Errata for
The Feynman Lectures on Physics Volume III
Definitive Edition (final printing)

The errors in this list appear in the final printing of *The Feynman Lectures on Physics: Definitive Edition* (2010) and earlier printings and editions; these errors have been corrected in the 1st printing of the *New Millennium Edition* (2011).

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:vii, par 1

... Sin-Itero Tomanaga ...

Misspelled name. ("Sin-Itero Tomanaga" vs. "Sin-Itiro Tomonaga". See, for example, http://nobelprize.org/nobel_prizes/physics/laureates/1965/tomonaga-bio.html)

... Sin-Itiro Tomonaga ...

III:xiv, par 6

... Sin-Itero Tomanaga ...

Misspelled name. ("Sin-Itero Tomanaga" vs. "Sin-Itiro Tomonaga". See, for example, http://nobelprize.org/nobel_prizes/physics/laureates/1965/tomonaga-bio.html)

... Sin-Itiro Tomonaga ...

III:10, Table of Contents, Chapter 11

11-6 Generalization to *N*-state systems 11-20

Wrong page number.

11-6 Generalization to *N*-state systems 11-21

III:1-5, par 8

Assuming Propositon A, all electrons …

Incorrect spelling of 'Proposition'.

Assuming Proposition A, all electrons …

III:1-7, par 5

For the probability that an electron will arrive at the backstop by passing through *either* hole, we do find $P_{12}'=P_1 + P_2$.

P_1 and P_2 are missing their primes (see Fig. 1-4).

For the probability that an electron will arrive at the backstop by passing through *either* hole, we do find $P_{12}'=P_1' + P_2'$.

III:1-11, par 2

If you make the measurement on any object, and you can determine the *x*-component of its momentum with an uncertainty Δp, you cannot, at the same time, know its *x*-position more accurately than $\Delta x = h/\Delta p$, where h is a definite fixed number given by nature. It is called "Planck's constant," and is approximately 6.63 × 10^{-34} joule-seconds. The uncertainties in the position and momentum of a particle at any instant must have their product greater than Planck's constant.

Inaccurate statement of the uncertainty principle.

If you make the measurement on any object, and you can determine the *x*-component of its momentum with an uncertainty Δp, you cannot, at the same time, know its *x*-position more accurately than $\Delta x \geq \hbar/2\Delta p$, where $\hbar$ is a definite fixed number given by nature. It is called the "reduced Planck constant," and is approximately 1.05 × 10^{-34} joule-seconds. The uncertainties in the position and momentum of a particle at any instant must have their product greater than half the reduced Planck constant.

III:2-3, par 1

… the uncertainty in the vertical momentum must exceed $h/\Delta y$, …

Inconsistent with Eq. (2.3) which has been corrected from $\Delta y\,\Delta p_y \approx h$ to $\Delta y\,\Delta p_y \geq \hbar/2$.

… the uncertainty in the vertical momentum must exceed $\hbar/2\Delta y$, …

III:2-6, par 2

In a sense, this is a kind of dimensional analysis to find out in what way the kinetic energy depends upon Planck's constant, upon *m*, and upon the size of the atom.

Inconsistent with surrounding text and equations in which h has been corrected to $\hbar$.

In a sense, this is a kind of dimensional analysis to find out in what way the kinetic energy depends upon the reduced Planck constant, upon *m*, and upon the size of the atom.

III:2-6, par 2

The spread of momentum is roughly h/a because of the uncertainty relation,

Wrong constant ('h' vs. '$\hbar$').

The spread of momentum is roughly $\hbar/a$ because of the uncertainty relation,

III:2-6, par 2

—but the momenta must be of the order $p \approx h/a$.

Wrong constant (‘h’ vs. ‘$\hbar$’).

—but the momenta must be of the order $p \approx \hbar/a$.

III:2-6, par 2

Then the kinetic energy is roughly $\frac{1}{2}mv^2 = p^2/2m = h^2/2ma^2$.

Wrong constant (‘h’ vs. ‘$\hbar$’).

Then the kinetic energy is roughly $\frac{1}{2}mv^2 = p^2/2m = \hbar^2/2ma^2$.

III:2-6, Eq 2.10

$$E = h^2/2ma^2 - e^2/a. \tag{2.10}$$

Wrong constant (‘h’ vs. ‘$\hbar$’).

$$E = \hbar^2/2ma^2 - e^2/a. \tag{2.10}$$

III:2-6, Eq 2.11

$$E = -h^2/ma^3 + e^2/a^2, \tag{2.11}$$

Wrong constant (‘h’ vs. ‘$\hbar$’).

$$E = -\hbar^2/ma^3 + e^2/a^2, \tag{2.11}$$

III:2-6, Eq 2.12

$$\begin{aligned} a_0 = h^2/me^2 &= 0.528 \text{ angstrom} \\ &= 0.528 \times 10^{-10} \text{ meter.} \end{aligned} \tag{2.12}$$

Wrong constant (‘h’ vs. ‘$\hbar$’).

$$\begin{aligned} a_0 = \hbar^2/me^2 &= 0.528 \text{ angstrom} \\ &= 0.528 \times 10^{-10} \text{ meter.} \end{aligned} \tag{2.12}$$

III:2-6, Eq 2.13

$$E_0 = -e^2/2a_0 = -me^4/2h^2 = -13.6 \text{ ev.} \quad (2.13)$$

Wrong constant (‘h’ vs. ‘$\hbar$’).

$$E_0 = -e^2/2a_0 = -me^4/2\hbar^2 = -13.6 \text{ ev.} \quad (2.13)$$

III:3-6, Fig 3-4 caption

…in the experiment of Fig. 3 3:

Missing hyphen.

…in the experiment of Fig. 3-3:

III:4-6, par 4

…we can set $a_1 = a_2 = \cdots = a = a_n$, and similarly for *b, c,* …

Assignment is misordered.

…we can set $a_1 = a_2 = \cdots = a_n = a$, and similarly for *b, c,* …

III:4-7, par 4

When the light is emitted a photon is “created.” In such a case, we don’t need the incoming lines in Fig. 4-4; we can consider merely that there are *n* atoms *a, b, c,* ... emitting light, as in Fig. 4-5.

Transcription error. This is confusing because, in fact, there don’t have to be 'n' atoms (or any particular number of atoms) in this part of the discussion. Feynman makes this amply clear in his original (spoken) lecture, when he says that the photons under discussion are light, "emitted from some source that has nothing to do with the argument. It has nothing to do with the argument, whether they come from somewhere before or whether they simply come out of the atom and are created at the moment." Furthermore, Fig 4-5, does not show any atoms; the circles must be photons in this figure if is to be interpretted analogously to Fig 4-4.

When the light is emitted a photon is “created.” In such a case, we don’t need the incoming lines in Fig. 4-4; we can consider merely that there are some atoms emitting *n* photons as in Fig. 4-5.

III:4-10, Fig 4-8

The wave mode numbers in the column headed $\frac{2\mathrm{L}}{\lambda}$ are incorrect. The topmost curve, currently numbered '0', should be numbered '1', and the curve immediately below that, currently labeled '1' should be labeled '2'. (The curve labeled 'j' is okay.)

III:4-11, Fig 4-10, vertical axis legend

$$\frac{\pi\hbar^2}{V}\left(\frac{C}{kT}\right)\times\frac{dE}{d\omega}$$

The 'π' should also be squared.

$$\frac{(\pi\hbar)^2}{V}\left(\frac{C}{kT}\right)\times\frac{dE}{d\omega}$$

III:4-14, par 6

We have said earlier that the nuclear forces are the same between the neutron and the proton, between the proton and the proton, and between the proton and the neutron.

The interaction between neutron and proton is redundantly mentioned twice, and the interaction between neutron and neutron is omitted.

We have said earlier that the nuclear forces are the same between the neutron and the proton, between the proton and the proton, and between the neutron and the neutron.

III:5-7, 1st line

it from the first *S*-fiter.)

Incorrect spelling of 'filter'.

it from the first *S*-filter.)

III:5-9, par 4

If we then put another + S filter,

Unwanted space between '+' and 'S'.

If we then put another +S filter,

III:5-15, par 1

…that the state ϕ goes into the base states is his T representation.

Incorrect word ('is' vs. 'in').

…that the state ϕ goes into the base states in his T representation.

III:5-15, par 1

… the matrix $\langle jT|iS\rangle$. This matrix can then be used to convert all of his equations to our form.

Feynman said this backwards. The S-Base is *ours* in this discussion, and the T-Base is the other fellow's.

… the matrix $\langle jT|iS\rangle$. This matrix can then be used to convert all of our equations to his form.

III:6-1, below Eq 6.4

The amplitudes for the state (ψ) to be in the base states (iT) are related

Wrong base states ('iT' vs. 'jT').

The amplitudes for the state (ψ) to be in the base states (jT) are related

III:6-5, Eq 6.14

$$\frac{R_{ki}^{US}}{\sqrt{\text{Det } R^{US}}} = \sum_i \frac{R_{kj}^{UT}}{\sqrt{\text{Det } R^{UT}}} \frac{R_{ji}^{TS}}{\sqrt{\text{Det } R^{TS}}} \tag{6.14}$$

The wrong index is summed ('i' vs. 'j').

$$\frac{R_{ki}^{US}}{\sqrt{\text{Det } R^{US}}} = \sum_j \frac{R_{kj}^{UT}}{\sqrt{\text{Det } R^{UT}}} \frac{R_{ji}^{TS}}{\sqrt{\text{Det } R^{TS}}} \tag{6.14}$$

III:6-6, above unnumbered Eq

You might conclude that any rotation about the z-axis of the "frame of reference" for base states leaves the amplitudes C_+ to be "up" and "down," the same as before.

Extraneous (and confusing) word (C_+) and superfluous comma (after "down"). C_+ is the amplitude to be up, not "up and down."

You might conclude that any rotation about the z-axis of the "frame of reference" for base states leaves the amplitudes to be "up" and "down" the same as before.

III:6-7, par 1

Well, all we have decided is that the *magnitudes* of C_1' and C_2' are the same in the two cases, …

Incorrect notations (2) (‘C_1'’ vs. ‘C_+'’ and ‘C_2'’ vs. ‘C_+’)

Well, all we have decided is that the *magnitudes* of C_+' and C_+ are the same in the two cases, …

III:6-9, par 2

a particle that is the (+S) state—so that it goes on the “upper” path in the first apparatus…

Missing word ‘in’ before ‘the (+S) state’.

a particle that is in the (+S) state—so that it goes on the “upper” path in the first apparatus…

III:6-13, last par

We want to know the amplitude $\langle C_+|\psi\rangle$ that the particle is “up” along *z* and the amplitude $\langle C_-|\psi\rangle$ that it is “down” …

C_+ and C_- are amplitudes and not states.

We want to know the amplitude C_+ that the particle is “up” along *z* and the amplitude C_- that it is “down” …

III:7-6, Fig 7-2 and caption

The vector label ‘*p*’ should be bold (two occurences).

III:7-10, par 1

This is identical to Eq. (7.26) if we replace p/m by *v* and $\Delta V/D$ by $\partial V/\partial y$.

Incorrect capitalization (‘m’ vs. ‘M’).

This is identical to Eq. (7.26) if we replace p/M by *v* and $\Delta V/D$ by $\partial V/\partial y$.

III:8-1, par 3

The states χ and ϕ correspond to the two vectors ***A*** and ***B***.

Misleading word order: χ corresponds to ***B*** and ϕ corresponds to ***A*** in Eq.s 8.1 and 8.2.

The states χ and ϕ correspond to the two vectors ***B*** and ***A***.

III:8-2, par 2

We remove the $\langle\chi|$ from both sides Eq. (8.1) …

Missing word 'of'.

We remove the $\langle\chi|$ from both sides of Eq. (8.1) …

III:8-3, unnumbered Eq after Eq 8.15

$$\boldsymbol{A}\cdot\boldsymbol{B}=\sum_i A_iB_i\,.$$

Wrong order (this is supposed to be analogous to Eq 8.15 with χ corresponding to ***B*** and ϕ corresponding to ***A***.

$$\boldsymbol{B}\cdot\boldsymbol{A}=\sum_i B_iA_i\,.$$

III:8-4, last par

If we multiply it "on the left" by $|\phi\rangle$, it becomes

Wrong side ('left' vs. 'right').

If we multiply it "on the right" by $|\phi\rangle$, it becomes

III:8-6, par 4

We also guess that there is an idealized proton which has its π-mesons, and *k*-mesons, …

Incorrect capitalization & italics ('*k*-' vs. 'K-' see Section 11-5).

We also guess that there is an idealized proton which has its π-mesons, and K-mesons, …

III:8-8, par 1

The things go crash and out come, say, two *k*-mesons,

Incorrect capitalization & italics (‘*k*-’ vs. ‘K-‘ see Section 11-5).

The things go crash and out come, say, two K-mesons,

III:8-9, par 3

If we let $C_i(t)$= $\langle i|\psi(t)\rangle$ stand for the amplitude to be in the base state *i* at the time *t,*

Missing space between $C_i(t)$ and $=$.

If we let $C_i(t) = \langle i|\psi(t)\rangle$ stand for the amplitude to be in the base state *i* at the time *t,*

III:8-10, Eq 8.41

$$i\hbar\frac{dC_1}{dt} = H_{11}C_1. \qquad (8.41)$$

Extra space between ‘(‘ and ‘8’ in equation number.

$$i\hbar\frac{dC_1}{dt} = H_{11}C_1. \qquad (8.41)$$

III:8-11, par 4

We will say that the nitrogen is in state $|\mathit{1}\rangle$ when the nitrogen is “up,” as in Fig. 8-1(a), and is in the state $|2\rangle$ when the nitrogen is “down,” as in (b).

Typographical error. “2” should be in italics.

We will say that the nitrogen is in state $|\mathit{1}\rangle$ when the nitrogen is “up,” as in Fig. 8-1(a), and is in the state $|\mathit{2}\rangle$ when the nitrogen is “down,” as in (b).

III:8-13, Eq 8.52

$$C_1(t) = e^{-(i/\hbar)E_0 t} \cos\frac{At}{\hbar}$$

The equation is missing its equation number.

$$C_1(t) = e^{-(i/\hbar)E_0 t} \cos\frac{At}{\hbar} \qquad (8.52)$$

III:9-4, par 1

$$H_{I,I} = E_I, \qquad H_{I,II} = 0,$$
$$H_{I,II} = 0, \qquad H_{II,II} = E_{II},$$

Incorrect subscript for row 2 col 1 (‘$H_{I,II}$’ vs. ‘$H_{II,I}$’).

$$H_{I,I} = E_I, \qquad H_{I,II} = 0,$$
$$H_{II,I} = 0, \qquad H_{II,II} = E_{II},$$

III:9-5, par 4

As a result of this moment, the energy in an electric field $\mathcal{E}$ will depend on the molecular orientation.

Typographical error. Vectors should be written in bold italics (‘$\mathcal{E}$’ vs. ‘$\boldsymbol{\mathcal{E}}$’).

As a result of this moment, the energy in an electric field $\boldsymbol{\mathcal{E}}$ will depend on the molecular orientation.

III:9-8, Fig 9-2

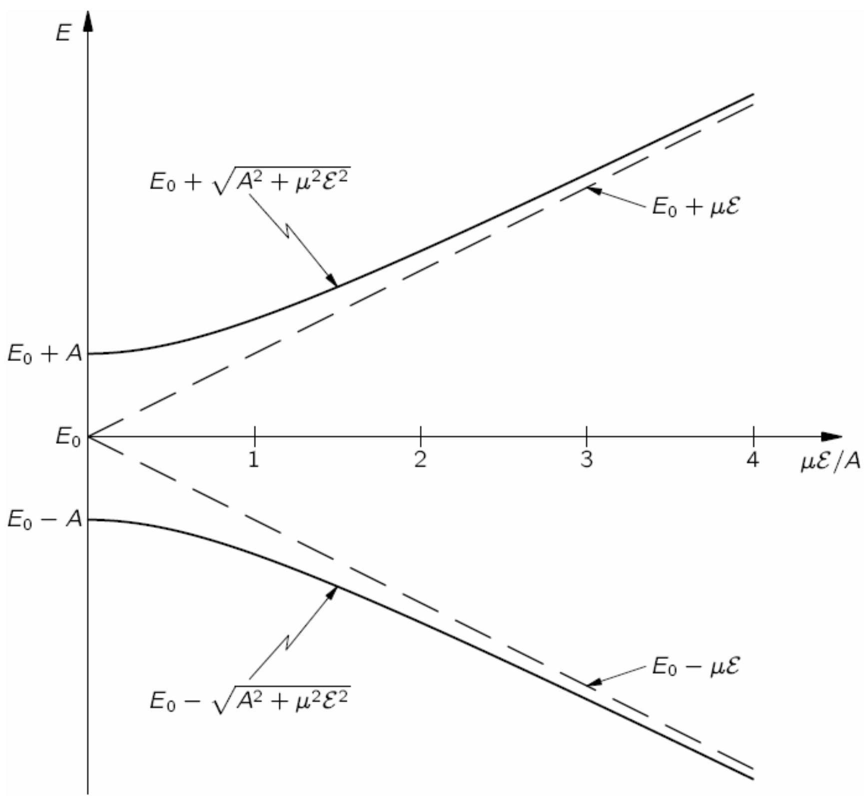
$$\mathrm{E}_0 - \sqrt{A^2 - \mu^2 \varepsilon^2}$$

Wrong sign. The (lower) curve (for energy base state II) is mislabeled.

$$\mathrm{E}_0 - \sqrt{A^2 + \mu^2 \varepsilon^2}$$

III:9-8, Fig 9-2

Three errors: (1) The *x*-axis should be labeled $\mu\mathcal{E}/A$ and not just $\mu\mathcal{E}$ - otherwise the pure numbers on the *x*-axis make no sense. (2) The numbers on the *x*-axis are half what they should be. (3) The (lower) curve (for energy base state II) is mislabeled; it should be $E_0 - \sqrt{A^2 + \mu^2\varepsilon^2}$, not $E_0 - \sqrt{A^2 - \mu^2\varepsilon^2}$. The figure should look like this:



III:9-8, last par

The beam is then set through a…

Incorrect spelling of 'sent'.

The beam is then sent through a…

III:9-13, Fig 9-6

The '$\mathcal{E}$' beside the vertical axis on the left side of the figure should be 'E'; it indicates the direction of increasing energy, not the electric field.

III:9-14, par 3, unnumbered Eq

$$\mathcal{I} = \varepsilon_0 c^2 \left|\boldsymbol{\mathcal{E}} \times \boldsymbol{B}\right|_{\text{ave}} = ½\varepsilon_0 c^2 \left(\boldsymbol{\mathcal{E}} \times \boldsymbol{B}\right)_{\text{max}} = 2\varepsilon_0 c^2 \mathcal{E}_0^2.$$

Missing magnitude operator ($\left(\boldsymbol{\mathcal{E}} \times \boldsymbol{B}\right)_{\text{max}}$ vs. $\left|\boldsymbol{\mathcal{E}} \times \boldsymbol{B}\right|_{\text{max}}$).

$$\mathcal{I} = \varepsilon_0 c^2 \left|\boldsymbol{\mathcal{E}} \times \boldsymbol{B}\right|_{\text{ave}} = ½\varepsilon_0 c^2 \left|\boldsymbol{\mathcal{E}} \times \boldsymbol{B}\right|_{\text{max}} = 2\varepsilon_0 c^2 \mathcal{E}_0^2.$$

III:10-2, par 3

There is some small amplitide for the electron to …

Incorrect spelling of 'amplitude'.

There is some small amplitude for the electron to …

III:10-4, par I

… is given in units of 1 Å(10-8 cm),

There should be a space between the 'Å' and the parantheses.

… is given in units of 1 Å (10-8 cm),

III:10-5, Eq 10.10

$$A \sim \frac{e^{-\left(\sqrt{2mW_H}/\hbar\right)R}}{R} \tag{10.10}$$

Wrong symbol for "proportional to" ('~' vs. '∝'). Feynman explicitly defines "~" to mean "approximately equal to" in FLP Vol I Chapter 8 -- see Eq. (8.14). " ~" is used to mean "proportional to" elsewhere – for example, Vol I, page 7-2, where it can be found in Kepler's third law. '∝' is also used to mean "proportional to," in some other places in FLP (for example, Vol I, page 5-1). In 1975, FLP's then-Editor in Chief, Allan Wylde, commented on these inconsistencies in a letter to Feynman. Feynman responded to Wylde as follows: "We have been careless with these signs because, at least at that time, a strict convention has not been established. If you want to use ~ for "proportional to" and the proper [wavy equal sign] for "approximate" you'll have to be careful throughout the text to find all the other places we used these symbols."

$$A \propto \frac{e^{-\left(\sqrt{2mW_H}/\hbar\right)R}}{R} \tag{10.10}$$

III:10-8, par 2

… as shown in Fig. 10-4(a)

There is no part (a) in Fig 10-4 (and it would be a mistake to use (a) or (b) to label Fig. 10-4 because 'a' and 'b; are already used to label electrons in the figure).

… as shown in the top half of Fig. 10-4.

III:10-8, caption of Fig 10-5

(E_h = 13.6 ev.)

Incorrect capitalization of subscript.

(E_H = 13.6 ev.)

III:10-13, 2nd line of Eq 10.17

$$i\hbar\frac{dC_2}{dt} = E_2 C = +\mu B_z C_2.$$

Missing subscript on middle 'C'.

$$i\hbar\frac{dC_2}{dt} = E_2 C_2 = +\mu B_z C_2.$$

III:11-3, par 5

It is the sum of products of terms taken in pairs from the *i*th row of *A* and the *k*th column of *B*.

Wrong column ('k' vs. 'j', see Eq 11.12).

It is the sum of products of terms taken in pairs from the *i*th row of *A* and the *j*th column of *B*.

III:11-3, Fig 11-1, caption, 1st line

$$\mathrm{C}_{ik} = \sum_{j} \mathrm{A}_{ij}\mathrm{B}_{jk}$$

Inconsistent with Eq 11.12 and the body text. (See correction for par III:11-3, par 5)

$$\mathrm{C}_{ij} = \sum_{k} \mathrm{A}_{ik}\mathrm{B}_{kj}$$

III:11-5, 1st unnumbered Eq

$$\langle i|\psi(t+\Delta t)\rangle = \sum_{j} \langle i|U(t,t+\Delta t)|\,j\rangle\langle j|\psi(t)\rangle$$

The order of the arguments of U should be reversed (see Section III:8-4).

$$\langle i|\psi(t+\Delta t)\rangle = \sum_{j} \langle i|U(t+\Delta t,t)|\,j\rangle\langle j|\psi(t)\rangle$$

III:11-5, after 1st unnumbered Eq

The matrix element $\langle i|U(t,t+\Delta t)|\,j\rangle$ is the amplitude …

The order of the arguments of U should be reversed (see Section III:8-4).

The matrix element $\langle i|U(t+\Delta t,t)|\,j\rangle$ is the amplitude …

III:11-5, 2nd unnumbered Eq

$$\langle i|U(t,t+\Delta t)|j\rangle = ...$$

The order of the arguments of U should be reversed (see Section III:8-4).

$$\langle i|U(t+\Delta t,t)|j\rangle = ...$$

III:11-5, par 3

we can—as we did in Eq. (8.31)—write the amplitude that …

Incorrect reference.

we can—as we did in Eq. (8.34)—write the amplitude that …

III:11-5, par 3

We see that $-i/\hbar\,\langle i\,|\,H\,|\,j\rangle$ is the amplitude that—under the physical conditions described by *H*—a state $|j\rangle$ will, during the time *dt,* "generate" the state $|i\rangle$.

Incorrect statement (the amplitude is proportional to *dt*).

We see that $-i/\hbar\,\langle i\,|\,H\,|\,j\rangle dt$ is the amplitude that—under the physical conditions described by *H*—a state $|j\rangle$ will, during the time *dt,* "generate" the state $|i\rangle$.

III:11-6, par 1

For instance we would describe Eq. (11.18) in this way: "The time derivative of the *state vector* $|\psi\rangle$ is equal to what you get by operating with the Hamiltonian *operator* $\hat{H}$ on each base state, …

Incorrect statement (compare to next sentence, re. Eq (11.19)).

For instance we would describe Eq. (11.18) in this way: "The time derivative of the *state vector* $|\psi\rangle$ times $i\hbar$ is equal to what you get by operating with the Hamiltonian *operator* $\hat{H}$ on each base state, …

III:11-6, par 2

Remember that this equation—as well as Eq. (11.19)—is not the statement that the $\hat{H}$ operator is just the identical *operation* as d/dt.

Incorrect statement (as above).

Remember that this equation—as well as Eq. (11.19)—is not the statement that the $\hat{H}$ operator is just the identical *operation* as $i\hbar\frac{d}{dt}$.

III:11-8, par 4

… the equations look like this:

Missing reference.

… the equations (9.38) and (9.39) look like this:

III:11-13, 2nd Eq in Eq 11.39

$\mathrm{K}^- + p \rightarrow \Lambda_0 + \pi^+$

Typographic error (‘Λ_0‘ vs. ‘Λ^0‘).

$\mathrm{K}^- + p \rightarrow \Lambda^0 + \pi^+$

III:11-14, par 3, 3rd unnumbered equations

$\mathrm{n} + \mathrm{n} \rightarrow \mathrm{n} + \mathrm{p} + \overline{\mathrm{K}}^0 + \mathrm{K}^+$

Error in physics (violates conservation of charge). Proton should be an anti-proton.

$\mathrm{n} + \mathrm{n} \rightarrow \mathrm{n} + \overline{\mathrm{p}} + \overline{\mathrm{K}}^0 + \mathrm{K}^+$

III:11-14, par 3, 4th unnumbered equations

$S = 0 + 0 = 0 + 0 + +1 + -1$

Strangeness of $\overline{\mathrm{K}}^0$ and K^+ (corresponding to above equation) are reversed.

$S = 0 + 0 = 0 + 0 + -1 + +1$

III:11-15, par 1, unnumbered reaction

$$\bar{\mathrm{K}}^0 + \mathrm{p} \to \mathrm{A}^0 + \pi^+$$

The 'Λ' looks like an 'A'.

$$\bar{\mathrm{K}}^0 + \mathrm{p} \to \Lambda^0 + \pi^+$$

III:11-15, par 3, unnumbered reaction

$$\mathrm{K}^0 + \mathrm{p} \to \Lambda^0 + \pi^0$$

Violates conservation of charge. The π^0 should be π^+. [Refering to this reaction the text says, "a $\bar{\mathrm{K}}^0$ can do just that." As illustrated in 11-5(b), and noted in the preceding unnumbered equation, it is the π^+ that is produced: $\bar{\mathrm{K}}^0 + \mathrm{p} \to \Lambda^0 + \pi^+$.]

$$\mathrm{K}^0 + \mathrm{p} \to \Lambda^0 + \pi^+$$

III:11-17, par 1

But since there is the amplitude $\langle \bar{\mathrm{K}}^0 \,|\, \mathrm{W} \,|\, \mathrm{K}^0 \rangle$ for the K^0 to turn into a $\bar{\mathrm{K}}^0$ there should be the additional term

$$\langle \bar{\mathrm{K}}^0 \,|\, \mathrm{W} \,|\, \mathrm{K}^0 \rangle C_- = AC_-$$

added to the right-hand side of the first equation.

Inaccurate statement; the term added to the right-hand side of the first equation is the amplitude for a $\bar{\mathrm{K}}^0$ to turn into a K^0.

But since there is the amplitude $\langle \mathrm{K}^0 \,|\, \mathrm{W} \,|\, \bar{\mathrm{K}}^0 \rangle$ for the $\bar{\mathrm{K}}^0$ to turn into a K^0 there should be the additional term

$$\langle \mathrm{K}^0 \,|\, \mathrm{W} \,|\, \bar{\mathrm{K}}^0 \rangle C_- = AC_-$$

added to the right-hand side of the first equation.

III:11-18, par 2

… think in terms of the two "particles" (that is, "states") K_1 and K_2.

Typographic error ('K' vs. 'K', 2 times).

… think in terms of the two "particles" (that is, "states") K_1 and K_2.

III:11-18, par 5

Remembering that A is a complex number, it is convenient to take $A = \alpha - i\beta$.

Typographical error (missing '2').

Remembering that A is a complex number, it is convenient to take $2A = \alpha - i\beta$.

III:11-19, par 2 (just before Eq 11.54)

and—from Eq. (11.51) —that

Incorrect reference.

and—from Eqs. (11.52) and (11.53)—that

III:11-19, par 2

Now remember that K_1 and K_2 are each linear combinations of K^0 and $\overline{K}^0$. In Eqs. (11.54) the amplitudes have been chosen so that at $t = 0$ the $\overline{K}^0$ parts cancel each other out by interference, leaving only a K^0 state.

Confusing wording ('K_1 and K_2 are each linear combinations of K^0 and $\overline{K}^0$' vs. 'K^0 and $\overline{K}^0$ are each linear combinations of K_1 and K_2'). In the text above, "the $\overline{K}^0$ parts cancel each other out by interference" refers to the amplitude for a $\overline{K}^0$ state given as a linear combination of the amplitudes for states K_1 and K_2 (as per C_2 in Eqs 11.50). "the $\overline{K}^0$ parts," refer to the equal and opposite amplitudes for state K_1 and K_2 in the state $\overline{K}^0$, which cancel in the linear combination giving an amplitude of 0 for the state $\overline{K}^0$. Thus, what seems pertinent here is that K^0 and $\overline{K}^0$ are linear combinations of K_1 and K_2.

Now remember that K^0 and $\overline{K}^0$ are each linear combinations of K_1 and K_2. In Eqs. (11.54) the amplitudes have been chosen so that at $t = 0$ the $\overline{K}^0$ parts cancel each other out by interference, leaving only a K^0 state.

III:11-19, par 4

… ($2\beta = 10^{10}$ sec) …

β is not a period, it is a frequency (see text after Eq. 11.53), so it's units are not seconds, but seconds^{-1}

… ($2\beta = 10^{10}$ sec^{-1}) …

III:11-20, Fig 11-6

The scale of the (horizontal time) axis in both graphs is too small by half. In (a) the time should range from 0 to ~2 x 10^{-10} seconds and in (b) the time should should range from 0 to ~8 x 10^{-10} seconds. Therefore the numerical labels on the time axis in both graphs should be doubled.

III:11-20, Fig 11-6

$$2\beta = 10^{10}\,\text{sec}$$

β is not a period, it is a frequency (see text after Eq. 11.53), so it's units are not seconds, but seconds^{-1} [Three occurrences: in caption, in (a) and in (b)]

$$2\beta = 10^{10}\,\text{sec}^{-1}$$

III:11-20, Fig 11-6,caption

… (a) for $\alpha = \pi\beta$, (b) for $\alpha = 4\pi\beta$ …

Values of α for (a) and (b) are interchanged.

… (a) for $\alpha = 4\pi\beta$, (b) for $\alpha = \pi\beta$ …

III:11-21, par 3

This is a set of N linear algebraic equations for the N unknowns a_1, a_2, …, a_n, …

Typographic error ('a_n' vs. 'a_N').

This is a set of N linear algebraic equations for the N unknowns a_1, a_2, …, a_N, …

II:11-22, Eq 11.67

$$\hat{H}\left|\boldsymbol{n}\right\rangle = E_{\mathbf{n}}\left|\boldsymbol{n}\right\rangle$$

Typographic error ('$\boldsymbol{n}$' vs. '$\mathbf{n}$').

$$\hat{H}\left|\mathbf{n}\right\rangle = E_{\mathbf{n}}\left|\mathbf{n}\right\rangle$$

III:11-23, below Eq 11.76

Then we multiply Eq. (11.75) on the left by $\left|\mathbf{n}\right\rangle$ to get

Incorrect statement ('left' vs. 'right').

Then we multiply Eq. (11.75) on the right by $\left|\mathbf{n}\right\rangle$ to get

III:12-2, par 1 and Fig 12-1

For handy reference, we've also summarized the notation in Fig. 12-1

There is no notation in Fig 12-1. Either the notation given in Eq 12.1 should label the corresponding state in the figure, or the above sentence should be struck from par 1.

III:12-3, Table 12-1, line 5

$$\sigma_y \,|+\rangle = + \;\; i|-\rangle$$

There should be no space between '+' and 'i'

$$\sigma_y \,|+\rangle = +i\,|-\rangle$$

III:12-4, par 3

Then the three $\sigma_z^{\mathrm{p}}, \sigma_y^{\mathrm{p}}, \sigma_z^{\mathrm{p}}$ —that makes six.

Typographic error. The first indexed 'z' should be an 'x'.

Then the three $\sigma_x^{\mathrm{p}}, \sigma_y^{\mathrm{p}}, \sigma_z^{\mathrm{p}}$ —that makes six.

III:12-5, par 2

…the thing we call μ_{e} appears in quantum mechanics as $\mu_{\mathrm{e}}\sigma_{\mathrm{e}}$. Similarly, what appears classically as μ_{p} will usually turn out in quantum mechanics to be $\mu_{\mathrm{p}}\sigma_{\mathrm{p}}$ …

Typographic error. The subscripts on the sigma operators should be superscripts (2 occurences).

…the thing we call μ_{e} appears in quantum mechanics as $\mu_{\mathrm{e}}\sigma^{\mathrm{e}}$. Similarly, what appears classically as μ_{p} will usually turn out in quantum mechanics to be $\mu_{\mathrm{p}}\sigma^{\mathrm{p}}$ …

III:12-12, par 3

(in addition to the steady strong field B).

Vectors should be bold.

(in addition to the steady strong field $\boldsymbol{B}$).

III:12-13, par 2

… the two together have the energy $(\mu_e + \mu_p)B = \mu B$, …

Sign error.

… the two together have the energy $(\mu_e + \mu_p)B = -\mu B$, …

III:12-13, Fig 12-5

The label 'B' (magnitude of the magnetic field) is missing from the horizontal axis. 'B' should be added to the graph near the arrowhead at the end of the horizontal axis (similar to the 'E' that labels the vertical axis).

III:13-2, par 5

Using these base states, any state $|\phi\rangle$ of our one-dimensional crystal can be described by …

Missing words ("of the electron in").

Using these base states, any state $|\phi\rangle$ of the electron in our one-dimensional crystal can be described by …

III:13-5, par 6

As another example, suppose that k were $\pi/4b$. The real part of $a(x_n)$ would vary as shown by curve 1 in Fig. 13-4. If k were seven times larger $(k = 7\pi/4)$, the real part of $a(x_n)$ would vary as shown by curve 2 in in the figure.

The statement (at the top of page 13-6) that "the amplitudes a(xn) for k = pi/4b and k = 7pi/4b are the same" is incorrect. a(xn) = exp(i n pi/4) in the first case but a(xn) = exp(-i n pi/4) in the second case (the real parts are equal, so it doesn't show up in Fig 13-4). The main point of the discussion is that one only needs to consider values of k within a certain range, because values of k outside that range yield physical states identical to physical states for values of k within that range. In the first example the endpoints of the given range are k = 0 and k = 2pi/b, which yield exactly the same state; therefore, the endpoints for the range given in the second example should also yield exactly the same state. This can be achieved by changing the lower endpoint from k=pi/4b to k = –pi/4b.

Also, a wrong value for k is given ('$7\pi/4$' vs. '$7\pi/4b$').

As another example, suppose that k were $-\pi/4b$. The real part of $a(x_n)$ would vary as shown by curve 1 in Fig. 13-4. If k were $7\pi/4b$, the real part of $a(x_n)$ would vary as shown by curve 2 in in the figure.

III:13-5, Fig 13-4, caption

curve 1 is for $k = \pi/4$, curve 2 is for k = $7\pi/4$.

See comments for III:13-5, par 6. Also, incorrect values for k are given (both off by factor of 1/*b*).

curve 1 is for $k = -\pi/4b$, curve 2 is for k = $7\pi/4b$.

III:13-5, Fig 13-4, label on vertical axis

↑ Re A(x_n)

Incorrect capitalization (‘A’ vs. ‘a’)

↑ Re a(x_n)

III:13-6, par 5

For the stationary states described by Eq. (13.12), … a superposition of several solutions like Eq. (13.12) with slightly different values of *k*—

Incorrect reference (‘13.12’ vs. ‘13.14,’ two occurrences).

For the stationary states described by Eq. (13.14), … a superposition of several solutions like Eq. (13.14) with slightly different values of *k*—

III:13-8, Eq 13.25

$$C(x, y, z) = e^{-iEt/\hbar} e^{-i\boldsymbol{k}\cdot\boldsymbol{r}}$$

The sign of the 2nd exponent is wrong.

$$C(x, y, z) = e^{-iEt/\hbar} e^{i\boldsymbol{k}\cdot\boldsymbol{r}}$$

III:13-10, par 1

… we described in Chapter 36, Vol. 1; …

Consistency error (‘Vol. 1’ vs. ‘Vol. I’).

… we described in Chapter 36, Vol. I; …

III:14-1, Sidebar, Reference to Kittel

Reference: C. Kittel, Introduction to Solid State Physics, Chapters 13, 14 and 18.

Incomplete information. The chapter numbers in “Introduction to Solid State Physics” vary from edition to edition. Therefore a full reference including the edition should be given.

Reference: C. Kittel, Introduction to Solid State Physics, 2nd Edition, Chapters 13, 14 and 18.

III:14-1, Eq 14.1

$$\mathrm{E} = \mathrm{E}_0 - 2\mathrm{A}_x \cos k_x a - 2\mathrm{A}_y \cos k_y b - 2\mathrm{A} \cos k_z c \qquad (14.1)$$

All the E's and A's should be italic as per Eq 14.2. And subscript ‘z’ is missing on ‘A’ in final term on right-hand side.

$$E = E_0 - 2A_x \cos k_x a - 2A_y \cos k_y b - 2A_z \cos k_z c \qquad (14.1)$$

III:14-1, Eq 14.3

$$\mathrm{E} = \mathrm{E}_{\min} + \alpha k^2 \qquad (14.3)$$

The E's should be italic as per Eq 14.2. side.

$$E = E_{\min} + \alpha k^2 \qquad (14.3)$$

III:14-2, Fig 14-3

The lower bound of the energy curve is incorrectly labelled ‘E’. It should be labelled ‘$\mathrm{E}^{+}_{\mathrm{min}}$’ as per Fig 14-4 (see also Fig 14-2). [Note: the *incorrect* label is in the middle right of the diagram; the other E near the top of the diagram (labelling the vertical axis) is correct.]

III:14-3, par 6

Of course that does not happen because after awhile the electrons and holes accidentally find each other—

Grammatical error: adverb used where noun is needed (“awhile” vs.“a while”).

Of course that does not happen because after a while the electrons and holes accidentally find each other—

III:14-4, par 2

The variation of many of the properties of a superconductor—the conductivity for example—is mainly determined by the exponential factor because all the other factors vary much more slowly with temperature.

Wrong word ("superconductor" vs. "semiconductor"). This was a slip of the tongue: Feynman actually said "superconductor," but he was lecturing (only) about semiconductors at the time, not (at all) about superconductors, and furthermore, this statement clearly refers to the former, and not to the latter.

The variation of many of the properties of a semiconductor—the conductivity for example—is mainly determined by the exponential factor because all the other factors vary much more slowly with temperature.

III:14-4, par 4

This extra electron is very loosely attached—the binding energy is less than 1/10 of a volt.

Wrong unit ('volt' vs. 'electron volt'), and the binding energy for As in Ge is (according to Kittel) 12.7 meV which is about 1/100 eV.

This extra electron is very loosely attached—the binding energy is only about 1/100 of an electron volt.

III:14-7, Eq 14.9

$$\mathcal{E}_{\text{tr}} = -v_{\text{drift}} \times B. \tag{14.9}$$

(All three) vectors should be written in bold italics.

$$\boldsymbol{\mathcal{E}}_{\text{tr}} = -\boldsymbol{v}_{\text{drift}} \times \boldsymbol{B}. \tag{14.9}$$

III:14-7, par 3

… found out that for berylium the potential difference had the wrong sign.

Incorrect spelling of 'beryllium'.

… found out that for beryllium the potential difference had the wrong sign.

III:14-7, last par

… a vertical electric field which we will call $\mathcal{E}_{\text{tr}}$ …

Vectors should be bold.

… a vertical electric field which we will call $\boldsymbol{\mathcal{E}}_{\text{tr}}$ …

III:14-8, par 1

The electric field strength $\mathcal{E}_{\mathrm{tr}}$ in the crystal is proportional to…

Vector component should be written in italics.

The electric field strength $\varepsilon_{\mathrm{tr}}$ in the crystal is proportional to…

III:14-8, par 1

The constant of proportionality $1/qN$ is called the Hall coefficient and is usually represented by the symbol R_H

The "H" in "R_H" should not be italic, because it is not an index.

The constant of proportionality $1/qN$ is called the Hall coefficient and is usually represented by the symbol R_{H}.

III:14-8, par 3

This brought about by the electric fields which …

Missing word, 'is,' and missing comma before 'which.'

This is brought about by the electric fields, which …

III:14-8, par 3

On the *n*-type side of *p*-*n* junction…

Missing article.

On the *n*-type side of the *p*-*n* junction…

III:14-10, Eq 14.12

$$I_0 \sim N_p\left(n\text{-side}\right) = N_p\left(p\text{-side}\right)e^{-qV/\kappa T} \qquad (14.12)$$

Wrong symbol for "proportional to" ('~' vs. '$\propto$'). See notes on error III:10-5, Eq 10.10, above.

$$I_0 \propto N_p\left(n\text{-side}\right) = N_p\left(p\text{-side}\right)e^{-qV/\kappa T} \qquad (14.12)$$

III:14-10, par 3, unnumbered Eq

$$I_1 \sim N_p\left(p\text{-side}\right)e^{-q(V-\Delta V)/\kappa T}.$$

Wrong symbol for "proportional to" ('~' vs. '$\propto$'). See notes on error III:10-5, Eq 10.10, above.

$$I_1 \propto N_p\left(p\text{-side}\right)e^{-q(V-\Delta V)/\kappa T}.$$

III:14-11, par 2

This back current I_0 is limited by the small density of the minority carriers on the *n*-side of the junction.

The term "minority carriers" is not used elsewhere; this statement should therefore be made clearer.

This back current I_0 is limited by the small density of the minority *p*-type carriers on the *n*-side of the junction.

III:15-2, end of par 3

(From now on we will leave off the descriptive superscript on the *P*.)

The operator *P* is missing its hat.

(From now on we will leave off the descriptive superscript on the $\hat{P}$.)

III:15-3, par 2

On the state $\left|5\right\rangle$, the operation …

Typographic error ('5' vs. 'x_5').

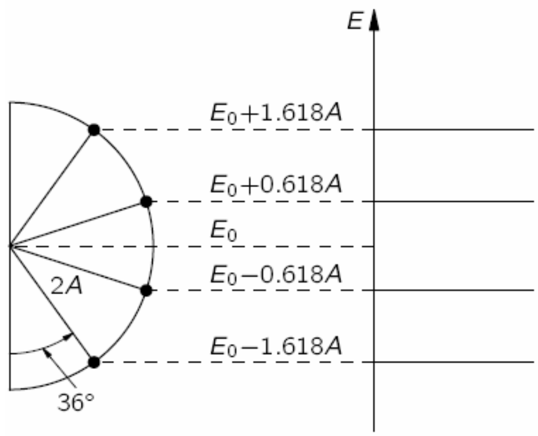
On the state $\left|x_5\right\rangle$, the operation …

III:15-9, Fig 15-8

Consistency error ('S' vs 's', 6 occurrences): The body text (and footnote) uses lowercase for variable 's', not upper case, and the figure should match.

III:15-10, Fig 15-11

Following Figs 15-8 and 15-15, the solid lines to the right should indicate existing energy levels. However, E0 is not an existing energy level.



III:16-2, par 2

(see Section 13-3).

Incorrect reference.

(see Section 13-2).

III:16-3, Eq 16.8

$$C(x_n) = e^{iEt/\hbar} e^{ikx_n} \tag{16.8}$$

Sign error (‘$e^{iEt/\hbar}$’ vs ‘$e^{-iEt/\hbar}$’).

$$C(x_n) = e^{-iEt/\hbar} e^{ikx_n} \tag{16.8}$$

III:16-6, par 5

Remembering that $\langle \phi | x \rangle$ is the complex conjugate of $\langle x | \phi \rangle$, we can write Eq. (16.18) as

Incorrect reference.

Remembering that $\langle \phi | x \rangle$ is the complex conjugate of $\langle x | \phi \rangle$, we can write Eq. (16.19) as

III:16-7, par 2

We can find this amplitude by using our basic equation for the resolution of amplitudes, Eq. (16.20).

Incorrect reference.

(We can find this amplitude by using our basic equation for the resolution of amplitudes, Eq. (16.19).

III:16-8, above Eq 16.29

The intregral can also be rewritten as

Incorrect spelling of 'integral'.

The integral can also be rewritten as

III:16-8, Fig 16-1,caption

The probability density of the wave function of Eq. (16.24).

Incorrect reference. ('Eq. (16.24)' vs 'Eq. (16.25)')

The probability density of the wave function of Eq. (16.25).

III:16-9, par 3

… since it refers to the same state ψ, …

Consistency error ('state ψ ' vs. 'state $|\psi\rangle$ ').

… since it refers to the same state $|\psi\rangle$, …

III:16-9, par 3

This equation must be true for any state ψ and, …

Consistency error ('state ψ ' vs. 'state $|\psi\rangle$ ').

This equation must be true for any state $|\psi\rangle$ and, …

III:16-15, Eq 16.58

$$\frac{d^2a(x)}{dx^2} = \frac{2m}{\hbar}\left[V(x) - E\right]a(x). \tag{16.58}$$

Missing exponent on $\hbar$.

$$\frac{d^2a(x)}{dx^2} = \frac{2m}{\hbar^2}\left[V(x) - E\right]a(x). \tag{16.58}$$

III:16-15, par 1

This equation says that at each x the second derivative of $a(x)$ with respect to x is proportional to $a(x)$, the coefficient of proportionality being given by the quantity $(V - E)$.

Incorrect statement.

This equation says that at each x the second derivative of $a(x)$ with respect to x is proportional to $a(x)$, the coefficient of proportionality being given by the quantity $(2m/\hbar^2)(V - E)$.

III:16-15, par 1

That means that the curve of $a(x)$ will be concave away from the axis.

Incomplete statement.

That means that the curve of $a(x)$ will be concave away from the x-axis.

III:16-15, par 2

… and the curve of $a(x)$ will always be concave toward the axis like one of the pieces shown in part (b) of Fig. 16-4.

Incomplete statement.

… and the curve of $a(x)$ will always be concave toward the x-axis like one of the pieces shown in part (b) of Fig. 16-4.

III:17-2, par 3

We would like to say the same things a litte bit more generally—

Incorrect spelling of 'little'.

We would like to say the same things a little bit more generally—

III:17-4, Fig 17-3

Figure 17-3 has two parts referenced in the body text as "17-3(a)" and "17-3(b)," but the labels (a) and (b) are missing from the figure.

III:17-4, par 1

… have an H_2^+ ion in the state which we once called $|I\rangle$.

An earlier discussion of the molecular hydrogen ion (in Section III:10-1) is referred to, yet the two states of the ion are reversed in this section (17-2) in relation to the earlier discussion. Compare, for example, Eq 10-7 and Eq 17.12. A footnote should be added pointing out this difference.

… have an H_2^+ ion in the state which we once called $|I\rangle$ †.

†See section 10-1. The states $|I\rangle$ and $|II\rangle$ are reversed in this section relative to the earlier discussion.

III:17-11, Fig 17-6a

The particle label 'Λ_0' should be 'Λ^0'.

III:17-12, Fig 17-7

All particle labels 'Λ' should be 'Λ^0'.

III:17-12, Fig 17-8

All particle labels 'Λ' should be 'Λ^0'.

III:17-13, Fig 17-9

All particle labels 'Λ' should be 'Λ^0'.

III:18-8, Eq 18.22

$$\langle x_1 x_2 | F \rangle = +\ i. \tag{18.22}$$

There should be no space between '$+$' and 'i'.

$$\langle x_1 x_2 | F \rangle = +i. \tag{18.22}$$

III:18-8, par 3

—it became known as the "Einstein-Podalsky-Rosen paradox."

Misspelled Podolsky.

—it became known as the "Einstein-Podolsky-Rosen paradox."

III:18-11, Eq 18.32

$$\begin{aligned}\left|\frac{3}{2},+\frac{3}{2},S\right\rangle &= a^3\left|\frac{3}{2},+\frac{3}{2},T\right\rangle + \sqrt{3}a^2b\left|\frac{3}{2},+\frac{1}{2},T\right\rangle \\ &\quad + \sqrt{3}a^2b\left|\frac{3}{2},-\frac{1}{2},T\right\rangle + b^3\left|\frac{3}{2},-\frac{3}{2},T\right\rangle.\end{aligned} \tag{18.32}$$

Wrong coefficient on first term of second line ('a^2b' vs. 'ab^2').

$$\begin{aligned}\left|\frac{3}{2},+\frac{3}{2},S\right\rangle &= a^3\left|\frac{3}{2},+\frac{3}{2},T\right\rangle + \sqrt{3}a^2b\left|\frac{3}{2},+\frac{1}{2},T\right\rangle \\ &\quad + \sqrt{3}ab^2\left|\frac{3}{2},-\frac{1}{2},T\right\rangle + b^3\left|\frac{3}{2},-\frac{3}{2},T\right\rangle.\end{aligned} \tag{18.32}$$

III:18-12, Eq 18.35

$$\begin{aligned}\langle j,m'|R_y(\theta)|j,m\rangle &= \left[(j+m)!(j-m)!(j+m')!(j-m')!\right]^{1/2} \\ &\quad \times \sum_k \frac{(-1)^k(\cos\theta/2)^{2j+m'-m-2k}(\sin\theta/2)^{m-m'+2k}}{(m-m'+k)!(j+m'-k)!(j-m-k)!k!},\end{aligned} \tag{18.35}$$

Wrong power on (-1) (k vs. $k+m-m'$) – compare Tables 17-1 and 17-2.

$$\begin{aligned}\langle j,m'|R_y(\theta)|j,m\rangle &= \left[(j+m)!(j-m)!(j+m')!(j-m')!\right]^{1/2} \\ &\quad \times \sum_k \frac{(-1)^{k+m-m'}(\cos\theta/2)^{2j+m'-m-2k}(\sin\theta/2)^{m-m'+2k}}{(m-m'+k)!(j+m'-k)!(j-m-k)!k!},\end{aligned} \tag{18.35}$$

III:18-14, Fig 18-10, caption

> [From J. A. Kuehner, *Physical Review,* Vol. 125, p.1653, 1962.]

Wrong page number; the article begins on page 1650.

> [From J. A. Kuehner, *Physical Review,* Vol. 125, p.1650, 1962.]

III:18-15, par 4

> They are called the *Clebsch-Gordon coefficients*.

Proper name misspelled (‘*Gordon*’ vs. ‘*Gordan*’, possibly confusion with Gordon of the Klein-Gordon equation).

> They are called the *Clebsch-Gordan coefficients*.

III:18-17, Table 18-4

All m’s should be uppercase (4 occurences).

III:18-18, Table 18-6, line 1

$$\left|J=\frac{3}{2},M=\frac{3}{2}\right\rangle=\left|a,+\frac{1}{2};b,+1\right\rangle$$

Inconsistent notation - missing ‘+’ sign.

$$\left|J=\frac{3}{2},M=+\frac{3}{2}\right\rangle=\left|a,+\frac{1}{2};b,+1\right\rangle$$

III:18-18, Table 18-6, line 2

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

Inconsistent notation - missing ‘+’ sign. Superfluous space (between ‘0’ and bracket).

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

III:18-18, par 2

The combined states are $\left|a, m_a; b, m_a\right\rangle$,

Wrong subscript on 2nd 'm' ('a' vs. 'b').

The combined states are $\left|a, m_a; b, m_b\right\rangle$,

III:18-18, par 5

—the Clebsch-Gordon coefficients for each particular term.

Proper name misspelled ('Gordon' vs. 'Gordan'). See error III:18-15, par 4.

—the Clebsch-Gordan coefficients for each particular term.

III:18-19, par 1

So each of the Clebsch-Gordon coefficients has, if you wish, *six* indices identifying its position in the formulas like those of Table 18-3 and 18-6.

Proper name misspelled ('Gordon' vs. 'Gordan'). See error III:18-15, par 4.

So each of the Clebsch-Gordan coefficients has, if you wish, *six* indices identifying its position in the formulas like those of Table 18-3 and 18-6.

III:18-20, Eq 18.60

$$\left[\frac{(r+s)!}{r!s!}\right]^{-1/2} \underbrace{\{\left|+++\cdots++\right.}_{r}\underbrace{\left.---\cdots--\right\rangle}_{s} + \left(\text{all arrangements of order}\right)\} = \left|j,m\right\rangle \tag{18.60}$$

The underbraces are misplaced.

$$\left[\frac{(r+s)!}{r!s!}\right]^{-1/2} \{\left|\underbrace{+++\cdots++}_{r}\underbrace{---\cdots--}_{s}\right\rangle + \left(\text{all arrangements of order}\right)\} = \left|j,m\right\rangle \tag{18.60}$$

III:18-21, Eq 18.67 [introduced in the 2nd printing]

$$R_y(\theta)\left|\begin{matrix} r \\ s \end{matrix}\right\rangle = \sum_{r'=0}^{r+s} B_{r'} \left[\frac{(r'+s')!}{r'!s'!}\right]^{1/2} \left\{|+\rangle^{r'} \Big|-\Big\rangle^{s'}\right\}_{\text{perm}}. \tag{18.67}$$

The right angle bracket of $|-\rangle$ is way too large.

$$R_y(\theta)\left|\begin{matrix} r \\ s \end{matrix}\right\rangle = \sum_{r'=0}^{r+s} B_{r'} \left[\frac{(r'+s')!}{r'!s'!}\right]^{1/2} \left\{|+\rangle^{r'} |-\rangle^{s'}\right\}_{\text{perm}}. \tag{18.67}$$

III:18-22, Eq 18.74

$$\left|\psi_F^+\right\rangle = \alpha\left\{ R_{\text{up}}\right\rangle + \left|L_{\text{dn}}\right\rangle\right\}, \tag{18.74}$$

Missing bar in first bracket on right-hand side (‘ $R_{\text{up}}\rangle$ ’ vs. ‘$|R_{\text{up}}\rangle$ ’.

$$\left|\psi_F^+\right\rangle = \alpha\left\{\left|R_{\text{up}}\right\rangle + \left|L_{\text{dn}}\right\rangle\right\}, \tag{18.74}$$

III:18-22, par 2

…which contains amplitudes for the emission photons into all sorts of angles.

Missing word (‘of’).

…which contains amplitudes for the emission of photons into all sorts of angles.

III:19-4, par 2

… for all $k > 1$.

Incomplete statement.

… for all $k \geq 1$.

III:19-7, Fig. 19-3

The angle ϕ shown between the x and x’ axes is incorrect. ϕ is the angle between the x-axis and the projection of the x’-axis into the xy-plane (shown dotted in the figure -- ϕ is also the angle between the y and y’ axes, as correctly shown in the figure).

III:19-8, Fig 19-4

$|j,m\rangle$.

Incorrect label on left side of figure (in this section the total angular momentum is 'l', not 'j'.

$|l,m\rangle$

III:19-15, Table 19-2, line *Z=18*

| 18 | **A** *argon* | 15.8 | …

Outdated symbol for Argon ('A' vs. 'Ar').

| 18 | **Ar** *argon* | 15.8 | …

III:19-16, par 4 heading

Na to A

Outdated symbol for Argon ('A' vs. 'Ar').

Na to Ar

III:20-5, below 20.19

… where the amplitudes $\langle i|H|j\rangle$ are …

The operator H is missing its hat.

… where the amplitudes $\langle i|\hat{H}|j\rangle$ are …

III:20-5, Eq after 20.19

$$\langle E\rangle_{\text{av}} = \sum_{ij}\langle\psi|i\rangle E_i\delta_{ij}\langle j|\psi\rangle = \sum_i E_i\langle\psi|i\rangle\langle i|\psi\rangle$$

The first E_i should be E_j.

$$\langle E\rangle_{\text{av}} = \sum_{ij}\langle\psi|i\rangle E_j\delta_{ij}\langle j|\psi\rangle = \sum_i E_i\langle\psi|i\rangle\langle i|\psi\rangle$$

III:20-11, Eqs (20.59), 3rd line

Consistency error, The '$\mathcal{P}$' in operator $\hat{\mathcal{P}}_x$ is typographically different from those that follow.

III:20-12, 1st line

In this list, we have introduced the symbol $\mathcal{P}_x$ for …

The operator $\hat{\mathcal{P}}_x$ is missing its hat.

In this list, we have introduced the symbol $\hat{\mathcal{P}}_x$ for …

III:20-13, Eq 20.67

$$\hat{\mathcal{P}}_{\text{total}} = \hat{\mathcal{P}}_{x1} + \hat{\mathcal{P}}_{x2} + \hat{\mathcal{P}}_{x3} + \cdots \tag{20.67}$$

Typographical error: the numerals '1,2,3...' should be subscripts on 'x'

$$\hat{\mathcal{P}}_{\text{total}} = \hat{\mathcal{P}}_{x_1} + \hat{\mathcal{P}}_{x_2} + \hat{\mathcal{P}}_{x_3} + \cdots \tag{20.67}$$

III:20-14, below Eq 20.68

What is $\hat{\mathcal{L}}$?

Subscript 'z' missing.

What is $\hat{\mathcal{L}}_z$?

III:20-14, Eqs (20.70) (introduced in the definitive edition)

Consistency error, The '$\mathcal{P}$' in operator $\hat{\mathcal{P}}_x$ is typographically different from those that precede and follow.

III:20-15, 1st unnumbered Eq (introduced in the definitive edition)

Consistency error, The '$\mathcal{P}$'s in operators $\hat{\mathcal{P}}_x$ and $\hat{\mathcal{P}}_y$ are typographically different from those that precede and follow.

III:20-16, par 2

If we take the complex conjugate of this equation, it is equivalent to…

Incorrect reference ("this equation" implies the immediately preceding equation, which is 20.79, but what follows is the complex conjugate of equation 20.78).

If we take the complex conjugate of Eq. (20.78), it is equivalent to…

III:20-17, 1st unnumbered Eq (introduced in the definitive edition)

Consistency error, The '$\mathcal{P}$' in operator $\hat{\mathcal{P}}_x$ is typographically different from those that precede and follow.

III:21-2, Fig 21-1

The curve from a to b should be labeled 'Γ' (Gamma) not 'r'.

III:21-2, Fig 21-1, caption

The amplitude to go from *a* to *b* along the path Γ is proportional to $\exp(iq/\hbar)\int_a^b \mathbf{A}\cdot d\mathbf{s}$.

Missing brackets for function exp.

The amplitude to go from *a* to *b* along the path Γ is proportional to $\exp\left[(iq/\hbar)\int_a^b \mathbf{A}\cdot d\mathbf{s}\right]$.

III:21-2, par 5

So the next step is to expand both sides of (21.4) in powers of *b*,

Inaccurate statement: only the right-hand side of (21.4) is expanded in powers of *b*.

So the next step is to expand the right-hand side of (21.4) in powers of *b*,

III:21-4, above Eq 21.12 (introduced in the definitive edition)

… momentum operator $\hat{\mathcal{P}}$ minus $q\boldsymbol{A}$.

Two errors: The operator $\hat{\mathcal{P}}$ is a vector operator and should be bold. The '$\mathcal{P}$' in operator $\hat{\mathcal{P}}$ is typographically different from those that precede and follow.

… momentum operator $\hat{\boldsymbol{\mathcal{P}}}$ minus $q\boldsymbol{A}$.

III:21-4, Eq 21.12

$$\boldsymbol{J} = \frac{1}{2}\left\{\psi^*\left[\frac{\hat{\mathcal{P}} - q\boldsymbol{A}}{m}\psi\right]\psi \;+\psi\left[\frac{\hat{\mathcal{P}} - q\boldsymbol{A}}{m}\right]^*\psi^*\right\}. \tag{21.12}$$

Five errors: The operator $\hat{\mathcal{P}}$ is a vector operator and should be bold (two occurences). The '$\mathcal{P}$' in operator $\hat{\mathcal{P}}$ is typographically different from those that precede and follow (two occurences). The ψ *inside* the leftmost square brackets shouldn't be there [NOTE: This is a Caltech-approved correction that was botched in the 4th printing – See *FLP_Definitive_Edition_3rd_printing_Vol_III_Errata.pdf*].

$$\boldsymbol{J} = \frac{1}{2}\left\{\psi^*\left[\frac{\hat{\boldsymbol{\mathcal{P}}} - q\boldsymbol{A}}{m}\right]\psi \;+\psi\left[\frac{\hat{\boldsymbol{\mathcal{P}}} - q\boldsymbol{A}}{m}\right]^*\psi^*\right\}. \tag{21.12}$$

III:21-4, Eq 21.13 (introduced in the definitive edition)

Two errors: The operator $\hat{\mathcal{P}}$ is a vector operator and should be bold. The '$\mathcal{P}$' in operator $\hat{\mathcal{P}}$ is typographically different from those that precede and follow.

III:21-5, par 3

… in which I can produce a flux of magnetic field (*B*-field), …

Vectors should be bold.

… in which I can produce a flux of magnetic field (***B***-field), …

III:21-5, Eq 21.16

$$E = -\frac{\partial \boldsymbol{A}}{\partial t}$$

Vectors should be bold.

$$\boldsymbol{E} = -\frac{\partial \boldsymbol{A}}{\partial t}$$

III:21-5, par 4

… this charge immediately picks up an "mv" momentum equal to $-q\boldsymbol{A}$.

The term "*mv*-momentum" has already been introduced.

… this charge immediately picks up an *mv*-momentum equal to $-q\boldsymbol{A}$.

III:21-5, par 4

But there is something that isn't changed immediately and that's the difference between mv and $-q\boldsymbol{A}$. And so the sum $\boldsymbol{p} = mv + q\boldsymbol{A}$ is something which …

The 'v' in both (2) instances of 'mv' should be bold ('$m\boldsymbol{v}$').

But there is something that isn't changed immediately and that's the difference between $m\boldsymbol{v}$ and $-q\boldsymbol{A}$. And so the sum $\boldsymbol{p} = m\boldsymbol{v} + q\boldsymbol{A}$ is something which …

III:21-7, footnote 6

First discovered by Onnes in 1911; H. K. Onnes, Comm. Phys. Lab., Univ. Leyden …

Improper abbreviation of (composite) family name ('Onnes' and 'K. Onnes' vs. 'Kamerlingh-Onnes').

First discovered by Kamerlingh-Onnes in 1911; H. Kamerlingh-Onnes, Comm. Phys. Lab., Univ. Leyden …

III:21-9, par 2

Since ρ and q have the same (negative) sign, and since ρ is constant, I can set $\rho q/m = -(\text{some constant})$;

Incomplete and inaccurate statement.

Since ρ and q have the same (negative) sign, and since ρ is constant, I can set $-\rho q/m = -(\text{some positive constant})$;

III:21-9, Eq 21.21

$$\boldsymbol{J} = -(\text{some constant})\boldsymbol{A}. \tag{21.21}$$

Incomplete statement (see correction for III:21-9, par 2).

$$\boldsymbol{J} = -(\text{some positive constant})\boldsymbol{A}. \tag{21.21}$$

III:21-9, footnote 9

[9] H. London and F. London, *Proc. Roy. Soc.* (London) **A149**, 71 (1935); Physica 2, 341 (1935)

Authors are listed in wrong order.

[9] F. London and H. London, *Proc. Roy. Soc.* (London) **A149**, 71 (1935); Physica 2, 341 (1935)

III:21-10, par 2

Also, remember that q in Eq. (21.24) is twice the charge on an electron,

Typographical error ('on' vs. 'of).

Also, remember that q in Eq. (21.24) is twice the charge of an electron,

III:21-10, par 2

… $1/\lambda$ would be about 2×10^{-5} cm. That gives you the order of magnitude.

Wrong order of magnitude (10^{-5} vs. 10^{-6}).

… $1/\lambda$ would be about 2×10^{-6} cm. That gives you the order of magnitude.

III:21-10, Fig 21-3, caption

(a) A superconducting cylinder is a magnetic field;

Typographical error ('is' vs. 'in').

(a) A superconducting cylinder in a magnetic field;

III:21-14, par 3

Josephson analyzed this situation and discovered that a number of strange phenomenon should occur.

Incorrect pluralization ("phenomenon" vs. "phenomena").

Josephson analyzed this situation and discovered that a number of strange phenomena should occur.

III:21-16, par 4

… are connected to our electrical intruments which …

Incorrect spelling of 'instruments'.

… are connected to our electrical instruments which …

III:21-18, par 3

One should be able to go even farther.

Grammatical error ('farther' vs. 'further').

One should be able to go even further.

III:21-18, footnote 18

[18] Jaklevic, Lambe, Silva, and Mercereau, *Phys. Rev. Letters* **12**, 274 (1964).

"Silver" is misspelled.

[18] Jaklevic, Lambe, Silver, and Mercereau, *Phys. Rev. Letters* **12**, 274 (1964).

III:A-6, par 2

… an axis through the atom parallel to *B*, so if *B* is along …

Vectors should be bold ('*B*' vs. '***B***', 2x)

… an axis through the atom parallel to ***B***, so if ***B*** is along …

III:A-11, par 1

$$\langle J \cdot J \rangle_{av} = 3\langle J_z^2 \rangle.$$

Missing '*av*' on right-hand side. (See correction for II:34-11,par 1 in Commemorative Issue Errata.)

$$\langle J \cdot J \rangle_{av} = 3\langle J_z^2 \rangle_{av}.$$

III:A-14, Fig 35-1

(a) Every one of the (9) small 'j_z's should be a capital 'J_z', and (b) all (9) values given for J_z need to be multiplied by $\hbar$, as per Figs 34-5 and 34-6. [Note: the (3) 'j's and their given values are okay.]

III:A-17, Fig 35-5

The vertical field **B** in Magnet 2 should be labeled $\mathbf{B_0}$ (see text).

III:A-17, page number

The page number is missing on this page.

III:A-20, Eq 35.14

$$e^{-\Delta U}/^{kT}\,. \tag{35.14}$$

Typographical error. The "/" is too big – it belongs in the exponent.

$$e^{-\Delta U/kT}\,. \tag{35.14}$$

III:A-20, Eq 35.15

$$N_{\text{up}} = ae^{-\mu_0 B/kt}, \tag{35.15}$$

Capitilization error ('t' vs. 'T').

$$N_{\text{up}} = ae^{-\mu_0 B/kT}, \tag{35.15}$$

III:A-20, Eq 35.16

$$N_{\text{down}} = ae^{+\mu_0 B/kt}, \tag{35.16}$$

Capitilization error ('t' vs. 'T').

$$N_{\text{down}} = ae^{+\mu_0 B/kT}, \tag{35.16}$$

III:A-21, par 1

A plot of M as a function of B is given in Fig. 35.7.

Typographical error ('35.7' vs. '35−7').

A plot of M as a function of B is given in Fig. 35−7.

III:A-21, par 2

In most normal cases—say, for typical moments, room temperatures, and the fields one can normally get (like 10,000 gauss)—the ratio $\mu_0 B/kT$ is about 0.02.

Arithmetic error ('0.02' vs. '0.002'). [With g=2, T=295, the ratio is 0.00227698.]

In most normal cases—say, for typical moments, room temperatures, and the fields one can normally get (like 10,000 gauss)—the ratio $\mu_0 B/kT$ is about 0.002.

III:A-22, 1st line

like praseodynium-ammonium-nitrate

Incorrect spelling of 'praseodymium'

like praseodymium-ammonium-nitrate

III:Index-5

Priestly, J.

Incorrect spelling of proper name ('Priestly' vs. 'Priestley').

Priestley, J.