# Errata for
# The Feynman Lectures on Physics Volume II
# Definitive Edition (Caltech Approved)

The errors in this list appear in *The Feynman Lectures on Physics: Definitive Edition* and earlier editions; all corrections have been approved by Caltech; these errors will be corrected in future editions.

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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Michael A. Gottlieb
Playa Tamarindo, Guanacaste
Costa Rica
mg@feynmanlectures.info

### II:xiii, par 4

The supernova of 1987 has just been discovered, and Feynman was very excited about it.

Incorrect word ('has' instead of 'had').

The supernova of 1987 had just been discovered, and Feynman was very excited about it.

### II:1-7, Fig 1-8

The labels "+" and "–" indicating charge should be exchanged in this figure, so that the indicated current direction is shown flowing from "+" to "–", as shown in Fig. 1-6, Fig.1-7 and Fig. 1-9.

### II:1-10, par 2

—they may disappear completely in certain coordinate frames

Incorrect punctuation (missing '.' at end of sentence)

—they may disappear completely in certain coordinate frames.

### II:2-6, par 1

since $\Delta y$ is negative when $\Delta x$ is positive.

Missing prime on '$\Delta y$'.

since $\Delta y'$ is negative when $\Delta x$ is positive.

### II:3-1, par 3

If Γ(gamma) is any curve joining (1) and (2),

Typographical error: missing space after Γ.

If Γ (gamma) is any curve joining (1) and (2),

**II:3-2, par 1**

we mean the limit of the sum

$$\sum f_i \Delta s_i \,,$$

Summation index '*i*' missing.

we mean the limit of the sum

$$\sum_i f_i \Delta s_i \,,$$

**II:3-2, par 3**

In Chapter 1, we showed that the component of $\nabla\psi$ along a small …

Incorrect reference.

In Chapter 2, we showed that the component of $\nabla\psi$ along a small …

**II:3-2, par 3**

… the rate of change of $\psi$ in the direction of $\Delta R$

Typographical error; vectors should be bold ('$R$' vs. '$\boldsymbol{R}$').

… the rate of change of $\psi$ in the direction of $\Delta \boldsymbol{R}$

**II:3-2, Eq 3.6**

$$\psi(2) - \psi(1) = \sum (\nabla\psi)_i \cdot \Delta \boldsymbol{s}_i \,. \tag{3.6}$$

Summation index '*i*' missing.

$$\psi(2) - \psi(1) = \sum_i (\nabla\psi)_i \cdot \Delta \boldsymbol{s}_i \,. \tag{3.6}$$

**II:3-3, par 7**

Imagine that we have a closed surface $\boldsymbol{S}$ that encloses the volume $V$.

Typographical error; only vectors should be bold ('$\boldsymbol{S}$' vs. '$S$').

Imagine that we have a closed surface $S$ that encloses the volume $V$.

## II:3-5, par 1

There are, of course, more terms, but they will involve $(\Delta_x)^2$ and higher powers…

Typographical error ('*x*' should not be a subscript.).

There are, of course, more terms, but they will involve $(\Delta x)^2$ and higher powers…

## II:3-6, Eq 3.20

$$-\frac{d}{dt}\left(q\Delta V\right) = -\frac{dq}{dt}\Delta V. \tag{3.20}$$

Wrong kind of derivative. In going from Eq 3.19 to Eq 3.20 the total derivative in front of the volume integral is (implicitly) put under the integral sign, thus making it a partial deriviative.

$$-\frac{\partial}{\partial t}\left(q\Delta V\right) = -\frac{\partial q}{\partial t}\Delta V. \tag{3.20}$$

## II:3-6, Eq 3.21

$$-\frac{dq}{dt} = \nabla \cdot \boldsymbol{h}. \tag{3.21}$$

Wrong kind of derivative. (see error II:3-6, Eq 20).

$$-\frac{\partial q}{\partial t} = \nabla \cdot \boldsymbol{h}. \tag{3.21}$$

## II:3-7, par 3, unnumbered Eq

$$-\frac{dq}{dt} = \nabla \cdot \boldsymbol{h} = -\nabla \cdot \left(\kappa \nabla T\right),$$

Wrong kind of derivative. (see error II:3-6, Eq 20).

$$-\frac{\partial q}{\partial t} = \nabla \cdot \boldsymbol{h} = -\nabla \cdot \left(\kappa \nabla T\right),$$

## II:3-7, Eq 3.26

$$\frac{dq}{dt} = \kappa \nabla \cdot \nabla T = \kappa \nabla^2 T, \tag{3.26}$$

Wrong kind of derivative. (see error II:3-6, Eq 20).

$$\frac{\partial q}{\partial t} = \kappa \nabla \cdot \nabla T = \kappa \nabla^2 T, \tag{3.26}$$

## II:3-7, Eq 3.27

$$\frac{dq}{dt} = c_v \frac{dT}{dt}. \tag{3.27}$$

Wrong kind of derivative. (see error II:3-6, Eq 20).

$$\frac{\partial q}{\partial t} = c_v \frac{\partial T}{\partial t}. \tag{3.27}$$

## II:3-7, Eq 3.28

$$\frac{dT}{dt} = \frac{\kappa}{c_v} \nabla^2 T. \tag{3.28}$$

Wrong kind of derivative. (see error II:3-6, Eq 20).

$$\frac{\partial T}{\partial t} = \frac{\kappa}{c_v} \nabla^2 T. \tag{3.28}$$

## II:3-7, Eq 3.29

$$\frac{dT}{dt} = D\, \nabla^2 T, \tag{3.29}$$

Wrong kind of derivative. (see error II:3-6, Eq 20).

$$\frac{\partial T}{\partial t} = D\, \nabla^2 T, \tag{3.29}$$

**II:4-4, par 6**

Let point $a$ be at the distance $r_1$ from $q$, and point $b$ at $r_2$.

Subscripts inconsistent with following discussion ('$r_1$' and '$r_2$' vs. '$r_a$' and '$r_b$'. See Eq 4.20).

Let point $a$ be at the distance $r_a$ from $q$, and point $b$ at $r_b$.

**II:4-6, par 3**

Consider two points, one at $x$ and one at $(x + dx)$,

Inconsistent with following (two) unnumbered Eqs ('$dx$' vs. '$\Delta x$').

Consider two points, one at $x$ and one at $(x + \Delta x)$,

**II:4-6, par 3**

The path is along the horizontal line from $x$ to $x + dx$.

Inconsistent with following (two) unnumbered Eqs ('$dx$' vs. '$\Delta x$').

The path is along the horizontal line from $x$ to $x + \Delta x$.

**II:4-7, par 4**

Because of this, Eq. (4−28)—or (4.29)—can contain only part of the laws of electricity.

Punctuation error in equation number ('−' vs. '.').

Because of this, Eq. (4.28)—or (4.29)—can contain only part of the laws of electricity.

**II:4-8, Fig 4-5**

In Fig. 4-5 the Point Charge is twice as far from point b as it is from point a, yet the electric field vector at point b ($E_b$) is drawn four times longer than the electric field vector at point a ($E_a$); it should be the other way around: $E_a$ has four times the magnitude of $E_b$. The lengths (but not the positions) of vectors $E_a$ and $E_b$ should be exchanged in this figure.

## II:5-5, par 4, unnumbered Eq

$$\frac{E_2}{E_1} = \frac{q_2/r_2^2}{q_1/r_1^2} = 1\,.$$

Missing 'Δ's (two of them. See preceding unnumbered Eq).

$$\frac{E_2}{E_1} = \frac{\Delta q_2/r_2^2}{\Delta q_1/r_1^2} = 1\,.$$

## II:5-7, par 4

The inverse square law is valid at distances like one meter and also at $10^{-10}$m;

Missing space before 'm'.

The inverse square law is valid at distances like one meter and also at $10^{-10}$ m;

## II:6-2, par 6, final unnumbered Eq

$$\frac{1}{\sqrt{\left[z-(d/2)\right]^2 + x^2 + y^2}} \approx \frac{1}{\sqrt{r^2\left[1-(zd/r^2)\right]}} \approx \frac{1}{r}\left(1-\frac{zd}{r^2}\right)^{-1/2}.$$

The second approximately equal sign should be an equal sign ('≈' vs. '=').

$$\frac{1}{\sqrt{\left[z-(d/2)\right]^2 + x^2 + y^2}} \approx \frac{1}{\sqrt{r^2\left[1-(zd/r^2)\right]}} = \frac{1}{r}\left(1-\frac{zd}{r^2}\right)^{-1/2}.$$

## II:6-3, par 1

—and throwing away terms with higher powers than the square of d—

Incorrect statement.

—and throwing away terms with the square or higher powers of d—

**II:6-4, par 1**

The transverse component $E_\perp$ is in the x-y plane …

Punctuation error. [See correction III:17-14, par 3 in Commemorative Issue errata.]

The transverse component $E_\perp$ is in the xy-plane …

**II:6-7, Eq 6.22**

$$\phi \;=\; \frac{1}{4\pi\varepsilon_0}\frac{1}{R}\sum q_i \;=\; \frac{Q}{4\pi\varepsilon_0}, \tag{6.22}$$

Summation index '$i$' missing.

$$\phi \;=\; \frac{1}{4\pi\varepsilon_0}\frac{1}{R}\sum_i q_i \;=\; \frac{Q}{4\pi\varepsilon_0}, \tag{6.22}$$

**II:6-7, par 2**

In other words if $\boldsymbol{e}_r$ is the unit vector in the direction of $\boldsymbol{R}$,

Inconsistent notation ('$\boldsymbol{e}_r$' vs. '$\boldsymbol{e}_R$'). See Eqs. II:14.28 and II:14.34.

In other words if $\boldsymbol{e}_R$ is the unit vector in the direction of $\boldsymbol{R}$,

**II:6-7, Eq 6.23**

$$r_i \approx R - \boldsymbol{d}_i \cdot \boldsymbol{e}_r\,. \tag{6.23}$$

Inconsistent notation ('$\boldsymbol{e}_r$' vs. '$\boldsymbol{e}_R$'). See error II:6-7, par 2, *above*.

$$r_i \approx R - \boldsymbol{d}_i \cdot \boldsymbol{e}_R\,. \tag{6.23}$$

**II:6-7, Eq 6.25**

$$\phi = \frac{1}{4\pi\varepsilon_0}\left(\frac{Q}{R} + \sum_i q_i \frac{\boldsymbol{d}_i \cdot \boldsymbol{e}_r}{R^2} + \cdots\right). \tag{6.25}$$

Inconsistent notation ('$\boldsymbol{e}_r$' vs. '$\boldsymbol{e}_R$'). See error II:6-7, par 2, *above*.

$$\phi = \frac{1}{4\pi\varepsilon_0}\left(\frac{Q}{R} + \sum_i q_i \frac{\boldsymbol{d}_i \cdot \boldsymbol{e}_R}{R^2} + \cdots\right). \tag{6.25}$$

**II:6-7, par 2**

The three dots indicate the terms of higher order in $d/R$ that we have neglected.

Missing subscript (‘$d$’ vs ‘$d_i$’).

The three dots indicate the terms of higher order in $d_i/R$ that we have neglected.

**II:6-7, Eq 6.26**

$$\boldsymbol{p} = \sum q_i \boldsymbol{d}_i \tag{6.26}$$

Summation index ‘$i$’ missing.

$$\boldsymbol{p} = \sum_i q_i \boldsymbol{d}_i\,, \tag{6.26}$$

**II:6-7, Eq 6.27**

$$\phi = \frac{1}{4\pi\varepsilon_0}\frac{\boldsymbol{p}\cdot\boldsymbol{e}_r}{R^2}. \tag{6.27}$$

Inconsistent notation (‘$\boldsymbol{e}_r$’ vs. ‘$\boldsymbol{e}_R$’). See error II:6-7, par 2, *above*.

$$\phi = \frac{1}{4\pi\varepsilon_0}\frac{\boldsymbol{p}\cdot\boldsymbol{e}_R}{R^2}. \tag{6.27}$$

**II:6-9, par 5**

You can find the surface charge density by using the result we worked out in Section 5-6 with Gauss’ theorem.

Two errors: (1) it’s Gauss’ *law* not Gauss’ theorem, (2) incorrect reference (‘5-6’ vs ‘5-9’) [Gauss’ law is used in both sections 5-6 and 5-9, but here Feynman is discussing the fields near a conductor, which is the subject of 5-9, not the fields of sheets of charge, which is the subject of 5-6.]

You can find the surface charge density by using the result we worked out in Section 5-9 with Gauss’ law.

**II:6-10, par 5**

Let's find the fields around a metal sphere …

Incomplete statement (see Fig 6-11).

Let's find the fields around a grounded metal sphere …

**II:6-13, par 2**

From the definition of *C*, we see that its unit is one $\text{coul}/\text{volt}$.

Incorrect abbreviation of 'coulomb'.

From the definition of *C*, we see that its unit is one $\text{coulomb}/\text{volt}$.

**II:6-14, par 2**

… is placed at the center of an evacuated glass sphere (Fig. 6−16.)

Punctuation error: the period belongs at the end of the sentence, not in parentheses.

… is placed at the center of an evacuated glass sphere (Fig. 6−16).

**II:6-14, par 4**

The combination of these two effects limits the resolution to 25 A or so.

Incorrect abbreviation for angstrom ('A' vs. 'Å')

The combination of these two effects limits the resolution to 25 Å or so.

**II:6-14, Fig. 6-17 caption**

Courtesy of Erwin W. Mueller,

Incorrect spelling of proper name ('Mueller' vs. 'Müller')

Courtesy of Erwin W. Müller,

**II:6-14, footnote**

See E. W. Mueller:

Incorrect spelling of proper name ('Mueller' vs. 'Müller')

See E. W. Müller:

**II:7-4, par 2**

This fact is used to make devices (called quadrupole lenses) that are useful for focusing particle beams (see Section 29-9).

Incorrect reference.

This fact is used to make devices (called quadrupole lenses) that are useful for focusing particle beams (see Section 29-7).

**II:7-9, Eq 7.35**

$$D^2 = \frac{\varepsilon_0 kT}{2n_0 q^2}. \tag{7.35}$$

Missing subscript ( '$q$' vs. '$q_e$', see preceding Eqs).

$$D^2 = \frac{\varepsilon_0 kT}{2n_0 q_e^2}. \tag{7.35}$$

**II:7-9, par 3**

Equation (7.36) says that the sheath gets thinner with increasing concentration of ions ($n_0$) or with decreasing temperature.

Incorrect reference.

Equation (7.35) says that the sheath gets thinner with increasing concentration of ions ($n_0$) or with decreasing temperature.

**II:8-5, par 1**

The spacing of the ions is 2.81 A $\left(= 2.81 \times 10^{-8}\text{ cm}\right)$.

Incorrect abbreviation for angstrom ('A' vs 'Å').

The spacing of the ions is 2.81 Å $\left(= 2.81 \times 10^{-8}\text{ cm}\right)$.

**II:8-5, Fig 8-5**

Incorrect abbreviation for angstrom ('2.81 A' vs '2.81 Å').

**II:8-8, par 7**

In going from B11 to C11, we replace a neutron by a proton, which has less mass. So part of the energy difference is the difference in the rest energies of a neutron and a proton, which is 0.784 Mev.

The difference between the rest energies of a neutron and a proton is 1.293 MeV, not .784 MeV. Feynman fails to mention the rest energy of the electron that must be added to the atom (to keep it neutral) when transitioning from B11 (Z=5) to C11 (Z=6), though he includes that energy in his calculation.

In going from B11 to C11, we replace a neutron by a proton and an electron, which have less mass. So part of the energy difference is the difference in the rest energies of a neutron and that of a proton plus an electron, which is 0.784 Mev.

**II:10-4, par 1, unnumbered Eq**

$$\sigma_{\text{pol}} = Nq_e\ \ \delta.$$

Unwanted extra space between $q_e$ and $\delta$.

$$\sigma_{\text{pol}} = Nq_e\delta.$$

**II:10-4, Eq 10.8**

$$\boldsymbol{P} = \chi\boldsymbol{\varepsilon}_0\boldsymbol{E}. \tag{10.8}$$

Epsilon should not be bold ('$\boldsymbol{\varepsilon}_0$' vs. '$\varepsilon_0$') .

$$\boldsymbol{P} = \chi\varepsilon_0\boldsymbol{E}. \tag{10.8}$$

**II:10-5, par 6**

… so we again get that $\sigma = P$.

Missing subscript on sigma ('$\sigma$' vs. '$\sigma_{\text{pol}}$') .

… so we again get that $\sigma_{\text{pol}} = P$.

### II:11-1, par 2

As we pointed out in Chapters 6 and 7, there is in the water vapor molecule an average plus charge on the hydrogen atoms and a negative charge on the oxygen.

Incorrect reference (no mention is made of the water vapor molecule in chapter 7).

As we pointed out in Chapter 6, there is in the water vapor molecule an average plus charge on the hydrogen atoms and a negative charge on the oxygen.

### II:11-3, par 3

… it takes about 24.5 volts to pull the electron off helium,

Wrong voltage ('24.5' vs. '24.6'). See Table III:19-2, line 2.

… it takes about 24.6 volts to pull the electron off helium,

### II:11-3, par 3

… compared with the 13.5 volts required to ionize hydrogen.

Wrong voltage ('13.5' vs. '13.6'). See, for example, Vol I Eq 38.13.

… compared with the 13.6 volts required to ionize hydrogen.

### II:11-4, par 6, unnumbered Eq

$$P = -\frac{N}{2}\int_0^\pi \left(1+\frac{p_0 E}{kT}\cos\theta\right) p_0 \cos\theta \, d\left(\cos\theta\right)$$

Incorrect limits of integration. $\theta$ goes from 0 to π (see Eq 11.19), so cos $\theta$ goes from 1 to −1.

$$P = -\frac{N}{2}\int_1^{-1} \left(1+\frac{p_0 E}{kT}\cos\theta\right) p_0 \cos\theta \, d\left(\cos\theta\right)$$

### II:12-1, par 3

There is a potential $(\phi)$ whose gradient multiplied by a scalar function $(\kappa)$ has a divergence equal to another scalar function $(-\rho/\varepsilon_0)$.

Missing subscript on rho ('$\rho$' vs. '$\rho_{\text{free}}$').

There is a potential $(\phi)$ whose gradient multiplied by a scalar function $(\kappa)$ has a divergence equal to another scalar function $(-\rho_{\text{free}}/\varepsilon_0)$.

**II:12-8, par 5**

Then we represent the flow by giving the velocity vector $v(\boldsymbol{r})$ as a function of position $\boldsymbol{r}$.

'*v*' is a vector and so it should be bold ('$v(\boldsymbol{r})$' vs. '$\boldsymbol{v}(\boldsymbol{r})$').

Then we represent the flow by giving the velocity vector $\boldsymbol{v}(\boldsymbol{r})$ as a function of position $\boldsymbol{r}$.

**II:12-11, par 1**

… then *I,* the energy arriving *per unit area* of the surface, is only cos $\theta$ as great,

Missing subscript ('$I$' vs. '$I_n$').

… then $I_n$ *,* the energy arriving *per unit area* of the surface, is only cos $\theta$ as great,

**II:12-11, par 2**

… within one part in a thousand? *Answer;* …

Punctuation error ('*;*' vs. '*:*') .

… within one part in a thousand? *Answer:* …

**II:13-2, Fig 13-4, caption**

The integral of $\boldsymbol{j} \cdot \boldsymbol{n}$ over a closed surface is the rate of change of the total charge Q inside.

Sign error. See Eq 13.6.

The integral of $\boldsymbol{j} \cdot \boldsymbol{n}$ over a closed surface is negative the rate of change of the total charge Q inside.

**II:13-10, Fig 13-12**

The arrowheads indicating the directions of magnetic fields B and B' should (both) point in the other direction (right-hand rule).

## II:14-3, Eq 14.9

$$\boldsymbol{A} = \tfrac{1}{2}\boldsymbol{B} \times \boldsymbol{r}'. \tag{14.9}$$

Missing subscript ('$\boldsymbol{B}$' vs. '$\boldsymbol{B}_0$'). See Eq 14.8.

$$\boldsymbol{A} = \tfrac{1}{2}\boldsymbol{B}_0 \times \boldsymbol{r}'. \tag{14.9}$$

## II:14-3, par 2

The vector potential $\boldsymbol{A}$ has the magnitude $Br'/2$ …

Missing subscript ('$B$' vs. '$B_0$'). See error II:14-3, Eq 14.9.

The vector potential $\boldsymbol{A}$ has the magnitude $B_0 r'/2$ …

## II:14-5, par 2, unnumbered Eq

$$A_z = -\frac{\pi a\ ^2 j_z}{2\pi\epsilon_0 c^2} \ln r'$$

Unwanted space between '$a$' and its superscript 2 ('$a\ ^2$' vs. '$a^2$').

$$A_z = -\frac{\pi a^2 j_z}{2\pi\epsilon_0 c^2} \ln r'$$

## II:14-5, par 6

The result is the same as the electrostatic potential outside a cylinder with a surface charge

$$\sigma = \sigma_0 \sin\phi,$$
with $\sigma_0 = J/c^2$.

Wrong sign ('$J/c^2$' vs. '$-J/c^2$'). See preceding unnumbered equation.

The result is the same as the electrostatic potential outside a cylinder with a surface charge

$$\sigma = \sigma_0 \sin\phi,$$
with $\sigma_0 = -J/c^2$.

## II:14-7, Fig 14-6, caption

$(R >> a,$ or $b.)$

Incorrect punctuation (there should be no comma after '*a*').

$(R >> a$ or $b.)$

## II:14-8, par 5

(See Eqs. (6.14) and (6.15); also Fig. 6-5.)

Incorrect reference ('Fig. 6-5' vs. 'Fig. 6-4')

(See Eqs. (6.14) and (6.15); also Fig. 6-4.)

## II:14-8, par 6

… $\nabla \cdot E = \rho / \varepsilon_0$ and $\nabla \times B = j / \varepsilon_0 c^2$ ,

Five errors: $E$, $B$, and $j$ are supposed to be vectors and $\nabla \cdot$ and $\nabla \times$ are supposed to be vector operators, so they should all be bold. See Eqs. 14.1 and 14.2.

… $\boldsymbol{\nabla} \boldsymbol{\cdot} \boldsymbol{E} = \rho / \varepsilon_0$ and $\boldsymbol{\nabla} \boldsymbol{\times} \boldsymbol{B} = \boldsymbol{j} / \varepsilon_0 c^2$ ,

## II:14-9, par 3

In studying electrostatics we found that the electric field of a known charge distribution could be obtained directly with an integral (Eq. 4-16):

Incorrect punctuation of equation number ('4-16' vs. '4.16').

In studying electrostatics we found that the electric field of a known charge distribution could be obtained directly with an integral (Eq. 4.16):

## II:15-1, par 3

You will remember that we found the same kind of relationship for the torque of an electric dipole:

The torque of an electric dipole is not mentioned anywhere else.

The same kind of relationship holds for the torque of an electric dipole in an electric field:

**II:15-1, par 4, unnumbered Eq**

$$dU = -\tau\, d\theta.$$

Wrong sign. U decreases when $\theta$ decreases and $\tau > 0$.

$$dU = \tau\, d\theta.$$

**II:15-2, par 1**

Setting $\tau = -\mu B \sin\theta$, and integrating, …

Wrong sign. See unnumbered Eqs on page 15-1 (also, the integral of sin $\theta$ is – cos $\theta$).

Setting $\tau = \mu B \sin\theta$, and integrating, …

**II:15-2, par 1**

… the energy is lowest when $\mu$ and $B$ are parallel.

Vectors $\mu$ and $B$ are parallel (not their magnitudes); vectors should be bold.

… the energy is lowest when $\boldsymbol{\mu}$ and $\boldsymbol{B}$ are parallel.

**II:15-2, par 3**

Again, this corresponds to our result for an electric dipole:

The energy of an electric dipole is given in a different chapter - see Eq. (11.14).

Again, this corresponds to the result for an electric dipole:

**II:15-3, Eq 15.9**

$$U_{\text{mech}} = W = -Iab\ \ B = -\mu B$$

There should be less space between '$b$' and '$I$'.

$$U_{\text{mech}} = W = -IabB = -\mu B$$

**II:17-8, par 2**

… let's analyze what happens in the setup described in Section 12, and shown in Fig. 17-1.

Incorrect reference.

… let's analyze what happens in the setup described in Section 1, and shown in Fig. 17-1.

**II:18-2, Table 18-1, line 4**

IV. $c^2\nabla\times\boldsymbol{B}=\dfrac{\boldsymbol{j}}{\varepsilon_0}+\dfrac{\partial\boldsymbol{E}}{\partial t}$ $c^2\left(\text{Integral of } \boldsymbol{B} \text{ around a loop}\right)$ = (Current through the loop)$/\varepsilon_0$

$+\dfrac{\partial}{\partial t}\left(\text{Flux of } \boldsymbol{E} \text{ through the loop}\right)$

The partial derivative on $\left(\text{Flux of } \boldsymbol{E} \text{ through the loop}\right)$ should be a total derivative [see chapter II:1].

II. $c^2\nabla\times\boldsymbol{B}=\dfrac{\boldsymbol{j}}{\varepsilon_0}+\dfrac{\partial\boldsymbol{E}}{\partial t}$ $c^2\left(\text{Integral of } \boldsymbol{B} \text{ around a loop}\right)$ = (Current through the loop)$/\varepsilon_0$

$+\dfrac{d}{dt}\left(\text{Flux of } \boldsymbol{E} \text{ through the loop}\right)$

**II:18-2, Table 18-1, line 5**

$\nabla\cdot\boldsymbol{j}=-\dfrac{\partial\rho}{\partial t}$ $\left(\text{Flux of current through a closed surface}\right)$ =

$-\dfrac{\partial}{\partial t}\left(\text{Charge inside}\right)$

The partial derivative on $\left(\text{Charge inside}\right)$ should be a total derivative.

$\nabla\cdot\boldsymbol{j}=-\dfrac{\partial\rho}{\partial t}$ $\left(\text{Flux of current through a closed surface}\right)$ =

$-\dfrac{d}{dt}\left(\text{Charge inside}\right)$

## II:18-11, footnote

Equation (18.23) is called "the Lorentz gauge."

Wrong physicist. Ludwig Valentin Lorenz wrote down this gauge condition in 1867, when Hendrik Antoon Lorentz was 14 years old. [See the correction for chapter 4 page 79 of "An Introduction to Quantum Field Theory," by Peskin & Schroeder, documented in the errata posted at http://www.slac.stanford.edu/~mpeskin/QFT.html]

Equation (18.23) is called "the Lorenz gauge."

## II:20-3, Eq 20.5

$$\nabla^2 \boldsymbol{A} = \frac{1}{c^2}\frac{\partial^2 \boldsymbol{A}}{\partial t^2} = -\frac{\boldsymbol{j}}{\varepsilon_0 c^2} \qquad (20.5)$$

Typographical error (first '=' should be "–").

$$\nabla^2 \boldsymbol{A} - \frac{1}{c^2}\frac{\partial^2 \boldsymbol{A}}{\partial t^2} = -\frac{\boldsymbol{j}}{\varepsilon_0 c^2} \qquad (20.5)$$

## II:20-6, par 5

… expecially because we know what the solution is supposed to be,

Typographical error ('expecially' vs 'especially').

… especially because we know what the solution is supposed to be,

## II:32-12, par 2

$\delta = 6.7 \times 10^{-4}\,\mathrm{cm}$.

The given $\delta$ is too big by a factor of 10.

$\delta = 6.7 \times 10^{-5}\,\mathrm{cm}$

## II:33-7, par 3

Equation (33.24a) gives nothing, because there are no $x$ derivatives. Equation (33.23b) has one, $-c^2 \dfrac{\partial B_z}{\partial x}$,

Incorrect reference.

Equation (33.24a) gives nothing, because there are no $x$ derivatives. Equation (33.24b) has one, $-c^2 \dfrac{\partial B_z}{\partial x}$,

## II:35-2, 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.]

## II:35-5, Fig 35-5

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

## II:35-8, Eq 35.14

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

Typographical error. The fraction bar ‘/’ is too big – it belongs in the exponent.

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

## II:35-8, Eq 35.15

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

Capitilization error (‘t’ vs. ‘T’).

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

**II:35-8, Eq 35.16**

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

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

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

**II:35-9, 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.

**II:35-9, 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.

**II:39-7, par 3**

If you use (39.20) for $S_{ij}$, and write the $e_{ij}$ as $\frac{1}{2}\partial u_i/\partial x_j +$ $\partial u_j/\partial x_i$, you end up with a vector equation

Missing parentheses.

If you use (39.20) for $S_{ij}$, and write the $e_{ij}$ as $\frac{1}{2}\left(\partial u_i/\partial x_j +\right.$ $\left.\partial u_j/\partial x_i\right)$, you end up with a vector equation