$$-\frac{1}{9}\hbar\frac{1}{\epsilon}B^{\mu\nu2}-\frac{1}{4}\frac{1}{g_Y^2}B^{\mu\nu2}-\frac{1}{6}\hbar\frac{1}{\epsilon}G^{\mu\nu A2}-\frac{1}{4}\frac{1}{g_s^2}G^{\mu\nu A2}-\frac{1}{4}\frac{1}{g_L^2}W^{\mu\nu I2}-\frac{1}{9}\hbar B^{\mu\nu2}\mathrm{Log}\left[\frac{\overline{\mu}^2}{M_\phi^2}\right]-$$

$$\frac{1}{6}\hbar G^{\mu\nu A2}\mathrm{Log}\left[\frac{\overline{\mu}^2}{M_\phi^2}\right]+D_\mu\overline{H}_i D_\mu H^i+C_{H^2}\overline{H}_i H^i+i\left(\overline{d}^r_a\cdot\gamma_\mu P_R\cdot D_\mu d^{ar}\right)+i\left(\overline{e}^r\cdot\gamma_\mu P_R\cdot D_\mu e^r\right)+$$

$$i\left(\overline{l}^r_i\cdot\gamma_\mu P_L\cdot D_\mu l^{ir}\right)+i\left(\overline{q}^r_{ai}\cdot\gamma_\mu P_L\cdot D_\mu q^{air}\right)+i\left(\overline{u}^r_a\cdot\gamma_\mu P_R\cdot D_\mu u^{ar}\right)-\frac{1}{2}\lambda\overline{H}_i\overline{H}_j H^i H^j+$$

$$\frac{1}{2}\hbar\frac{1}{\epsilon}\lambda_{H\chi}^{pr}\lambda_{H\chi}^{rp}\overline{H}_i\overline{H}_j H^i H^j+\frac{1}{2}\hbar\lambda_{H\chi}^{pr}\lambda_{H\chi}^{rp}LF_{1,1,0}\left[M_\chi^p,M_\chi^r\right]\overline{H}_i\overline{H}_j H^i H^j-$$

$$\overline{Y_d}^{pr}\overline{H}_i\left(\overline{d}^r_a\cdot P_L\cdot q^{aip}\right)-\frac{1}{8}\hbar\overline{Y_d}^{ps}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{rt}\overline{H}_i\left(\overline{d}^r_a\cdot P_L\cdot q^{aip}\right)+$$

$$\frac{1}{4}\hbar\frac{1}{\epsilon}\overline{Y_d}^{ps}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{rt}\overline{H}_i\left(\overline{d}^r_a\cdot P_L\cdot q^{aip}\right)+\frac{1}{2}\hbar\overline{Y_d}^{ps}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{rt}LF_{1,1,0}\left[M_\phi,M_\chi^t\right]\overline{H}_i\left(\overline{d}^r_a\cdot P_L\cdot q^{aip}\right)-$$

$$\frac{1}{4}\hbar\overline{Y_d}^{ps}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{rt}LF_{2,1,-1}\left[M_\phi,M_\chi^t\right]\overline{H}_i\left(\overline{d}^r_a\cdot P_L\cdot q^{aip}\right)-\overline{Y_e}^{pr}\overline{H}_i\left(\overline{e}^r\cdot P_L\cdot l^{ip}\right)-$$

$$Y_e^{rp}H^i\left(\overline{l}^r_i\cdot P_R\cdot e^p\right)-Y_d^{rp}H^i\left(\overline{q}^r_{ai}\cdot P_R\cdot d^{ap}\right)-\frac{1}{8}\hbar Y_d^{rt}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{ts}H^i\left(\overline{q}^r_{ai}\cdot P_R\cdot d^{ap}\right)+$$

$$\frac{1}{4}\hbar\frac{1}{\epsilon}Y_d^{rt}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{ts}H^i\left(\overline{q}^r_{ai}\cdot P_R\cdot d^{ap}\right)+\frac{1}{2}\hbar Y_d^{rt}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{ts}LF_{1,1,0}\left[M_\phi,M_\chi^s\right]H^i\left(\overline{q}^r_{ai}\cdot P_R\cdot d^{ap}\right)-$$

$$\frac{1}{4}\hbar Y_d^{rt}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{ts}LF_{2,1,-1}\left[M_\phi,M_\chi^s\right]H^i\left(\overline{q}^r_{ai}\cdot P_R\cdot d^{ap}\right)-Y_u^{rp}\overline{H}_i\left(\overline{q}^r_{aj}\cdot P_R\cdot u^{ap}\right)\varepsilon^{ji}-$$

$$\overline{Y_u}^{pr}H^j\left(\overline{u}^r_a\cdot P_L\cdot q^{aip}\right)\overline{\varepsilon}_{ij}+\frac{1}{180}\hbar\frac{1}{M_\phi^2}G^{\mu\nu C}G^{\mu\rho B}G^{\nu\rho A}f^{ABC}-\frac{1}{45}\hbar C_{H^2}g_Y^4\frac{1}{M_\phi^2}\overline{H}_i\overline{H}_j H^i H^j+$$

$$\frac{1}{45}\hbar\lambda g_Y^4\frac{1}{M_\phi^2}\overline{H}_i\overline{H}_j\overline{H}_k H^i H^j H^k+\hbar C_{H^2}\lambda_{H\chi}^{pr}\lambda_{H\chi}^{rp}LF_{2,1,0}\left[M_\chi^p,M_\chi^r\right]\overline{H}_i\overline{H}_j H^i H^j-$$

$$\hbar\lambda\lambda_{H\chi}^{pr}\lambda_{H\chi}^{rp}LF_{2,1,0}\left[M_\chi^p,M_\chi^r\right]\overline{H}_i\overline{H}_j\overline{H}_k H^i H^j H^k-\hbar C_{H^2}\lambda_{H\chi}^{pr}\lambda_{H\chi}^{rp}LF_{3,1,-1}\left[M_\chi^p,M_\chi^r\right]\overline{H}_i\overline{H}_j H^i H^j+$$

$$\hbar\lambda\lambda_{H\chi}^{pr}\lambda_{H\chi}^{rp}LF_{3,1,-1}\left[M_\chi^p,M_\chi^r\right]\overline{H}_i\overline{H}_j\overline{H}_k H^i H^j H^k-$$

$$\frac{1}{3}\hbar\lambda_{H\chi}^{pr}\lambda_{H\chi}^{rs}\lambda_{H\chi}^{sp}LF_{1,1,1,0}\left[M_\chi^p,M_\chi^r,M_\chi^s\right]\overline{H}_i\overline{H}_j\overline{H}_k H^i H^j H^k-\frac{2}{45}\hbar g_Y^4\frac{1}{M_\phi^2}D_\mu\overline{H}_i\overline{H}_j H^i D_\mu H^j-$$

$$\frac{1}{45}\hbar g_Y^4\frac{1}{M_\phi^2}\overline{H}_i D_\mu\overline{H}_j H^i D_\mu H^j+\hbar\lambda_{H\chi}^{pr}\lambda_{H\chi}^{rp}LF_{2,1,0}\left[M_\chi^p,M_\chi^r\right]\overline{H}_i D_\mu\overline{H}_j H^i D_\mu H^j-$$

$$\hbar\lambda_{H\chi}^{pr}\lambda_{H\chi}^{rp}LF_{3,1,-1}\left[M_\chi^p,M_\chi^r\right]\overline{H}_i D_\mu\overline{H}_j H^i D_\mu H^j+\frac{1}{90}\hbar g_Y^4\frac{1}{M_\phi^2}\overline{Y_d}^{pr}\overline{H}_i\overline{H}_j H^i\left(\overline{d}^r_a\cdot P_L\cdot q^{ajp}\right)-$$

$$\frac{1}{2}\hbar\overline{Y_d}^{ps}\overline{Y_d}^{tr}Y_d^{tv}\overline{\lambda_{\psi\chi}}^{su}\lambda_{\psi\chi}^{vu}LF_{2,1,0}\left[M_\phi,M_\chi^u\right]\overline{H}_i\overline{H}_j H^i\left(\overline{d}^r_a\cdot P_L\cdot q^{ajp}\right)+$$

$$\hbar\overline{Y_d}^{ps}\overline{Y_d}^{tr}Y_d^{tv}\overline{\lambda_{\psi\chi}}^{su}\lambda_{\psi\chi}^{vu}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\overline{H}_i\overline{H}_j H^i\left(\overline{d}^r_a\cdot P_L\cdot q^{ajp}\right)-$$

$$\frac{1}{2}\hbar\overline{Y_d}^{ps}\overline{Y_d}^{tr}Y_d^{tv}\overline{\lambda_{\psi\chi}}^{su}\lambda_{\psi\chi}^{vu}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\overline{H}_i\overline{H}_j H^i\left(\overline{d}^r_a\cdot P_L\cdot q^{ajp}\right)-$$

$$\frac{1}{2}\hbar\overline{Y_d}^{pr}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{2,1,0}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i\overline{H}_j H^i\left(\overline{d}^r_a\cdot P_L\cdot q^{ajp}\right)+$$

$$\frac{1}{2}\hbar\overline{Y_d}^{pr}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{3,1,-1}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i\overline{H}_j H^i\left(\overline{d}^r_a\cdot P_L\cdot q^{ajp}\right)-$$

$$\frac{1}{2}\hbar\overline{Y_d}^{ps}\lambda_{H\chi}^{tu}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{ru}LF_{1,1,1,0}\left[M_\phi,M_\chi^t,M_\chi^u\right]\overline{H}_i\overline{H}_j H^i\left(\overline{d}^r_a\cdot P_L\cdot q^{ajp}\right)+$$

$$\frac{1}{4}\hbar\overline{Y_d}^{ps}\lambda_{H\chi}^{tu}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{ru}LF_{2,1,1,-1}\left[M_\phi,M_\chi^t,M_\chi^u\right]\overline{H}_i\overline{H}_j H^i\left(\overline{d}^r_a\cdot P_L\cdot q^{ajp}\right)-$$

$$\frac{1}{4}\hbar\overline{Y_d}^{ps}\lambda_{H\chi}^{tu}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{ru}LF_{2,1,1,-1}\left[M_\chi^t,M_\phi,M_\chi^u\right]\overline{H}_i\overline{H}_j H^i\left(\overline{d}^r_a\cdot P_L\cdot q^{ajp}\right)+$$

$$\frac{1}{4}\hbar\overline{Y_d}^{ps}\lambda_{H\chi}^{tu}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{ru}LF_{2,1,1,-1}\left[M_\chi^u,M_\phi,M_\chi^t\right]\overline{H}_i\overline{H}_j H^i\left(\overline{d}^r_a\cdot P_L\cdot q^{ajp}\right)+$$

$$\frac{1}{90}\hbar g_Y^4\frac{1}{M_\phi^2}\overline{Y_e}^{pr}\overline{H}_i\overline{H}_j H^i\left(\overline{e}^r\cdot P_L\cdot l^{jp}\right)-$$

$$\frac{1}{2}\hbar\overline{Y_e}^{pr}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{2,1,0}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i\overline{H}_j H^i\left(\overline{e}^r\cdot P_L\cdot l^{jp}\right)+$$

$$\frac{1}{2}\hbar\overline{Y_e}^{pr}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{3,1,-1}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i\overline{H}_j H^i\left(\overline{e}^r\cdot P_L\cdot l^{jp}\right)+$$

$$\frac{1}{90}\hbar g_Y^4\frac{1}{M_\phi^2}Y_e^{rp}\overline{H}_i H^i H^j\left(\overline{l}^r_j\cdot P_R\cdot e^p\right)-$$

$$\frac{1}{2}\hbar Y_e^{rp}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{2,1,0}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i H^i H^j\left(\overline{l}^r_j\cdot P_R\cdot e^p\right)+$$

$$\frac{1}{2}\hbar Y_e^{rp}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{3,1,-1}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i H^i H^j\left(\overline{l}^r_j\cdot P_R\cdot e^p\right)+$$

$$\frac{1}{90}\hbar g_Y^4\frac{1}{M_\phi^2}Y_d^{rp}\overline{H}_i H^i H^j\left(\overline{q}^r_{aj}\cdot P_R\cdot d^{ap}\right)-$$

$$\frac{1}{2}\hbar\overline{Y_d}^{st}Y_d^{rv}Y_d^{sp}\overline{\lambda_{\psi\chi}}^{tu}\lambda_{\psi\chi}^{vu}LF_{2,1,0}\left[M_\phi,M_\chi^u\right]\overline{H}_i H^i H^j\left(\overline{q}^r_{aj}\cdot P_R\cdot d^{ap}\right)+$$

$$\hbar\overline{Y_d}^{st}Y_d^{rv}Y_d^{sp}\overline{\lambda_{\psi\chi}}^{tu}\lambda_{\psi\chi}^{vu}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\overline{H}_i H^i H^j\left(\overline{q}^r_{aj}\cdot P_R\cdot d^{ap}\right)-$$

$$\frac{1}{2}\hbar\overline{Y_d}^{st}Y_d^{rv}Y_d^{sp}\overline{\lambda_{\psi\chi}}^{tu}\lambda_{\psi\chi}^{vu}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\overline{H}_i H^i H^j\left(\overline{q}^r_{aj}\cdot P_R\cdot d^{ap}\right)-$$

$$\frac{1}{2}\hbar Y_d^{rp}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{2,1,0}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i H^i H^j\left(\overline{q}^r_{aj}\cdot P_R\cdot d^{ap}\right)+$$

$$\frac{1}{2}\hbar Y_d^{rp}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{3,1,-1}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i H^i H^j\left(\overline{q}^r_{aj}\cdot P_R\cdot d^{ap}\right)-$$

$$\frac{1}{2}\hbar Y_d^{rt}\lambda_{H\chi}^{su}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{tu}LF_{1,1,1,0}\left[M_\phi,M_\chi^s,M_\chi^u\right]\overline{H}_i H^i H^j\left(\overline{q}^r_{aj}\cdot P_R\cdot d^{ap}\right)+$$

$$\frac{1}{4}\hbar Y_d^{rt}\lambda_{H\chi}^{su}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{tu}LF_{2,1,1,-1}\left[M_\phi,M_\chi^s,M_\chi^u\right]\overline{H}_i H^i H^j\left(\overline{q}^r_{aj}\cdot P_R\cdot d^{ap}\right)+$$

$$\frac{1}{4}\hbar Y_d^{rt}\lambda_{H\chi}^{su}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{tu}LF_{2,1,1,-1}\left[M_\chi^s,M_\phi,M_\chi^u\right]\overline{H}_i H^i H^j\left(\overline{q}^r_{aj}\cdot P_R\cdot d^{ap}\right)-$$

$$\frac{1}{4}\hbar Y_d^{rt}\lambda_{H\chi}^{su}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{tu}LF_{2,1,1,-1}\left[M_\chi^u,M_\phi,M_\chi^s\right]\overline{H}_i H^i H^j\left(\overline{q}^r_{aj}\cdot P_R\cdot d^{ap}\right)+$$

$$\frac{1}{90}\hbar g_Y^4\frac{1}{M_\phi^2}Y_u^{rp}\overline{H}_i\overline{H}_j H^i\left(\overline{q}^r_{ak}\cdot P_R\cdot u^{ap}\right)\varepsilon^{kj}-$$

$$\frac{1}{2}\hbar Y_u^{rp}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{2,1,0}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i\overline{H}_j H^i\left(\overline{q}^r_{ak}\cdot P_R\cdot u^{ap}\right)\varepsilon^{kj}+$$

$$\frac{1}{2}\hbar Y_u^{rp}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{3,1,-1}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i\overline{H}_j H^i\left(\overline{q}^r_{ak}\cdot P_R\cdot u^{ap}\right)\varepsilon^{kj}+$$

$$\frac{1}{90}\hbar g_Y^4\frac{1}{M_\phi^2}\overline{Y_u}^{pr}\overline{H}_i H^i H^k\left(\overline{u}^r_a\cdot P_L\cdot q^{ajp}\right)\overline{\varepsilon}_{jk}-$$

$$\frac{1}{2}\hbar\overline{Y_u}^{pr}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{2,1,0}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i H^i H^k\left(\overline{u}^r_a\cdot P_L\cdot q^{ajp}\right)\overline{\varepsilon}_{jk}+$$

$$\frac{1}{2}\hbar\overline{Y_u}^{pr}\lambda_{H\chi}^{st}\lambda_{H\chi}^{ts}LF_{3,1,-1}\left[M_\chi^s,M_\chi^t\right]\overline{H}_i H^i H^k\left(\overline{u}^r_a\cdot P_L\cdot q^{ajp}\right)\overline{\varepsilon}_{jk}-$$

$$\frac{2i}{135}\hbar g_Y^4\frac{1}{M_\phi^2}\delta_{pr}D_\mu\overline{H}_i H^i\left(\overline{d}^r_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)+\frac{2i}{135}\hbar g_Y^4\frac{1}{M_\phi^2}\delta_{pr}\overline{H}_i D_\mu H^i\left(\overline{d}^r_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)-$$

$$\frac{i}{12}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{rs}LF_{3,1,-1}\left[M_\phi,M_\chi^s\right]D_\mu\overline{H}_i H^i\left(\overline{d}^r_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)+$$

$$\frac{i}{12}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{rs}LF_{3,1,-1}\left[M_\phi,M_\chi^s\right]\overline{H}_i D_\mu H^i\left(\overline{d}^r_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)+$$

$$\frac{i}{36}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{rs}LF_{4,1,-2}\left[M_\phi,M_\chi^s\right]D_\mu\overline{H}_i H^i\left(\overline{d}^r_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)-$$

$$\frac{i}{36}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{rs}LF_{4,1,-2}\left[M_\phi,M_\chi^s\right]\overline{H}_i D_\mu H^i\left(\overline{d}^r_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)-$$

$$\frac{2i}{45}\hbar g_Y^4\frac{1}{M_\phi^2}D_\mu\overline{H}_i H^i\left(\overline{e}^r\cdot\gamma_\mu P_R\cdot e^r\right)+\frac{2i}{45}\hbar g_Y^4\frac{1}{M_\phi^2}\overline{H}_i D_\mu H^i\left(\overline{e}^r\cdot\gamma_\mu P_R\cdot e^r\right)-$$

$$\frac{i}{45}\hbar g_Y^4\frac{1}{M_\phi^2}D_\mu\overline{H}_i H^i\left(\overline{l}^r_j\cdot\gamma_\mu P_L\cdot l^{jr}\right)+\frac{i}{45}\hbar g_Y^4\frac{1}{M_\phi^2}\overline{H}_i D_\mu H^i\left(\overline{l}^r_j\cdot\gamma_\mu P_L\cdot l^{jr}\right)-$$

$$\frac{i}{2}\hbar\overline{Y_d}^{ps}Y_d^{ru}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{ut}LF_{2,1,0}\left[M_\phi,M_\chi^t\right]D_\mu\overline{H}_i H^j\left(\overline{q}^r_{aj}\cdot\gamma_\mu P_L\cdot q^{aip}\right)+$$

$$\frac{i}{2}\hbar\overline{Y_d}^{ps}Y_d^{ru}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{ut}LF_{2,1,0}\left[M_\phi,M_\chi^t\right]\overline{H}_i D_\mu H^j\left(\overline{q}^r_{aj}\cdot\gamma_\mu P_L\cdot q^{aip}\right)+$$

$$i\hbar\overline{Y_d}^{ps}Y_d^{ru}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{ut}LF_{3,1,-1}\left[M_\phi,M_\chi^t\right]D_\mu\overline{H}_i H^j\left(\overline{q}^r_{aj}\cdot\gamma_\mu P_L\cdot q^{aip}\right)-$$

$$i\hbar\overline{Y_d}^{ps}Y_d^{ru}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{ut}LF_{3,1,-1}\left[M_\phi,M_\chi^t\right]\overline{H}_i D_\mu H^j\left(\overline{q}^r_{aj}\cdot\gamma_\mu P_L\cdot q^{aip}\right)-$$

$$\frac{i}{2}\hbar\overline{Y_d}^{ps}Y_d^{ru}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{ut}LF_{4,1,-2}\left[M_\phi,M_\chi^t\right]D_\mu\overline{H}_i H^j\left(\overline{q}^r_{aj}\cdot\gamma_\mu P_L\cdot q^{aip}\right)+$$

$$\frac{i}{2}\hbar\overline{Y_d}^{ps}Y_d^{ru}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{ut}LF_{4,1,-2}\left[M_\phi,M_\chi^t\right]\overline{H}_i D_\mu H^j\left(\overline{q}^r_{aj}\cdot\gamma_\mu P_L\cdot q^{aip}\right)+$$

$$\frac{i}{135}\hbar g_Y^4\frac{1}{M_\phi^2}D_\mu\overline{H}_i H^i\left(\overline{q}^r_{aj}\cdot\gamma_\mu P_L\cdot q^{ajr}\right)-\frac{i}{135}\hbar g_Y^4\frac{1}{M_\phi^2}\overline{H}_i D_\mu H^i\left(\overline{q}^r_{aj}\cdot\gamma_\mu P_L\cdot q^{ajr}\right)+$$

$$\frac{4i}{135}\hbar g_Y^4\frac{1}{M_\phi^2}D_\mu\overline{H}_i H^i\left(\overline{u}^r_a\cdot\gamma_\mu P_R\cdot u^{ar}\right)-\frac{4i}{135}\hbar g_Y^4\frac{1}{M_\phi^2}\overline{H}_i D_\mu H^i\left(\overline{u}^r_a\cdot\gamma_\mu P_R\cdot u^{ar}\right)+$$

$$\frac{i}{12}\hbar\overline{Y_d}^{ps}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{rt}LF_{3,1,-1}\left[M_\phi,M_\chi^t\right]\overline{H}_i B^{\mu\nu}\left(\overline{d}^r_a\cdot\Gamma_{\mu\nu}P_L\cdot q^{aip}\right)-$$

$$\frac{i}{12}\hbar\overline{Y_d}^{ps}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{rt}LF_{4,1,-2}\left[M_\phi,M_\chi^t\right]\overline{H}_i B^{\mu\nu}\left(\overline{d}^r_a\cdot\Gamma_{\mu\nu}P_L\cdot q^{aip}\right)-$$

$$\frac{i}{4}\hbar\overline{Y_d}^{ps}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{rt}LF_{3,1,-1}\left[M_\phi,M_\chi^t\right]\overline{H}_i G^{\mu\nu A}\left(\overline{d}^r_a\cdot\Gamma_{\mu\nu}P_L\cdot q^{bip}\right)T^{Aa}_b+$$

$$\frac{i}{4}\hbar\overline{Y_d}^{ps}\overline{\lambda_{\psi\chi}}^{st}\lambda_{\psi\chi}^{rt}LF_{4,1,-2}\left[M_\phi,M_\chi^t\right]\overline{H}_i G^{\mu\nu A}\left(\overline{d}^r_a\cdot\Gamma_{\mu\nu}P_L\cdot q^{bip}\right)T^{Aa}_b+$$

$$\frac{i}{12}\hbar Y_d^{rt}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{ts}LF_{3,1,-1}\left[M_\phi,M_\chi^s\right]H^i B^{\mu\nu}\left(\overline{q}^r_{ai}\cdot\Gamma_{\mu\nu}P_R\cdot d^{ap}\right)-$$

$$\frac{i}{12}\hbar Y_d^{rt}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{ts}LF_{4,1,-2}\left[M_\phi,M_\chi^s\right]H^i B^{\mu\nu}\left(\overline{q}^r_{ai}\cdot\Gamma_{\mu\nu}P_R\cdot d^{ap}\right)-$$

$$\frac{i}{4}\hbar Y_d^{rt}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{ts}LF_{3,1,-1}\left[M_\phi,M_\chi^s\right]H^i G^{\mu\nu A}\left(\overline{q}^r_{ai}\cdot\Gamma_{\mu\nu}P_R\cdot d^{bp}\right)T^{Aa}_b+$$

$$\frac{i}{4}\hbar Y_d^{rt}\overline{\lambda_{\psi\chi}}^{ps}\lambda_{\psi\chi}^{ts}LF_{4,1,-2}\left[M_\phi,M_\chi^s\right]H^i G^{\mu\nu A}\left(\overline{q}^r_{ai}\cdot\Gamma_{\mu\nu}P_R\cdot d^{bp}\right)T^{Aa}_b-$$

$$\frac{1}{30}\hbar g_s^4\frac{1}{M_\phi^2}\delta_{pt}\delta_{rs}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{d}^t_b\cdot\gamma_\mu P_R\cdot d^{br}\right)+$$

$$\frac{1}{90}\hbar g_s^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{d}^t_b\cdot\gamma_\mu P_R\cdot d^{br}\right)-$$

$$\frac{2}{405}\hbar g_Y^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{d}^t_b\cdot\gamma_\mu P_R\cdot d^{br}\right)+$$

$$\frac{1}{12}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{ru}\lambda_{\psi\chi}^{tu}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{ps}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{d}^t_b\cdot\gamma_\mu P_R\cdot d^{br}\right)-$$

$$\frac{1}{18}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{ru}\lambda_{\psi\chi}^{tu}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{ps}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{d}^t_b\cdot\gamma_\mu P_R\cdot d^{br}\right)-$$

$$\frac{1}{4}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{ru}\lambda_{\psi\chi}^{su}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{pt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{d}^t_b\cdot\gamma_\mu P_R\cdot d^{br}\right)-$$

$$\frac{1}{36}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{ru}\lambda_{\psi\chi}^{tu}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{ps}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{d}^t_b\cdot\gamma_\mu P_R\cdot d^{br}\right)+$$

$$\frac{1}{54}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{ru}\lambda_{\psi\chi}^{tu}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{ps}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{d}^t_b\cdot\gamma_\mu P_R\cdot d^{br}\right)+$$

$$\frac{1}{12}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{ru}\lambda_{\psi\chi}^{su}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{pt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{d}^t_b\cdot\gamma_\mu P_R\cdot d^{br}\right)+$$

$$\frac{1}{8}\hbar\overline{\lambda_{\psi\chi}}^{pu}\overline{\lambda_{\psi\chi}}^{rv}\lambda_{\psi\chi}^{sv}\lambda_{\psi\chi}^{tu}LF_{2,1,1,-1}\left[M_\phi,M_\chi^u,M_\chi^v\right]\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{d}^t_b\cdot\gamma_\mu P_R\cdot d^{br}\right)-$$

$$\frac{4}{135}\hbar g_Y^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{e}^t\cdot\gamma_\mu P_R\cdot e^r\right)-$$

$$\frac{1}{6}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{e}^t\cdot\gamma_\mu P_R\cdot e^r\right)+$$

$$\frac{1}{18}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{e}^t\cdot\gamma_\mu P_R\cdot e^r\right)-$$

$$\frac{1}{45}\hbar g_Y^4\frac{1}{M_\phi^2}\left(\overline{e}^s\cdot\gamma_\mu P_R\cdot e^t\right)\left(\overline{e}^t\cdot\gamma_\mu P_R\cdot e^s\right)-\frac{1}{45}\hbar g_Y^4\frac{1}{M_\phi^2}\left(\overline{e}^s\cdot\gamma_\mu P_R\cdot e^s\right)\left(\overline{e}^t\cdot\gamma_\mu P_R\cdot e^t\right)-$$

$$\frac{2}{135}\hbar g_Y^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{l}^t_i\cdot\gamma_\mu P_L\cdot l^{ir}\right)-$$

$$\frac{1}{12}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{l}^t_i\cdot\gamma_\mu P_L\cdot l^{ir}\right)+$$

$$\frac{1}{36}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{l}^t_i\cdot\gamma_\mu P_L\cdot l^{ir}\right)-$$

$$\frac{2}{45}\hbar g_Y^4\frac{1}{M_\phi^2}\left(\overline{e}^s\cdot\gamma_\mu P_R\cdot e^s\right)\left(\overline{l}^t_i\cdot\gamma_\mu P_L\cdot l^{it}\right)-\frac{1}{90}\hbar g_Y^4\frac{1}{M_\phi^2}\left(\overline{l}^s_i\cdot\gamma_\mu P_L\cdot l^{is}\right)\left(\overline{l}^t_j\cdot\gamma_\mu P_L\cdot l^{jt}\right)+$$

$$\frac{2}{135}\hbar g_Y^4\frac{1}{M_\phi^2}\left(\overline{e}^s\cdot\gamma_\mu P_R\cdot e^s\right)\left(\overline{q}^t_{ai}\cdot\gamma_\mu P_L\cdot q^{ait}\right)+$$

$$\frac{1}{135}\hbar g_Y^4\frac{1}{M_\phi^2}\left(\overline{l}^s_i\cdot\gamma_\mu P_L\cdot l^{is}\right)\left(\overline{q}^t_{aj}\cdot\gamma_\mu P_L\cdot q^{ajt}\right)-$$

$$\frac{1}{15}\hbar g_s^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{bp}\right)\left(\overline{q}^t_{bi}\cdot\gamma_\mu P_L\cdot q^{air}\right)-$$

$$\frac{1}{4}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{bp}\right)\left(\overline{q}^t_{bi}\cdot\gamma_\mu P_L\cdot q^{air}\right)+$$

$$\frac{1}{12}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{bp}\right)\left(\overline{q}^t_{bi}\cdot\gamma_\mu P_L\cdot q^{air}\right)+$$

$$\frac{1}{45}\hbar g_s^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{q}^t_{bi}\cdot\gamma_\mu P_L\cdot q^{bir}\right)+$$

$$\frac{2}{405}\hbar g_Y^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{q}^t_{bi}\cdot\gamma_\mu P_L\cdot q^{bir}\right)+$$

$$\frac{1}{12}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{q}^t_{bi}\cdot\gamma_\mu P_L\cdot q^{bir}\right)+$$

$$\frac{1}{36}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{q}^t_{bi}\cdot\gamma_\mu P_L\cdot q^{bir}\right)-$$

$$\frac{1}{36}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{q}^t_{bi}\cdot\gamma_\mu P_L\cdot q^{bir}\right)-$$

$$\frac{1}{108}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{q}^t_{bi}\cdot\gamma_\mu P_L\cdot q^{bir}\right)-$$

$$\frac{1}{30}\hbar g_s^4\frac{1}{M_\phi^2}\left(\overline{q}^s_{ai}\cdot\gamma_\mu P_L\cdot q^{ajt}\right)\left(\overline{q}^t_{bj}\cdot\gamma_\mu P_L\cdot q^{bis}\right)+$$

$$\frac{1}{90}\hbar g_s^4\frac{1}{M_\phi^2}\left(\overline{q}^s_{ai}\cdot\gamma_\mu P_L\cdot q^{ais}\right)\left(\overline{q}^t_{bj}\cdot\gamma_\mu P_L\cdot q^{bjt}\right)-$$

$$\frac{1}{810}\hbar g_Y^4\frac{1}{M_\phi^2}\left(\overline{q}^s_{ai}\cdot\gamma_\mu P_L\cdot q^{ais}\right)\left(\overline{q}^t_{bj}\cdot\gamma_\mu P_L\cdot q^{bjt}\right)+$$

$$\frac{8}{135}\hbar g_Y^4\frac{1}{M_\phi^2}\left(\overline{e}^s\cdot\gamma_\mu P_R\cdot e^s\right)\left(\overline{u}^t_a\cdot\gamma_\mu P_R\cdot u^{at}\right)+\frac{4}{135}\hbar g_Y^4\frac{1}{M_\phi^2}\left(\overline{l}^s_i\cdot\gamma_\mu P_L\cdot l^{is}\right)\left(\overline{u}^t_a\cdot\gamma_\mu P_R\cdot u^{at}\right)-$$

$$\frac{1}{15}\hbar g_s^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{bp}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{ar}\right)-$$

$$\frac{1}{4}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{bp}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{ar}\right)+$$

$$\frac{1}{12}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{bp}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{ar}\right)-$$

$$\frac{1}{15}\hbar g_s^4\frac{1}{M_\phi^2}\left(\overline{q}^s_{ai}\cdot\gamma_\mu P_L\cdot q^{bis}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{at}\right)+$$

$$\frac{1}{45}\hbar g_s^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{br}\right)+$$

$$\frac{8}{405}\hbar g_Y^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{br}\right)+$$

$$\frac{1}{12}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{br}\right)+$$

$$\frac{1}{9}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{3,1,-1}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{br}\right)-$$

$$\frac{1}{36}\hbar g_s^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{br}\right)-$$

$$\frac{1}{27}\hbar g_Y^2\overline{\lambda_{\psi\chi}}^{pu}\lambda_{\psi\chi}^{su}LF_{4,1,-2}\left[M_\phi,M_\chi^u\right]\delta_{rt}\left(\overline{d}^s_a\cdot\gamma_\mu P_R\cdot d^{ap}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{br}\right)-$$

$$\frac{1}{30}\hbar g_s^4\frac{1}{M_\phi^2}\delta_{pt}\delta_{rs}\left(\overline{u}^s_a\cdot\gamma_\mu P_R\cdot u^{ap}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{br}\right)+$$

$$\frac{1}{90}\hbar g_s^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{u}^s_a\cdot\gamma_\mu P_R\cdot u^{ap}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{br}\right)-$$

$$\frac{8}{405}\hbar g_Y^4\frac{1}{M_\phi^2}\delta_{ps}\delta_{rt}\left(\overline{u}^s_a\cdot\gamma_\mu P_R\cdot u^{ap}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{br}\right)+$$

$$\frac{1}{45}\hbar g_s^4\frac{1}{M_\phi^2}\left(\overline{q}^s_{ai}\cdot\gamma_\mu P_L\cdot q^{ais}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{bt}\right)-$$

$$\frac{4}{405}\hbar g_Y^4\frac{1}{M_\phi^2}\left(\overline{q}^s_{ai}\cdot\gamma_\mu P_L\cdot q^{ais}\right)\left(\overline{u}^t_b\cdot\gamma_\mu P_R\cdot u^{bt}\right)$$