Corrections for “A Supersymmetry Primer”, version 1

Please note that version 1 is now hopelessly obsolete; you should be reading version 7 (January 2016) instead!

The following is a list of known corrections to hep-ph/9709356 v1, dated September 15, 1997. If you have a different arXiv version, you can find the corresponding list of corrections at: http://www.niu.edu/spmartin/primer

I do not maintain errata for the World Scientific “Perspectives on Supersymmetry” chapter (non-arXiv) versions.

Please send any further corrections or suggestions to spmartin@niu.edu.

This list was last updated: April 26, 2012.

• Section 1, eq. (1.2): The numerical coefficient of the logarithmic term should not be 6. In fact, it should be 12 for the real component of the complex field $H$ and 4 for the imaginary part of $H$. This difference is due to the fact that the fermion mass necessarily breaks the electroweak symmetry, so one can’t really talk about the logarithmic correction to $m_H^2$ as if it were universal. The $\Lambda_{UV}^2$ correction is the same for the real and imaginary parts of $H$, however, and is correct as given. (Thanks to Shufang Su.)

• Section 2, eq. (2.12): $\Psi_M$ should have its entries reversed. It should be $(\xi^\alpha \xi^{\dagger}_\alpha)$.

• Section 3.2, eq. (3.46): The indices $ij$ should be lowered on $W^*_{ij}$.

• Section 3.2, sentence after eq. (3.47): “$W_i$” should be “$W^i$”.

• Section 5.1, third sentence of the second full paragraph after eq. (5.3): There are five, not nine, more scalar quartic interactions proportional to $y_t^2$ besides the three shown in Figure 8. (Thanks to Bob McElrath and Keith Thomas.)

• Section 5.1, fourth sentence from the end in the third full paragraph after eq. (5.3): The sentence “The winos and bino only couple to the left-handed squarks and sleptons, and . . .” should have the words “and bino” removed. So it should read: “The winos only couple to the left-handed squarks and sleptons, and . . .”. (Thanks to John Terning.)

• Section 5.2, third sentence of the first full paragraph after eq. (5.8): Instead of minutes or hours, the proton lifetime would actually be a tiny fraction of a second if all components of $\lambda'$ and $\lambda''$ were of order unity. (Thanks to John Terning.)

• Section 5.2, fourth sentence of the first full paragraph after eq. (5.8): The list of proton decay final states is misleading. Using the $s$-channel squark-exchange Feynman diagram in Figure 11, only the final states $e^+\pi^0$ and $\mu^+\pi^0$ and $\nu\pi^+$ and $\nu K^+$ can be obtained at tree-level. However, the other final states $e^+K^0$ and $\mu^+K^0$ and $\nu\pi^+$ and $\nu K^+$ can be obtained by tree-level $t$-channel squark-exchange diagrams involving the $\lambda'$ and $\lambda''$ couplings. (Note that I also sloppily did not distinguish between neutrinos and antineutrinos in the original text. The cases with neutrinos in the final state rely on left-right squark mixing.) (Thanks to Herbi Dreiner.)

• Section 5.3, eq. (5.11): “$Q$” in the last term of the second line in the equation should be “$L$”. That term should be $-\tilde{e}_a \tilde{L} \tilde{H}_d$. (Thanks to Graham Kribs.)

• Section 6.1, eqs. (6.4) and (6.5): There are three minus sign errors. These equations should read:

$$V = -\frac{1}{2} D^2 - \kappa D - g D \sum_i q_i \phi^i \phi_i$$

$$D = -\kappa - g \sum_i q_i \phi^i \phi_i$$

• Section 6.2, eq. (6.18) should have a $\delta$ in front: $\delta \tilde{\Psi}_\mu^\alpha = -\partial_\mu \epsilon^\alpha$. 

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• Section 6.3, second full sentence after eq. (6.21): \( \langle F_S \rangle \) should actually be: \( \sqrt{\langle F_S \rangle} \). (Thanks to Verónica Sanz.)

• Section 7.1, eq. (7.23): The coefficient of \( g^2 |M_1|^2 \) should be \(-\frac{6}{5}\), not \(-\frac{3}{5}\). (Thanks to Scott Thomas and Gudrun Hiller.)

• Section 7.2, eq. (7.29): The 174 GeV should be squared. So, the equation should read:

\[
v_u^2 + v_d^2 = v^2 = 2m_Z^2/(g^2 + g'^2) \approx (174 \text{ GeV})^2.
\]

• Section 7.2, eq. (7.41): The factor of \( \sin^4 \beta \) should actually be \( \sin^2 \beta \cos^2 \alpha \). However, in the usual decoupling limit of \( m_A^0 \gg m_Z \), then \( \cos \alpha \approx \sin \beta \) and eq. (7.41) becomes correct as written. (Thanks to John Terning and Gudrun Hiller.)

• Section 7.3, last sentence of paragraph that includes eq. (7.53): “\( \mu \)” should be “\( |\mu| \)”.

• Section 7.3, eq. (7.57): “\( U^T \)” should be “\( U^\ast \)”. So this equation should read:

\[
U^\ast X V^{-1} = \begin{pmatrix} m\tilde{C}_1 & 0 \\ 0 & m\tilde{C}_2 \end{pmatrix}.
\]

• Section 7.3, eq. (7.58),(7.59): This should be just one equation, not two equations as the numbering seemed to indicate.

• Section 7.5, 1st line after eq. (7.84): The range for the stop mixing angle should be \( 0 \leq \theta_\tilde{t} < \pi \). (Thanks to Graham Kribs.)

• Appendix, end of paragraph before equation (A.1): “infrared degrees of freedom” should be “ultraviolet degrees of freedom”