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Erratum

Higgs bosons in supersymmetric models (I) [Nucl. Phys. B272 (1986) 1]

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(1) At the beginning of sect. 2, we state that eq. (2.1) is the most general two-Higgs doublet scalar potential subject to a discrete symmetry $\phi_1 \to -\phi_1$ which is only softly violated by dimension-two terms. This is not strictly correct. First, rename λ_7 appearing in eq. (2.1) as λ_8. Then, there is one additional term that can be added:

$$\lambda_7\left[\mathrm{Re}\ \phi_1^\dagger\phi_2 - v_1 v_2 \cos\xi\right]\left[\mathrm{Im}\ \phi_1^\dagger\phi_2 - v_1 v_2 \sin\xi\right].$$

However, this term can be eliminated by redefining the phases of the scalar fields. To see this, note that if $\lambda_7 \neq 0$ then the coefficient multiplying the term $(\phi_1^\dagger\phi_2)^2$ in the scalar potential is complex, while if $\lambda_7 = 0$ then the corresponding coefficient is real. Subsequent results presented in the paper are not affected by this choice. Moreover, in the minimal supersymmetric model, $\lambda_7 = 0$ (at tree-level). On the other hand, in *CP*-violating two-Higgs doublet models, it is important to keep $\lambda_7 \neq 0$ if one wishes to retain the overall freedom to redefine the Higgs field phases.

(2) In eq. (3.3), the sign of the μ term should be switched. That is, the relevant term in the superpotential should read: $W = -\mu\varepsilon_{ij}H_1^i H_2^j$, in the convention that $\varepsilon_{12} = -\varepsilon_{21} = 1$. Then, the signs of the μ terms in eq. (4.28) and in the equations of appendix A are all correct. However, the sign of μ in eqs. (4.13) and (4.19) and in the associated squark–squark–Higgs Feynman rules of figs. 11–14 must be changed.

(3) In fig. 1, to get the Feynman rules for incoming W^- and outgoing H^-, but leaving the momentum definitions the same, multiply rules (a) and (b) by -1; rule (c) is unchanged.

(4) In eq. (4.10), a d should appear immediately to the right of the last square bracket.

(5) In eq. (4.11), in the term proportional to m_Z replace $H_1^0 \cos(\beta+\alpha) + H_2^0 \sin(\beta+\alpha)$ by $H_1^0 \cos(\beta+\alpha) - H_2^0 \sin(\beta+\alpha)$.

(6) In fig. 9, multiply the $H_1^0H_1^0H_1^0$ and $H_2^0H_2^0H_2^0$ vertices by a factor of g. Otherwise, the Feynman rules of figs. 9 and 10 are correct as depicted.

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(7) A point of clarification. The reader should not that eqs. (4.12)–(4.15) contain only those terms needed to compute the mass and scalar interactions of the squarks and sleptons. To obtain the entire scalar potential, one must add the terms of eqs. (3.8) and (3.9) that are not included in eqs. (4.13)–(4.15).

(8) In figs. 17c, d and the Feynman rules for the $H_1^0 H_2^0 \tilde{q}_{kL} \tilde{q}_{kL}$ and $H_1^0 H_2^0 \tilde{q}_{kR} \tilde{q}_{kR}$ vertices are incorrect. The correct Feynman rules are

$$H_1^0 H_2^0 \tilde{q}_{kL} \tilde{q}_{kL}: \quad \frac{ig^2 \sin 2\alpha}{2}\left[\frac{T_{3k} - e_k \sin^2\theta_W}{\cos^2\theta_W} - \frac{m_q^2}{2m_W^2} D_k\right],$$

$$H_1^0 H_2^0 \tilde{q}_{kR} \tilde{q}_{kR}: \quad \frac{ig^2 \sin 2\alpha}{2}\left[e_k \tan^2\theta_W - \frac{m_q^2}{2m_W^2} D_k\right].$$

(9) In eq. (4.27), in the term proportional to $N\psi_N\psi_N$ remove the factor of 2.

(10) In eq. (4.28), add + h.c. to the right-hand side.

(11) Eq. (4.29) should read $\mathscr{L}_m^{soft} = \frac{1}{2}M\lambda^a\lambda^a + \frac{1}{2}M'\lambda'\lambda' + \text{h.c.}$

(12) In the second line of eq. (4.30), replace v_2 with $-v_2$; i.e. $(v_1\psi_{H_1}^0 - v_2\psi_{H_2}^0)$ is the correct form.

(13) In eq. (4.48), replace $+\sqrt{2}$ with $\pm\sqrt{2}$. In eq. (4.49), replace $-\sqrt{2}$ with $\mp\sqrt{2}$. In both cases, the upper sign should be used for H_1^0 and H_2^0 couplings to $\tilde{\chi}^0\tilde{\chi}^0$ given in eq. (4.47), and the lower sign should be used for the corresponding couplings of H_3^0.

(14) In fig. 22, replace $(1-\gamma_5)$ by $(1+\gamma_5)$ in (b) and (d). In fig. 23, replace $(1+\gamma_5)$ by $(1-\gamma_5)$ in (b) and (d).

(15) In the second line of eq. (5.5), the plus sign immediately following P_L should be a minus sign. Note that the corresponding Feynman rules depicted in fig. 24 are correct.

(16) In eq. (A.2), insert: + h.c. at the end.