

Errata for “Introduction to Elementary Particles, 2nd ed.”

First Printing

September 16, 2008

1. Page 10, second line from bottom and 4 lines above: change “M.A.” to “MA.”
2. Page 11, line 6: “N.J.” \rightarrow “NJ.”; line 17: “C.A.” \rightarrow “CA.”; line 19: “M.A.” \rightarrow “MA.”.
3. Page 173, Table 5.2 caption, line 2: change “5.83” to “5.35”.
4. Page 190, first equation: $\frac{\hbar}{2} \rightarrow \frac{2}{\hbar}$.
5. Page 191, line after Eq. 5.69: change “5.46” to “5.48”.
6. Page 194, Problem 5.1(b), line 1: change “up and down” to “(effective)”; line 2: insert “charged” in front of “pion”.
7. Page 194, Problem 5.2, line 1: change “ ψ ” to “ Ψ ” (capital letter).
8. Page 195, Problem 5.7, line 3: insert “ $f = 0$ ” before “levels”.
9. Page 195, Problem 5.11, line 2: “ F_0 ” should be math italic.
10. Page 195, Problem 5.12, line 1: change “5.46” to “5.48”; lines 5-6: “(1983)” \rightarrow “(1997)” and “Benjamin, New York” \rightarrow “Addison-Wesley, Reading, MA”.
11. Page 195, Problem 5.13, line 1: “5.46” \rightarrow “5.48”; line 2: change “But the same formula can be applied” to “What if you apply the same formula”, and put a question mark at the end of the sentence.
12. Page 195, Problem 5.1(a), line 3: “Particle Data Booklet” \rightarrow “*Particle Physics Booklet*”.
13. Page 195, Problem 5.13(b), line 2: remove space after “ Υ ”.
14. Page 195, Problem 5.16: “5.60” \rightarrow “5.62”.
15. Page 196, Problem 5.21: change “(See Halzen . . . 2.19.)” to “, assuming $m_u = m_d$.”, and put the following sentence in parentheses.
16. Page 196, Problem 5.23, line 1: change “Equations 5.12, 5.13 and” to “Problem 5.2 and Equation”; line 2: at the end, add “Express your answer in terms of α , m , c , and \hbar . (We will use this result in Chapter 7, when we calculate the lifetime of positronium.)”.
17. Page 223, change Problem 6.14 to read:

Find $d\sigma/d\Omega$ and σ for $A + A \rightarrow B + B$ in the lab frame (target A at rest). Assume $m_B = m_C = 0$, and the incident A is nonrelativistic. Express your answer in terms of the mass (m) and speed (v) of the incident particle, and keep only the lowest order (in $v/c \ll 1$).

18. Page 256, last line of first footnote: change “7.40” to “7.41”.
19. Page 263, second line after Eq. 7.181: change “7.174” to “Eq. 7.178”.
20. Page 267, reference 7, last line: change “pp. 216 ff” to “Section 4.7”.
21. Page 270, Problem 7.22, at end: add “Assume A^0 was constant in the distant past.”.
22. Page 271, Problem 7.31(a): change “in Section 7.7” to “on page 252”.
23. Page 272, Problem 7.45, line 2: replace “In the experiment . . . prediction.” with “What if the CM energy is 57.8 GeV? [This was the value used in the experiment [9], but that was for inelastic electron/positron scattering, so don’t expect to match their result ($\alpha^{-1} = 129$).]”
24. Page 273, Problem 7.49(e), last line: change mc to $m_e c$.
25. Page 273, Problem 7.51(b), line 2: change σ_y to σ_z ; also in the displayed equation in part (c).
26. Page 282, line before Eq. 8.19: remove parentheses around “8.18”.
27. Page 291, line after Eq. 8.51: change “8.23” to “8.13”.
28. Page 303, Problem 8.4, line 6: no line break after “8.3.”; the line break would be excellent right before “then”, with “and the x ’s might as well” moved to the last line. The text on the line in between should be raised, so it is centered with respect to the three matrices:

$$\text{then } q_\mu L^{\mu\nu} = 0 \Rightarrow L^{\mu\nu} = \begin{pmatrix} \cdot & \cdot & \cdot & 0 \\ \cdot & \cdot & \cdot & 0 \\ \cdot & \cdot & \cdot & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}. \text{ So } L^{\mu\nu} K_{\nu\mu} = L^{\mu\nu} = \begin{pmatrix} \cdot & \cdot & \cdot & 0 \\ \cdot & \cdot & \cdot & 0 \\ \cdot & \cdot & \cdot & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} \cdot & \cdot & \cdot & x \\ \cdot & \cdot & \cdot & x \\ \cdot & \cdot & \cdot & x \\ x & x & x & x \end{pmatrix}$$

29. Page 303, Problem 8.11, line 5: remove open parentheses in front of “Fischbach”.
30. Page 304, Problem 8.21, line 4: insert “(Section 8.5)” before “is gauge-invariant”.
31. Page 306, Problem 8.24(a), line 1: change “8.86” to “8.92”.
32. Page 306, Problem 8.25: change “9.69” to “8.93” (twice).
33. Page 306, Problem 8.26, change “9.71” to “8.95”.
34. Page 364, Eq. 10.61: raise the prime on A'_μ , as in Eq. 10.60.

35. Page 368, Eq. 10.83: the first ϕ should be bold face (like the second).
36. Page 371, before and after Eq. 10.101: modify to read

... simply rub out the field variables. (This naive rule doesn't get all the c 's and \hbar 's right—what we actually erase is $\phi/\sqrt{\hbar c^{1/3}}$ for a scalar field ϕ , $A_\mu/\sqrt{4\pi\hbar c^{1/3}}$ for a vector field A_μ , and $\sqrt{\hbar c^{1/3}}\psi$ for a spinor field ψ .) Thus

$$-i\sqrt{\frac{4\pi}{\hbar c}} q\gamma^\mu = ig_e\gamma^\mu \quad (\text{QED vertex factor}) \quad (10.101)$$

In the case of chromodynamics (Equation 10.88) the quark-gluon coupling ...

37. Page 384, *Answers* to Problem 10.12(b): change “ g ” to “ q ” (twice).
38. Page 384, Problem 10.14(c): change “4.20(c)” to “4.19(a)”.
39. Page 402, last line of text: change $-im_f c^2/v$ to $-im_f c^2/v\sqrt{\hbar c}$.
40. Page 403, first line: change $2iM_m^2 c^2 g^{\mu\nu}/(\hbar^2 v)$ to $2iM_m^2 c^3 g^{\mu\nu}/v\sqrt{\hbar c}$.
41. Page 403, line after first figure: change $-3im_h^2 c^2/(\hbar^2 v)$ to $-3im_h^2 c^3/v$.
42. Page 419, Problem 12.1(a), second line: change g_w to $(g_w/2)$.
43. Page 419, Problem 12.3(b), bottom line: change “120” to “200”.