Errata for
The Feynman Lectures on Physics Volume III
Commemorative Issue

The errors in this list appear in *The Feynman Lectures on Physics: Commemorative Issue* (1989) and earlier editions; these errors have been corrected in *The Feynman Lectures on Physics: Definitive Edition* (2005).

Errors are listed in the order of their appearance in the book. Each listing consists of the errant text followed by a brief description of the error, followed by corrected text.

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III:5-15, Eq 5.37

$$\langle jT \mid \phi\rangle = \sum_j \langle jT \mid iS\rangle\langle iS \mid \phi\rangle . \tag{5.37}$$

Wrong index summed.

$$\langle jT \mid \phi\rangle = \sum_i \langle jT \mid iS\rangle\langle iS \mid \phi\rangle . \tag{5.37}$$

III:5-16, par 3

…then the coefficients $\langle jT | iS\rangle$ of (5.38) and (5.39) give the transformation connecting C_i' and C_i'.

Typographical error (unwanted tick on C_i).

…then the coefficients $\langle jT | iS\rangle$ of (5.38) and (5.39) give the transformation connecting C_i and C_i'.

III:6-8, par 1

ther words, if we rotate T from the straight line through S by the small angle ε,

Typographical error ('o' missing from first word on page).

other words, if we rotate T from the straight line through S by the small angle ε,

III:6-12, par 1

$e^{i\theta} + e^{-i\theta} = 2\cos\theta,$ and $e^{i\theta} - e^{i\theta} = 2i\sin\theta.$

Typographical error (missing '-' in rightmost exponent).

$e^{i\theta} + e^{-i\theta} = 2\cos\theta,$ and $e^{i\theta} - e^{-i\theta} = 2i\sin\theta.$

III:6-13, par 4

Finally, we rotate by the angle $(\pi/2-\phi)$ about *x*.

Wrong axis.

Finally, we rotate by the angle $(\pi/2-\phi)$ about *z*.

III:7-5, Eq 7.17

$$\frac{d\omega}{dk} = \frac{dW}{dp} = \frac{d}{dp}\left(\frac{p^2}{2M}\right) = \frac{p}{M}, \qquad (7.17)$$

Missing subscript (on W_{p}).

$$\frac{d\omega}{dk} = \frac{dW_p}{dp} = \frac{d}{dp}\left(\frac{p^2}{2M}\right) = \frac{p}{M}, \qquad (7.17)$$

III:9-12, Eq 9.50

$$P_{II} = \gamma_{II}^2 = \sin^2\left(\frac{\mu\varepsilon_0}{\hbar}\right)t. \qquad (9.50)$$

Missing norm - as per Eq. (9.49).

$$P_{II} = |\gamma_{II}|^2 = \sin^2\left(\frac{\mu\varepsilon_0}{\hbar}\right)t. \qquad (9.50)$$

III:9-13, par 5, after Eq 9.51

This γ_{11}, used with Eq. (9.40), ...

Typographical error in subscript (“11” instead of “*II*”)

This γ_{II}, used with Eq. (9.40), ...

III:10-3, Fig. 10-3 caption

(E_h = 13.6 ev.)

Typographical errors: (subscript ‘*h*’ vs. ‘*H*’, and ‘ev.’ vs’ eV.’).

(E_H = 13.6 eV.)

III:10-4, par 4

For small separations, the energies of the two "states" we imagined in Fig. 6-1 are not really equal to E_0;

Incorrect reference.

For small separations, the energies of the two "states" we imagined in Fig. 10-1 are not really equal to E_0;

III:10-9, par 3

For this state, an interchange of two electrons gives

$$\left(|2\rangle - |1\rangle\right),$$

which is $-|I\rangle$, as required.

Missing factor.

For this state, an interchange of two electrons gives

$$\frac{1}{\sqrt{2}}\left(|2\rangle - |1\rangle\right),$$

which is $-|I\rangle$, as required.

III:10-14, Eq 10.21

$$|H_{12}|^2 = \mu^2\left(B_x^2 + B^2 y\right).$$

Typographical error ('y' should be a subscript).

$$|H_{12}|^2 = \mu^2\left(B_x^2 + B_y^2\right).$$

III:10-15, par 5

Using these matrix elements in Eq. (10.16) - and canceling $-\mu B$ from the numerator and denominator - we find

Incorrect reference.

Using these matrix elements in Eq. (10.24) - and canceling $-\mu B$ from the numerator and denominator - we find

III:11-1, sidebar

Review: Chapter 35, Vol I, *Polarization*

Incorrect reference.

Review: Chapter 33, Vol I, *Polarization*

III:11-7, par 4

Looking at Table 11-3, you see that $\hat{\sigma}_x\hat{\sigma}_y$ operating on $|+\rangle$ or $|-\rangle$ gives just what you get if you operate with $\hat{\sigma}_z$ and multiply by $-i$.

Wrong sign.

Looking at Table 11-3, you see that $\hat{\sigma}_x\hat{\sigma}_y$ operating on $|+\rangle$ or $|-\rangle$ gives just what you get if you operate with $\hat{\sigma}_z$ and multiply by i.

III:11-9, par 1

We have an artificial space that we might “call the ammonia molecule representitive space”,

Typographical error (misplaced qoutes).

We have an artificial space that we might call the “ammonia molecule representitive space”,

III:11-9, par 2

(This is just a quick reminder of the classical theory of polarized light that we studied in Chapter 35, Vol. I.)

Incorrect reference.

(This is just a quick reminder of the classical theory of polarized light that we studied in Chapter 33, Vol. I.)

III:11-11, Eq. 11.35

$$\begin{aligned} |x\rangle &= \frac{1}{\sqrt{2}}\left(|R\rangle + |L\rangle\right), \\ |y\rangle &= -\frac{i}{\sqrt{2}}\left(|R\rangle - |L\rangle\right). \end{aligned} \tag{11.35}$$

Wrong sign.

$$\begin{aligned} |x\rangle &= \frac{1}{\sqrt{2}}\left(|R\rangle - |L\rangle\right), \\ |y\rangle &= -\frac{i}{\sqrt{2}}\left(|R\rangle + |L\rangle\right). \end{aligned} \tag{11.35}$$

III:11-12, par 1

The first term is just $|R\rangle$, and the second term is $e^{+i\theta}$.

Wrong sign.

The first term is just $|R\rangle$, and the second term is $e^{-i\theta}$.

III:11-21, Eq 11.63

$$\mathrm{Det}\begin{pmatrix} H_{11}-E & H_{12} & H_{13} & \cdots \\ H_{21} & H_{22}-E & H_{23} & \cdots \\ H_{31} & E_{32} & H_{33}-E & \cdots \\ \cdots & \cdots & \cdots & \cdots \end{pmatrix} = 0. \qquad (11.63)$$

Typographical error in third row second column of matrix ("E_{32}" instead of "H_{32}")

$$\mathrm{Det}\begin{pmatrix} H_{11}-E & H_{12} & H_{13} & \cdots \\ H_{21} & H_{22}-E & H_{23} & \cdots \\ H_{31} & H_{32} & H_{33}-E & \cdots \\ \cdots & \cdots & \cdots & \cdots \end{pmatrix} = 0. \qquad (11.63)$$

III:11-22, Eq 11.65

$$C_i(\mathbf{n}) = \langle i \,|\, \mathbf{n} \rangle e^{(i/\hbar)E_{\mathbf{n}}t},$$

with (11.65)

$$\langle i \,|\, \mathbf{n} \rangle = a_i(\mathbf{n}).$$

Wrong sign.

$$C_i(\mathbf{n}) = \langle i \,|\, \mathbf{n} \rangle e^{-(i/\hbar)E_{\mathbf{n}}t},$$

with (11.65)

$$\langle i \,|\, \mathbf{n} \rangle = a_i(\mathbf{n}).$$

III:11-22, Eq 11.66

$$|\psi_{\mathbf{n}}(t)\rangle = \sum_i |i\rangle a_i(\mathbf{n}) e^{-(i/\hbar)E_{\mathbf{n}}t},$$

or (11.66)

$$|\psi_{\mathbf{n}}(t)\rangle = |\mathbf{n}\rangle e^{(i/\hbar)E_{\mathbf{n}}t}.$$

Wrong sign.

$$|\psi_{\mathbf{n}}(t)\rangle = \sum_i |i\rangle a_i(\mathbf{n}) e^{-(i/\hbar)E_{\mathbf{n}}t},$$

or (11.66)

$$|\psi_{\mathbf{n}}(t)\rangle = |\mathbf{n}\rangle e^{-(i/\hbar)E_{\mathbf{n}}t}.$$

III:12-10, Eq 12.30, first line

$$Ea_1 = A\{-(\mu_e + \mu_p)B\}C_1,$$

Typographical error.

$$Ea_1 = \{A - (\mu_e + \mu_p)B\}C_1,$$

III:12-11, Fig 12-3

$$-\mu - \mu' B$$

Error in label (asymptote to energy level E_{IV}).

$$-A - \mu' B$$

III:12-12, par 5

On the other hand, the proton can have its spin down. Then its energy in the external field goes to $-\mu_p B$,

Wrong sign.

On the other hand, the proton can have its spin down. Then its energy in the external field goes to $+\mu_p B$,

III:12-13, par 3

They come from Eq. (9.23), which is

Incorrect reference.

They come from Eq. (9.24), which is

III:12-13, par 3

$$\frac{a_2}{a_3} = \frac{E - H_{22}}{H_{11}}.$$

Wrong subscript.

$$\frac{a_2}{a_3} = \frac{E - H_{22}}{H_{21}}.$$

III:13-4, Eq. 13-8

$$Ea(x_n) = E_0 a(x_{n+1}) - Aa(x_{n+1}) - Aa(x_{n-1}) \quad (13.8)$$

Wrong subscript.

$$Ea(x_n) = E_0 a(x_n) - Aa(x_{n+1}) - Aa(x_{n-1}) \quad (13.8)$$

III:13-5, par 5

According to Eq. (13.10) the smallest *k*'s correspond to low energy states - $E \approx (E_0 - 2A)$.

Incorrect reference.

According to Eq. (13.13) the smallest *k*'s correspond to low energy states - $E \approx (E_0 - 2A)$.

III:13-8, Eq. 13-26

$$E = E_{\min} + A_x a^2 k_x^2 + A_y b k_y^2 + A_z c k_z^2 \qquad (13.26)$$

Missing superscript '2' on '*b*' and on '*c*'.

$$E = E_{\min} + A_x a^2 k_x^2 + A_y b^2 k_y^2 + A_z c^2 k_z^2 \qquad (13.26)$$

III:13-10, Eq 13.28, second line

$$Ea_{-1} = E_0 a_{1-} - Aa_0 - Aa_{-2}\,.$$

Typographical error (in subscript of first term on right).

$$Ea_{-1} = E_0 a_{-1} - Aa_0 - Aa_{-2}\,.$$

III:13-11, par 2

The equations involving a_n's with $n \le 1$ are all satisfied by Eq. (13.29),

Wrong sign.

The equations involving a_n's with $n \le -1$ are all satisfied by Eq. (13.29),

III:13-12, par 3

We can get this solution, however, if we permit the trial solution we took in Eq. (13.15) to have an imaginary number for *k*.

Incorrect reference.

We can get this solution, however, if we permit the trial solution we took in Eq. (13.10) to have an imaginary number for *k*.

III:13-12, par 4

The remaining three equations in Eq. (13.28) are satisfied if $c = c'$ and if κ is chosen such that

a_0 has not been specified.

The remaining three equations in Eq. (13.28) are satisfied if $a_0 = c = c'$ and if κ is chosen such that

III:14-6, Eq 14.6

$$\boldsymbol{j} = N_n \boldsymbol{v}_{drift} q_n \boldsymbol{\mathcal{E}} = \frac{N_n q_n^2 \tau_n}{m_n} \boldsymbol{\mathcal{E}}. \tag{14.6}$$

Extra factor $\boldsymbol{\mathcal{E}}$ (see Eq 14.5).

$$\boldsymbol{j} = N_n \boldsymbol{v}_{drift} q_n = \frac{N_n q_n^2 \tau_n}{m_n} \boldsymbol{\mathcal{E}}. \tag{14.6}$$

III:14-9, par 1

Because of the potential gradient at the junction, the positive carriers have to climb up a potential hill to get to the *p*-type side.

Wrong side of junction (see first paragraph of Section 14-5).

Because of the potential gradient at the junction, the positive carriers have to climb up a potential hill to get to the *n*-type side.

III:15-3, Eq 15.8

$$H_{n,n} = A;$$

Missing factor '2' (see Eq. 15.7)

$$H_{n,n} = 2A;$$

III:15-5, Eq 15.21

$$a_{m,n} = \exp^{[ik_c(x_m+x_n)]} \sin k\left|x_m - x_n\right|, \qquad (15.21)$$

Argument to exp should not be superscript.

$$a_{m,n} = \exp[ik_c(x_m + x_n)]\sin k\left|x_m - x_n\right|, \qquad (15.21)$$

III:15-6, par 3

Any linear combination of (15.15) and (15.23) is also a good solution, and has an energy still given by Eq. (15.19).

Incorrect reference.

Any linear combination of (15.18) and (15.23) is also a good solution, and has an energy still given by Eq. (15.19).

III:15-6, par 3

The solution we should have chosen - because of our symmetry requirement - is just the sum of (15.15) and 15.23):

Incorrect reference.

The solution we should have chosen - because of our symmetry requirement - is just the sum of (15.18) and 15:23):

III:15-11, Eq 15.31

$$E = 2(E_0 - 1.618A) + 2(E_0 - 0.618A) = 4(E_0 - A) - 0.477A. \qquad (15.31)$$

Typographical error ('7' vs. '2').

$$E = 2(E_0 - 1.618A) + 2(E_0 - 0.618A) = 4(E_0 - A) - 0.472A. \qquad (15.31)$$

III:15-13, par 2

Nuclei containg protons in these numbers are also especially stable.

Typographical error ('containg' vs. ' containing').

Nuclei containing protons in these numbers are also especially stable.

III:16-8, par 1

(More precisily, σ is equal to...

Misspelling ('precisily' vs. 'precisely').

(More precisely, σ is equal to...

III:16-8, Eq 16.32

$$\phi(p) = \left(2\pi\eta^2\right)^{-1/4} e^{-p^2/4\eta^2},$$

Incorrect normalization (see Eqs 16.22, 16.31)

$$\phi(p) = \left(\eta^2/2\pi\hbar^2\right)^{-1/4} e^{-p^2/4\eta^2},$$

III:16-9, par 2

This is a quantatative statement of the Heisenberg uncertainty principle,

Misspelling (‘quantatative’ vs ‘quantitative’).

This is a quantitative statement of the Heisenberg uncertainty principle,

III:16-10, par 1

Then Eq. (16.36) would read as follows:

Incorrect reference.

Then Eq. (16.38) would read as follows:

III:16-12, par 2

According to Eq. (16.51), the rate of change of the ψ at x would depend on ...

Unwanted extra word “the”.

According to Eq. (16.51), the rate of change of ψ at x would depend on ...

III:16-12, par 2

This means - as we saw in the example of the chain of atoms at the beginning of the chapter, Eq. (16.12) - that the right hand side of Eq. (16.15) can be expressed completely in terms of ψ and the derivitives of ψ with respect to x, all evaluated at the postion x.

Incorrect reference.

This means - as we saw in the example of the chain of atoms at the beginning of the chapter, Eq. (16.12) - that the right hand side of Eq. (16.51) can be expressed completely in terms of ψ and the derivitives of ψ with respect to x, all evaluated at the postion x.

III:16-13, par 2

$$H(x,x') = \left\{ -\frac{\hbar^2}{2m}\frac{d^2}{dx^2} + V(x) \right\} \delta(x-x) .$$

Missing prime on 'x'.

$$H(x,x') = \left\{ -\frac{\hbar^2}{2m}\frac{d^2}{dx^2} + V(x) \right\} \delta(x-x') .$$

III:16-14, Eq 16.55

$$-i\hbar \frac{\partial \psi(\boldsymbol{r}_1, \boldsymbol{r}_2, \boldsymbol{r}_3, \ldots)}{\partial t} = \sum_i \frac{\hbar^2}{2m_i} \left\{ \frac{\partial^2 \psi}{\partial x_i} + \frac{\partial^2 \psi}{\partial y_i} + \frac{\partial^2 \psi}{\partial x_i} \right\} + V(\boldsymbol{r}_1, \boldsymbol{r}_1, \ldots)\psi . \quad (16.55)$$

All of the second derivitives are missing exponents in their denominators.
x_i appears where z_i should appear.
$\boldsymbol{r}_1$ appears where $\boldsymbol{r}_2$ should appear (on right).

$$-i\hbar \frac{\partial \psi(\boldsymbol{r}_1, \boldsymbol{r}_2, \boldsymbol{r}_3, \ldots)}{\partial t} = \sum_i \frac{\hbar^2}{2m_i} \left\{ \frac{\partial^2 \psi}{\partial x_i^2} + \frac{\partial^2 \psi}{\partial y_i^2} + \frac{\partial^2 \psi}{\partial z_i^2} \right\} + V(\boldsymbol{r}_1, \boldsymbol{r}_2, \ldots)\psi . \quad (16.55)$$

III:17-1, par 1

In classical physics there are a number of quantities which are *conserved* — such a momentum, energy, and angular momentum.

Typographical error ('a' vs. 'as').

In classical physics there are a number of quantities which are *conserved* — such as momentum, energy, and angular momentum.

III:17-5, par 2

So *if the inversion operator is a symmetry operation* of a state, there are only two possibilities for δ:

Incorrect statement.

So *if the inversion operator is a symmetry operation* of a state, there are only two possibilities for $e^{i\delta}$:

III:17-5, Eq 17.16

$$\left|\psi_0'\right\rangle = \hat{P}\left|\psi_0 = e^{i\delta}\left|\psi_0\right\rangle . \qquad (17.16)$$

Typographical error (missing bracket).

$$\left|\psi_0'\right\rangle = \hat{P}\left|\psi_0\right\rangle = e^{i\delta}\left|\psi_0\right\rangle . \qquad (17.16)$$

III:17-9, par 3

$$\hat{R}_z(\Delta\phi) = e^{im\Delta\phi}\left|\psi_0\right\rangle = (1 + im\Delta\phi)\left|\psi_0\right\rangle .$$

Missing state vector.

$$\hat{R}_z(\Delta\phi)\left|\psi_0\right\rangle = e^{im\Delta\phi}\left|\psi_0\right\rangle = (1 + im\Delta\phi)\left|\psi_0\right\rangle .$$

III:17-13, Fig 17-9

Amplitude a $\cos\theta/2$ Amplitude -b $\cos\theta/2$

Wrong function ('sin' vs. 'cos').

Amplitude a $\cos\theta/2$ Amplitude -b $\sin\theta/2$

III:17-14, par 2

Each of the terms in (17-33) and (17-34) …

Typographical errors.

Each of the terms in (17.33) and (17.34) …

III:17-14, par 3

—in say, the y z-plane of the disintegration of Fig. 17-7.

Typographical errors.

—in, say, the yz-plane of the disintegration—of Fig. 17-7.

III:17-14, footnote

†Remembering that the spin is an axial vector and flips over in the reflection.

Incorrect statement.

†Remembering that the spin is an axial vector and doesn't flip over in the reflection.

III:18-4, par 3

The results (18.17) and (18.18) correspond exactly to the classical theory of light scattering we gave in Vol I, Section 32-6,

Incorrect reference (there is no Section 32-6 in Vol I).

The results (18.17) and (18.18) correspond exactly to the classical theory of light scattering we gave in Vol I, Section 32-5,

III:18-5, par 4

The position is the antiparticle of the electron;

Typographical error ('position' vs. 'positron').

The positron is the antiparticle of the electron;

III:18-6, par 1

we will choose for our description right and left circular polarization - always with respect to the direction of motion.

Missing footnote dagger.

we will choose for our description right and left circular polarization - always with respect to the direction of motion.†

III:18-9, par 2

We have already discussed the key to this "paradox" in our very first lecture on quantum mechanical behavior in Chapter 35, Vol. I.

Incorrect reference.

We have already discussed the key to this "paradox" in our very first lecture on quantum mechanical behavior in Chapter 37, Vol. I. †

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†See also Chapter 1 of the present volume.

III:18-9, par 2

But it was precisely the point of Chapter 35, Vol. I, to point out right at the beginning that this is not so in Nature.

Incorrect reference.

But it was precisely the point of Chapter 37, Vol. I, to point out right at the beginning that this is not so in Nature.

III:18-16, Eq 18.48

$$\left| J=\frac{3}{2}, M=\frac{1}{2} \right\rangle = \sqrt{2/3}\left| \mathrm{e},+\frac{1}{2};\mathrm{d},0 \right\rangle + \sqrt{1/3}\left| \mathrm{e},-\frac{1}{2};\mathrm{d},1 \right\rangle . \tag{18.48}$$

Typographical errors (two missing '+'s).

$$\left| J=\frac{3}{2}, M=+\frac{1}{2} \right\rangle = \sqrt{2/3}\left| \mathrm{e},+\frac{1}{2};\mathrm{d},0 \right\rangle + \sqrt{1/3}\left| \mathrm{e},-\frac{1}{2};\mathrm{d},+1 \right\rangle . \tag{18.48}$$

III:18-16, Table 18-5, row 2

$$\left|J=\frac{3}{2},M=+\frac{1}{2}\right\rangle=\sqrt{2/3}\left|\mathrm{e},+\frac{1}{2};\mathrm{d},0\right\rangle+\sqrt{1/3}\left|\mathrm{e},-\frac{1}{2};\mathrm{d},1\right\rangle$$

Typographical error (missing '+').

$$\left|J=\frac{3}{2},M=+\frac{1}{2}\right\rangle=\sqrt{2/3}\left|\mathrm{e},+\frac{1}{2};\mathrm{d},0\right\rangle+\sqrt{1/3}\left|\mathrm{e},-\frac{1}{2};\mathrm{d},+1\right\rangle$$

III:18-17, Eq. 18-54

$$\begin{aligned}\left|J=\frac{1}{2},M=\frac{1}{2}\right\rangle&=\sqrt{1/3}\left|\mathrm{e},+\frac{1}{2};\mathrm{d},0\right\rangle-\sqrt{2/3}\left|\mathrm{e},-\frac{1}{2};\mathrm{d},+1\right\rangle,\\ \left|J=\frac{1}{2},M=-\frac{1}{2}\right\rangle&=\sqrt{2/3}\left|\mathrm{e},+\frac{1}{2};\mathrm{d},-1\right\rangle-\sqrt{1/3}\left|\mathrm{e},-\frac{1}{2};\mathrm{d},0\right\rangle.\end{aligned}\tag{18.54}$$

Typographical error (missing '+').

$$\begin{aligned}\left|J=\frac{1}{2},M=+\frac{1}{2}\right\rangle&=\sqrt{1/3}\left|\mathrm{e},+\frac{1}{2};\mathrm{d},0\right\rangle-\sqrt{2/3}\left|\mathrm{e},-\frac{1}{2};\mathrm{d},+1\right\rangle,\\ \left|J=\frac{1}{2},M=-\frac{1}{2}\right\rangle&=\sqrt{2/3}\left|\mathrm{e},+\frac{1}{2};\mathrm{d},-1\right\rangle-\sqrt{1/3}\left|\mathrm{e},-\frac{1}{2};\mathrm{d},0\right\rangle.\end{aligned}\tag{18.54}$$

III:18-17, par 2

...by writing out the deuterium parts in terms of the neutron and proton states—using Table 18-3.

Incorrect reference.

...by writing out the deuterium parts in terms of the neutron and proton states——using Table 18-4.

III:18-17, par 2

The first state in (18.53) is … (18.55)

Incorrect reference.

The first state in (18.52) is … (18.55)

III:18-17, par 2

The M = - ½ state which corresponds to (18.57) can be written down (by changing the proper + ½ 's to - ½ 's) to get … (18.57)

Incorrect reference.

The M = - ½ state which corresponds to (18.53) can be written down (by changing the proper + ½'s to - ½'s) to get … (18.57)

III:18-17, par 3

The set of equations in Table 18-5 means that if the coordinates are rotated about, say, the y-axis - so that the states of the spin one-half particle and of the spin one particle change according to Table 18-1 and Table 18-2 -

Incorrect references (to two Tables).

The set of equations in Table 18-5 means that if the coordinates are rotated about, say, the y-axis - so that the states of the spin one-half particle and of the spin one particle change according to Table 17-1 and Table 17-2 -

III:18-20, par 1

The state with $m = j$ would be $\left| + + + \ldots + \right\rangle$ (with j plus signs).

Missing factor '2'.

The state with $m = j$ would be $\left| + + + \ldots + \right\rangle$ (with $2j$ plus signs).

III:18-20, par 2

It will help us to keep track of things if we write

$$\left| j,m \right\rangle = \left| \begin{matrix} r \\ s \end{matrix} \right\rangle \tag{18.62}$$

where, using the equalities of (18.67)

$r = j + m, \qquad s = j - m.$

Incorrect reference.

It will help us to keep track of things if we write

$$\left| j,m \right\rangle = \left| \begin{matrix} r \\ s \end{matrix} \right\rangle \tag{18.62}$$

where, using the equalities of (18.61)

$r = j + m, \qquad s = j - m.$

III:18-21, Eq 18.65

$$\ldots = \left[\frac{(r+s)!}{r!s!} \right]^{1/2} \left\{ \left| + \right\rangle C + \left| - \right\rangle S)^r (\left| - \right\rangle C - \left| + \right\rangle S^s \right\}_{\text{perm}} . \tag{18.65}$$

Two parentheses are missing.

$$\ldots = \left[\frac{(r+s)!}{r!s!} \right]^{1/2} \left\{ (\left| + \right\rangle C + \left| - \right\rangle S)^r (\left| - \right\rangle C - \left| + \right\rangle S)^s \right\}_{\text{perm}} . \tag{18.65}$$

III:18-21, par 3

Comparing (18.39) with (18.37) - and remembering that $r' + s' = r + s$ - we see that $B_{r'}$ is just the coefficient of $a^{r'}b^{s'}$ in the following expression: … (18.70)

Two incorrect references.

Comparing (18.65) with (18.67) - and remembering that $r' + s' = r + s$ - we see that $B_{r'}$ is just the coefficient of $a^{r'}b^{s'}$ in the following expression: … (18.70)

III:18-21, par 4

Making these substitutions, we get Eq. (18.34) in Section 18-4.

Incorrect reference.

Making these substitutions, we get Eq. (18.35) in Section 18-4.

III:19-5, par 2

If it just happened by luck that α were equal to 1/*n* where ***n*** is any integer,

Typographical error ('*n*' should not be bold)

If it just happened by luck that α were equal to 1/*n* where *n* is any integer,

III:19-7, Eq 19.31

$$\langle l,0|R_y(\phi)R_z(\phi)|l,m\rangle. \qquad (19.31)$$

Typographical error ('ϕ' vs. 'θ')

$$\langle l,0|R_y(\theta)R_z(\phi)|l,m\rangle. \qquad (19.31)$$

III:19-7, par 4

For the general case you would start with the state $|l,m\rangle$ and operate with $R_z(\phi)$ to get the new state $R_z(\phi)|l,m\rangle$. Then you operate on this state with $R_y(\theta)$ to get the state $R_y(\theta)R_z(\phi)|l,m\rangle$ (which is just $e^{im\phi}|l,m\rangle$).

Transcription error (?) - misplaced parenthetical expression.

For the general case you would start with the state $|l,m\rangle$ and operate with $R_z(\phi)$ to get the new state $R_z(\phi)|l,m\rangle$ (which is just $e^{im\phi}|l,m\rangle$). Then you operate on this state with $R_y(\theta)$ to get the state $R_y(\theta)R_z(\phi)|l,m\rangle$.

III:19-7, Eq 19.35

$$\psi_{l,m}(\boldsymbol{r}) = Y_{l,m}(\theta,\phi)F_l(r) \ . \tag{19.35}$$

Missing factor 'a'.

$$\psi_{l,m}(\boldsymbol{r}) = a\,Y_{l,m}(\theta,\phi)F_l(r) \ . \tag{19.35}$$

III:19-8, Eq 19.36

$$\langle 1,0|R_y(\theta)R_z(\phi)|1,-1\rangle = -\frac{1}{\sqrt{2}}\sin\theta e^{i\phi} \,,$$

Wrong sign (see Table 19-1).

$$\langle 1,0|R_y(\theta)R_z(\phi)|1,-1\rangle = \frac{1}{\sqrt{2}}\sin\theta e^{i\phi} \,,$$

III:19-9, Table 19-1, 3rd before last row, 3rd column

$$l,0|R_y(\theta)R_z(\phi)|l,m$$

Missing brackets.

$$\langle l,0|R_y(\theta)R_z(\phi)|l,m\rangle$$

III:19-9, par 3

Notice, incidentally, that all the functions for a given l have the property that that they have the same parity—

Typographical error (repeated 'that').

Notice, incidentally, that all the functions for a given l have the property that they have the same parity—

III:19-10, Eq 19.39

$$\ldots = -\left[\frac{r^2}{F_l}\left\{\frac{1}{r}\frac{d^2}{dr^2}(rF_l) + \frac{2m}{\hbar^2}\left(E + \frac{e^2}{r}\right)\right\}\right]Y_{l.m} \qquad (19.39)$$

Missing factor F_l.

$$\ldots = -\left[\frac{r^2}{F_l}\left\{\frac{1}{r}\frac{d^2}{dr^2}(rF_l) + \frac{2m}{\hbar^2}\left(E + \frac{e^2}{r}\right)F_l\right\}\right]Y_{l.m} \qquad (19.39)$$

III:19-10, Eq 19.40

$$\frac{1}{\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta\frac{\partial Y_{l.m}}{\partial\theta}\right) + \frac{1}{\sin^2\theta}\frac{\partial^2}{\partial\theta^2} = -K_l Y_{l.m} \qquad (19.40)$$

Second term on left is wrong.

$$\frac{1}{\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta\frac{\partial Y_{l.m}}{\partial\theta}\right) + \frac{1}{\sin^2\theta}\frac{\partial^2 Y_{l.m}}{\partial\phi^2} = -K_l Y_{l.m} \qquad (19.40)$$

III:19-10, par 3

The matrix element for $R_y(\theta)$ is also quite simple:

$$\langle l,0|R_y(\theta)|l,l\rangle = b(\sin\theta)^l$$

where ***b*** is some number.†

Typographical error ('b' should not be bold).

The matrix element for $R_y(\theta)$ is also quite simple:

$$\langle l,0|R_y(\theta)|l,l\rangle = b(\sin\theta)^l$$

where b is some number. †

III:19-10, footnote

The amplitude for that is $\left(\cos\theta/2\sin\theta/2\right)^l$ which is the same as $\sin^l\theta$.

Incorrect statement..

The amplitude for that is $\left(\cos\theta/2\sin\theta/2\right)^l$ which is proportional to $\sin^l\theta$.

III:19-11, par 3

The only difference is that $l\left(l+1\right)\hbar$ appears for the angular momentum instead of $l^2\hbar^2$ as we might expect.

Typographical error (missing exponent - see Eq 19.46).

The only difference is that $l\left(l+1\right)\hbar^2$ appears for the angular momentum instead of $l^2\hbar^2$ as we might expect.

III:19-11, Eq 19.48

$$-l\left(l+1\right)\left\{\frac{a_1}{\rho}-\sum_{k=1}^{\infty}a_{k+1}\rho^{k-1}\right\}. \tag{19.48}$$

Wrong sign (see Eq 19.47).

$$-l\left(l+1\right)\left\{\frac{a_1}{\rho}+\sum_{k=1}^{\infty}a_{k+1}\rho^{k-1}\right\}. \tag{19.48}$$

III:19-12, par 4

they are labeled by the *principle quantum number n*—

Misspelling (‘*principle*’ vs. ‘*principal*’)

they are labeled by the *principal quantum number n*—

III:19-12, par 5

The lowest energy, or ground, state is an *s*-state. It has $l = 0$, $n = 0$, and $m = 0$.

Wrong principal quantum number.

The lowest energy, or ground, state is an *s*-state. It has $l = 0$, $n = 1$, and $m = 0$.

III:19-12, par 5

The amplitude to find the electron is a maximum at the center, and falls of monatonically with increasing distance from the center.

Misspelling ("monatonically").

The amplitude to find the electron is a maximum at the center, and falls of monotonically with increasing distance from the center.

III:19-13, Fig 19-7

```
-13.6 ev |  --------------------------------------- 1
              s       p       d       f
          ℓ = 1       2       3       4
```

Total angular momentm numbers (labelling the figure's columns) are off by 1.

```
-13.6 ev |  --------------------------------------- 1
              s       p       d       f
          ℓ = 0       1       2       3
```

III:19-16, par 6

As we described earlier - and illustrated in Fig. 19-7 - the higher angular momentum states get pushed up in energy.

Incorrect reference.

As we described earlier - and illustrated in Fig. 19-8 - the higher angular momentum states get pushed up in energy.

III:19-17, par 2

The energies of the 3*p* and 4*s* are so close together that small effects can shift the balance either way.

Typographical error ('*p*' vs. '*d*').

The energies of the 3*d* and 4*s* are so close together that small effects can shift the balance either way.

III:20-2, par 2

$$c_y = a_z b_x - a_x b_y$$

Typographical error (b_y vs. b_z)

$$c_y = a_z b_x - a_x b_z$$

III:20-2, par 2

So long as you have in mind some set A_{ij}, Eq. (20.2) means just the same as Eq. (20.3).

Transcription error(?).

So long as you have in mind some set $|i\rangle$, Eq. (20.2) means just the same as Eq. (20.3).

III:20-5, par 3

Equation (19.18) says that for *any* set of base states $|i\rangle$, the average energy can be calculated from … (20.19)

Incorrect reference.

Equation (20.18) says that for *any* set of base states $|i\rangle$, the average energy can be calculated from … (20.19)

III:20-6, Eq 20.21

$$A_{av} = \langle \psi | \phi \rangle, \qquad (20.21)$$

Typographical error (missing brackets).

$$\langle A \rangle_{av} = \langle \psi | \phi \rangle, \qquad (20.21)$$

III:20-7, Eq 20.30

$$\langle E \rangle_{av} = \int \psi(\boldsymbol{r}) \hat{\mathcal{H}} \psi(\boldsymbol{r})\, d\,\text{Vol}, \qquad (20.30)$$

Typographical error (missing '*').

$$\langle E \rangle_{av} = \int \psi^*(\boldsymbol{r}) \hat{\mathcal{H}} \psi(\boldsymbol{r})\, d\,\text{Vol}, \qquad (20.30)$$

III:20-8, par 4

Our equation for $\langle x \rangle_{av}$ has the same form as Eq. (20.33).

Incorrect reference.

Our equation for $\langle x \rangle_{av}$ has the same form as Eq. (20.28).

III:20-8, par 4

First let's expand $\langle \psi | \phi \rangle$ in the *x*-representation. It is … (20.37)

Typographical error (ϕ vs. α)

First let's expand $\langle \psi | \alpha \rangle$ in the *x*-representation. It is … (20.37)

III:20-10, par 3

If we start by saying that $\langle p \rangle_{\text{av}}$ is given by Eq. (20.48) we can expand that equation in terms of the *p*-representation to get back to Eq. (20.45).

Incorrect reference.

If we start by saying that $\langle p \rangle_{\text{av}}$ is given by Eq. (20.48) we can expand that equation in terms of the *p*-representation to get back to Eq. (20.46).

III:20-10, par 3

If we are given the *p*-description of the state - namely the amplitude $\langle p | \psi \rangle$, which is an algebraic function of the momentum *p* - we can get $\langle p | \phi \rangle$ from Eq. (20.47) and proceed to evaluate the integral.

Typographical error (β vs. ϕ)

If we are given the *p*-description of the state - namely the amplitude $\langle p | \psi \rangle$, which is an algebraic function of the momentum *p* - we can get $\langle p | \beta \rangle$ from Eq. (20.47) and proceed to evaluate the integral.

III:20-10, par 6

The derivative of $e^{-ipx\hbar}$ with respect to *x* is…

Missing division sign (in exponent).

The derivative of $e^{-ipx/\hbar}$ with respect to *x* is…

III:20-11, par 2

When we asked for the average energy of the state $|\psi\rangle$ we said it was

$$\langle E\rangle_{av} = \langle\psi|\phi\rangle, \text{ with } |\phi_1\rangle = \hat{H}|\psi\rangle.$$

Typographical error (unwanted subscript on ϕ)

When we asked for the average energy of the state $|\psi\rangle$ we said it was

$$\langle E\rangle_{av} = \langle\psi|\phi\rangle, \text{ with } |\phi\rangle = \hat{H}|\psi\rangle.$$

III:20-11, par 2

Here $\hat{\mathcal{H}}$ is an *algebraic* operator which works a function of *x*.

Missing word 'on'.

Here $\hat{\mathcal{H}}$ is an *algebraic* operator which works on a function of *x*.

III:20-11, par 2

In the coordinate world the equivalent equations were

$$\langle p\rangle_{av} = \int \psi(x)\beta(x)dx, \text{ with } \beta(x) = \frac{\hbar}{i}\frac{d}{dx}\psi(x).$$

Typographical error (missing '*').

In the coordinate world the equivalent equations were

$$\langle p\rangle_{av} = \int \psi^*(x)\beta(x)dx, \text{ with } \beta(x) = \frac{\hbar}{i}\frac{d}{dx}\psi(x).$$

III:20-14, par 1

(Remember, this definition applies only to a state $|\psi\rangle$ which has no internal spin variables, but depends only on the coordinates $\boldsymbol{r}$ = *x,y,x*.)

Typographical error (' *x* ' vs. ' *z*').

(Remember, this definition applies only to a state $|\psi\rangle$ which has no internal spin variables, but depends only on the coordinates $\boldsymbol{r}$ = *x,y,z*.)

III:20-14, Eq 20.68

$$\psi'(r)=\left(1+\frac{i}{\hbar}\varepsilon\hat{\mathcal{L}}_z\right)\psi(x). \qquad (20.68)$$

Two typographical errors (first 'r' should be bold, 'x' should be '$\boldsymbol{r}$').

$$\psi'(\boldsymbol{r})=\left(1+\frac{i}{\hbar}\varepsilon\hat{\mathcal{L}}_z\right)\psi(\boldsymbol{r}). \qquad (20.68)$$

III:20-14, par 2

$$\psi'(x,y,z)=\psi(x+\varepsilon y,y-\varepsilon x,z)=\psi(x,y,z)+\varepsilon y\frac{\partial\psi}{\partial x}-\varepsilon x\frac{\partial\psi}{\partial y}$$

Wrong signs (see Eqs 20.68 and 20.69)

$$\psi'(x,y,z)=\psi(x-\varepsilon y,y+\varepsilon x,z)=\psi(x,y,z)-\varepsilon y\frac{\partial\psi}{\partial x}+\varepsilon x\frac{\partial\psi}{\partial y}$$

III:20-15, par 1

$$x\mathcal{P}_x\psi(x)-\hat{\mathcal{P}}_x x\psi(x),$$

Typographical error (missing hat).

$$x\hat{\mathcal{P}}_x\psi(x)-\hat{\mathcal{P}}_x x\psi(x),$$

III:20-15, par 1

$$x\frac{\hbar}{i}\frac{\partial}{\partial\psi}\psi(x)-\frac{\hbar}{i}\frac{\partial}{\partial x}x\psi(x).$$

Typographical error ('ψ' vs. 'x').

$$x\frac{\hbar}{i}\frac{\partial}{\partial x}\psi(x)-\frac{\hbar}{i}\frac{\partial}{\partial x}x\psi(x).$$

III:20-15, par 1

If Plank's constant were zero,

Misspelling ('Plank' vs. 'Planck').

If Planck's constant were zero,

III:20-16, Eq 20.79

$$i\hbar\frac{dC_i}{dt}=\sum_{ij}H_{ij}C_j\ . \qquad (20.79)$$

Typographical error (wrong index summed)

$$i\hbar\frac{dC_i}{dt}=\sum_{j}H_{ij}C_j\ . \qquad (20.79)$$

III:20-16, Eq 20.81

$$\frac{d}{dt}\langle A\rangle_{av}=\left(\frac{d}{dt}\langle\psi|\right)\hat{A}|\psi+\langle\psi|\hat{A}\left(\frac{d}{dt}|\psi\rangle\right). \qquad (20.81)$$

Typographical error (missing bracket)

$$\frac{d}{dt}\langle A\rangle_{av}=\left(\frac{d}{dt}\langle\psi|\right)\hat{A}|\psi\rangle+\langle\psi|\hat{A}\left(\frac{d}{dt}|\psi\rangle\right). \qquad (20.81)$$

III:20-16, par 2

Finally, using the two equations (20.78) and (20.79) to replace the derivatives, we get

Incorrect reference.

Finally, using the two equations (20.78) and (20.80) to replace the derivatives, we get

III:20-16, par 4

$$\hat{\mathcal{H}}x - x\hat{\mathcal{H}} = \left\{\frac{\hbar^2}{2m}\frac{d^2}{dx^2} + V(x)\right\}x - x\left\{\frac{\hbar^2}{2m}\frac{d^2}{dx^2} + V(x)\right\}.$$

Wrong signs (see Table 20-1).

$$\hat{\mathcal{H}}x - x\hat{\mathcal{H}} = \left\{-\frac{\hbar^2}{2m}\frac{d^2}{dx^2} + V(x)\right\}x - x\left\{-\frac{\hbar^2}{2m}\frac{d^2}{dx^2} + V(x)\right\}.$$

III:20-16, par 4

… you end up after a little work with

$$-\frac{\hbar^2}{2m}\frac{d\psi}{dx}.$$

Off by a factor of 2.

… you end up after a little work with

$$-\frac{\hbar^2}{m}\frac{d\psi}{dx}.$$

III:20-17, Eq 20.85

$$\hat{H}\hat{x} = \hat{x}\hat{H} = -i\frac{\hbar}{m}p_x \qquad (20.85)$$

Typographical error ('=' vs. '-')

$$\hat{H}\hat{x} - \hat{x}\hat{H} = -i\frac{\hbar}{m}p_x \qquad (20.85)$$

III:20-17, par 2

… and you find that

$$\hat{\mathcal{H}}\hat{\mathcal{P}} - \hat{\mathcal{P}}\hat{\mathcal{H}} = -i\hbar\frac{dV}{dx}$$

Wrong sign.

… and you find that

$$\hat{\mathcal{H}}\hat{\mathcal{P}} - \hat{\mathcal{P}}\hat{\mathcal{H}} = i\hbar\frac{dV}{dx}$$

III:20-17, par 3

Quantum mechanics has the essential difference that $\hat{p}\hat{x}$ is not equal to $\hat{x}\hat{p}$. They differ by a little bit - by the small number $\hbar$.

Transcription error (?).

Quantum mechanics has the essential difference that $\hat{p}\hat{x}$ is not equal to $\hat{x}\hat{p}$. They differ by a little bit - by the small number $i\hbar$.

III:20-17, par 4

Heisenberg, on the other hand, found that nature could be described by classical equations, except that $xp - px$ should be equal to $\hbar/i$,

Wrong sign.

Heisenberg, on the other hand, found that nature could be described by classical equations, except that $xp - px$ should be equal to $i\hbar$,

III:21-2, Eq. 21.1

$$\langle b \mid a \rangle_{\text{in } A} = \langle b \mid a \rangle_{A=0} \cdot \exp\left\{ \frac{iq}{\hbar} \int_a^b \boldsymbol{A} \cdot d\boldsymbol{s} \right\}. \qquad (21.1)$$

Braces used where brackets should be used.

$$\langle b \mid a \rangle_{\text{in } A} = \langle b \mid a \rangle_{A=0} \cdot \exp\left[\frac{iq}{\hbar} \int_a^b \boldsymbol{A} \cdot d\boldsymbol{s} \right]. \qquad (21.1)$$

III:21-2, par 3

the amplitude to jump will be altered from what it was before by a factor $\exp\left(iq/\hbar A_x b\right)$,

Missing brackets, misplaced parentheses.

the amplitude to jump will be altered from what it was before by a factor $\exp\left[\left(iq/\hbar\right) A_x b\right]$,

III:21-2, par 4

So $(iq/\hbar)$ times the integral is just $bf(x+b/2)$.

Missing factor 'i'.

So $(iq/\hbar)$ times the integral is just $ibf(x+b/2)$.

III:21-2, par 5

Now we know that if the function $C(x)$ is smooth enough (we take the long wavelength limit), and if we let the atoms get close together, Eq. (16.4) will approach the behavior of an electron in free space.

Incorrect reference.

Now we know that if the function $C(x)$ is smooth enough (we take the long wavelength limit), and if we let the atoms get close together, Eq. (21.4) will approach the behavior of an electron in free space.

III:21-3, par 2

$$Kb^2 = \frac{\hbar}{m_{\text{eff}}}.$$

The equation is incorrect (see Eq 13.20).

$$Kb^2 = \frac{\hbar^2}{2m_{\text{eff}}}.$$

III:21-4, Eq 21.10

$$\begin{aligned}\frac{\partial P}{\partial t} = -\frac{i}{\hbar}\psi^* \frac{1}{2m}\left(\frac{\hbar}{i}\nabla - q\boldsymbol{A}\right)\cdot\left(\frac{\hbar}{i}\nabla - q\boldsymbol{A}\right)\psi + e\phi\psi^*\psi \\ -\psi\frac{1}{2m}\left(\frac{\hbar}{i}\nabla + q\boldsymbol{A}\right)\cdot\left(\frac{\hbar}{i}\nabla + q\boldsymbol{A}\right)\psi^* - e\phi\psi\psi^*\end{aligned}. \qquad (21.10)$$

A variable 'e' is introduced without being defined ($e = -iq/\hbar$). The third term on the right is off by a factor $-i/\hbar$.

$$\begin{aligned}\frac{\partial P}{\partial t} = -\frac{i}{\hbar}\Big[\psi^* \frac{1}{2m}\left(\frac{\hbar}{i}\nabla - q\boldsymbol{A}\right)\cdot\left(\frac{\hbar}{i}\nabla - q\boldsymbol{A}\right)\psi + q\phi\psi^*\psi \\ +\psi\frac{1}{2m}\left(\frac{\hbar}{i}\nabla + q\boldsymbol{A}\right)\cdot\left(\frac{\hbar}{i}\nabla + q\boldsymbol{A}\right)\psi^* - q\phi\psi\psi^*\Big]\end{aligned}. \qquad (21.10)$$

III:21-4, Eq 21.11

$$\frac{\partial P}{\partial t} = -\nabla \cdot \left\{ \frac{1}{2m} \psi^* \left(\frac{\hbar}{i} \nabla - q\boldsymbol{A} \right) \psi + \psi \left(-\frac{\hbar}{i} \nabla - q\boldsymbol{A} \right) \psi^* \right\}. \qquad (21.11)$$

The second term on the right is off by a factor $\frac{1}{2m}$.

$$\frac{\partial P}{\partial t} = -\nabla \cdot \left\{ \frac{1}{2m} \psi^* \left(\frac{\hbar}{i} \nabla - q\boldsymbol{A} \right) \psi + \frac{1}{2m} \psi \left(-\frac{\hbar}{i} \nabla - q\boldsymbol{A} \right) \psi^* \right\}. \quad (21.11)$$

III:21-4, par 2

Equation (21.10) shows that the probability is conserved locally.

Incorrect reference.

Equation (21.11) shows that the probability is conserved locally.

III:21-4, par 2

If ψ is zero at the surface, Eq. (21.10) says that $\boldsymbol{J}$ is zero,

Incorrect reference.

If ψ is zero at the surface, Eq. (21.12) says that $\boldsymbol{J}$ is zero,

III:21-6, par 1

When Schrödinger first discovered his equation he discovered the conservation law of Eq. (21.9) as a consequence of his equation.

Incorrect reference.

When Schrödinger first discovered his equation he discovered the conservation law of Eq. (21.8) as a consequence of his equation.

III:21-6, par 2

With this understanding, $\hat{J}$ (the current of probability I have calculated) becomes directly the electric current density.

Typographical error ('$\boldsymbol{J}$' should be bold and not hatted).

With this understanding, $\boldsymbol{J}$ (the current of probability I have calculated) becomes directly the electric current density.

III:21-8, Eq 21.17

$$\psi(\boldsymbol{r}) = \rho(\boldsymbol{r}) e^{i\theta(r)}, \qquad (21.17)$$

Missing exponent on ρ.

$$\psi(\boldsymbol{r}) = \rho^{1/2}(\boldsymbol{r}) e^{i\theta(r)}, \qquad (21.17)$$

III:21-11, par 1

Equation (21.27) the becomes

Typographical error ('the' vs. 'then').

Equation (21.27) then becomes

III:21-11, par 2

According to London the basic unit of flux should be $2\pi\hbar/q_e$, which is about $4\times10^{-7}\,\text{gauss} = \text{cm}^2$.

Typographical error ('$=$' vs. '$\cdot$').

According to London the basic unit of flux should be $2\pi\hbar/q_e$, which is about $4\times10^{-7}\,\text{gauss} \cdot \text{cm}^2$.

III:21-12, Eq 21.30

$$\Phi_0 = \frac{\pi\hbar}{q_e} \approx 2\times10^{-7}\ \text{gauss-cm}^2. \qquad (21.30)$$

Typographical error ('-' vs. '$\cdot$').

$$\Phi_0 = \frac{\pi\hbar}{q_e} \approx 2\times10^{-7}\ \text{gauss}\cdot\text{cm}^2. \qquad (21.30)$$

III:21-12, Eq 21.32

$$\frac{\partial \rho}{\partial t} = \nabla \cdot \rho v . \qquad (21.32)$$

Wrong sign.

$$\frac{\partial \rho}{\partial t} = -\nabla \cdot \rho v . \qquad (21.32)$$

III:21-12, Eq 21.33

$$\hbar \frac{\partial \theta}{\partial t} = -\frac{m}{2}\boldsymbol{v}^2 + q\phi - \frac{\hbar^2}{2m}\left\{\frac{1}{\sqrt{\rho}}\nabla^2\left(\sqrt{\rho}\right)\right\}. \qquad (21.33)$$

Wrong signs (second and third terms on right).

$$\hbar \frac{\partial \theta}{\partial t} = -\frac{m}{2}\boldsymbol{v}^2 - q\phi + \frac{\hbar^2}{2m}\left\{\frac{1}{\sqrt{\rho}}\nabla^2\left(\sqrt{\rho}\right)\right\}. \qquad (21.33)$$

III:21-12, par 2 (near bottom of page)

In any case, the equation says that rate of change of the quantity $\hbar\theta$ is given by a kinetic energy term, $\frac{1}{2}mv^2$, plus a potential energy term, $q\phi$, with an additional term, containing the factor $\hbar^2$, which we could call a "quantum mechanical energy."

Missing word "the" and wrong signs for energy terms.

In any case, the equation says that the rate of change of the quantity $\hbar\theta$ is given by a kinetic energy term, $-\frac{1}{2}mv^2$, plus a potential energy term, $-q\phi$, with an additional term, containing the factor $\hbar^2$, which we could call a "quantum mechanical energy."

III:21-13, Eq 21.34

$$\frac{\partial \boldsymbol{v}}{\partial t} = \frac{q}{m}\left(-\nabla\phi - \frac{\partial \boldsymbol{A}}{\partial t}\right) - \boldsymbol{v}\times(\nabla\times\boldsymbol{v}) - (\boldsymbol{v}\times\nabla)\boldsymbol{v} - \nabla\frac{\hbar^2}{2m}\left(\frac{1}{\sqrt{\rho}}\nabla^2\sqrt{\rho}\right). \tag{21.34}$$

In the second to last term on the right $\boldsymbol{v}\times\nabla$ appears where $\boldsymbol{v}\cdot\nabla$ belongs. The last term on the right is off by a factor of $-1/m$.

$$\frac{\partial \boldsymbol{v}}{\partial t} = \frac{q}{m}\left(-\nabla\phi - \frac{\partial \boldsymbol{A}}{\partial t}\right) - \boldsymbol{v}\times(\nabla\times\boldsymbol{v}) - (\boldsymbol{v}\cdot\nabla)\boldsymbol{v} + \nabla\frac{\hbar^2}{2m^2}\left(\frac{1}{\sqrt{\rho}}\nabla^2\sqrt{\rho}\right). \tag{21.34}$$

III:21-13, par 2

This extra term also appears as the third term on the right side of Eq. (21.25). Taking it to the left side, I can write Eq. (21.25) in the following way:

Incorrect references.

This extra term also appears as the third term on the right side of Eq. (21.34). Taking it to the left side, I can write Eq. (21.34) in the following way:

III:21-13, Eq 21.38

$$m\left.\frac{d\boldsymbol{v}}{dt}\right|_{\text{comoving}} = q(\boldsymbol{E} + \boldsymbol{v}\times\boldsymbol{B}) - \nabla\frac{\hbar^2}{2}\left(\frac{1}{\sqrt{\rho}}\nabla^2\sqrt{\rho}\right). \tag{21.38}$$

The last term on the right is off by a factor of $-1/m$ (as per Eq 21.34).

$$m\left.\frac{d\boldsymbol{v}}{dt}\right|_{\text{comoving}} = q(\boldsymbol{E} + \boldsymbol{v}\times\boldsymbol{B}) + \nabla\frac{\hbar^2}{2m}\left(\frac{1}{\sqrt{\rho}}\nabla^2\sqrt{\rho}\right). \tag{21.38}$$

III:21-13, par 3

Ordinarily one writes that $\nabla \times \boldsymbol{v} = 0$ for an ideal fluid, but for an *ideal charged fluid in a magnetic field,* this gets modified to Eq. (21.40).

Incorrect reference.

Ordinarily one writes that $\nabla \times \boldsymbol{v} = 0$ for an ideal fluid, but for an *ideal charged fluid in a magnetic field,* this gets modified to Eq. (21.39).

III:21-15, Eq 21.43

$$\dot{\theta}_1 = +\frac{K}{\hbar}\sqrt{\frac{\rho_2}{\rho_1}}\cos\delta - \frac{qV}{2\hbar},$$
$$\dot{\theta}_2 = +\frac{K}{\hbar}\sqrt{\frac{\rho_1}{\rho_2}}\cos\delta + \frac{qV}{2\hbar}. \qquad (21.43)$$

Wrong signs (first term on right side of both equations).

$$\dot{\theta}_1 = -\frac{K}{\hbar}\sqrt{\frac{\rho_2}{\rho_1}}\cos\delta - \frac{qV}{2\hbar},$$
$$\dot{\theta}_2 = -\frac{K}{\hbar}\sqrt{\frac{\rho_1}{\rho_2}}\cos\delta + \frac{qV}{2\hbar}. \qquad (21.43)$$

III:21-15, par 2

The first two equations say that $\dot{\rho}_1 = -\dot{\rho}_2$. "But," you say, " they must both be zero if ρ_1 and ρ_2 are both constant and equal to zero."

Transcription error (?).

The first two equations say that $\dot{\rho}_1 = -\dot{\rho}_2$. "But," you say, " they must both be zero if ρ_1 and ρ_2 are both constant and equal to ρ_0."

III:21-17, Eq 21.52

$$\begin{aligned} J_{\text{total}} &= J_0 \left\{ \sin\left(\delta_0 + \frac{q_e}{\hbar}\Phi\right) + \sin\left(\delta_0 - \frac{q_e}{\hbar}\Phi\right) \right\} \\ &= J_0 \sin\delta_0 \cos\frac{q_e\Phi}{\hbar}. \end{aligned} \tag{21.52}$$

Bottom line is off by a factor of 2.

$$\begin{aligned} J_{\text{total}} &= J_0 \left\{ \sin\left(\delta_0 + \frac{q_e}{\hbar}\Phi\right) + \sin\left(\delta_0 - \frac{q_e}{\hbar}\Phi\right) \right\} \\ &= 2J_0 \sin\delta_0 \cos\frac{q_e\Phi}{\hbar}. \end{aligned} \tag{21.52}$$

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$$J_{\max} = J_0 \left| \cos\frac{q_e\Phi}{\hbar} \right|.$$

Right side is off by a factor of 2 (as per Eq 21.52).

$$J_{\max} = 2J_0 \left| \cos\frac{q_e\Phi}{\hbar} \right|.$$