

Errata

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Fundamentals of Neutrino Physics and Astrophysics

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

Anchor	± Lines	Wrong	Correct
page iii	t + 5	Universita	Università

Chapter 1			
Anchor	± Lines	Wrong	Correct
page 4	b − 9	1967	1962

Chapter 2			
Anchor	± Lines	Wrong	Correct
eqn (2.31)		$\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & -1 \\ 1 & 1 \end{pmatrix}$	$\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & 1 \\ -1 & 1 \end{pmatrix}$
eqn (2.189)		$(\not{p}_P - m) \gamma^0 u^{(-h)}(p_P) = 0$	$(\not{p} - m) \gamma^0 u^{(-h)}(p_P) = 0$
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)		$(V_\mu^{ab} - A_\mu^{ab}) W^{\mu\dagger}$	$(V_\mu^{ba} - A_\mu^{ba}) W^{\mu\dagger}$
eqn (2.414)		$(V_\mu^{ba} - A_\mu^{ba}) W^\mu$	$(V_\mu^{ab} - A_\mu^{ab}) W^\mu$
eqn (2.416)	−1	a time reversal	a passive time reversal
eqn (2.416)		$x_T^\mu = (-x^0, \vec{x}) = x_\mu$	$x_T^\mu = (-x^0, \vec{x}) = -x_\mu$
eqn (2.424)	−2	the transformation	the active transformation

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

Chapter 2			
Anchor	\pm Lines	Wrong	Correct
eqn (2.454)	-1	transform as	transform as (normal ordering is implicitly assumed)
eqn (2.454)		$(S_{ab})^{\text{CPT}} = -\xi_{\text{CPT}}^{a*} \xi_{\text{CPT}}^b \overline{\psi}_a \psi_b =$ $-\xi_{\text{CPT}}^{a*} \xi_{\text{CPT}}^b S_{ab}$	$(S_{ab})^{\text{CPT}} = \xi_{\text{CPT}}^a \xi_{\text{CPT}}^{b*} \overline{\psi}_b \psi_a =$ $\xi_{\text{CPT}}^a \xi_{\text{CPT}}^{b*} S_{ba}$
eqn (2.455)		$(V_{ab}^\mu)^{\text{CPT}} = \xi_{\text{CPT}}^{a*} \xi_{\text{CPT}}^b \overline{\psi}_a \gamma_\mu \psi_b =$ $\xi_{\text{CPT}}^{a*} \xi_{\text{CPT}}^b V_{ab}^\mu$	$(V_{ab}^\mu)^{\text{CPT}} =$ $-\xi_{\text{CPT}}^a \xi_{\text{CPT}}^{b*} \overline{\psi}_b \gamma^\mu \psi_a =$ $-\xi_{\text{CPT}}^a \xi_{\text{CPT}}^{b*} V_{ba}^\mu$
eqn (2.456)		$(T_{ab}^{\mu\nu})^{\text{CPT}} =$ $-\xi_{\text{CPT}}^{a*} \xi_{\text{CPT}}^b \overline{\psi}_a \sigma_{\mu\nu} \psi_b =$ $-\xi_{\text{CPT}}^{a*} \xi_{\text{CPT}}^b T_{ab}^{\mu\nu}$	$(T_{ab}^{\mu\nu})^{\text{CPT}} =$ $\xi_{\text{CPT}}^a \xi_{\text{CPT}}^{b*} \overline{\psi}_b \sigma^{\mu\nu} \psi_a =$ $\xi_{\text{CPT}}^a \xi_{\text{CPT}}^{b*} T_{ba}^{\mu\nu}$
eqn (2.457)		$(A_{ab}^\mu)^{\text{CPT}} =$ $\xi_{\text{CPT}}^{a*} \xi_{\text{CPT}}^b \overline{\psi}_a \gamma_\mu \gamma^5 \psi_b =$ $\xi_{\text{CPT}}^{a*} \xi_{\text{CPT}}^b A_{ab}^\mu$	$(A_{ab}^\mu)^{\text{CPT}} =$ $-\xi_{\text{CPT}}^a \xi_{\text{CPT}}^{b*} \overline{\psi}_b \gamma^\mu \gamma^5 \psi_a =$ $-\xi_{\text{CPT}}^a \xi_{\text{CPT}}^{b*} A_{ba}^\mu$
eqn (2.458)		$(P_{ab})^{\text{CPT}} =$ $-\xi_{\text{CPT}}^{a*} \xi_{\text{CPT}}^b \overline{\psi}_a \gamma^5 \psi_b =$ $-\xi_{\text{CPT}}^{a*} \xi_{\text{CPT}}^b P_{ab}$	$(P_{ab})^{\text{CPT}} =$ $-\xi_{\text{CPT}}^a \xi_{\text{CPT}}^{b*} \overline{\psi}_b \gamma^5 \psi_a =$ $-\xi_{\text{CPT}}^a \xi_{\text{CPT}}^{b*} P_{ba}$
eqn (2.458)	+1	<p>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.</p>	<p>Choosing $\xi_{\text{CPT}}^a = \xi_{\text{CPT}}^b$, CPT transforms each covariant bilinear into its Hermitian conjugate, with a minus sign for V_{ab}^μ, A_{ab}^μ 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_{ab}^μ, A_{ab}^μ 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.</p>

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

Chapter 3			
Anchor	± Lines	Wrong	Correct
eqn (3.44)		This equation is wrong. Erase all the sentence.	
eqn (3.122)		$\frac{\sum_k [I^k (I^k + 1) - (I_3^k)] v_k^2}{2 \sum_k (I_3^k) v_k^2}$	$\frac{\sum_k [I^k (I^k + 1) - (I_3^k)^2] v_k^2}{2 \sum_k (I_3^k)^2 v_k^2}$
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	$\varepsilon_\mu^{(3)}(p) \cdot p = -\omega$	$\varepsilon^{(3)}(p) \cdot p = -\omega$

Chapter 4			
Anchor	± 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)		$\begin{pmatrix} \omega_1 & 0 \\ 0 & \omega_2 \end{pmatrix}$	$\begin{pmatrix} e^{i\omega_1} & 0 \\ 0 & e^{i\omega_2} \end{pmatrix}$
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	\pm 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)		$\mathcal{A}_{\pi^- \rightarrow \ell^- \bar{\nu}_\ell}$	$\mathcal{A}_{\bar{u}d \rightarrow \ell^- \bar{\nu}_\ell}$
eqn (5.50)		$\bar{u}_\nu(p_\nu) \gamma_\rho (1 - \gamma^5) v_\ell(p_\ell)$	$\bar{u}_\ell(p_\ell) \gamma_\rho (1 - \gamma^5) v_\nu(p_\nu)$
eqn (5.51)		$\bar{v}_u(p_u) \gamma^\rho (1 - \gamma^5) u_d(p_d) \rightarrow$ $\frac{1}{m_\pi} \langle 0 h_W^\rho(0) \pi^-(p_\pi) \rangle$	$\bar{v}_u(p_u) \gamma^\rho (1 - \gamma^5) u_d(p_d) =$ $\langle 0 h_W^\rho(0) \bar{u}(p_u), d(p_d) \rangle \rightarrow$ $\langle 0 h_W^\rho(0) \pi^-(p_\pi) \rangle$
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 $\langle \pi^-(p_\pi) \pi^-(p'_\pi) \rangle = (2\pi)^3 2E_\pi \delta^3(\vec{p}_\pi - \vec{p}'_\pi)$ 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)		$\bar{u}_\nu(p_\nu) \not{p}_\pi (1 - \gamma^5) v_\ell(p_\ell)$	$\bar{u}_\ell(p_\ell) \not{p}_\pi (1 - \gamma^5) v_\nu(p_\nu)$
eqn (5.55)		$\frac{m_\ell}{m_\pi} \bar{u}_\nu(p_\nu) (1 + \gamma^5) v_\ell(p_\ell)$	$m_\ell \bar{u}_\ell(p_\ell) (1 + \gamma^5) v_\nu(p_\nu)$
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)		$\frac{1}{4} \left(1 + \frac{Q^2}{4m_N^2} \right) G_P^2$	$4 \left(1 + \frac{Q^2}{4m_N^2} \right) G_P^2$

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

Chapter 6			
Anchor	± Lines	Wrong	Correct
eqn (6.1)		$\overline{L_{\alpha L}}$	$\overline{L'_{\alpha L}}$
eqn (6.69)		$\frac{1}{2} i\gamma^\mu \nu_L$	$\frac{1}{2} i\cancel{\partial} \nu_L$
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)		$\nu_L^\dagger M^{L*} C \nu_L^*$	$\nu_L^\dagger M^{L*} C \nu_L^*$
eqn (6.210)		$\nu_L^\dagger W_L^T M^L W_L C \nu_L^*$	$\nu_L^\dagger W_L^T M^L W_L C \nu_L^*$
eqn (6.222)	+5	$M'^\ell.$	$M'^\ell = 0.$
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)		$\overline{n} \left(i\overset{\leftrightarrow}{\partial} - M \right) n$	$\frac{1}{2} \overline{n} \left(i\overset{\leftrightarrow}{\partial} - M \right) n$
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)		$\overline{\ell_L} \gamma^\rho U n_L$	$\overline{\ell_L} \gamma^\rho U n_L W_\rho^\dagger$

Chapter 7			
Anchor	\pm 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_{kj}^2
eqn (7.156)		$+2 \left(\sum_{j \leq N_{A_1}} \sum_{k > N_A} \Im m \dots \right)$	$-2 \left(\sum_{j \leq N_{A_1}} \sum_{k > N_A} \Im m \dots \right)$

Chapter 8			
Anchor	\pm Lines	Wrong	Correct
eqn (8.29)	-2	$\mathcal{M}_{\alpha k}^P$ or $\mathcal{M}_{\alpha k}^D$	$\mathcal{M}_{\alpha k}^P$ and $\mathcal{M}_{\alpha k}^D$
eqn (8.77)	+3	$\sigma_t^I \gtrsim \sigma_p^I$	$\sigma_t^I \gtrsim \sigma_x^I$
page 309	t + 3	eqn (8.115)	eqn (8.114)
eqn (8.144) twice		Δm^2	Δm_{kj}^2

Chapter 9			
Anchor	\pm Lines	Wrong	Correct
eqn (9.1)		G_F	G_F^2
eqn (9.2)		G_F	G_F^2
eqn (9.157)		$\vec{\sigma}_M = U_M^\dagger \vec{\sigma}_F U_M = \mathcal{H}_M$	$\vec{\sigma}_M = U_M^\dagger \vec{\sigma}_F U_M$

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

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

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

Chapter 13			
Anchor	± Lines	Wrong	Correct
page 476	$b - 9$	$\Delta m_{31}^2 \gtrsim 10^3 \text{ eV}^2$	$\Delta m_{31}^2 \gtrsim 10^{-3} \text{ eV}^2$

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

Chapter 17			
Anchor	± Lines	Wrong	Correct
eqn (17.23)		$2.3 \times 10^4 \Omega_M^0$	$1.2 \times 10^4 \Omega_M^0$
eqn (17.49)	-9	${}^2\text{He}$	${}^2\text{H}$
eqn (17.70)	+6	an upper limit	a lower limit

Appendix A			
Anchor	± Lines	Wrong	Correct
eqn (A.19)		$\epsilon_{ijk} \epsilon_{lmn} = \begin{vmatrix} \delta_{il} & \delta_{im} & \delta_{in} \\ \delta_{jl} & \delta_{jm} & \delta_{jn} \\ \delta_{kl} & \delta_{km} & \delta_{kn} \end{vmatrix}$	$\epsilon_{ijk} \epsilon_{lmn} = \begin{vmatrix} \delta_{il} & \delta_{im} & \delta_{in} \\ \delta_{jl} & \delta_{jm} & \delta_{jn} \\ \delta_{kl} & \delta_{km} & \delta_{kn} \end{vmatrix}$
eqn (A.105)		$\sigma_D^{0k} = i \alpha_D^k = i \begin{pmatrix} \sigma^k & 0 \\ 0 & -\sigma^k \end{pmatrix}$	$\sigma_D^{0k} = i \alpha_D^k = i \begin{pmatrix} 0 & \sigma^k \\ \sigma^k & 0 \end{pmatrix}$

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

Appendix C			
Anchor	\pm 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	\pm 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	