Errata for
The Feynman Lectures on Physics Volume I
New Millenium Edition (1st printing)

The errors in this list appear in the 1st printing of *The Feynman Lectures on Physics: New Millennium Edition* (2011) and earlier printings and editions; these errors have been corrected in the 2nd hardback printing (and in the 1st paperback 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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I:2-9, par 2

One Mev is equal to 1.782×10^{-27} gram.

Inaccurate statement. One Mev (~= 1.782662×10^{-27} grams) is closer to 1.783×10^{-27} gram.

One Mev is equal to about 1.783×10^{-27} gram.

I:3-3, par 2

In plant cells, for example, there is machinery for picking up light and generating sucrose, which is consumed in the dark to keep the plant alive. When the plant is eaten the sucrose itself generates in the animal a series of chemical reactions very closely related to photosynthesis (and its opposite effect in the dark) in plants.

Wrong kind of sugar ('sucrose' vs. 'glucose', two occurences).

In plant cells, for example, there is machinery for picking up light and generating glucose, which is consumed in the dark to keep the plant alive. When the plant is eaten the glucose itself generates in the animal a series of chemical reactions very closely related to photosynthesis (and its opposite effect in the dark) in plants.

I:9-8, Table 9-2, footnote

Cross x at 1.022, …

Sign error.

Cross x at -1.022, …

I:13-9, par 2

… and let us calculate the *potential energy* of a particle of mass *m'* a distance *R* away from the sphere …

Imprecise statement.

… and let us calculate the *potential energy* of a particle of mass *m'* a distance *R* away from the center of the sphere …

I:13-9, par 2

The earth can be imagined as a series of spherical shells, each one of which contributes an energy which depends only on its mass and the distance from the center;

Unclear wording ("the distance from the center" to what?).

The earth can be imagined as a series of spherical shells, each one of which contributes an energy which depends only on its mass and its distance from the center;

I:14-1, par 4

If, for instance, the force were constant and the displacement were a finite distance $\Delta \boldsymbol{s}$, then the work done in moving the constant force through that distance is only the component of force along $\Delta \boldsymbol{s}$ times Δs.

Redundant (that the force is constant is stated twice) and unclear (it is the object that is moved not the force).

If, for instance, the force were constant and the displacement were a finite distance $\Delta \boldsymbol{s}$, then the work done in moving the object through that distance is only the component of force along $\Delta \boldsymbol{s}$ times Δs.

I:15-2, par 3

In the past century interest in it was heightened as the result of investigations into the phenomena of electricity, magnetism and light.

Now that we are in the 21st century, a more specific reference is called for (also, there is missing comma after century).

In the 19th century, interest in it was heightened as the result of investigations into the phenomena of electricity, magnetism and light.

I:15-9, par 4

That m should be 2000 times m_0 means that $1 - v^2/c^2$ must be 1/4,000,000, and that means that v^2/c^2 differs from 1 by one part in 4,000,000, or that v differs from c by one part in 8,000,000, …

Redundant, confusing, statement (1 - v^2/c^2 = 1/4,000,000 implies that v - c = c/8,000,000).

That m should be 2000 times m_0 means that $1 - v^2/c^2$ must be 1/4,000,000, and that means that v differs from c by one part in 8,000,000, …

I:17-2, Fig 17-1

Description of part (d) is missing in caption. Should be “(d) a light path”.

I:19-2, par 1

In the same manner, just by looking at object B, we get $M_B X_B$, and of course, adding the two yields MX:

Wrong notation for center of mass (‘X’ vs ‘X_{CM}’).

In the same manner, just by looking at object B, we get $M_B X_B$, and of course, adding the two yields MX_{CM}: …

I:19-3, par 2

But $\sum m_i x_i = MX$, …

Wrong notation for center of mass (‘*X*’ vs ‘X_{CM}’).

But $\sum m_i x_i = MX_{\text{CM}}$, …

I:19-4, par 4

So the *x*-distance of the center of mass times the area of the triangle is the volume swept out, which is of course $\pi D^2 H/3$. Thus $(2\pi x)(½HD) = 1/3\,\pi D^2 H$ or $x = D/3$.

Inconsistent way of writing fractions on a line.

So the *x*-distance of the center of mass times the area of the triangle is the volume swept out, which is of course $\pi D^2 H/3$. Thus $(2\pi x)(½HD) = \pi D^2 H/3$ or $x = D/3$.

I:19-5, Eq 19.4

$$I = \int (x^2 + y^2)\, dm = \int (x^2 + y^2) \rho\, dv \qquad (19.4)$$

Wrong symbol for volume (‘V’ vs. ‘v’). In the following text, 'V' is used exclusively for volume while 'v' is reserved for velocity.

$$I = \int (x^2 + y^2)\, dm = \int (x^2 + y^2) \rho\, dV \qquad (19.4)$$

I:36-8, par 3

Now we see that if we make the δ too small, then each ommatidium does not look in only one direction, because of diffraction! If we make them too big, each one sees in a definite direction, but there are not enough of them to get a good view of the scene. So we adjust the distance *d* in order to make minimal the total effect of these two.

Wrong symbol for distance between ommatidia (‘*d*’ vs. ‘δ’).

Now we see that if we make the δ too small, then each ommatidium does not look in only one direction, because of diffraction! If we make them too big, each one sees in a definite direction, but there are not enough of them to get a good view of the scene. So we adjust the distance δ in order to make minimal the total effect of these two.

I:37-1, par 7

The gradual accumulation of information about atomic and small-scale behavior during the first quarter of this century, …

Outdated reference ('this century' vs. 'the 20^{th} century').

The gradual accumulation of information about atomic and small-scale behavior during the first quarter of the 20th century, …

I:39-8, par 1

Let us suppose that we have two molecules, of different mass, colliding, and that the collision is viewed on the center-of-mass (CM) system.

Wrong word ('on' vs. 'in' the CM system).

Let us suppose that we have two molecules, of different mass, colliding, and that the collision is viewed in the center-of-mass (CM) system.

I:39-8, Fig 39-2

In order for this figure to appear on the same page where it is referred to in the text it should be moved to the margin near the top of page 39-7, close to par 2.

I:39-8, Fig 39-3

In order for this figure to appear close to where it is referred to in the text it should be moved up to near the top of page 39-8, close to par1 (where Fig. 39-2 currently appears – see correction above). But there are also several problems with this figure (and nothing like this appears on Feynman's blackboards). First of all, the labels necessarily indicate speeds, not vectors, because obviously we can not have two (different) vectors $\boldsymbol{v}_1$, and two (different) vectors $\boldsymbol{v}_2$ as currently shown. Secondly, in the CM system the speed of atom 1 (both before and after the collision, assuming it is perfectly elastic) would be $|\boldsymbol{v}_1 - \boldsymbol{v}_{CM}|$, while the speed of atom 2 (before and afte the collision) would be $|\boldsymbol{v}_2 - \boldsymbol{v}_{CM}|$. Third, the word "molecules" in the caption should be changed to "atoms" for consistency with the text. The following changes are proposed:

(1) move the figure to near the top of the page,
(2) change the labels in the figure from $\boldsymbol{v}_1$ and $\boldsymbol{v}_2$ to (italic, but not bold) u_1 and u_2 – indicating *speeds* in the CM system.
(3) Add the following text to the figure:

$$u_1 = |\boldsymbol{v}_1 - \boldsymbol{v}_{CM}|, \quad u_2 = |\boldsymbol{v}_1 - \boldsymbol{v}_{CM}|.$$

(4) In the caption change the word "molecules" to "atoms."

I:40-10, par 2

That problem was solved by Planck, in the early years of this century.

Outdated reference ('this century' vs. 'the 20th century').

That problem was solved by Planck, in the early years of the 20th century.

I:41-1, par 2

This problem was first solved by Einstein at the beginning of the present century.

Outdated reference ('the present century' vs. 'the 20th century').

This problem was first solved by Einstein at the beginning of the 20th century.

I:41-8, par 3

All the things we have been talking about—the so-called Johnson noise and Planck's distribution, and the correct theory of the Brownian movement which we are about to describe—are developments of the first decade or so of this century. Now with those points and that history in mind, we return to the Brownian movement.

Outdated reference ('this century' vs. 'the 20th century').

All the things we have been talking about—the so-called Johnson noise and Planck's distribution, and the correct theory of the Brownian movement which we are about to describe—are developments of the first decade or so of the 20th century. Now with those points and that history in mind, we return to the Brownian movement.

I:42-2, par 4

Then at a given moment there will be a certain number of atoms which are condensing onto the surface of the liquid. The number of condensing molecules, the number that arrive on a unit area, is the number n per unit volume times the velocity v.

Inaccurate statement ("on a unit area" vs. "on a unit area per unit time"). Note: Feynman originally said "on a unit area per second."

Then at a given moment there will be a certain number of atoms which are condensing onto the surface of the liquid. The number of condensing molecules, the number that arrive on a unit area per unit time, is the number n per unit volume times the velocity v.

I:42-2, par 4

Thus

$$N_c = nv \qquad (42.2)$$

is the number which arrive per unit area and are condensing.

Inaccurate statement ("number" vs. "rate").

Thus

$$N_c = nv \qquad (42.2)$$

is the rate at which the molecules arrive per unit area and are condensing.

I:48-3, Eq 48.7

$$A_1 e^{i\omega_1 t} + A_2 e^{i\omega_2 t} = e^{1/2i(\omega_1+\omega_2)t}[A_1 e^{1/2i(\omega_1-\omega_2)t} + A_2 e^{-1/2i(\omega_1-\omega_2)t}]. \qquad (48.7)$$

Inconsistency in how fractions are written on a line (in exponents '$1/2\,i(\omega_1-\omega_2)t$' vs '$i(\omega_1-\omega_2)t/2$'.

$$A_1 e^{i\omega_1 t} + A_2 e^{i\omega_2 t} = e^{i(\omega_1+\omega_2)t/2}[A_1 e^{i(\omega_1-\omega_2)t/2} + A_2 e^{-i(\omega_1-\omega_2)t/2}]. \qquad (48.7)$$

I:48-6, Eq 48.15

$$\begin{aligned} e^{i(\omega_1 t-k_1 x)} + e^{i(\omega_2 t-k_2 x)} &= e^{1/2i[(\omega_1+\omega_2)t-(k_1+k_2)x]} \\ &\times\{e^{1/2i[(\omega_1-\omega_2)t-(k_1-k_2)x]} + e^{-1/2i[(\omega_1-\omega_2)t-(k_1-k_2)x]}\}. \end{aligned} \qquad (48.15)$$

Inconsistency in how fractions are written on a line (in exponents '$1/2[\cdots]$' vs '$[\cdots]/2$'.

$$\begin{aligned} e^{i(\omega_1 t-k_1 x)} + e^{i(\omega_2 t-k_2 x)} &= e^{i[(\omega_1+\omega_2)t-(k_1+k_2)x]/2} \\ &\times\{e^{i[(\omega_1-\omega_2)t-(k_1-k_2)x]/2} + e^{-i[(\omega_1-\omega_2)t-(k_1-k_2)x]/2}\}. \end{aligned} \qquad (48.15)$$

I:52-7, par 3

There are two kinds of vectors. There are "honest" vectors, for example a step $\Delta\boldsymbol{r}$ in space.

In the corresponding figure (Fig. 52-2) the vector is $\boldsymbol{r}$, not $\Delta\boldsymbol{r}$. In the original lecture he says only "a step in space," and draws a figure similar to Fig 52-2. In subsequent text only $\boldsymbol{r}$ is referred to, not $\Delta\boldsymbol{r}$. The text should be changed to in order to match the figure and following usage.

There are two kinds of vectors. There are "honest" vectors, for example a step $\boldsymbol{r}$ in space.