$$L(m_t) = \Omega(f_b, N) \prod_{i=1}^{N} \left(f_b P_b(m_i, x_i) + (1 - f_b) P_s(m_i, x_i, m_t) \right)$$

$$P_b(m, x) = \sum_{\text{bg types}} a_j B_j(m, x), \qquad \sum_{\text{bg types}} a_j = 1$$

$$P_s(m, x, m_t) = \left(p_{cp} S_{0,m_t}(m, x) + (1 - p_{cp}) S_{1,m_t}(m, x) \right) p_{cj} + (1 - p_{cj}) S_{2,m_t}(m, x)$$

N is the number of observed events

m_i is the top mass in the ith event. x_i symbolizes all other template variables.

P_s and P_b are the signal and background densities

f_b is the background fraction

$\Omega(f_b, N)$ is the background constraint. For now, $\Omega(f_b, N) \equiv 1$. Future possibility: continuous Poisson constraint $\Omega(f_b, N) = \frac{N_b^{f_b N}}{\Gamma(f_b N + 1)} e^{-N_b}$

B_j are the templates for different background types. a_j are the background composition coefficients (assumed known).

S_{0,m_t}, S_{1,m_t}, and S_{2,m_t} are the three signal templates for the given generated m_t

p_{cj}, p_{cp} are the probabilities of correct jet and permutation assignments, respectively