

$$w_i^{train,M_j} = w_i^{MC,M_j} \frac{N^{M_1}}{\sum w_i^{MC,M_j}}$$

$$\sum_i w_i^{train,M_j} = N^{M_1}$$

$$w_i^{train,BG_k} = w_i^{MC,BG_k} \frac{N^{M_1} \sum_{M_j} 1}{\sum_{i,BG_k} w_i^{MC,BG_k}}$$

$$\sum_{i,BG_k} w_i^{train,BG_k} = N^{M_1} \sum_{M_j} 1$$