Correction list for Applied Quantum Mechanics – second edition
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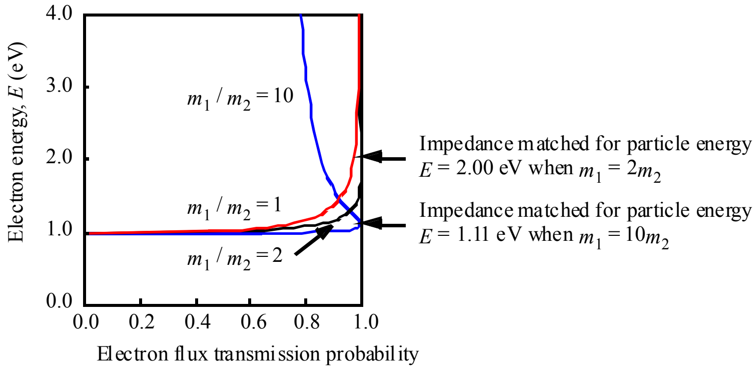
Page no, line no	Correction	Comment
28/20 up	… for relative permittivity of …	Add “relative”
28/19 up	… is $\varepsilon_{\mathrm{r}}(\omega) =$ …	Add non-italic subscript r
56/1-3 up	A particle moves between two points *A* and *B* in a vertical plane as illustrated in the figure. If acceleration due to gravity is *g* and velocity is initially zero, find the shape of the frictionless surface on which the particle must move to give a trajectory that takes the shortest time.	Replace text for Problem 1.15
69/Fig. 2.9	Alice generates a random number sequence and transmits binary bit 0 and bit 1 as H and D_+ respectively Bit 1 1 1 0 1 0 0 0 1 0 1 1 1 1 0 1 1 Photon state D_+ D_+ D_+ H D_+ H H H D_+ H D_+ D_+ D_+ D_+ H D_+ D_+ Bob tests with randomly chosen D_- or V for bit 0 and bit 1 respectively Detector state V V D_- D_- D_- D_- V D_- D_- V V D_- D_- D_- D_- V D_- Probability Bob detects ½ ½ - ½ - ½ - ½ - - ½ - - - ½ ½ - Bob detects 1 1 - 0 - 0 - 0 - - 1 - - - 0 1 - Alice keeps bits 1 1 - 0 - 0 - 0 - - 1 - - - 0 1 -	Replace zeros with ones second to last column on right hand side.
81/17 up	$\psi(k,t=0) = \frac{1}{A\sqrt{\pi}} e^{-i(k-k_0)x_0} e^{-(k-k_0)^2 \Delta x^2}$	x subscript zero in Eq. (2.57)
81/1 up	$\psi(k,t=0) = \frac{1}{A\sqrt{\pi}} e^{-i(k-k_0)x_0} e^{-(k-k_0)^2 \Delta x^2} e^{-i\omega_k t}$	x subscript zero in Eq. (2.60)
120/16 up	$\Delta\langle T\rangle = \frac{-\hbar^2}{2m}\psi(x_0)\Delta\psi$	Correct Eq. (3.14)
123/3 up	$\begin{vmatrix} e^{-ikL/2} & e^{ikL/2} \\ e^{ikL/2} & e^{-ikL/2} \end{vmatrix} = e^{-ikL} - e^{ikL} = 0$	Upper case L in Eq. (3.28)
139/13 up	$\lvert B\rvert^2 = \frac{(1-k_2/k_1)^2}{(1+k_2/k_1)^2} = \left(\frac{\upsilon_1 - \upsilon_2}{\upsilon_1 + \upsilon_2}\right)^2$	Correct Eq. (3.102) by including superscript 2 on right-hand-side term
144/Fig. 3.11		Correct inset equations to read $m_1/m_2 = 10$ $m_1/m_2 = 1$ $m_1/m_2 = 2$
145/3 down	$m_1 = m_2$, $m_1 = 2\times m_2$, and $m_1 = 10\times m_2$.	Correct subscripts
158/10 down	$\psi^* \frac{\partial\psi}{\partial x} = ik\lvert A\rvert^2 - ikA^*Be^{-2ikx} + ikB^*Ae^{2ikx} - ik\lvert B\rvert^2$	Superscript –2*ikx* second term on right hand side of equation
159/8 up	$\psi(x) = Ae^{\kappa x} + Be^{-\kappa x}$. In addition, the …	Remove *t* from left side of equation
159/7-6 up	… The term $Ae^{\kappa x}$ can only carry current if the term $Be^{-\kappa x}$ exists. …	Remove “right-propagating” and “left-propagating”
163/10 down	…when particle energy $E = V_0/(1 - m_2/m_1)$.	Correct subscripts
170/2 down	… motion in one-dimension. The …	Remove a
173/2 down	… positions x_j and …	Correct subscript

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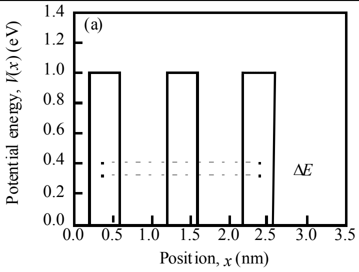
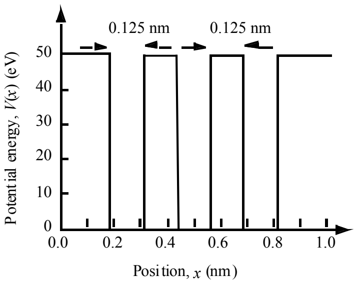
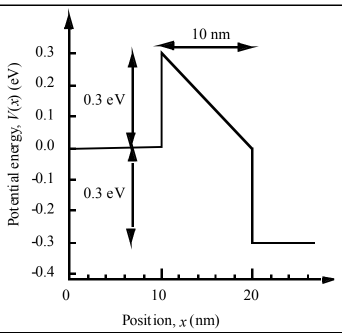
176/2 down	$\mathbf{P}_{j_{free}} = \begin{bmatrix} e^{-ik_jL_j} & 0 \\ 0 & e^{ik_jL_j} \end{bmatrix}$	Insert equals sign in Eq. (4.17)
184/10 down	$p_{11} = \frac{(k_2+k_1)(k_1+k_2)e^{-ik_2L} + (k_1-k_2)(k_2-k_1)e^{ik_2L}}{4k_1k_2}$	Correct superscript in last term in Eq. (4.61)
185/7 down	… and $k_2L = n\pi$ for …	
186/7 down	$Trans(E \ge V_0) = \left(1 + \frac{1}{4}\left(\frac{E-(E-V_0)}{E^{1/2}(E-V_0)^{1/2}}\right)^2 \sin^2(k_2L)\right)^{-1}$	Correct superscript in Eq. (4.72)
189/6 down	… well of Section 3.7, there …	
194/Fig. 4.11(a)		Correct x-axis scale in Fig. 4.11(a)
203/6 up	$p_{11} = \cos(k_1L) - i\sin(k_1L) + i\frac{k_0}{k_1}\cos(k_1L) + \frac{k_0}{k_1}\sin(k_1L)$	Place plus sign before third term on right hand side of Eq. (4.110)
207/18 up	$\mathbf{P} = \frac{1}{4k_1k_2}\begin{bmatrix} e^{-ik_1L_W} & 0 \\ 0 & e^{ik_1L_W} \end{bmatrix}\begin{bmatrix} k_1+k_2 & k_1-k_2 \\ k_1-k_2 & k_1+k_2 \end{bmatrix}\begin{bmatrix} e^{-ik_2L_b} & 0 \\ 0 & e^{ik_2L_b} \end{bmatrix}\begin{bmatrix} k_2+k_1 & k_2-k_1 \\ k_2-k_1 & k_2+k_1 \end{bmatrix}$	Place L_W and L_b in exponents in Eq. (4.115)
234/1 up	… for the same potential except in the region $x \le 0$ nm and $x \ge 1$ nm where the potential is zero.	Add to the sentence
235/3 down		Correct the y-axis scale in the figure
235/10 up		Correct the x-axis scale and the barrier width scale in the figure
235/4 up	… the right-hand edge of the 10-nm-thick barrier …	10-nm
235/1 up	energy $-0.3 < E < 1$ eV	
236/2 down	… drop $0 < \Delta V < 2$ eV caused by …	
243/2 down	… *of Hermitian operators are real* …	Plural – "operators"
245/3 up	… can be used to define the adjoint $\hat{A}^\dagger$ of an operator $\hat{A}$.	Delete "Hermitian" and add "$\hat{A}^\dagger$ of an operator $\hat{A}$."

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245/2 up	…is its own adjoint $\hat{A}^\dagger$, that is …	Delete "Hermitian"
252/6 up	$\left\langle x_n^2 \right\rangle = A_n^2 \left[\frac{x^3}{6} - \frac{x^2}{4k_n}\sin(2k_n x) - \frac{x}{4k_n^2}\cos(2k_n x) + \frac{1}{8k_n^3}\sin(2k_n x) \right]_0^L$	Place negative sign before third term on right hand side of Eq. (5.94)
269/7 down	… oscillation frequency is $(\omega_2 - \omega_1) = 3\hbar\pi^2 / 2mL^2$.	Subscript one, ω_1
269/5 up	… probability density $\lvert\psi(p_x,t)\rvert^2$ is found …	$\lvert\ \rvert$ sign
289/3 down	… constant we wish to find. Eq. (6.59) may be written …	Delete "Because $\hat{b}^\dagger$ is a Hermitian operator"
292/ 6 up	$\psi_3 = \frac{1}{\sqrt{3}}\hat{b}^\dagger\psi_2 = \frac{1}{\sqrt{2}\sqrt{3}}(\hat{b}^\dagger)^2\psi_1 = \frac{1}{\sqrt{3!}}(\hat{b}^\dagger)^3\psi_0$	$\frac{1}{\sqrt{3}}$ in Eq. (6.89)
301/6 up	$\langle A \rangle = \langle \psi(0) \rvert e^{i\hat{H}t/\hbar}\hat{A}e^{-i\hat{H}t/\hbar} \lvert \psi(0) \rangle = \langle \psi(0) \rvert \tilde{A} \lvert \psi(0) \rangle$	$e^{i\hat{H}t/\hbar}$ in Eq. (6.135)
338/3 down	If the value of n' calculated using ...	n'
355/6 up	$a_1 = \frac{\sqrt{2}}{L}\left[\frac{1}{2}\frac{2L}{\pi}\sin\left(\frac{\pi x'}{2L}\right) - \frac{1}{2}\frac{2L}{3\pi}\sin\left(\frac{3\pi x'}{2L}\right) \right]_0^L$	Fix () in Eq. (8.5)
359/17 up	… approximate the value $a_n(t>0)$ by $a_n(t \le 0) = 1$. Such an …	
365/2 down	$\frac{d}{dt}P_n(t) = \frac{2\pi}{\hbar}\lvert W_{mn} \rvert^2 D(E_m)$	Subscript m in Eq. (8.53)
365/2 up	… in Eq. (8.57) and Eq. (8.58) are related via …	Eq. numbers
366/2 down	$\lvert\langle m \rvert \hat{b} \lvert n \rangle\rvert^2 = \lvert\langle n \rvert \hat{b}^\dagger \lvert m \rangle\rvert^2$	Eq. (8.60)
366/4 down	$\tau_{mn}^{\text{emi}} D(E_m = E_n - \hbar\omega) = \tau_{nm}^{\text{abs}} D(E_m = E_n + \hbar\omega)$	Eq. (8.61) subscript mn and nm
366/3 up	… electronic state (Table 2.6). The coulomb …	Table 2.6
379/7 down	$\upsilon(q) = \int d^3r\ \upsilon(r)e^{-i\mathbf{q}.\mathbf{r}}$	Superscript in Eq. (8.119)
379/10 up	$\upsilon(q) = \frac{e^2}{4\pi\varepsilon_0\varepsilon_{r0}}e^{-rq_{\text{TF}}}$	Eq. (8.124) ε_{r0} subscript
383/6 up	For large velocity $k \to \infty$ and so $kr_0 >> 1$. In this limit the …	$kr_0 >> 1$
384/6 down	Hence, in the limit $kr_0 >> 1$	$kr_0 >> 1$ and no period
389/16 down	… that $\tau_{\text{sp}} = 1.6$ ns (see Problem 11.4).	add "(see Problem 11.4)."
400/6 up	… we have $dk/dE = m/\hbar^2 k$. Substituting into …	dk/dE
401/3 down	… so that $d\eta = \cos(\theta/2)d(\theta/2)$. …	$d\eta$
402/8 down	$V(q) = \frac{-e^2}{2\varepsilon_0\varepsilon_{r0}}\frac{1}{iq}\left(\frac{2iq}{\frac{1}{r_0^2}+q^2}\right) = \frac{-e^2}{\varepsilon_0\varepsilon_{r0}}\left(\frac{1}{\frac{1}{r_0^2}+q^2}\right) = \frac{-e^2}{\varepsilon_0\varepsilon_{r0}(1+1/q^2r_0^2)}$	$1/q^2r_0^2$
403/8 down	$V(q) = \frac{-e^2}{\varepsilon_0\varepsilon_{r0}q}\frac{q}{(q^2+1/r_0^2)} = \frac{-e^2}{\varepsilon_0\varepsilon_{r0}(q^2+1/r_0^2)} = \frac{-e^2}{\varepsilon_0\varepsilon_{r0}q^2(1+1/q^2r_0^2)}$	$1/q^2r_0^2$
403/11 down	… via the relation $\sigma = ne^2\tau/m^* = en\mu$.	$ne^2\tau/m^*$
408/20 down	… the minimum value of …	minimum
410/15 up	$P(t) = \frac{4W_0^2}{\hbar^2}\lvert\langle\psi_f\rvert\hat{b}\lvert\psi_i\rangle\rvert^2\frac{\sin^2((\omega_{fi}+\omega)t/2)}{(\omega_{fi}+\omega)t}t + \frac{4W_0^2}{\hbar^2}\lvert\langle\psi_f\rvert\hat{b}^\dagger\lvert\psi_i\rangle\rvert^2\frac{\sin^2((\omega_{fi}+\omega)t/2)}{(\omega_{fi}+\omega)t}t$	Add "*t*" to far right hand side of equation
441/4 up	$\langle F_s(t)F_s(t')\rangle = ((G+\kappa)S + \beta r_{\text{spon}})\delta(t-t')$	r_{spon} in Eq. (9.86)
470/3 down	$= \frac{V_0}{L^2}\left(\frac{L}{\pi}+\frac{L}{3\pi}\right)\left(\frac{L}{\pi}+\frac{L}{3\pi}\right) = \frac{V_0}{L^2}\left(\frac{4L}{3\pi}\right)\left(\frac{4L}{3\pi}\right) = \frac{16V_0}{9\pi^2}$	Correct Eq. (10.150)

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470/5 down	$\begin{bmatrix} W_{11} & W_{12} \\ W_{21} & W_{22} \end{bmatrix} = \begin{bmatrix} \frac{V_0}{4} & \frac{16V_0}{9\pi^2} \\ \frac{16V_0}{9\pi^2} & \frac{V_0}{4} \end{bmatrix} = \frac{V_0}{4} \begin{bmatrix} 1 & \frac{64}{9\pi^2} \\ \frac{64}{9\pi^2} & 1 \end{bmatrix}$	Correct Eq. (10.151)
470/7 down	$(\boldsymbol{H} - E\mathbf{1}) \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} = (\boldsymbol{H}^{(0)} + \boldsymbol{W} - E\mathbf{1}) \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} = \frac{V_0}{4} \begin{bmatrix} (1-E) & \frac{64}{9\pi^2} \\ \frac{64}{9\pi^2} & (1-E) \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \end{bmatrix}$	Correct last part of Eq. (10.152)
470/10 up	… where we set $\Delta = \frac{64}{9\pi^2}$	$\Delta = \frac{64}{9\pi^2}$
470/8 up	$E_+ = E_{12}^{(0)} + \frac{V_0}{4}\left(1 + \frac{64}{9\pi^2}\right)$	Correct Eq. (10.155)
470/6 up	$E_- = E_{12}^{(0)} + \frac{V_0}{4}\left(1 - \frac{64}{9\pi^2}\right)$	Correct Eq. (10.156)
502/1 down	… the operator $\hat{L}^2/\hbar^2$ and …	$\hat{L}^2/\hbar^2$
528/6 up	$e\lvert\mathbf{E}\rvert \int \psi_{210}^{*} \hat{z} \psi_{200} d^3 r = \frac{e\lvert\mathbf{E}\rvert}{32\pi} \int_0^{\infty} \frac{r^4}{a_{\mathrm{B}}^4}\left(2 - \frac{r}{a_{\mathrm{B}}}\right) e^{-r/a_{\mathrm{B}}} dr \int_0^{\pi} \cos^2(\theta)\sin(\theta) d\theta \int_0^{2\pi} d\phi$	
541/8 down	$\frac{1}{1+x} = 1 - x + x^2 - x^3 + \cdots = \sum_{n=0}^{n=\infty} (-1)^n x^n$ for $\lvert x\rvert < 1$	
541/9 down	$\log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots = \sum_{n=0}^{n=\infty} \frac{(-1)^n x^{n+1}}{n+1}$ for $\lvert x\rvert < 1$	
543/8 down	$\int_0^{\infty} x^{\nu-1} e^{-\mu x^p} dx = \frac{1}{p} \mu^{-\frac{\nu}{p}} \Gamma\left(\frac{\nu}{p}\right)$ for $\mathrm{Re}\ \mu > 0$, $\mathrm{Re}\ \nu > 0$, $p > 0$	$\mu^{-\frac{\nu}{p}}$, include minus sign in superscript.