

$$\begin{aligned}
& \frac{1}{8} \hbar B^{\mu\nu 2} - \frac{1}{4} \frac{1}{g^2} B^{\mu\nu 2} - \frac{1}{24} \hbar - \frac{1}{\epsilon} G^{\mu\nu A 2} - \frac{1}{4} \frac{1}{g_s^2} G^{\mu\nu A 2} - \frac{1}{4} \frac{1}{g_L^2} W^{\mu\nu I 2} - \frac{1}{9} \hbar B^{\mu\nu 2} \text{Log} \left[ \frac{\overline{\mu}^2}{M_{\phi^2}^2} \right] - \\
& \frac{1}{24} \hbar G^{\mu\nu A 2} \text{Log} \left[ \frac{\overline{\mu}^2}{M_{\phi^2}^2} \right] + D_\mu \overline{H}_i D_\mu H^i + C_H \overline{H}_i H^i + i \left( \overline{d}^r \cdot \gamma_\mu P_R \cdot D_\mu d^{\text{ar}} \right) + i \left( \overline{e}^r \cdot \gamma_\mu P_R \cdot D_\mu e^r \right) + \\
& i \left( \overline{l}_i^r \cdot \gamma_\mu P_L \cdot D_\mu l^{\text{ir}} \right) + i \left( \overline{q}_{a i}^r \cdot \gamma_\mu P_L \cdot D_\mu q^{\text{air}} \right) + i \left( \overline{u}_a^r \cdot \gamma_\mu P_R \cdot D_\mu u^{\text{ar}} \right) - \frac{1}{2} \lambda \overline{H}_i \overline{H}_j H^i H^j + \\
& \frac{3}{2} \hbar - \frac{1}{\epsilon} \lambda_{H_X}{}^2 \overline{H}_i \overline{H}_j H^i H^j + \frac{3}{2} \hbar \lambda_{H_X}{}^2 \overline{H}_i \overline{H}_j H^i H^j \text{Log} \left[ \frac{\overline{\mu}^2}{M_{\phi^2}^2} \right] - \overline{Y}_d^{\text{pr}} \overline{H}_i \left( \overline{d}_a^r \cdot P_L \cdot q^{\text{airp}} \right) - \\
& \overline{Y}_e^{\text{pr}} \overline{H}_i \left( \overline{e}^r \cdot P_L \cdot l^{\text{ip}} \right) - Y_e^{\text{rp}} H^i \left( \overline{l}_i^r \cdot P_R \cdot e^{\text{p}} \right) - Y_d^{\text{rp}} H^i \left( \overline{q}_{a j}^r \cdot P_R \cdot d^{\text{ap}} \right) - Y_U^{\text{rp}} \overline{H}_i \left( \overline{q}_{a j}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{j i} - \\
& \frac{1}{8} \hbar Y_U^{\text{rt}} \overline{\lambda}_{\psi\chi}^{\text{ps}} \overline{\lambda}_{\psi\chi}^{\text{ts}} \overline{H}_i \left( \overline{q}_{a j}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{j i} + \frac{1}{4} \hbar - \frac{1}{\epsilon} Y_U^{\text{rt}} \overline{\lambda}_{\psi\chi}^{\text{ps}} \overline{\lambda}_{\psi\chi}^{\text{ts}} \overline{H}_i \left( \overline{q}_{a j}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{j i} + \\
& \frac{1}{2} \hbar Y_U^{\text{rt}} \overline{\lambda}_{\psi\chi}^{\text{ps}} \overline{\lambda}_{\psi\chi}^{\text{ts}} \text{LF}_{1,1,0} \left[ M_{\phi}, M_{\chi^S} \right] \overline{H}_i \left( \overline{q}_{a j}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{j i} - \\
& \frac{1}{2} \hbar Y_U^{\text{rt}} \overline{\lambda}_{\psi\chi}^{\text{ps}} \overline{\lambda}_{\psi\chi}^{\text{ts}} \text{LF}_{2,1,-1} \left[ M_{\phi}, M_{\chi^S}, M_{\phi} \right] \overline{H}_i \left( \overline{q}_{a j}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{j i} - \overline{Y}_U^{\text{rp}} H^j \left( \overline{u}_a^r \cdot P_L \cdot q^{\text{airp}} \right) \overline{\varepsilon}_{i j} - \\
& \frac{1}{8} \hbar Y_U^{\text{ps}} \overline{\lambda}_{\psi\chi}^{\text{st}} \overline{\lambda}_{\psi\chi}^{\text{rt}} H^j \left( \overline{u}_a^r \cdot P_L \cdot q^{\text{airp}} \right) \overline{\varepsilon}_{i j} + \frac{1}{4} \hbar - \frac{1}{\epsilon} Y_U^{\text{ps}} \overline{\lambda}_{\psi\chi}^{\text{st}} \overline{\lambda}_{\psi\chi}^{\text{rt}} H^j \left( \overline{u}_a^r \cdot P_L \cdot q^{\text{airp}} \right) \overline{\varepsilon}_{i j} + \\
& \frac{1}{2} \hbar Y_U^{\text{ps}} \overline{\lambda}_{\psi\chi}^{\text{st}} \overline{\lambda}_{\psi\chi}^{\text{rt}} \text{LF}_{1,1,0} \left[ M_{\phi}, M_{\chi^T} \right] H^j \left( \overline{u}_a^r \cdot P_L \cdot q^{\text{airp}} \right) \overline{\varepsilon}_{i j} - \\
& \frac{1}{4} \hbar Y_U^{\text{ps}} \overline{\lambda}_{\psi\chi}^{\text{st}} \overline{\lambda}_{\psi\chi}^{\text{rt}} \text{LF}_{2,1,-1} \left[ M_{\chi^T}, M_{\phi} \right] H^j \left( \overline{u}_a^r \cdot P_L \cdot q^{\text{airp}} \right) \overline{\varepsilon}_{i j} - \\
& \frac{1}{360} \hbar \frac{1}{M_{\phi^2}^2} G^{\mu\nu C} G^{\mu\nu B} G^{\nu\rho A} f^{\text{ABC}} - \frac{1}{90} \hbar C_H \overline{H}_i \overline{H}_j H^i H^j - \frac{1}{2} \hbar C_H \overline{H}_i \overline{H}_j H^i H^j + \\
& \frac{1}{90} \hbar \lambda \overline{H}_i \overline{H}_j H^i H^j + \frac{1}{2} \hbar \lambda \frac{1}{M_{\phi^2}^2} \lambda_{H_X}{}^2 \overline{H}_i \overline{H}_j \overline{H}_k H^i H^j H^k + \\
& \frac{1}{2} \hbar - \frac{1}{M_{\phi^2}^2} \lambda_{H_X}{}^3 \overline{H}_i \overline{H}_j \overline{H}_k H^i H^j H^k - \frac{1}{45} \hbar \overline{H}_i \overline{H}_j \overline{H}_k H^i H^j D_\mu H^j - \frac{1}{90} \hbar \overline{H}_i \overline{H}_j H^i D_\mu H^j - \\
& \frac{1}{2} \frac{1}{M_{\phi^2}^2} \lambda_{H_X}{}^2 \overline{H}_i D_\mu \overline{H}_j H^i D_\mu H^j - \frac{1}{9} \hbar \lambda_{H_X} \frac{1}{M_{\phi^2}^2} \overline{H}_i H^i B^{\mu\nu 2} - \frac{1}{24} \hbar \lambda_{H_X} \frac{1}{M_{\phi^2}^2} \overline{H}_i H^i G^{\mu\nu A 2} + \\
& \frac{1}{180} \hbar \overline{H}_i \overline{H}_j \frac{1}{M_{\phi^2}^2} \overline{Y}_d^{\text{pr}} \overline{H}_i H^i \left( \overline{d}_a^r \cdot P_L \cdot q^{\text{airp}} \right) + \frac{1}{4} \hbar - \frac{1}{M_{\phi^2}^2} \lambda_{H_X}{}^2 \overline{Y}_d^{\text{pr}} \overline{H}_i H^i \left( \overline{d}_a^r \cdot P_L \cdot q^{\text{airp}} \right) + \\
& \frac{1}{180} \hbar \overline{H}_i \overline{H}_j \frac{1}{M_{\phi^2}^2} \overline{Y}_e^{\text{pr}} \overline{H}_i H^i \left( \overline{e}^r \cdot P_L \cdot l^{\text{ip}} \right) + \frac{1}{4} \hbar - \frac{1}{M_{\phi^2}^2} \lambda_{H_X}{}^2 \overline{Y}_e^{\text{pr}} \overline{H}_i H^i \left( \overline{e}^r \cdot P_L \cdot l^{\text{ip}} \right) + \\
& \frac{1}{180} \hbar \overline{H}_i \overline{H}_j \frac{1}{M_{\phi^2}^2} Y_e^{\text{rp}} \overline{H}_i H^i H^j \left( \overline{l}_j^r \cdot P_R \cdot e^{\text{p}} \right) + \frac{1}{4} \hbar - \frac{1}{M_{\phi^2}^2} \lambda_{H_X}{}^2 Y_e^{\text{rp}} \overline{H}_i H^i H^j \left( \overline{l}_j^r \cdot P_R \cdot e^{\text{p}} \right) + \\
& \frac{1}{180} \hbar \overline{H}_i \overline{H}_j \frac{1}{M_{\phi^2}^2} Y_d^{\text{rp}} \overline{H}_i H^i H^j \left( \overline{q}_{a j}^r \cdot P_R \cdot d^{\text{ap}} \right) + \frac{1}{4} \hbar - \frac{1}{M_{\phi^2}^2} \lambda_{H_X}{}^2 Y_d^{\text{rp}} \overline{H}_i H^i H^j \left( \overline{q}_{a j}^r \cdot P_R \cdot d^{\text{ap}} \right) + \\
& \frac{1}{180} \hbar \overline{H}_i \overline{H}_j \frac{1}{M_{\phi^2}^2} Y_U^{\text{rp}} \overline{H}_i H^i H^j \left( \overline{q}_{a k}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{k j} + \frac{1}{4} \hbar - \frac{1}{M_{\phi^2}^2} \lambda_{H_X}{}^2 Y_U^{\text{rp}} \overline{H}_i H^i H^j \left( \overline{q}_{a k}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{k j} - \\
& \frac{1}{2} \hbar \lambda_{H_X} Y_U^{\text{rt}} \overline{\lambda}_{\psi\chi}^{\text{ps}} \overline{\lambda}_{\psi\chi}^{\text{ts}} \text{LF}_{2,1,0} \left[ M_{\phi}, M_{\chi^S} \right] \overline{H}_i \overline{H}_j H^i \left( \overline{q}_{a k}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{k j} + \\
& \frac{1}{4} \hbar \lambda_{H_X} Y_U^{\text{rt}} \overline{\lambda}_{\psi\chi}^{\text{ps}} \overline{\lambda}_{\psi\chi}^{\text{ts}} \text{LF}_{2,2,-1} \left[ M_{\phi}, M_{\chi^S} \right] \overline{H}_i \overline{H}_j H^i \left( \overline{q}_{a k}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{k j} - \\
& \frac{1}{2} \hbar Y_U^{\text{st}} Y_U^{\text{rv}} Y_U^{\text{sp}} \overline{\lambda}_{\psi\chi}^{\text{tu}} \overline{\lambda}_{\psi\chi}^{\text{vu}} \text{LF}_{2,1,0} \left[ M_{\chi^U}, M_{\phi} \right] \overline{H}_i \overline{H}_j H^i \left( \overline{q}_{a k}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{k j} + \\
& \frac{1}{2} \hbar Y_U^{\text{st}} Y_U^{\text{rv}} Y_U^{\text{sp}} \overline{\lambda}_{\psi\chi}^{\text{tu}} \overline{\lambda}_{\psi\chi}^{\text{vu}} \text{LF}_{3,1,-1} \left[ M_{\chi^U}, M_{\phi} \right] \overline{H}_i \overline{H}_j H^i \left( \overline{q}_{a k}^r \cdot P_R \cdot u^{\text{ap}} \right) \varepsilon^{k j} - \\
& \frac{1}{2} \hbar Y_U^{\text{st}} Y_U^{\text{rv}} Y_U^{\text{sp}} \overline{\lambda}_{\psi\chi}^{\text{tu}} \overline{\lambda}_{\psi\chi}^{\text{vu}} \text{LF}_{4,1,-2} \left[ M_{\chi^U}, M_{\phi} \right] \overline{H}_i \overline{H}_j H^i \left( \overline{q}_{a k}^r \cdot P_R \cdot u^{\text{ap}} \right$$