

# Lectures on Quantum Mechanics

## (3 companion books)

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### List of typographical errors (updated January 2009)

#### Errata in *Basic Matters*

1. Page 4, Section 1.2, 2nd paragraph, 2nd line, read “with single photons” rather than “with simple photons”.
2. Page 20, the 2nd line of (2.4.20), replace  $\begin{pmatrix} 0 & 0 \\ 0 & -1 \end{pmatrix}$  by  $\begin{pmatrix} 0 & 0 \\ -1 & 0 \end{pmatrix}$ .
3. Page 23, 2nd line of (2.5.1), replace  $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$  by  $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$ .
4. Page 24, 2nd line, replace  $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$  by  $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$ .
5. Page 29, replace (2.5.36) by

$$\begin{pmatrix} \alpha \\ \beta \end{pmatrix} = \left[ \underbrace{\begin{pmatrix} a_1 \\ b_1 \end{pmatrix} (a_1^*, b_1^*)}_{\substack{\text{projects on} \\ \text{column} \\ \begin{pmatrix} a_1 \\ b_1 \end{pmatrix}}} + \underbrace{\begin{pmatrix} a_2 \\ b_2 \end{pmatrix} (a_2^*, b_2^*)}_{\substack{\text{projects on} \\ \text{column} \\ \begin{pmatrix} a_2 \\ b_2 \end{pmatrix}}} \right] \begin{pmatrix} \alpha \\ \beta \end{pmatrix},$$

6. Page 44, Exercise 2-16, the lower right matrix element should be  $-\cos \vartheta$  rather than  $\cos \vartheta$ .
7. Page 48, last line of (2.11.16), the lower right matrix element should be  $-\cos \vartheta$  rather than  $\cos \vartheta$ .
8. Page 93, 1st line of (3.6.4), replace  $\langle \downarrow_z, 0 |$  by  $|\downarrow_z, 0\rangle$ .
9. Page 113, 2nd line of (4.1.22), replace  $\arctan \frac{x-x'}{\epsilon}$  by  $\arctan \frac{x'-x}{\epsilon}$ .
10. Page 130, 2nd line of (4.8.14), replace  $e^{-(p\delta X/\hbar)}$  by  $e^{-(p\delta X/\hbar)^2}$ .
11. Page 133, 2nd line before (4.10.6), replace “varational” by “variational”.
12. Page 135, the unnumbered equation following (4.10.16), replace  $\frac{\partial}{\partial \dot{x}}$  by  $\frac{\partial L}{\partial \dot{x}}$ .
13. Page 143, left-hand side of (5.1.13), there should be a minus sign in front of the 1st term.
14. Page 146, right-hand side of (5.1.30), replace  $-\frac{ab}{a+b}$  by  $+\frac{ab}{a+b}$ .
15. Page 146, 1st term on the left-hand side of (5.1.32), replace  $x$  by  $x'$ .
16. Page 146, 2nd line of (5.1.32), replace the minus sign by a plus sign.
17. Page 147, 1st line of (5.1.34), replace “=  $4\delta X \delta P$ ” by “=  $4i\delta X \delta P$ ”.
18. Page 147, right-hand sides of (5.1.36), replace  $\frac{(2\pi)^{-\frac{1}{4}}}{\delta X}$  by  $\frac{(2\pi)^{-\frac{1}{4}}}{\sqrt{\delta X}}$ ; 3 occurrences.

19. Page 153, replace  $\frac{1}{2\pi}$  by  $\frac{1}{\sqrt{2\pi}}$  in (5.1.75).
20. Page 164, 2nd and 3rd lines of (5.2.24), replace  $e^{iW(\bar{p})}$  and  $e^{-iW(\bar{p})}$  by  $e^{iW(\bar{p})/\hbar}$  and  $e^{-iW(\bar{p})/\hbar}$ , respectively.
21. Page 164, last line of (5.2.25), replace  $(2ME)^{-\frac{3}{2}}$  by  $(2ME)^{\frac{3}{2}}$ .
22. Page 164, the line after (5.2.27), replace  $\phi = \frac{1}{3MF}(2ME)^{\frac{3}{2}}$  by  $\phi = \frac{1}{3MF\hbar}(2ME)^{\frac{3}{2}}$ .
23. Page 165, 2nd line of (5.3.2), replace  $-\frac{\partial}{\partial P}H$  by  $\frac{\partial}{\partial P}H$ .
24. Page 166, replace  $\frac{\hbar^2}{2M\omega}$  by  $\frac{\hbar}{2M\omega}$  in (5.3.6).
25. Page 174, the last ket in (5.3.70), on the far right, should be  $|0\rangle$  rather than  $|n\rangle$ .
26. Page 176, 1st line of (5.3.78), replace  $\left(\frac{d}{dq}\right)^n$  by  $\left(-\frac{d}{dq}\right)^n$ .
27. Page 178, replace  $\sqrt{\frac{\hbar}{2M\omega}}$  by  $\sqrt{\frac{\hbar M\omega}{2}}$ .
28. Page 192, bottom line on the right-hand side of (5.5.10), replace  $B \sin(x)$  by  $B \sin(kx)$ .
29. Page 192, 2nd equation of (5.5.11), bottom line on the right-hand side, replace  $Bk \cos(x)$  by  $Bk \cos(kx)$ .
30. Page 193, replace (5.5.15) by
 
$$\left(\frac{\kappa a}{2}\right)^2 = -\frac{2ME}{\hbar^2}\left(\frac{a}{2}\right)^2 = \underbrace{\frac{2MV_0}{\hbar^2}\left(\frac{a}{2}\right)^2}_{\equiv \theta^2} - \underbrace{\frac{2M(E+V_0)}{\hbar^2}\left(\frac{a}{2}\right)^2}_{=(ka/2)^2 = \vartheta^2} = \theta^2 - \vartheta^2.$$
31. Page 198, 1st line of (5.5.39), replace  $\left(e^{-ika/2} + r e^{ika/2}\right)$  by  $\left(e^{-ika/2} - r e^{ika/2}\right)$ .
32. Page 199, in (5.5.42) and (5.5.44) replace  $\begin{pmatrix} e^{ika} \\ r \end{pmatrix}$  by  $\begin{pmatrix} e^{-ika} \\ r \end{pmatrix}$ .
33. Page 199, in (5.5.45), replace  $(1+r)$  by  $(e^{-ika} + r)$  and  $(1-r)$  by  $(e^{-ika} - r)$ .
34. Page 200, in (5.5.46) and (5.5.47), multiply the right-hand sides by  $e^{-ika}$ .
35. Page 200, replace  $2E/V_0$  by  $4E/V_0$  in (5.5.49).

### Errata in *Simple Systems*

1. Page 40, 2nd line after (1.8.17), replace “(1.8.2).” by “(1.8.3), or of the two sides in (1.8.4).”
2. Page 40, Exercise 1-22, 1st displayed equation, replace  $e^{i(xP+pX)/\hbar}$  by  $e^{-i(xP+pX)/\hbar}$ .
3. Page 56, 2nd line of (3.1.19), replace  $x$  by  $x'$  in the last factor.

4. Page 84, right-hand side of (3.4.73), replace  $\left(\frac{x}{l} + \sqrt{2a}\right)$  by  $\left(-\frac{x}{l} + \sqrt{2a}\right)$ .
5. Page 92, Exercise 3-28, replace  $dx dp = \hbar ds s d\phi$  by  $dx dp = 2\hbar ds s d\phi$ .
6. Page 102, replace the second equation in (3.5.24) by  $-\hbar \frac{\partial}{\partial X_2} G = P_1$ .
7. Page 124, Exercise 4-12, 1st displayed equation, replace  $\frac{1}{(\sin \theta)^2} \frac{\partial^2}{\partial \theta^2}$  by  $\frac{1}{(\sin \theta)^2} \frac{\partial^2}{\partial \phi^2}$ .
8. Page 162, last term in (6.5.19), replace  $\langle m^{(0)} | H_1 | m^{(0)} \rangle$  by  $\langle m^{(0)} | H_1 | n^{(0)} \rangle$ .
9. Page 162, 6th line before (6.5.20), delete “of the” at the end of the line.
10. Page 179, 2nd line of (6.8.37), read  $p(x) = \sqrt{2M(E - V(x))}$  rather than  $p(x) = \sqrt{2ME(E - V(x))}$ .
11. Page 180, replace  $\frac{d^2}{dx^2}$  by  $\frac{d^2}{dr^2}$  in (6.8.41).

#### Errata in *Perturbed Evolution*

1. Page 4, 2nd line of (1.1.18), replace  $(a_j)$  by  $|a_j\rangle$ .
2. Page 42, last line of Exercise 1-23, replace “is a real parameter” by “is a positive real parameter”.
3. Page 44, 1st line of (1.4.50), read  $e^{-iH(t_2)T/\hbar}$  rather than  $e^{-iH(t_2)T}$ .
4. Page 54, 1st line of (2.4.8), replace  $e^{i\omega t}$  by  $e^{-i\omega t}$ .
5. Page 57, 1st line of (2.4.22), read  $\delta(E_n - E')$  rather than  $\delta(E_n - E_m)$ .
6. Page 67, 2nd line of (2.5.55), replace  $\frac{f(\omega')}{i(\omega' - \omega)}$  by  $\frac{f(\omega')}{\omega' - \omega}$ .
7. Page 88, in the figure read “out of the” rather than “out off the”.
8. Pages 89 and 90, in (3.1.17), (3.1.19), (3.1.20) as well as Exercise 3-1 replace  $\vec{j}(r, t)$  by  $\vec{j}(\vec{r}, t)$ ; 4 occurrences.
9. Page 94, right-hand side of (3.2.16), replace  $\frac{2M}{\hbar}$  by  $\frac{2M}{\hbar^2}$ .
10. Page 105, 2nd line of (3.4.19), replace  $d\kappa \kappa^2$  by  $d\kappa$ .
11. Page 114, 4th line before (3.4.57), replace  $f(\vec{k}', \vec{k})$  by  $f(\vec{k}, \vec{k})$ .
12. Page 116, right-hand side of (3.4.69), replace  $f(\vec{k}', \vec{k})$  by  $f(\vec{k}, \vec{k})$ .
13. Page 121, the line between (3.5.15) and (3.5.16), replace  $u_l(r) = r\psi_l(r)$  by  $u_l(r) = r\psi_l(kr)$ .
14. Page 132, left-hand side in the 1st line of (4.1.15), replace  $|l, m\rangle$  by  $|j, m\rangle$ .
15. Page 134, 1st line of Exercise 4-3, read  $J(J + \hbar)$  rather than  $J(J + 1)$ .
16. Page 136, 5th line before (4.2.11), replace  $|jm\rangle$  by  $|j, m\rangle$ .
17. Page 149, right-hand side of (5.2.4), replace  $g\mu_B \vec{S} \cdot \vec{B}$  by  $g\mu_B \vec{S} \cdot \vec{B}/\hbar$ .

18. Page 149, the last term in (5.2.8) should be  $(\vec{B} \times \vec{R})^2$  rather than  $(\vec{B} \times \vec{R})$ .
19. Page 150, the 2nd line of text before (5.2.10), read “from” rather than “form”.
20. Page 151, left-hand side of (5.2.14), replace  $(m_l, m_s)$  by  $(m_l, m_s)$ .
21. Page 156, the 2nd line of (6.1.7), replace  $\frac{1}{4M}\vec{P}_{\text{CM}}$  by  $\frac{1}{4M}\vec{P}_{\text{CM}}^2$ .
22. Page 176, right-hand side of (6.5.3), the 1st-column 2nd-row entry should be  $\psi_2(\vec{r}_1, s_1)$ , rather than  $\psi_1(\vec{r}_1, s_1)$ .

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