

ERRATA TO “QUANTUM FIELD THEORY”

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“line $-n$ ” means “line n from the bottom.”

Page 5, line -2 : one newton $\rightarrow 2 \times 10^{-7}$ newton

Page 8, 7 lines above (1.7): atoms about \rightarrow atoms are about

Page 10, 4 lines above (1.11): $y + \mathbf{p}^2 \rightarrow y + |\mathbf{p}|^2$

Page 15, line 9: $w = 0 \rightarrow v = 0$

Page 15: In the next-to-last display, $X_{\{f,g\}}h$ should be $-X_{\{f,g\}}h$, so the correspondence $f \mapsto X_f$ is an antihomomorphism. To fix this, change the definition of X_f (two displays earlier) to $\Omega(Y, X_f) = Yf$.

Page 16, line 25: $\mathbf{x}_n \rightarrow \mathbf{x}_k$

Page 17, line 11: $\mathbf{x}_n \rightarrow \mathbf{x}_k$

Page 18, line -9 : $\nabla V \rightarrow -\nabla V$

Page 21, next-to-last display: $m \rightarrow \mu$

Page 23, line 1: to realize \rightarrow was

Page 24, line -1 : $-mc^2 \rightarrow +mc^2$

Page 25, line before (2.18): §1.1 \rightarrow §1.2

Page 27, formula (2.24): $\mathbf{j} \rightarrow \mathbf{j}/c$

Page 28, line after (2.27): (2.25) \rightarrow (2.26)

Page 28, display after (2.28): $\mathbf{j} \rightarrow \mathbf{j}/c$

Page 33, line 5: Delete “with”.

Page 39, line -11 : $\lambda(xy)/\lambda(x)\lambda(y) \rightarrow \lambda(x)\lambda(y)/\lambda(xy)$

Page 40, line 2: bilinear \rightarrow skew-symmetric bilinear

Page 40, end of 4th paragraph, “This is the quantum version of Noether’s theorem”: Not quite. The quantum version of Noether’s theorem is that if a one-parameter group of symmetries commutes with the Hamiltonian, then the observable that generates it commutes with time translations.

Page 41, line 16: $ic[A_1, A_2] \rightarrow ib[A_1, A_2]$

Page 41, line 18: $[A_1, A_2] \rightarrow ib[A_1, A_2]$

Page 47, line 5: mometum \rightarrow momentum

Page 50, lines -18 and -17 : $\mathbf{x}_m \rightarrow \mathbf{x}_N$

Page 54, 5th display: $\langle AA^\dagger \phi_l | \phi_k \rangle \rightarrow \langle AA^\dagger \phi_{l-1} | \phi_{k-1} \rangle$

Page 57, line -13: infinitesimal \rightarrow infinitesimal

Page 58, line 15: $\kappa \rightarrow \kappa'$

Page 60, line 2 of Section 3.6: Insert minus sign before $\frac{\hbar^2}{2m} \nabla^2$

Page 67, 3rd line after 2nd display: $j^0 \rightarrow \rho$ and $\rho \rightarrow \int \rho$

Page 68, formula (4.6): $x_j \rightarrow x^j$

Page 71, line 8: The last L_ρ^ν should be L_σ^ν .

Page 73, 3rd line after (4.26): $\gamma^m \rightarrow \gamma^\mu$

Page 73, line -3 and page 74, line 1: $A_\mu + \partial_\mu \chi \rightarrow A_\mu - \partial_\mu \chi$

Page 75, line -9: $mc^2 \|\psi\| \rightarrow mc \|\psi\|$

Page 76, line 2: $\frac{e}{2m} \rightarrow e$ and $\frac{e}{m} \rightarrow 2e$

Page 76, display before (4.32): $e^2 \rightarrow \frac{1}{4}e^2$

Page 76, formula (4.32): $\frac{e^2}{2m} \rightarrow \frac{e^2}{8m}$

Page 80, third displayed formula: Both exponents 1/2 should be -1/2.

Page 82, line 18: a photon \rightarrow a pair of photons [to satisfy conservation of momentum]

Page 90, formula (4.45): $\frac{n_1! n_2! \dots}{k!} \rightarrow \frac{k!}{n_1! n_2! \dots}$

Page 100, line -14: $u_{kj} A_j^\dagger \rightarrow u_{jk} A_k^\dagger$

Page 101, line 9: All A_j should be $A_j(t)$.

Page 105, line -3: $g \rightarrow v$

Page 109, line 4: $\iint \rightarrow \int$

Page 113, 2nd line below 2nd display: $= v \rightarrow = mv$ (two places)

Page 115, display below (5.35): $\epsilon \rightarrow e$

Page 116, 3rd line above (5.38): a an \rightarrow a

Page 118, Concluding remarks, line 11: an \rightarrow a

Page 119, Axiom 3: The set \rightarrow The linear span of the set

Page 126, line 1: 0.9902065 \rightarrow 0.99019424

Page 129, line 8: $\mathcal{H}_{\text{field}} \rightarrow H_{\text{field}}$

Page 129, formula (6.13): Insert $\frac{1}{L^{3/2}}$ before the summation.

Page 129, line -7: $a_{\mathbf{p}} \rightarrow a(\mathbf{p})$ and $a_{\mathbf{p}}^\dagger \rightarrow a^\dagger(\mathbf{p})$

Page 130, lines -7 and -6: $\langle m, \mathbf{p} | n \rangle \rightarrow \langle m, \mathbf{p} | U_0(t) | n \rangle$

Page 130, line -2: Insert factor of $\frac{1}{i}$.

Page 134, 2nd and 3rd lines after (6.20): $\nabla - \mathbf{p} \rightarrow \nabla - i\mathbf{p}$

Page 134, formula (6.21), two lines above, and three lines below: $\mathbf{p} \cdot \nabla / M \rightarrow \mathbf{p} \cdot \nabla / iM$

Page 140, formula (6.29): $-\frac{1}{2}(\partial\phi)^2 \rightarrow +\frac{1}{2}(\partial\phi)^2$

Page 149, 4 lines above (6.49): $e^{itp_\mu x^\mu} \rightarrow e^{ip_\mu x^\mu}$

Page 151, 5th line after (6.53): $D_{\mu\nu}q^\nu \rightarrow D_{\mu\nu}p^\nu$

Page 152, line 3: $q_\mu q_\nu \rightarrow p_\mu p_\nu$

Page 152, line -14: Insert “and likewise with $\phi(y)$ replaced by $\phi^\dagger(y)$,” after “spacelike,”.

Page 158, line -11: $\Delta_F(0) \rightarrow -i\Delta_F(0)$

Page 160, first line of (vi): (5) \rightarrow (v)

Page 165, Table 6.2: v should be \bar{v} for incoming positrons; \bar{v} should be v for outgoing positrons.

Page 169, line 14: $V^{1/2}a_{\mathbf{B}}^\dagger(\mathbf{p}_1) \rightarrow V^{1/2}a_{\mathbf{B}}^\dagger(\mathbf{p}_1)|0\rangle$ and $V^{1/2}a_{\mathbf{B}}^\dagger(\mathbf{p}_2) \rightarrow V^{1/2}a_{\mathbf{B}}^\dagger(\mathbf{p}_2)|0\rangle$.

Page 171, line 9: particles \rightarrow describe particles

Page 191: Add the following clause to the end of the first sentence of item 2: “while preserving essential structural features such as Lorentz covariance”.

Page 192, 2nd paragraph of section 7.1, next-to-last line: $n\delta^{(n-1)}(t) \rightarrow -n\delta^{(n-1)}(t)$

Page 193, line -4: $-\Gamma'(1) \rightarrow \Gamma'(1)$

Page 193, third display: The integrand of the second integral should be $\phi(t)|t|^z$.

Page 197, line 1: Delete one copy of “*superficial degree of divergence*”.

Page 211, 3rd paragraph of section 7.5, line 2: Insert space before “that”.

Page 212, third display: $m^2\phi^2 \rightarrow \frac{1}{2}m^2\phi^2$

Page 229, formula (7.56): $\Gamma^\mu(q, p) \rightarrow \Gamma^\mu(p', p)$

Page 231, line -3: Brehmsstrahlung \rightarrow Bremsstrahlung

Page 235, line 7: $A^{-(d-4)/2} \rightarrow A^{-(4-d)/2}$

Page 235, display (7.64): Delete the 2 before the integral sign.

Page 244, line -1: $q_\mu \rightarrow k_\mu$

Page 245, formula (7.77): $(1-x)^2 \rightarrow (1-x)^2 m^2$

Page 245, line 8: $2p \rightarrow 2p^\mu$

Page 245, formula (7.78): $(2m^2 + 1 - x) \rightarrow 2m^2 x(1 - x)$

Page 264, third display: $dx_n \rightarrow dx_N$

Page 286, line 3: [??, vol. 4] \rightarrow [51]

Page 288, line 13: $e^{-Ay \cdot y} / 2 \rightarrow e^{-Ay \cdot y} / 2$

Page 291: Add the following sentence to the end of the first paragraph: “The quantum connection comes from the way Feynman diagrams can be read off from the Lagrangian, as explained in §§6.4–6.6.”

Page 296, last sentence of §9.1: The gauge transformations as stated here pertain to Abelian gauge fields ($G = U(1)$). If G is a non-Abelian simple group, there can be only one coupling constant α , as it turns up in the transformation law (9.1) for the rescaled gauge field.

Page 301, line -15: $\gamma(\eta) \rightarrow g(\eta)$

Page 304, 4th line after (9.10): $e + \nu_\mu + \bar{\nu}_\mu \rightarrow e + \nu_\mu + \bar{\nu}_e$

Page 313, line 4: third \rightarrow second

Page 313, line -10: $Y(d_L) = -\frac{1}{3} \rightarrow Y(d_R) = -\frac{1}{3}$

Page 324: Insert the entry “line width, 131”.

Page 325: Insert the entry “superficial degree of divergence, 197”.

Note: Readers may be interested in the book *Finite Quantum Electrodynamics* by G. Scharf (2nd ed., Springer, Berlin, 1995). It develops the Dyson series for the S-matrix of QED in a way that avoids divergent integrals, by replacing the usual time-ordered products by a construction with better regularity properties.