Corrections for "Two-component spinor techniques and Feynman rules for quantum field theory and supersymmetry", version published in Physics Reports, by Herbi K. Dreiner, Howard E. Haber and Stephen P. Martin.

The following is a list of known corrections to the version published as Physics Reports 494, 1, (2010). The corrections indicated below have been made in the arXiv version v6 available at https://arxiv.org/abs/0812.1594. We will not be maintaining separate lists of corrections for the arXiv versions v5 or earlier, so if you have one of those you should download v6 instead. Corrections to the arXiv version v6 will be collected at http://www.niu.edu/spmartin/spinors. This list was last updated May 24, 2022. Please send any further corrections or suggestions to: `dreiner@th.physik.uni-bonn.de` or `haber@scipp.ucsc.edu` or `spmartin@niu.edu`.

- page 5: Above eq. (2.6), the phrase "Under a Lorentz transformation" has been changed to "Under an active Lorentz transformation."

- page 5: Immediately following equation (2.8), the previous text read: "where $\theta^i \equiv \frac{1}{2}\epsilon^{ijk}\theta_{jk}$, $\zeta^i \equiv \theta^{i0} = -\theta^{0i}$, $\mathcal{S}^i \equiv \frac{1}{2}\epsilon^{ijk}\mathcal{S}_{jk}$, $\mathcal{K}^i \equiv \mathcal{S}^{0i} = -\mathcal{S}^{i0}\ldots$" This has been slightly modified to the following:

  "where $\theta^{\rho\sigma} = -\theta^{\sigma\rho}$ and $\mathcal{S}_{\rho\sigma} = -\mathcal{S}_{\sigma\rho}$. In particular, $\theta^i \equiv \frac{1}{2}\epsilon^{ijk}\theta_{jk}$, $\zeta^i \equiv \theta^{i0} = -\theta^{0i}$, $\mathcal{S}^i \equiv \frac{1}{2}\epsilon^{ijk}\mathcal{S}_{jk}$, $\mathcal{K}^i \equiv \mathcal{S}^{0i} = -\mathcal{S}^{i0}\ldots$"

- page 5: Two new equations were added. The text following eq. (2.9) which previously read

  > It follows from eqs. (2.8) and (2.9) that an infinitesimal orthochronous Lorentz transformation is given by $\Lambda^\mu{}_\nu \simeq \delta^\mu_\nu + \theta^\mu{}_\nu$ (after noting that $\theta^\mu{}_\nu = -\theta_\nu{}^\mu$).

  has been modified to read

  > Thus, an infinitesimal orthochronous Lorentz transformation is given by
  >
  > $$\Lambda^\mu{}_\nu \simeq \delta^\mu_\nu - \tfrac{1}{2}i\theta^{\rho\sigma}(\mathcal{S}_{\rho\sigma})^\mu{}_\nu = \delta^\mu_\nu + \tfrac{1}{2}\theta^{\rho\sigma}(\delta^\mu_\rho\, g_{\sigma\nu} - \delta^\mu_\sigma\, g_{\rho\nu}) = \delta^\mu_\nu + \tfrac{1}{2}(\theta^\mu{}_\nu - \theta_\nu{}^\mu)\,.$$
  >
  > Since $\theta^\mu{}_\nu = g_{\alpha\nu}\theta^{\mu\alpha} = -g_{\alpha\nu}\theta^{\alpha\mu} = -\theta_\nu{}^\mu$, it follows that
  >
  > $$\Lambda^\mu{}_\nu \simeq \delta^\mu_\nu + \theta^\mu{}_\nu\,.$$

  These two new equations will now be referred to as "the new eqs. (2.10) and (2.11)."

- page 8: The Pauli matrices are assigned two equation numbers, (2.27) and (2.28). Remove the first equation number. Thus, the Pauli matrices will subsequently be referred to as eq. (2.27).

- page 8: In footnote 11: Remove the parenthetical remark, "[i.e., omitting the asterisk in $(V^*)_{\dot\alpha\beta}$]." Then, at the very end of this footnote, replace $V_{\alpha\dot\beta} = V_{\dot\alpha\beta}$ with $V_{\alpha\dot\beta} = V_{\dot\beta\alpha}$.

- page 8: Remove footnote 12.

- page 8, eq. (2.34): In the second of the three equations, replace $(V^*)_{\dot\alpha\beta} \equiv (V_{\alpha\dot\beta})^*$ with $(V^*)_{\alpha\dot\beta} \equiv (V_{\alpha\dot\beta})^*$. In the third of the three equations, remove the last equality; the correct equation should read: $(V^\dagger)_{\alpha\dot\beta} \equiv (V_{\beta\dot\alpha})^*$.

- page 9, eq. (3.25): Replace $(W^{\mathsf{T}})_\alpha{}^\beta \equiv W^\beta{}_\alpha$ with $(W^{\mathsf{T}})^\beta{}_\alpha \equiv W_\alpha{}^\beta$.

- page 10, following eq. (2.52). Move eqs. (2.53) and (2.54) to appear just above the paragraph that begins "Computations of cross sections..." Add the following additional text (immediately following "...we shall not employ it here" which is now modified to "...we shall not make use of it here"):

  "Products of three or more sigma matrices can be reduced to sums of terms involving at most two sigma matrices by employing the identities,"

  Eqs. (2.53) and (2.54) should now follow this new text and end the paragraph.

- page 12: Equation (2.99) was simplified. It previously read: $\Lambda^\mu{}_\nu \simeq \delta^\mu_\nu + \frac{1}{2}\left(\theta_{\alpha\nu} g^{\alpha\mu} - \theta_{\nu\beta} g^{\beta\mu}\right)$. The new version of Eq. (2.99) is $\Lambda^\mu{}_\nu \simeq \delta^\mu_\nu + \theta^\mu{}_\nu$. Above Eq. (2.99), a reference to the new eq. (2.11) [mentioned above] was inserted in the phrase, "the 4×4 Lorentz transformation matrix Λ [cf. eq. (2.11)]..."

- page 14: The last sentence of the penultimate paragraph of Section 2 is a sentence fragment that should be completely removed.

- page 17, at the very top of the page: Remove the text:

  "where $\sqrt{p\cdot\sigma}$ and $\sqrt{p\cdot\overline{\sigma}}$ are defined either by eqs. (2.109) and (2.110) or by eqs. (2.113) and (2.114), respectively (as mandated by the spinor index structure)."

  Then move footnotemark 24, which should now appear on p. 16 just above eq. (3.1.19). The footnotemark should appear at the end of the sentence, "The resulting undotted spinor wave functions are given by:"

- page 25, first line: Replace "direction of the arrows do..." with "direction of the arrow does..."

- page 26, just above eq. (4.2.5): Replace "rules then includes..." with "rules then include..."

- page 28 below eq. (4.3.2): Replace $\hat{Y}_{Ijk} = (\hat{Y}^{Ijk})^*$ with "$\hat{Y}_{Ijk} = (\hat{Y}^{Ijk})^*$ is symmetric under the interchange of j and k."

- page 28 below eq. (4.3.4): Replace Y^{Ijk} with $\hat{Y}^{Ijk}$.

- page 32, Figure 4.3.4(d): Replace $-i(G_2)^{ij}\overline{\sigma}_{\mu\alpha\dot{\beta}}$ with $-i(G_2)^{ij}\sigma_{\mu\alpha\dot{\beta}}$. That is, remove the bar from the sigma matrix with lowered undotted and dotted indices.

- page 35, footnote 47: Replace "and explained in Ref. [154]" with "and explained in footnote 1 of Ref. [154]."

- page 41, footnote 51: This footnote has been modified. It now reads: "In order to have a unified description, we shall take the flavor index of all left-handed fields (including η_k) in the lowered position (in contrast to the convention adopted in Sections 3.2 and 4.3) when considering a collection of two-component fermion fields that contains both Majorana and Dirac fermions."

- page 42: Below eq. (4.6.9), change "...invariant s and of the masses..." to "...invariant s and the masses..." (i.e., remove "of").

- page 42: The last sentence in the paragraph above eq. (4.6.10) has been modified. The previous version,

  "As in the case of the full loop-corrected propagators, $[\boldsymbol{\Xi}^{\mathsf{T}}]^{\star} = \boldsymbol{\Xi}$ and $\overline{\boldsymbol{\Omega}} = \boldsymbol{\Omega}^{\star}$, where the star symbol was defined in the paragraph following eq. (4.6.6), and $(\boldsymbol{\Xi}^{\mathsf{T}})^{i}{}_{j} \equiv \boldsymbol{\Xi}_{j}{}^{i}$."

  has been modified to read:

  "As in the case of the full loop-corrected propagators, $\boldsymbol{\Omega}$ and $\overline{\boldsymbol{\Omega}}$ are complex symmetric matrices and the self-energy function satisfy hermiticity conditions, $[\boldsymbol{\Xi}^{\mathsf{T}}]^{\star} = \boldsymbol{\Xi}$ and $\overline{\boldsymbol{\Omega}} = \boldsymbol{\Omega}^{\star}$, where the star symbol was defined in the paragraph following eq. (4.6.6) and $(\boldsymbol{\Xi}^{\mathsf{T}})^{i}{}_{j} \equiv \boldsymbol{\Xi}_{j}{}^{i}$."

- page 52: In the fourth line of the first paragraph of Section 6.4, the equation numbers (3.1.33)–(3.1.36) indicated as corresponding to the polarized spin projections are incorrect. The corrected sentence is:

  "This is achieved by replacing the spin sums given in Eqs. (3.1.58)–(3.1.61) by the relevant polarized spin projections exhibited in Eqs. (3.1.46)–(3.1.57)."

- page 57: Eq. (6.9.8) and (6.9.9) refer to lines 1 and 2 of the same equation. The equation number on line 1 should be removed.

- page 58: Below eq. (16.10.1), change "matrix elements for the second (u-channel) graph are the same" to "matrix element for the second (u-channel) graph is the same".

- page 59: Below eq. (6.10.13), change "amplitudes for the second graph are the same" to "amplitude for the second graph is the same".

- page 59: In Figure 6.10.1, in the second Feynman graph, there is a missing parenthesis. Replace $\bar{e}^\dagger\, p_1, \lambda_1)$ with $\bar{e}^\dagger\, (p_1, \lambda_1)$.

- page 60: In eq. (16.10.17), remove the factor of (1/2) that appears on the first line of the equation. Then remove the sentence following this equation and replace it with:

  "After integrating over t to obtain the total cross-section, one must multiply the resulting expression by a factor of 1/2 to account for the identical sleptons in the final state (to avoid the double counting of indistinguishable particles)."

- page 60: Below eq. (6.10.18), change "amplitudes for the second graph are the same" to "amplitude for the second graph is the same".

- page 61: In eq. (16.10.22), remove the factor of (1/2) that appears on the first line of the equation. Then remove the first sentence following this equation and replace it with:

  "After integrating over t to obtain the total cross-section, one must multiply the resulting expression by a factor of 1/2 to account for the identical sleptons in the final state [as noted below eq. (6.10.17)]."

- page 94: In the sentence below eq. (6.25.4) which appears on the first line of page 94, replace "adjoint representation index indices" with "adjoint representation indices."

- page 95: Just above eq. (6.26.1), replace T^a with $\boldsymbol{T^a}$.

- page 95: Equation (6.26.1) should read: $\delta\psi_j = -i\theta^a(\boldsymbol{T^a})_j{}^k\psi_k$.

- page 104: The tensors $J^{\mu\nu}$, $J_{\mu\nu}$ and $\theta^\mu{}_\nu$ were added to the list in equation (A.13). The tensors, $\theta^{\mu\nu}$ and $\theta_{\mu\nu}$, were added to the list in equation (A.14). The phrase, "$J^{\mu\nu}$ is the angular momentum tensor" was added to the first sentence following equation (A.14). In the second sentence following equation (A.14), the sentence that previously read "The Dirac gamma matrices are defined in eq. (G.1.2)" has been expanded to read: "The Dirac gamma matrices are defined in eq. (G.1.2), and the tensor $\theta^{\mu\nu}$ parameterizes Lorentz transformations [cf. eqs. (2.8), (2.13), and (2.99)–(2.101)]."

- page 104: The last sentence of the paragraph containing eqs. (A.13) and (A.14) is incorrect. Both $p\cdot A$ and $p\cdot\sigma$ change sign when the Minkowski metric signature is reversed. The correct version reads: "In particular, $p\cdot A$ changes sign whereas $\sigma\cdot\partial$ and $\overline{\sigma}\cdot\partial$ do not change sign, when the Minkowski metric signature is reversed." Thanks to Fei Li.

- page 106, equation (B.1.2): For $\delta^{\dot\alpha\dot\beta}$, substitute $\delta^{\dot\alpha}{}_{\dot\beta}$. Also, the remark about this set being a Kronecker product should be ignored; this will be corrected and clarified in a future arXiv version (v6).

- page 108, equation (B.1.31): Both of the σ's on the right side should have bars.

- page 108, footnote 91: Change "Appendix B" to "Appendix A". (Here, the Appendix being referred to is in Bailin's book reference [77].)

- page 111: Just above eq. (C.1.5), replace: "Here, $R(\hat{\boldsymbol{n}},\theta)$ is a 3×3 orthogonal matrix ..." with "In general, $R(\hat{\boldsymbol{n}},\theta)$ is a 3×3 orthogonal matrix of unit determinant ...".

- page 117: In eq. (C.3.15), replace $\gamma(-\hat{\boldsymbol{p}}) = -\pi + \phi_p$ with $\gamma(-\hat{\boldsymbol{p}}) = -\phi_p - \pi$.

- page 117 in equation (C.3.16): replace the comma with a semicolon. Likewise, in the text just above this equation, replace $p^\mu = (E\,,\,\vec{\boldsymbol{p}})$ with $p^\mu = (E\,;\,\vec{\boldsymbol{p}})$.

- page 117, eqs. (C.3.24)–(C.3.27) contain a number of typographical errors. Each of the equations contains an extra overall minus sign following each of the two equal signs. In addition, factors of ξ_λ and $\xi_{-\lambda}$ should be interchanged (twice in each equation). The corrected equations read:

$$x^\alpha(-\vec{\boldsymbol{p}},-\lambda) = -y^\dagger_{\dot\beta}(\vec{\boldsymbol{p}},\lambda)\,\xi_\lambda\overline{\sigma}^{0\dot\beta\alpha} = -2\lambda\,\omega_\lambda\xi_\lambda\chi^\dagger_{-\lambda}(\hat{\boldsymbol{p}})\,, \tag{C.3.23}$$

$$y^\alpha(-\vec{\boldsymbol{p}},-\lambda) = -x^\dagger_{\dot\beta}(\vec{\boldsymbol{p}},\lambda)\,\xi_{-\lambda}\overline{\sigma}^{0\dot\beta\alpha} = -\omega_{-\lambda}\xi_{-\lambda}\,\chi^\dagger_\lambda(\hat{\boldsymbol{p}})\,, \tag{C.3.24}$$

$$x^\dagger_{\dot\alpha}(-\vec{\boldsymbol{p}},-\lambda) = -y^\beta(\vec{\boldsymbol{p}},\lambda)\,\xi_{-\lambda}\sigma^0_{\beta\dot\alpha} = -\omega_\lambda\xi_{-\lambda}\,\chi^\dagger_\lambda(\hat{\boldsymbol{p}})\,, \tag{C.3.25}$$

$$y^\dagger_{\dot\alpha}(-\vec{\boldsymbol{p}},-\lambda) = -x^\beta(\vec{\boldsymbol{p}},\lambda)\,\xi_\lambda\sigma^0_{\beta\dot\alpha} = 2\lambda\,\omega_{-\lambda}\xi_\lambda\,\chi^\dagger_{-\lambda}(\hat{\boldsymbol{p}})\,. \tag{C.3.26}$$

- page 118, in footnote 101: Change "linearly independent zero eigenvectors" to "linearly independent zero eigenvectors" and remove the comma that precedes the word "coincides".

- page 119, first sentence of the last paragraph of text, the words "the derivation of" should be removed.

- page 120, equation (D.2.5): Change "$\Omega_{ij} = \varepsilon_i^{1/2}Z_{ij}$, no sum over i" to "$\Omega_{ij} = \varepsilon_j^{1/2}Z_{ij}$, no sum over j." That is replace i with j in two places.

- page 123, line after equation (D.4.9): "If follows" should be "It follows".

- page 124, equation (E.1.7) : remove "with $\varepsilon_\eta = +1$".

- page 124, equation (E.1.8) : remove "with $\varepsilon_\eta = -1$".

- page 128, Equation numbers (F.12) and (F.13) have been removed (but the corresponding equations are left alone). Only one equation number should be used for the three line equation at the top of p. 128. After removing these (using \nonumber in the LaTeX file), the three line equation at the top of p. 128 will be numbered (F.12), and subsequent equations in Appendix F will be renumbered accordingly.

- page 129, footnote 117: remove the phrase "definition of."
- page 131, equation (G.1.24): the period at the end of this equation should be replaced by a comma.
- page 135, equation (G.1.76): The subscript M is missing from the fourth Ψ from the left.
- page 147, equation (G.5.15): For consistency, the location of Φ, $\Phi^\dagger$, W_μ and $W_\mu^\dagger$ have been moved from the front to the end of the corresponding bracketed quantity.
- page 150, third line from top: Replace "Thus, may evaluate ..." with "Thus, we may evaluate ...".
- page 150, just above eq. (G.6.9): Replace "it follow that" with "it follows that".
- page 150, second line below the penultimate pair of graphs. Replace "had we chose" with "had we chosen".
- page 151, below eq. (G.6.11): Replace: " Had we evaluated the second diagram, then one finds after using Eqs. (G.6.9) and (G.6.10) that the resulting amplitude is just the negative..." with "Had we chosen to evaluate the second diagram instead, the resulting amplitude [after using Eqs. (G.6.9) and (G.6.10)] would have been found to be the negative...".
- page 152, second line of Section G.7: Replace "$\Psi_{\alpha i}$, where α" with "Ψ_{ai}, where a".
- page 152, below equation (G.7.2): Replace "four-component indices α and β" with "four-component indices a and b".
- page 154, just below eq. (H.2.4): Replace the first sentence with "where $\sqrt{p\cdot\sigma}$ and $\sqrt{p\cdot\overline{\sigma}}$ are defined by eqs. (2.107) and (2.108), respectively."
- page 155, text below eq. (H.3.1). We correct some inconsistencies in tense. First, we replace "we used" with "we first make use of". Next, we replace "evaluated" with "evaluate".
- page 158, text below eq. (H.4.5). Replace "Eq. (H.4.1)–(G.4.15)" with "Eq. (H.4.1)–(H.4.4)"
- page 158 in eq. (H.4.6): in the equation for $v(-\boldsymbol{p}, -\lambda)$, replace $\xi_\lambda(\hat{\boldsymbol{p}})$ with $\xi_{-\lambda}(\hat{\boldsymbol{p}})$.
- page 158 in eq. (H.4.7): both equations are missing an overall minus sign. The correct equation reads:

$$\bar{u}(-\boldsymbol{p}\,,\,-\lambda) = -\bar{u}(\boldsymbol{p}\,,\,\lambda)\,\gamma^0\,\xi_{-\lambda}(\hat{\boldsymbol{p}})\,, \qquad\qquad \bar{v}(-\boldsymbol{p}\,,\,-\lambda) = -\bar{v}(\boldsymbol{p}\,,\,\lambda)\,\gamma^0\,\xi_{\lambda}(\hat{\boldsymbol{p}})\,,$$

- page 159, first line: replace (G.4.15) with (H.4.5).
- page 163 in the fourth line of footnote 156: change "one almost always finds..." with "one often finds..."
- page 165. In eqs. (I.2.44) and (I.2.45), and in the text between these two equations, replace ϵ with ε (six times) and replace k, when appearing as an argument of ε, with $\vec{\boldsymbol{k}}$ (six times).
- page 166: In eq. (I.2.51), replace $\gamma(-\hat{\boldsymbol{k}}) = -\pi + \phi$ with $\gamma(-\hat{\boldsymbol{k}}) = -\phi - \pi$.
- page 166 Replace ϵ with ε above eq. (I.2.56).
- page 166: In eq. (I.2.58), replace ε^{μ} on the right hand side by ε^{ν}.
- page 167: In the sentence above eq. (I.2.59), replace "In terms of the $\lambda_{\pm 1/2}$" with "In terms of the $\xi_{\pm 1/2}$"
- page 167 Replace ϵ with ε above eq. (I.2.60).
- page 167: Replace ϵ with ε in eqs. (I.2.60)–(I.2.64).
- page 168: Right above eq. (I.2.71), replace the phrase "... right-hand side of eqs. (I.2.69) and (I.2.70), respectively" with "... right-hand side of eqs. (I.2.66) and (I.2.67), respectively".
- page 168: In eq. (I.2.76), replace $\gamma(-\hat{\boldsymbol{p}}) = -\pi + \phi$ with $\gamma(-\hat{\boldsymbol{p}}) = -\phi - \pi$.
- page 168: On the right hand side of eq. (I.2.77), replace $\hat{\boldsymbol{p}}$ with $\hat{\boldsymbol{p}}_{\rm CM}$ (four times).
- page 169: In eq. (I.2.78), replace $\gamma(-\hat{\boldsymbol{p}}_{\rm CM}) = -\pi + \phi$ with $\gamma(-\hat{\boldsymbol{p}}_{\rm CM}) = -\phi - \pi$.
- page 169: In footnote 162, replace $\gamma(-\hat{\boldsymbol{p}}_{\rm CM}) = -\pi + \phi$ with $\gamma(-\hat{\boldsymbol{p}}_{\rm CM}) = -\phi - \pi$.
- page 176, equation (J.2.20): The subscripts j on each side of the equation should be J.
- page 180, Figure K.1.1 caption: This should say that "The repeated index i is not summed." (Not j.)
- page 180, Figure K.1.2 caption: This should say that "The repeated index j is not summed."

  page 195: In Ref. 276, the author's name was misspelled. The correct spelling is A. Sudbery.