1. SM Higgs + ?

SM is an Effective Field Theory

Dominant effects from new-physics (if not directly observable):

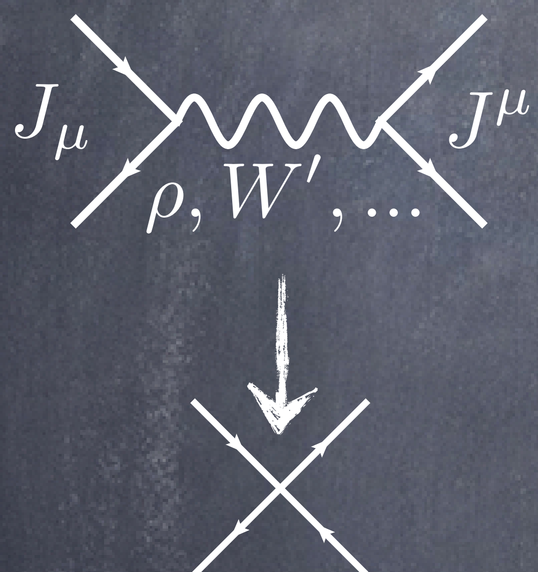
59 Dim-6 (leading) effective interactions

SM is an Effective Field Theory

Dominant effects from new-physics (if not directly observable):

59 Dim-6 (leading) effective interactions

Current-Current

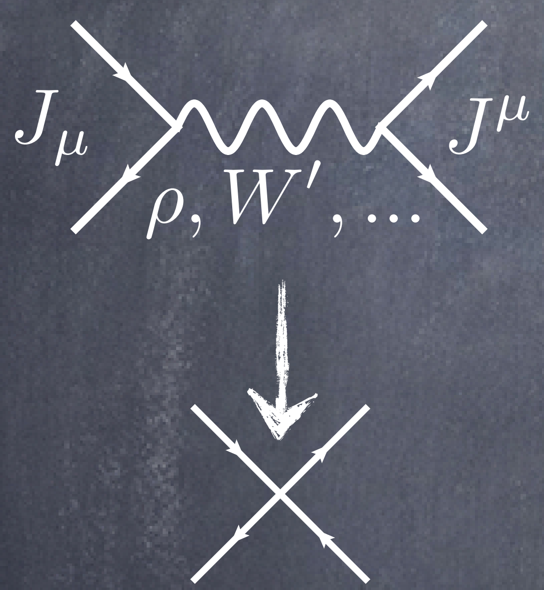


SM is an Effective Field Theory

Dominant effects from new-physics (if not directly observable):

59 Dim-6 (leading) effective interactions

Current-Current



$$\mathcal{O}^{ff'}_{LL,RR,LR} \equiv \frac{J^\mu_f J_{f',\mu}}{m_W^2}$$

$$\mathcal{O}^{f\,(3)}_{L,R} \equiv \frac{J^\mu_h J_{f,\mu}}{m_W^2}$$

$$\mathcal{O}_{W,B} \equiv \frac{J_{h,\mu} J^\mu_{W,B}}{m_W^2}$$

$$\mathcal{O}_T \equiv \frac{J^\mu_h J_{h,\mu}}{m_W^2}$$

$$J_V^{(i)\,\mu} = (D_\nu V^{\mu\nu})^{(i)}_{V=W,B}$$

$$J_f^{(i)\,\mu} = \bar{f}(\sigma^i)\gamma_\mu f$$

$$J_h^{(i)\,\mu} = H^\dagger(\sigma^i)\overleftrightarrow{D^\mu} H$$

m_W+ small coeff

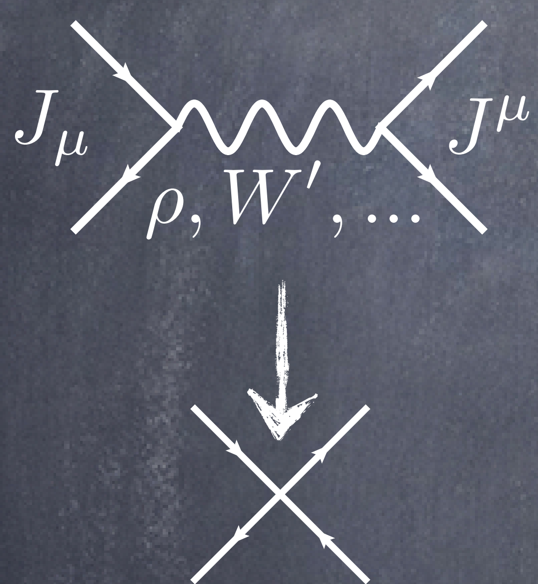
= high scale

SM is an Effective Field Theory

Dominant effects from new-physics (if not directly observable):

59 Dim-6 (leading) effective interactions

Current-Current



$$\mathcal{O}^{ff'}_{LL,RR,LR} \equiv \frac{J^\mu_f J_{f',\mu}}{m_W^2}$$

$$\mathcal{O}^{f\,(3)}_{L,R} \equiv \frac{J^\mu_h J_{f,\mu}}{m_W^2}$$

$$\mathcal{O}_{W,B} \equiv \frac{J_{h,\mu} J^\mu_{W,B}}{m_W^2}$$

$$\mathcal{O}_T \equiv \frac{J^\mu_h J_{h,\mu}}{m_W^2}$$

$$J^{(i)\,\mu}_V = (D_\nu V^{\mu\nu})^{(i)}_{V=W,B}$$

$$J^{(i)\,\mu}_f = \bar{f}(\sigma^i)\gamma_\mu f$$

$$J^{(i)\,\mu}_h = H^\dagger(\sigma^i)\overleftrightarrow{D^\mu} H$$

m_W+ small coeff

= high scale

Loop

$$\mathcal{O}_{HB,HW} = \frac{ig'}{m_W^2}(D_\mu H)^\dagger (D_\nu H) V^{\mu\nu}_{V=W,B}$$

$$\mathcal{O}_{\gamma,g} = \frac{g^2_{\gamma,g}|H|^2}{m_W^2}(F^{\mu\nu}_{\gamma,g})^2,$$

Tree-level (&strong)

$$\mathcal{O}^f_y = \frac{y_f}{v^2}|H|^2 \bar{f}_L H f_R$$

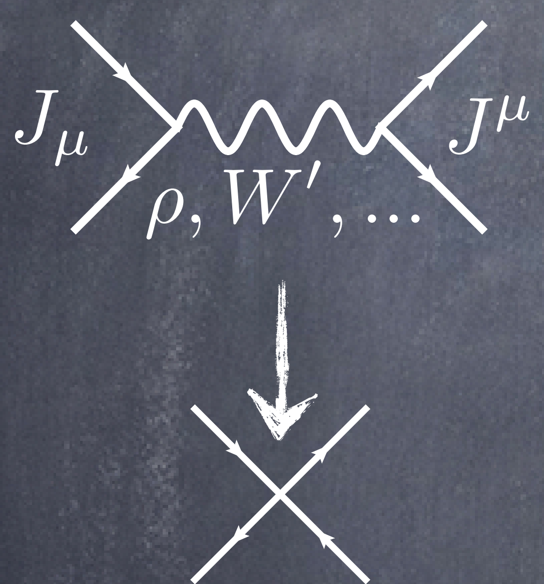
$$\mathcal{O}_H = \frac{\left(\partial^\mu \left(H^\dagger H\right)\right)^2}{2v^2}$$

SM is an Effective Field Theory

Dominant effects from new-physics (if not directly observable):

59 Dim-6 (leading) effective interactions

Current-Current



$$\mathcal{O}^{ff'}_{LL,RR,LR} \equiv \frac{J^\mu_f J_{f',\mu}}{m^2_W}$$

$$\mathcal{O}^{f\,(3)}_{L,R} \equiv \frac{J^\mu_h J_{f,\mu}}{m^2_W} \quad 4^q+1^l$$

$$\mathcal{O}_{W,B} \equiv \frac{J_{h,\mu} J^\mu_{W,B}}{m^2_W} \quad 2$$

$$\mathcal{O}_T \equiv \frac{J^\mu_h J_{h,\mu}}{m^2_W} \quad 1$$

$$J^{(i)\,\mu}_V = (D_\nu V^{\mu\nu})^{(i)}_{V=W,B}$$

$$J^{(i)\,\mu}_f = \bar{f}(\sigma^i)\gamma_\mu f$$

$$J^{(i)\,\mu}_h = H^\dagger(\sigma^i)\overleftrightarrow{D}^\mu H$$

m_W+ small coeff

= high scale

Loop

$$\mathcal{O}_{HB,HW} = \frac{ig'}{m^2_W}(D_\mu H)^\dagger(D_\nu H)V^{\mu\nu}_{V=W,B} \quad 2$$

$$\mathcal{O}_{\gamma,g} = \frac{g^2_{\gamma,g}|H|^2}{m^2_W}(F^{\mu\nu}_{\gamma,g})^2, \quad 2$$

Tree-level (&strong)

$$\mathcal{O}^f_y = \frac{y_f}{v^2}|H|^2\bar{f}_L H f_R \quad 3$$

$$\mathcal{O}_H = \frac{\left(\partial^\mu\left(H^\dagger H\right)\right)^2}{2v^2} \quad 1$$