p 56: Question 2.8: The reaction should (of course) read:
\[ p + \bar{p} \rightarrow p + p + \bar{p} + \bar{p}. \]

p 56: Question 2.9: The question should ask for the minimum opening angle; the maximum opening angle is (rather trivially) \( \pi \).

p 57: the factor of \( \frac{1}{4} \) in the last line of Question 2.16 should be removed, i.e. Find the eigenvalue(s) of the operator \( \hat{S}^2 = (\hat{S}_x^2 + \hat{S}_y^2 + \hat{S}_z^2) \), and deduce that the eigenstates of \( \hat{S}_c \) are a suitable representation of a spin-half particle.

p 78: the mass of the pion in Question 3.1 should be 140 MeV, not 140 GeV.

p146: In the matrix in the footnote \( B_{22} \rightarrow B_{21} \).

p177: Question 7.2 should be ignored. There was an error in my original solution, whereby finding a closed form was relatively straightforward - it isn’t!

p231: there is a typo in the equation at the bottom of the page:
\[ \frac{1}{2} \left[ S^2 - S_1^2 - S_1^2 \right] \rightarrow \frac{1}{2} \left[ S^2 - S_1^2 - S_2^2 \right]. \]

p312: In Figure 12.5, the arrows on the d and \( \nu_\mu \) are the wrong-way around, only left-handed chiral states participate in the weak charged-current.

p315: Line four contains a typo, the third reaction should read \( \bar{\nu}_\mu u \rightarrow \mu^+ d \)

p337: In Figure 13.16, the bottom two diagrams should (of course) show a \( \pi^+ \).

p341: There is a typo (p_1 \rightarrow p_2) in Equation (13.13), which should read
\[ \Delta \phi_{12} = (E_1 - E_2) \left[ T - \left( \frac{E_1 + E_2}{p_1 + p_2} \right) L \right] + \left( \frac{m_1^2 - m_2^2}{p_1 + p_2} \right) L. \]

This typo is repeated in question 13.1.

p362: In question 13.2, there is a spurious 4 in the denominator of the argument of the \( \sin^2(\ldots) \) in the second equation, it should read
\[ \sin^2(2\theta) \sin^2 \left( \frac{\Delta m^2 [\text{GeV}^2] L [\text{GeV}^{-1}]}{4E_\nu [\text{GeV}]} \right) \rightarrow \sin^2(2\theta) \sin^2 \left( \frac{1.27 \Delta m^2 [\text{eV}^2] L [\text{km}]}{E_\nu [\text{GeV}]} \right). \]
The expression in the main text is correct.

**p363:** Part d) of *question 13.9* should be ignored - it is poorly worded. The intention was to get the student to consider the case where the decay products of the pion were close to being perpendicular to the direction of the boost. Close to $\theta^* \sim \pi/2$ the transverse momentum is approximately $p^*$ and the longitudinal momentum is primarily due to the Lorentz boost.

**p427:** The last matrix element should read $\mathcal{M}_{LR}^2$ not $\mathcal{M}_{RR}^2$.

**p458:** *Question 16.7* should read $\mu^- \bar{\nu}_\mu \bar{u}d$.

**p498:** *Question 17.8* the expression for the fields should read:

$$A_\mu = \frac{g' W_\mu^{(3)} + g W B_\mu}{\sqrt{g'^2 + g^2}} \quad \text{and} \quad Z_\mu = \frac{g W W_\mu^{(3)} - g' B_\mu}{\sqrt{g'^2 + g^2}}.$$