PARTICLES

B_μ $\nu \sim\!\!\sim\!\!\sim\!\!\sim B \sim\!\!\sim\!\!\sim \mu$ talks to anything w/ Y ≠ 0

W^A_μ $A, \nu \sim\!\!\sim\!\!\sim W \sim\!\!\sim \mu, A$ talks to anything w/ A or a index ↳ UPPER/LOWER

$L^{a\alpha}$ $b, \dot{B} \xrightarrow{\;\;L\; ↙ \text{UPPER}\;\;} a, \alpha$ $Y = -\frac{1}{2}$
      C_{LOWER}

E^α $\dot{B} \xrightarrow{\;\;\bar{E}\;\;} a$ $Y = 1$

H^a $b \dashrightarrow \overset{H}{\;} \dashrightarrow a$
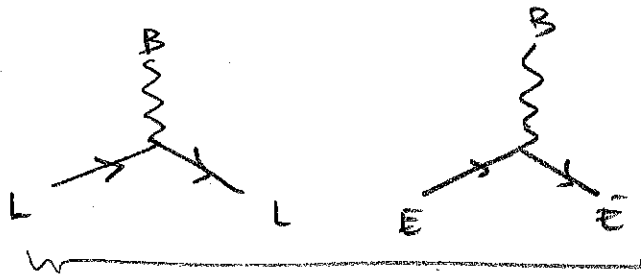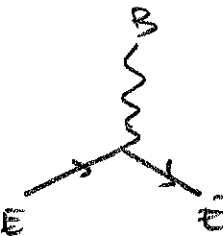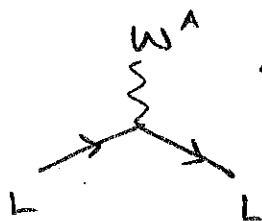   ↳ LOWER   ↳ UPPER
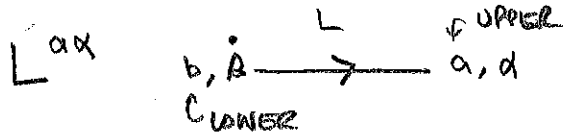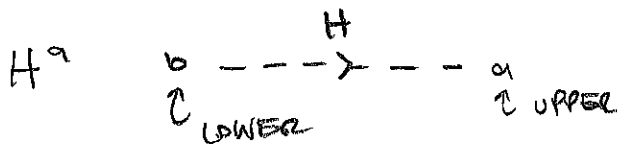
3 PARTICLE RULES :
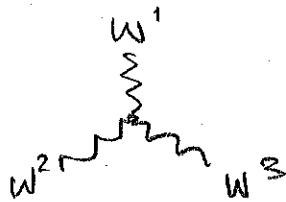
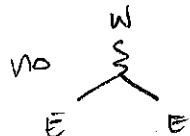Using $f^{ABC} = \varepsilon^{ABC}$ to contract A indices & $g_{\mu\nu}, P_\mu$ to contract μ indices.

USING δ^a_b to contract SU(2) & $(\sigma^\mu)_{\alpha\dot{\beta}}$ to contract spin
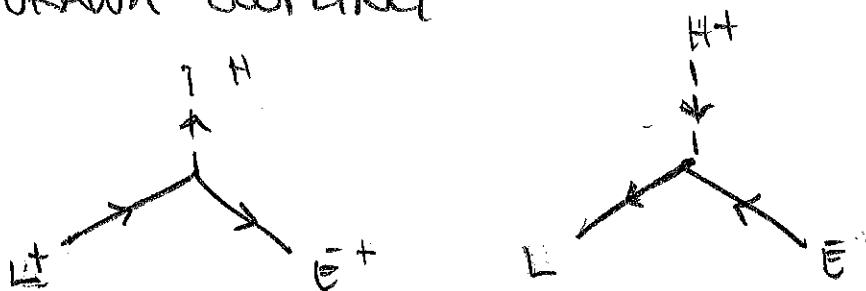
↳ using P_μ to contract spin index

← using $(T^A)^a_{\;b}$ to contract SU(2) indices →
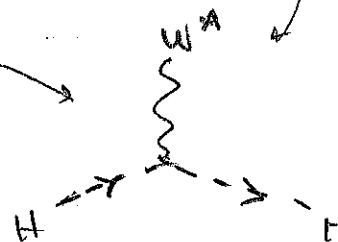
no $\underset{E \quad E}{\overset{W}{\Large\lessgtr}}$ b/c E has no SU(2) charge (no indices)

YUKAWA COUPLING:

CONTRACTION of INDICES / CONSERVATION OF CHARGE IN THE YUKAWA COUPLINGS:

SU(2): δ^a_b contracts L^+ & H / L & H^+

U(1): $-\frac{1}{2} - \frac{1}{2} + 1 = 0$ $\frac{1}{2} + \frac{1}{2} - 1 = 0$

$\underset{H^+}{\uparrow} \quad \underset{L^+}{\uparrow} \quad \underset{\bar{E}}{\uparrow}$ $\underset{H}{\uparrow} \quad \underset{L^+}{\uparrow} \quad \underset{\bar{E}^+}{\uparrow}$

SPIN : $\left.\begin{matrix} L^+ \text{ \& } \bar{E}^+ \\ L \text{ \& } E \end{matrix}\right.$ both have dotted indices
                                                   " "   undotted indices

contract these w/ $\epsilon_{\dot{\alpha}\dot{\beta}}$ or $\epsilon_{\alpha\beta}$.