Errata

11/06/2020

Fundamentals of Neutrino Physics and Astrophysics

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Oxford University Press

(publication date: 15 March 2007; 728 pages)

$\pm$ Lines are calculated before ($-$) or after ($+$) the Anchor. If the Anchor is a page, t and b indicate, respectively, top and bottom.

Anchor	$\pm$ Lines	Wrong	Correct
page iii	t + 5	Universita	Università

Chapter 1			
Anchor	$\pm$ Lines	Wrong	Correct
page 4	b − 9	1967	1962

Chapter 2			
Anchor	$\pm$ Lines	Wrong	Correct
eqn (2.31)		$\frac{1}{\sqrt{2}}\begin{pmatrix}\mathbf{1} & \mathbf{-1}\\ \mathbf{1} & \mathbf{1}\end{pmatrix}$	$\frac{1}{\sqrt{2}}\begin{pmatrix}\mathbf{1} & \mathbf{1}\\ \mathbf{-1} & \mathbf{1}\end{pmatrix}$
eqn (2.189)		$(\not{p}_{\mathrm{P}} - m)\,\gamma^0\,u^{(-h)}(p_{\mathrm{P}}) = 0$	$(\not{p} - m)\,\gamma^0\,u^{(-h)}(p_{\mathrm{P}}) = 0$
eqn (2.276)	$+1$	following eqn (2.276)	following eqn (2.278)
eqn (2.361)	-1	transform as	transform as (normal ordering is implicitly assumed)
eqn (2.378)	-1	a parity transformation	a passive parity transformation
eqn (2.385)	-1	The transformation	The active transformation
eqn (2.404)	-1	The transformation	The active transformation
eqn (2.408)	-1	transform as	transform as (normal ordering is implicitly assumed)
eqn (2.414)		$\left(V_\mu^{ab} - A_\mu^{ab}\right) W^{\mu\dagger}$	$\left(V_\mu^{ba} - A_\mu^{ba}\right) W^{\mu\dagger}$
eqn (2.414)		$\left(V_\mu^{ba} - A_\mu^{ba}\right) W^{\mu}$	$\left(V_\mu^{ab} - A_\mu^{ab}\right) W^{\mu}$
eqn (2.416)	-1	a time reversal	a passive time reversal
eqn (2.416)		$x_{\mathrm{T}}^\mu = (-x^0, \vec{x}) = x_\mu$	$x_{\mathrm{T}}^\mu = (-x^0, \vec{x}) = -x_\mu$
eqn (2.424)	-2	the transformation	the active transformation

Chapter 2			
Anchor	± Lines	Wrong	Correct
eqn (2.434)		$(S_{ab})^{\mathrm{T}} = -\xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,\overline{\psi_b}\,\psi_a = -\xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,S_{ba}$	$(S_{ab})^{\mathrm{T}} = \xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,\overline{\psi_a}\,\psi_b = \xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,S_{ab}$
eqn (2.435)		$(V_{ab}^{\mu})^{\mathrm{T}} = -\xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,\overline{\psi_b}\,\gamma_\mu\,\psi_a = -\xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,V_{\mu}^{ba}$	$(V_{ab}^{\mu})^{\mathrm{T}} = \xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,\overline{\psi_a}\,\gamma_\mu\,\psi_b = \xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,V_{\mu}^{ab}$
eqn (2.436)		$(T_{ab}^{\mu\nu})^{\mathrm{T}} = \xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,\overline{\psi_b}\,\sigma_{\mu\nu}\,\psi_a = \xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,T_{\mu\nu}^{ba}$	$(T_{ab}^{\mu\nu})^{\mathrm{T}} = -\xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,\overline{\psi_a}\,\sigma_{\mu\nu}\,\psi_b = -\xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,T_{\mu\nu}^{ab}$
eqn (2.437)		$(A_{ab}^{\mu})^{\mathrm{T}} = -\xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,\overline{\psi_b}\,\gamma_\mu\,\gamma^5\,\psi_a = -\xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,A_{\mu}^{ba}$	$(A_{ab}^{\mu})^{\mathrm{T}} = \xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,\overline{\psi_a}\,\gamma_\mu\,\gamma^5\,\psi_b = \xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,A_{\mu}^{ab}$
eqn (2.438)		$(P_{ab})^{\mathrm{T}} = \xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,\overline{\psi_b}\,\gamma^5\,\psi_a = \xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,P_{ba}$	$(P_{ab})^{\mathrm{T}} = \xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,\overline{\psi_a}\,\gamma^5\,\psi_b = \xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,P_{ab}$
eqn (2.439)		$W_\mu \xrightarrow{\mathrm{T}} -\xi_{\mathrm{T}}^{W}\,W^{\mu\dagger}$	$W_\mu \xrightarrow{\mathrm{T}} \xi_{\mathrm{T}}^{W*}\,W^{\mu}$
eqn (2.440)		$\xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,\xi_{\mathrm{T}}^{W}\left(V_{\mu}^{ab} - A_{\mu}^{ab}\right)W^{\mu\dagger} + \xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b^*}\,\xi_{\mathrm{T}}^{W^*}\left(V_{\mu}^{ba} - A_{\mu}^{ba}\right)W^{\mu}$	$\xi_{\mathrm{T}}^{a}\,\xi_{\mathrm{T}}^{b*}\,\xi_{\mathrm{T}}^{W*}\left(V_{\mu}^{ab} - A_{\mu}^{ab}\right)W^{\mu} + \xi_{\mathrm{T}}^{a*}\,\xi_{\mathrm{T}}^{b}\,\xi_{\mathrm{T}}^{W}\left(V_{\mu}^{ba} - A_{\mu}^{ba}\right)W^{\mu\dagger}$

Chapter 2			
Anchor	$\pm$ Lines	Wrong	Correct
eqn (2.454)	-1	transform as	transform as (normal ordering is implicitly assumed)
eqn (2.454)		$(S_{ab})^{\text{CPT}} = -\xi^{a*}_{\text{CPT}}\,\xi^{b}_{\text{CPT}}\,\overline{\psi_a}\,\psi_b = -\xi^{a*}_{\text{CPT}}\,\xi^{b}_{\text{CPT}}\,S_{ab}$	$(S_{ab})^{\text{CPT}} = \xi^{a}_{\text{CPT}}\,\xi^{b*}_{\text{CPT}}\,\overline{\psi_b}\,\psi_a = \xi^{a}_{\text{CPT}}\,\xi^{b*}_{\text{CPT}}\,S_{ba}$
eqn (2.455)		$(V^{\mu}_{ab})^{\text{CPT}} = \xi^{a*}_{\text{CPT}}\,\xi^{b}_{\text{CPT}}\,\overline{\psi_a}\,\gamma_\mu\,\psi_b = \xi^{a*}_{\text{CPT}}\,\xi^{b}_{\text{CPT}}\,V^{\mu}_{ab}$	$(V^{\mu}_{ab})^{\text{CPT}} = -\xi^{a}_{\text{CPT}}\,\xi^{b*}_{\text{CPT}}\,\overline{\psi_b}\,\gamma^\mu\,\psi_a = -\xi^{a}_{\text{CPT}}\,\xi^{b*}_{\text{CPT}}\,V^{\mu}_{ba}$
eqn (2.456)		$(T^{\mu\nu}_{ab})^{\text{CPT}} = -\xi^{a*}_{\text{CPT}}\,\xi^{b}_{\text{CPT}}\,\overline{\psi_a}\,\sigma_{\mu\nu}\,\psi_b = -\xi^{a*}_{\text{CPT}}\,\xi^{b}_{\text{CPT}}\,T^{\mu\nu}_{ab}$	$(T^{\mu\nu}_{ab})^{\text{CPT}} = \xi^{a}_{\text{CPT}}\,\xi^{b*}_{\text{CPT}}\,\overline{\psi_b}\,\sigma^{\mu\nu}\,\psi_a = \xi^{a}_{\text{CPT}}\,\xi^{b*}_{\text{CPT}}\,T^{\mu\nu}_{ba}$
eqn (2.457)		$(A^{\mu}_{ab})^{\text{CPT}} = \xi^{a*}_{\text{CPT}}\,\xi^{b}_{\text{CPT}}\,\overline{\psi_a}\,\gamma_\mu\,\gamma^5\,\psi_b = \xi^{a*}_{\text{CPT}}\,\xi^{b}_{\text{CPT}}\,A^{\mu}_{ab}$	$(A^{\mu}_{ab})^{\text{CPT}} = -\xi^{a}_{\text{CPT}}\,\xi^{b*}_{\text{CPT}}\,\overline{\psi_b}\,\gamma^\mu\,\gamma^5\,\psi_a = -\xi^{a}_{\text{CPT}}\,\xi^{b*}_{\text{CPT}}\,A^{\mu}_{ba}$
eqn (2.458)		$(P_{ab})^{\text{CPT}} = -\xi^{a*}_{\text{CPT}}\,\xi^{b}_{\text{CPT}}\,\overline{\psi_a}\,\gamma^5\,\psi_b = -\xi^{a*}_{\text{CPT}}\,\xi^{b}_{\text{CPT}}\,P_{ab}$	$(P_{ab})^{\text{CPT}} = -\xi^{a}_{\text{CPT}}\,\xi^{b*}_{\text{CPT}}\,\overline{\psi_b}\,\gamma^5\,\psi_a = -\xi^{a}_{\text{CPT}}\,\xi^{b*}_{\text{CPT}}\,P_{ba}$
eqn (2.458)	$+1$	Since all the covariant bilinears are left invariant by a CPT transformation, apart for a possible irrelevant phase (which is the same for the vector and axial currents), any possible interaction Lagrangian is invariant under CPT, in agreement with the CPT theorem, which says that CPT is a symmetry of any relativistic local field theory.	Choosing $\xi^{a}_{\text{CPT}} = \xi^{b}_{\text{CPT}}$, CPT transforms each covariant bilinear into its Hermitian conjugate, with a minus sign for V^{μ}_{ab}, A^{μ}_{ab} and P_{ab}. Since an interaction Lagrangian containing a covariant bilinear must contain also its Hermitian conjugate (the Lagrangian is Hermitian), it is invariant under CPT. The minus sign in the transformation of V^{μ}_{ab}, A^{μ}_{ab} and P_{ab} is compensated by a corresponding minus sign in the transformation of the fields to which they are coupled. The invariance under CPT of any interaction Lagrangian containing a covariant bilinear is in agreement with the CPT theorem, which says that CPT is a symmetry of any relativistic local field theory.

Chapter 2			
Anchor	$\pm$ Lines	Wrong	Correct
eqn (2.487)		$\vert\mathfrak{f}(p,h)\rangle = \frac{1}{2EV}\, a^{(h)\dagger}(p)\,\vert 0\rangle\,,$ $\vert\bar{\mathfrak{f}}(p,h)\rangle = \frac{1}{2EV}\, b^{(h)\dagger}(p)\,\vert 0\rangle$	$\vert\mathfrak{f}(p,h)\rangle = \frac{1}{\sqrt{2EV}}\, a^{(h)\dagger}(p)\,\vert 0\rangle\,,$ $\vert\bar{\mathfrak{f}}(p,h)\rangle = \frac{1}{\sqrt{2EV}}\, b^{(h)\dagger}(p)\,\vert 0\rangle$

Chapter 3			
Anchor	$\pm$ Lines	Wrong	Correct
eqn (3.44)		This equation is obviously wrong. Erase the equation and the corresponding sentence.	
eqn (3.122)		$\dfrac{\sum_k \left[I^k\left(I^k+1\right) - \left(I_3^k\right)\right] v_k^2}{2\sum_k \left(I_3^k\right) v_k^2}$	$\dfrac{\sum_k \left[I^k\left(I^k+1\right) - \left(I_3^k\right)^2\right] v_k^2}{2\sum_k \left(I_3^k\right)^2 v_k^2}$
eqn (3.192)		$A^\mu \to A'_\mu = A^\mu - \dfrac{1}{e}\,\partial_\mu\varphi(x)$	$A_\mu \to A'_\mu = A_\mu - \dfrac{1}{e}\,\partial_\mu\varphi(x)$
eqn (3.199)	$+1$	$\varepsilon_\mu^{(0)}(p)\cdot p = \omega$	$\varepsilon^{(0)}(p)\cdot p = \omega$
eqn (3.199)	$+2$	$\varepsilon_\mu^{(1)}(p)\cdot p = \varepsilon_\mu^{(2)}(p)\cdot p = 0$	$\varepsilon^{(1)}(p)\cdot p = \varepsilon^{(2)}(p)\cdot p = 0$
eqn (3.199)	$+2$	$\varepsilon_\mu^{(3)}(p)\cdot p = -\omega$	$\varepsilon^{(3)}(p)\cdot p = -\omega$
eqn (3.204)		m_W	m_W^2
eqn (3.205)		m_W	m_Z^2

Chapter 4			
Anchor	$\pm$ Lines	Wrong	Correct
eqn (4.22)		$\begin{pmatrix} \cos\vartheta\, e^{i\omega_1} & \sin\vartheta\, e^{i(\omega_2+\eta)} \\ -\sin\vartheta\, e^{i(\omega_1-\eta)} & \cos\vartheta\, e^{i\omega_2} \end{pmatrix}$	$\begin{pmatrix} \cos\vartheta\, e^{i\omega_1} & \sin\vartheta\, e^{i(\omega_1+\eta)} \\ -\sin\vartheta\, e^{i(\omega_2-\eta)} & \cos\vartheta\, e^{i\omega_2} \end{pmatrix}$
eqn (4.23)		$\begin{pmatrix} \omega_1 & 0 \\ 0 & \omega_2 \end{pmatrix}$	$\begin{pmatrix} e^{i\omega_1} & 0 \\ 0 & e^{\omega_2} \end{pmatrix}$
eqn (4.62)		$W^{13} = W^{13}(\vartheta_{13},\eta_{13}) =$ $D^1(\eta_{13}) R^{13} {D^1}^\dagger(\eta_{13})$	$W^{13} =$ $W^{13}(\vartheta_{13},\eta_{13}-\eta_{12}-\eta_{23})$
eqn (4.78)	-1	η_{13}	$\eta_{13}-\eta_{12}-\eta_{23}$
eqn (4.108)	$+1$	One can parameterize the mixing matrix as a product of the type in eqn (4.65) with $W^{ab}(\vartheta_{ab}=\pi/2,\eta_{ab})$ on the extreme left or the extreme right. Using	If $W^{ab}(\vartheta_{ab}=\pi/2,\eta_{ab})$ is on the extreme left or on the extreme right of the product in eqn (4.45) which parameterizes the mixing matrix, using
eqn (4.78)		$\delta_{13} = -\eta_{13}$	$\delta_{13} = -\eta_{13}+\eta_{12}+\eta_{23}$
eqn (4.117)	$+1$	eqn (4.115)	eqn (4.116)

Chapter 5			
Anchor	± Lines	Wrong	Correct
eqn (5.20)		$g_1^{(\nu_e)} = g_2^{(\bar{\nu}_e)}$	$g_1^{(\nu_e)} = 1 + g_2^{(\bar{\nu}_e)}$
eqn (5.21)		$g_2^{(\nu_e)} = g_1^{(\bar{\nu}_e)}$	$g_2^{(\nu_e)} = g_1^{(\bar{\nu}_e)} - 1$
eqn (5.37)	$+2$	$T_e^{\text{th}} = 10.92\,\text{GeV}$	$E_\nu^{\text{th}} = 10.92\,\text{GeV}$
eqn (5.50)		$\mathcal{A}_{\pi^- \to \ell^- \bar{\nu}_\ell}$	$\mathcal{A}_{\bar{u}d \to \ell^- \bar{\nu}_\ell}$
eqn (5.50)		$\overline{u_\nu}(p_\nu)\,\gamma_\rho\,\left(1-\gamma^5\right) v_\ell(p_\ell)$	$\overline{u_\ell}(p_\ell)\,\gamma_\rho\,\left(1-\gamma^5\right) v_\nu(p_\nu)$
eqn (5.51)		$\overline{v_u}(p_u)\,\gamma^\rho\,\left(1-\gamma^5\right) u_d(p_d) \to \dfrac{1}{m_\pi}\,\langle 0\vert h_W^\rho(0)\vert\pi^-(p_\pi)\rangle$	$\overline{v_u}(p_u)\,\gamma^\rho\,\left(1-\gamma^5\right) u_d(p_d) = \langle 0\vert h_W^\rho(0)\vert\bar{u}(p_u), d(p_d)\rangle \to \langle 0\vert h_W^\rho(0)\vert\pi^-(p_\pi)\rangle$
eqn (5.51)	$+2$	The factor $1/m_\pi$ serves to keep the dimensions right (the left-hand side has dimension of energy, the current h_W^ρ has dimension of E^3, and the one-pion state has dimension of E^{-1}, with the normalization $\langle\pi^-(p_\pi)\vert\pi^-(p'_\pi)\rangle = (2\pi)^3 2E_\pi \delta^3(\vec{p}_\pi - \vec{p}'_\pi)$ as the one-fermion state in eqn (2.234)).	Note the change of dimensions in Eq. (5.51): the left-hand side has dimension of energy E, whereas the right-hand side has dimension of E^2 (the current h_W^ρ has dimension of E^3, and each one-particle state of a fermion or a boson has dimension of E^{-1}). In this way, the amplitude acquires the correct dimension of E needed in eqn (E.44) for a two-body decay rate.
eqn (5.54)		$\overline{u_\nu}(p_\nu)\,\dfrac{\not{p}_\pi}{m_\pi}\,\left(1-\gamma^5\right) v_\ell(p_\ell)$	$\overline{u_\ell}(p_\ell)\,\not{p}_\pi\,\left(1-\gamma^5\right) v_\nu(p_\nu)$
eqn (5.55)		$\dfrac{m_\ell}{m_\pi}\,\overline{u_\nu}(p_\nu)\,\left(1+\gamma^5\right) v_\ell(p_\ell)$	$m_\ell\,\overline{u_\ell}(p_\ell)\,\left(1+\gamma^5\right) v_\nu(p_\nu)$
eqn (5.83)		$-v^{\rho\dagger}(x)$	$-v_W^{\rho\dagger}(x)$
eqn (5.84)		$-a^{\rho\dagger}(x)$	$-a_W^{\rho\dagger}(x)$
eqn (5.86)		$v^{\rho\dagger}(0)$	$v_W^{\rho\dagger}(0)$
eqn (5.124)		$1 - \frac{Q^2}{6}\,\langle(r_i^N)^2\rangle$	$G_i^N(0) - \frac{Q^2}{6}\,\langle(r_i^N)^2\rangle$
eqn (5.147)	-1	Erase “in the laboratory frame”.	
eqn (5.147) eqn (5.154) eqn (5.187)		p_{N_i}	p_N
eqn (5.151)		$\frac{1}{4}\left(1+\dfrac{Q^2}{4m_N^2}\right) G_P^2$	$4\left(1+\dfrac{Q^2}{4m_N^2}\right) G_P^2$

Chapter 5			
Anchor	± Lines	Wrong	Correct
eqn (5.160)		$-\dfrac{G_{\mathrm{F}}^2 \, \lvert V_{ud} \rvert^2 \, m_N^2}{4\pi}$	$\dfrac{G_{\mathrm{F}}^2 \, \lvert V_{ud} \rvert^2 \, m_N^2}{4\pi}$
eqn (5.187)	$+2$	A^{ZN}, B^{ZN}, and C^{ZN}	A_N, B_N, and C_N
eqn (5.256)		$F_{1,\mathrm{Q}}^{ZN}$	$F_{1,q}^{ZN}$
eqn (5.257)		$F_{2,\mathrm{Q}}^{ZN} = 2\,x\,F_{1,\mathrm{Q}}^{ZN}$	$F_{2,q}^{ZN} = 2\,x\,F_{1,q}^{ZN}$
eqn (5.258)		$F_{3,\mathrm{Q}}^{ZN}$	$F_{3,q}^{ZN}$

Chapter 6			
Anchor	± Lines	Wrong	Correct
eqn (6.1)		$\overline{L_{\alpha L}}$	$\overline{L'_{\alpha L}}$
eqn (6.69)		$\frac{1}{2}\, i\gamma^{\mu}\, \nu_L$	$\frac{1}{2}\, i\overleftrightarrow{\partial\!\!\!/}\, \nu_L$
page 208	t + 5	[532,79,79,408]	[532,79,N1,408] New Reference: [N1] P. Langacker, M.-X. Luo, Phys. Rev. D44, 817, 1991.
eqn (6.206)		$\nu_L'^{\dagger}\, M^{L*}\, \mathcal{C}\, \nu_L'^{*}$	$\boldsymbol{\nu}_L'^{\dagger}\, M^{L*}\, \mathcal{C}\, \boldsymbol{\nu}_L'^{*}$
eqn (6.210)		$\nu_L'^{\dagger}\, W_L^T\, M^L\, W_L\, \mathcal{C}\, \nu_L'^{*}$	$\boldsymbol{\nu}_L'^{\dagger}\, W_L^T\, M^L\, W_L\, \mathcal{C}\, \boldsymbol{\nu}_L'^{*}$
eqn (6.222)	$+5$	M'^{ℓ}**.**	$\boldsymbol{M'^{\ell} = 0.}$
page 227	t + 11	[532,79,79,408]	[532,79,N1,408]
page 228	b − 2	[814]	[N2,N3] New References: [N2] G. Lazarides, Q. Shafi, C. Wetterich, Nucl. Phys. B181, 287, 1981. [N3] R.N. Mohapatra and G. Senjanovic, Phys. Rev. D23 165, 1981.
eqn (6.345)		$\overline{\boldsymbol{n}} \left(i\overleftrightarrow{\partial\!\!\!/} - M \right) \boldsymbol{n}$	$\frac{1}{2}\, \overline{\boldsymbol{n}} \left(i\overleftrightarrow{\partial\!\!\!/} - M \right) \boldsymbol{n}$
eqn (6.418)		$\overline{\ell_{\alpha L}} \gamma^{\rho} U_{\alpha k} \nu_{kL}$	$\overline{\ell_{\alpha L}} \gamma^{\rho} U_{\alpha k} \nu_{kL} W_{\rho}^{\dagger}$
eqn (6.418)		$\overline{\boldsymbol{\ell}_L} \gamma^{\rho} U\, \boldsymbol{n}_L$	$\overline{\boldsymbol{\ell}_L} \gamma^{\rho} U\, \boldsymbol{n}_L W_{\rho}^{\dagger}$

Chapter 7			
Anchor	± Lines	Wrong	Correct
eqn (7.95)		$\exp\left[\frac{(L/E-\langle L/E\rangle)^2}{2\,\sigma_{L/E}^2}\right]$	$\exp\left[-\frac{(L/E-\langle L/E\rangle)^2}{2\,\sigma_{L/E}^2}\right]$
eqn (7.97)	$+6$	eqn (7.70)	eqn (7.93)
eqn (7.113) twice		Δm^2	Δm^2_{kj}
eqn (7.156)		$+2\left(\sum_{j\leq N_{A_1}}\sum_{k>N_A}\Im\mathfrak{m}\ldots\right.$	$-2\left(\sum_{j\leq N_{A_1}}\sum_{k>N_A}\Im\mathfrak{m}\ldots\right.$

Chapter 8			
Anchor	± Lines	Wrong	Correct
eqn (8.29)	-2	$\mathcal{M}^{\mathrm{P}}_{\alpha k}$ or $\mathcal{M}^{\mathrm{D}}_{\alpha k}$	$\mathcal{M}^{\mathrm{P}}_{\alpha k}$ and $\mathcal{M}^{\mathrm{D}}_{\alpha k}$
eqn (8.77)	$+3$	$\sigma^{\mathrm{I}}_t \gtrsim \sigma^{\mathrm{I}}_p$	$\sigma^{\mathrm{I}}_t \gtrsim \sigma^{\mathrm{I}}_x$
page 309	$\mathrm{t}+3$	eqn (8.115)	eqn (8.114)
eqn (8.144) twice		Δm^2	Δm^2_{kj}

Chapter 9			
Anchor	± Lines	Wrong	Correct
eqn (9.1)		G_{F}	G_{F}^2
eqn (9.2)		G_{F}	G_{F}^2
eqn (9.157)		$\vec{\sigma}_{\mathrm{M}} = U_{\mathrm{M}}^\dagger\,\vec{\sigma}_{\mathrm{F}}\,U_{\mathrm{M}} = \mathcal{H}_{\mathrm{M}}$	$\vec{\sigma}_{\mathrm{M}} = U_{\mathrm{M}}^\dagger\,\vec{\sigma}_{\mathrm{F}}\,U_{\mathrm{M}}$

Chapter 10			
Anchor	± Lines	Wrong	Correct
eqn (10.70)	-3	as an effectively incoherent sum	as effectively incoherent sums

Chapter 11			
Anchor	± Lines	Wrong	Correct
eqn (11.67)		$R_{\mu/e}^{\text{multi-GeV}}$	$R_{\mu/e}^{\text{sub-GeV}}$

Chapter 12			
Anchor	± Lines	Wrong	Correct
eqn (12.13)	-2	Neglecting the small recoil energy of the neutron, the	The

Chapter 13			
Anchor	$\pm$ Lines	Wrong	Correct
page 476	$b-9$	$\Delta m^2_{31} \gtrsim 10^3\,\mathrm{eV}^2$	$\Delta m^2_{31} \gtrsim 10^{-3}\,\mathrm{eV}^2$

Chapter 14			
Anchor	$\pm$ Lines	Wrong	Correct
eqn (14.2)		$G_\mathrm{F}^2\, m_e^5$	G_F^2
eqn (14.7)		$G_\mathrm{F}^2\, m_e^5$	G_F^2
eqn (14.8)		$G_\mathrm{F}^2\, m_e^5$	G_F^2
eqn (14.16)		$G_\mathrm{F}^2\, m_e^5$	G_F^2

Chapter 15			
Anchor	$\pm$ Lines	Wrong	Correct
eqn (15.14)		$\nu_e + p \to n + e^-$	$\nu_e + n \to p + e^-$
eqn (15.15)		$\bar\nu_e + n \to p + e^+$	$\bar\nu_e + p \to n + e^+$
eqn (15.21)		$\sqrt{1-\frac{m^2}{2E^2}}$	$\sqrt{1-\frac{m^2}{E^2}}$

Chapter 16			
Anchor	$\pm$ Lines	Wrong	Correct
eqn (16.40)		$\equiv$	$=$
eqn (16.190)	$+1$	T $T_\chi^{\chi\text{-dec}} = T_\gamma^{\chi\text{-dec}}$ at the decoupling	$T_\chi^{\chi\text{-dec}} = T_\gamma^{\chi\text{-dec}}$
eqn (16.213)	$+6$	because T_γ is the monopole moment of the temperature: $T_\gamma = \int T_\gamma(\theta,\phi)\, Y_\ell^{m*}(\theta,\phi)\,\mathrm{d}\!\cos\theta\,\mathrm{d}\phi$.	because $Y_0^0 = 1/\sqrt{4\pi}$ and $T_\gamma = \frac{1}{4\pi}\int T_\gamma(\theta,\phi)\,\mathrm{d}\!\cos\theta\,\mathrm{d}\phi$.
eqn (16.223)	$+2$	the wavelength of each Fourier mode	the amplitude of each wavelength

Chapter 17			
Anchor	$\pm$ Lines	Wrong	Correct
eqn (17.23)		$2.3\times10^4\,\Omega_\mathrm{M}^0$	$1.2\times10^4\,\Omega_\mathrm{M}^0$
eqn (17.49)	-9	^{2}He	^{2}H
eqn (17.70)	$+6$	an upper limit	a lower limit

Appendix A			
Anchor	± Lines	Wrong	Correct
eqn (A.19)		$\epsilon_{ijk}\,\epsilon_{\ell mn} = \begin{vmatrix} \delta_{i\ell} & \delta_{im} & \delta_{in} \\ \delta_{j\ell} & \delta_{jm} & \delta_{in} \\ \delta_{k\ell} & \delta_{km} & \delta_{kn} \end{vmatrix}$	$\epsilon_{ijk}\,\epsilon_{\ell mn} = \begin{vmatrix} \delta_{i\ell} & \delta_{im} & \delta_{in} \\ \delta_{j\ell} & \delta_{jm} & \delta_{jn} \\ \delta_{k\ell} & \delta_{km} & \delta_{kn} \end{vmatrix}$
eqn (A.105)		$\sigma^{0k}_{\mathrm{D}} = i\,\alpha^k_{\mathrm{D}} = i \begin{pmatrix} \sigma^k & 0 \\ 0 & -\sigma^k \end{pmatrix}$	$\sigma^{0k}_{\mathrm{D}} = i\,\alpha^k_{\mathrm{D}} = i \begin{pmatrix} 0 & \sigma^k \\ \sigma^k & 0 \end{pmatrix}$

Appendix B			
Anchor	± Lines	Wrong	Correct
eqn (B.17)		$g^{\alpha\rho}\,(\Lambda^T)_\rho{}^\mu\,g_{\mu\nu}\,\Lambda^\rho{}_\nu = \delta^\alpha_\nu$	$g^{\alpha\rho}\,(\Lambda^T)_\rho{}^\mu\,g_{\mu\nu}\,\Lambda^\nu{}_\sigma = \delta^\alpha_\sigma$

Appendix C			
Anchor	± Lines	Wrong	Correct
eqn (C.11)		$[\psi_r(t,\vec{x}\,,\,\pi_s(t,\vec{y}]_\pm =$ $i\,\delta_{rs}\,\delta^3(\vec{x}-\vec{y})$	$[\psi_r(t,\vec{x})\,,\,\pi_s(t,\vec{y})]_\pm =$ $i\,\delta_{rs}\,\delta^3(\vec{x}-\vec{y})$
eqn (C.12)		$[\psi_r(t,\vec{x}\,,\,\psi_s(t,\vec{y}]_\pm =$ $[\pi_r(t,\vec{x}\,,\,\pi_s(t,\vec{y}]_\pm = 0$	$[\psi_r(t,\vec{x})\,,\,\psi_s(t,\vec{y})]_\pm =$ $[\pi_r(t,\vec{x})\,,\,\pi_s(t,\vec{y})]_\pm = 0$

Bibliography			
Anchor	± Lines	Wrong	Correct
Ref. [813]		J. Phys. Conf. Ser., 53, 44-82, 2006	Ann. Rev. Nucl. Part. Sci., 56, 569-628, 2006
page 693		[731] and [732] are the same	