptance} \times \text{offline reco efficiency}$$

could be either of the two subtract events w/ ≥ 2 triggers

$$N_2 = \varepsilon_t^2 \cdot \mathcal{A} \cdot N_{\text{true}}$$

$$\Rightarrow N_1 + N_2 = 2\varepsilon_t \mathcal{A} \cdot N_{\text{true}} = 2\varepsilon_t \cdot \frac{N_2}{\varepsilon_t^2} \quad (\Rightarrow) \quad \varepsilon_t = \frac{2N_2}{N_1 + N_2}$$

(2) Differential $\varepsilon_t = \varepsilon_t(p_T, \eta, \dots)$

(1) assumes that tag/probe leptons are indistinguishable

BUT: if tag & probe in different bins \rightarrow leptons can be distinguished

\rightarrow 3 bins α, β, γ

$$\varepsilon_t^{\alpha\alpha} = \frac{2N_2^\alpha}{N_1^\alpha + N_2^\alpha}$$

$$\varepsilon_t^{\beta\beta} = \frac{N_2^\beta}{N_1^\beta}$$

$$\Rightarrow \text{total: } \varepsilon_t = \frac{N_2^\alpha + 2N_2^\beta}{N_1^\alpha + N_2^\alpha + N_1^\beta} = \frac{N_2^{\text{same}} + 2N_2^{\text{other}}}{N_{\text{total}}}$$