Quantum Physics III

Errata

p.21. In problem 2, replace …use your estimate of the sun's surface temperature to…
by and use 6000K as an estimate of the sun's surface temperature to…

p.40 In the solution to Example 2-4 (b) the second equation should have $\langle x^2 \rangle$ on the left side.

.64. In problem 11, the last equation should read

$$\psi(x,t) = A\left(\sin\frac{\pi x}{a}\right)^5$$

p.90. In problem 2, the definition of $V(x)$ in the third line should read

$$V(x) = 0 \qquad a < x$$

p.92. In problem 2, on the right side of the two equations make the replacements

$$\tanh ab \to \tanh \alpha b; \ \coth ab \to \coth \alpha b$$

p. 103 In equation (5-49), in lines 4 and 5 there should be a dx inserted.

p.118 In problem 7, the first line should read: Use the results of problems 5 and 6 ….

In problem 16, the first equation should read

$$e^{\lambda A} f(A^+) \,|\, 0\rangle = f(A^+ + \lambda) \,|\, 0\rangle$$

p.119. In problem 17, the last term of the last equation should read $\frac{\lambda^2}{2!}[A,[A,A^+]]$

p.126 In equation (7-48) the denominator should be $(l + m)!$

p.148 In equation (9-21) the summation sign should read $\sum_{k,l}$

p.154. In the first un-numbered equation which lists the eigenvectors, the last one should be associated with $\lambda = -1$.

p.156. Problem 1: In the second line use :…left-hand 5 x 5 corner of the infinite array.)

The two equations referred to in problems 2 and 3 should be (6-36) instead of (6-4).

p.191, The material just below Figure 12-1 should read as follows:

It follows that the energy shift is

$$\Delta E = \frac{1}{4} m_e c^2 (Z\alpha)^4 \frac{\begin{Bmatrix} \ell \\ -\ell - 1 \end{Bmatrix}}{n^3 l(l+1/2)(l+1)} \qquad (12\text{-}16)$$

valid for $l \neq 0$. When the effects of H_1 and H_2 are combined, we get

$$\Delta E = -\frac{1}{2} m_e c^2 (Z\alpha)^4 \left(\frac{1}{j+1/2} - \frac{3}{4n} \right) \qquad (12\text{-}17)$$

valid for both values of $l = j \pm 1/2$. It is necessary….

p.197. In problem 4. The final states in both cases should be $1^2S_{1/2}$. In part (b) the first wavelength should be 589.592 nm.

p.208 replace material from below Eq. (13-54) to below Eq. (13-57) by

Note that there is quite a lot of degeneracy in the problem: There are as many solutions for a given E as there are sets of integers $\{n_1, n_2, n_3\}$ that satisfy (13-54). Degeneracy is usually associated with the existence of mutually commuting observables and this example is no exception. In general when $H = H_x + H_y + H_z$ where

$$\begin{aligned} H_x &= \frac{p_x^2}{2m} + V_1(x) \\ H_y &= \frac{p_y^2}{2m} + V_2(y) \qquad (13-55) \\ H_z &= \frac{p_z^2}{2m} + V_3(z) \end{aligned}$$

the eigenfunctions of H have the form

$$\psi_{E_1 E_2 E_3}(x,y,z) = u_{E_1}(x) v_{E_2}(y) w_{E_3}(z) \qquad (13-56)$$

where $u_{E_1}(x), v_{E_2}(y), w_{E_3}(z)$ are eigenfunctions of H_x, H_y, and H_z respectively, with eigenvalues E_1, E_2 and E_3, and

$$E = E_1 + E_2 + E_3 \qquad (13\text{-}57)$$

p.238 In the expression for $c_n(\infty)$ the second line should read

$$\frac{qE}{i\hbar}\langle x \,|\, x \,|\, 0\rangle \int_{-\infty}^{\infty} dt' e^{-i\omega n t'} e^{-t'^2/\tau^2}$$

p.249 The two equations following (16-22) should read

$$\frac{\partial \psi}{\partial t} = \frac{\partial}{\partial t}\left(e^{-i\Lambda}\psi'\right) = -i\frac{\partial \Lambda}{\partial t}\psi + e^{-i\Lambda}\frac{\partial \psi'}{\partial t}$$

$$-i\hbar\nabla\psi = -i\hbar\nabla\left(e^{-i\Lambda}\psi'\right) = -\hbar\nabla\psi - i\hbar e^{-i\Lambda}\nabla\psi'$$

p.255 In the line following Eq. (16-71) replace L_1, L_2 by the product $L_1 L_2$.

p.260 In the line above Eq. (17-3) replace t-me-independent by time-dependent

p. 264 Two lines below Eq. (17-30) replace $m = m_i$ by $m = - m_i$

p.266 In Eq. (17-37) the r.h.s. should read $\approx \frac{g\hbar}{4}\left|\frac{k}{p}\right| = \ldots$

p.316. line 8 above Eq. (20-1) replace protons by photons.