Errata for
The Feynman Lectures on Physics Volume I
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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I: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 ...

I: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 ...

I: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.

I:10, Table of Contents, Chapter 24

24-2 Damped oscillations 24-2

Wrong page number.

24-2 Damped oscillations 24-3

I:I-2, par 3

The first is more exciting, more wonderful, and more fun, but the second is easier to get at first, and is a first step to a real understanding of the second idea.

Opposite sense of what was originally said (refer to tape) – very confusing wording.

The first is more exciting, more wonderful, and more fun, but the second is easier to get at first, and is a first step to a real understanding of the first idea.

I:I-3, par 2

… so we say they are 1 or 2 angstroms (A) in radius.

Incorrect abbreviation for angstrom (Å).

… so we say they are 1 or 2 angstroms (Å) in radius.

I:1-3, par 4

… at ordinary atmospheric pressure there might be only a few molecules in a whole room, and there certainly would not be as many as three in this figure. Most squares this size would contain none.

Inaccurate statement. At atmospheric pressure, and 100C, the molar volume of steam is around 30 liters, so the density of steam (at that temperature and pressure) is about 2 x 10^22 molecules per liter. A human-sized room filled with steam would therefore contain alot more than a few molecules. What Feynman actually said (in the tape of the lecture) was "in this whole room" not "in a whole room." At the time he said it, the lecture hall was darkened, and the figure was being projected on a screen. I think that what Feynman may have meant by "this whole room" was not the lecture hall, but the "room" (i.e. area) shown in the figure. A water molecule is about 3 angstroms in diameter, implying that the area shown in the figure is about (9x12) 108 square angstroms. If we also assume that the depth of the volume represented in the figure is equal to the diameter of a water molecule, then the volume of the figure is about 108 x 3 x 10^-30 m^3 = 3.24 x 10^-25 liters. At 1 atm pressure and a temperature of 100C, the molar volume of steam is around 30 liters, so the density of steam (at that temperature and pressure) is about 2 x 10^22 molecules per liter. Thus, in the volume shown in the figure, at 1 atm pressure and 100C, one would expect to find around 6.48 x 10^-3 molecules of steam, which fits well with Feynman's statement that the figure contains an unlikely number of water molecules.

… at ordinary atmospheric pressure there certainly would not be as many as three water molecules in this figure. Most squares this size would contain none."

I:1-3, par 4

For simplicity, the molecules are drawn so that there is a 120° angle between them.

Unclear/inaccurate statement.

For simplicity, the molecules are drawn so that there is a 120° angle between the hydrogen atoms.

I:I-3, par 4

… the distance between the center of a hydrogen and the center of the oxygen is 0.957 A.

Incorrect abbreviation for angstrom (Å).

… the distance between the center of a hydrogen and the center of the oxygen is 0.957 Å.

I:1-3, par 5

This means that the gas exerts a jittery force which our coarse senses (not being ourselves magnified a billion times) feels only as an *average push*.

Grammatical error (‘senses ... feels’ vs. ‘senses ... feel’)

This means that the gas exerts a jittery force which our coarse senses (not being ourselves magnified a billion times) feel only as an *average push*.

I:1-4, par 4

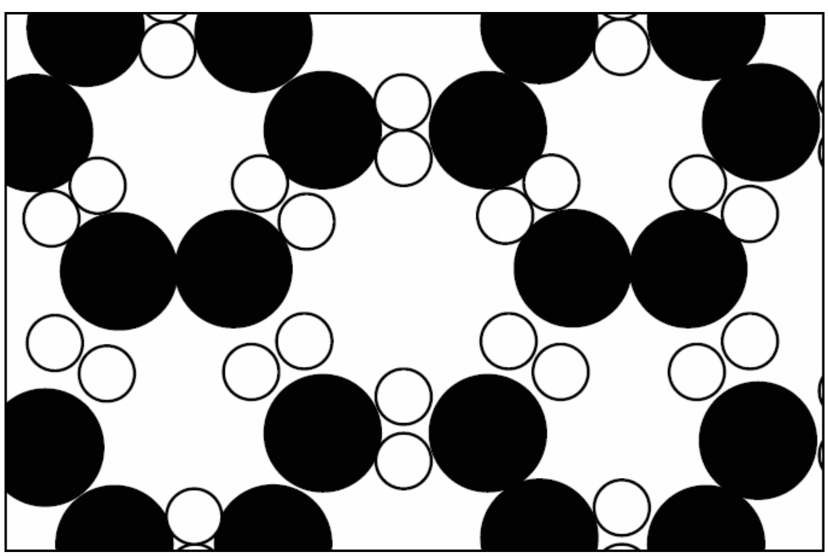
One of the correct features is that there is a part of the symmetry that is hexagonal. You can see that if we turn the picture around an axis by 120°, the picture returns to itself.

Wrong angle (“120°” vs. “60°”): hexagonal symmetry corresponds to invariance with rotations of 60°. See error report for Fig. 1-4.)

One of the correct features is that there is a part of the symmetry that is hexagonal. You can see that if we turn the picture around an axis by 60°, the picture returns to itself.

I:1-4, Fig 1-4

To make the hexagonal symmetry more apparent the figure should be translated so that the axis of symmetry lies in the center.



I:1-8, par 3

You see that the name of this thing in the more complete form that will tell you the structure of it is 4-(2, 2, 3, 6 tetramethyl-5-cyclohexanyl)-3-buten-2-one, and that tells you that this is the arrangement.

Misspelling. Because there is a double bond in the ring of α-irone (as shown in Fig. 1-10), the name should refer to 'cyclohexenyl' not 'cyclohexanyl'. This was an editing error – on Feynman's original blackboard it was spelled correctly.

You see that the name of this thing in the more complete form that will tell you the structure of it is 4-(2, 2, 3, 6 tetramethyl-5-cyclohexenyl)-3-buten-2-one, and that tells you that this is the arrangement.

I:2-5, par 2

In the range of frequency from 5×10^{14} to 5×10^{15} cycles per second our eyes would see…

Inaccurate statement. The given frequency range, supposedly for visible light, actually goes to UV light of 60 nm on the high frequency side. This was an editing error. What Feynman actually said was "5×10^{14} to 10^{15} cycles per second" (as correctly reflected in Table 2-1).

In the range of frequency from 5×10^{14} to 10^{15} cycles per second our eyes would see…

I:2-6, par 2

The uncertainty of the momentum and the uncertainty of the position are complementary, and the product of the two is constant.

Inaccurate statement.

The uncertainty of the momentum and the uncertainty of the position are complementary, and the product of the two is bounded by a small constant.

I:2-6, par 2

We can write the law like this $\Delta x \Delta p \geq h/2\pi$, …

Incorrect expression.

We can write the law like this $\Delta x \Delta p \geq \hbar/2$, …

I:2-7, par 3

… the interactions of electrons and protons that is electromagnetic theory,

Wrong particle ('protons' vs. 'photons').

… the interactions of electrons and photons that is electromagnetic theory,

I:2-9, par 3

…, and also some of the newer resonances (K*, φ, η).

The 'K' should not be italic.

…, and also some of the newer resonances (K*, φ, η).

I:2-9, par 4

There is a "lambda," with a mass of 1154 Mev, ...

Wrong mass (see Table 2-2).

There is a "lambda," with a mass of 1115 Mev, ...

I:2-9, par 5

… some new things called K-mesons, and they occur as a doublet, K^+ and K°.

(i) the (3) K's should not be italic and (ii) the '$^\circ$' should be a superscripted zero '^{0}'.

… some new things called K-mesons, and they occur as a doublet, K^+ and K^0.

I:2-9, par 5

…, but the π° is its own antiparticle.

The '$^\circ$' should be a superscripted zero '^{0}'.

…, but the π^0 is its own antiparticle.

I:2-9, par 5

The K^- and K^+ are antiparticles, and the K° and $\bar{K}^\circ$.

(i) the (4) K's should not be italic and (ii) the (2) '$^\circ$' should be superscripted zeros '^{0}'.

The K^- and K^+ are antiparticles, and the K^0 and $\bar{\mathrm{K}}^0$.

I:2-9, Table 2-2

All '$^\circ$' should be superscripted zeros '^{0}'.

I:2-9, Table 2-2

The strangenesses of all the baryons have the wrong sign – they should all be negative (see Table 11-4 in Vol. III, or http://en.wikipedia.org/wiki/List_of_baryons)

I:2-9, Table 2-2

The decay shown in the top right corner, $\mathrm{Y}_1^+ \to \Lambda^0 + \pi^-$, violates charge conservation; it should be $\mathrm{Y}_1^+ \to \Lambda^0 + \pi^+$.

I:2-9, Table 2-2, bottom line

$$\frac{\varepsilon^-}{0.51}$$

Wrong symbol for electron ('ε' vs. 'e').

$$\frac{e^-}{0.51}$$

I:2-10, footnote to Table 2-3

(~ means "approximately")

Incorrect description of symbol.

(~ means "of the order")

I:3-3, par 1

... but the machinery by which the chemical reaction induced by acetylcholine can modify the dimensions of the molecule is not yet known.

Incorrect word ('molecule' vs. 'muscle'). Acetylcholine acts on the myosin and actomyosin molecules in muscle tissue to create a force that displaces them relative to each other – this causes muscular contraction – the molecules themselves do not change dimensions.

... but the machinery by which the chemical reaction induced by acetylcholine can modify the dimensions of the muscle is not yet known.

I:3-4, par 3

The most important feature of the cycle of Fig. 3-1 is the transformation from GDP to GTP (guanadine-di-phosphate to guanadine-tri-phosphate) ...

Wrong chemicals – 2 occurences ("guanadine" vs. "guanosine")

The most important feature of the cycle of Fig. 3-1 is the transformation from GDP to GTP (guanosine-di-phosphate to guanosine-tri-phosphate) ...

I:3-5, par 2

One of the amino acids, called prolene, is not really an amino acid, … There is a slight difference, with the result that when prolene is in the chain, …

Incorrect spelling, 2 occurences ("prolene" vs. "proline")

One of the amino acids, called proline, is not really an amino acid, … There is a slight difference, with the result that when proline is in the chain, …

I:3-5, par 2

Some, for example, have a sulphur atom at a certain place; when two sulphur atoms […] put one of those sulphur hooks here; …

Incorrect spelling, 3 occurences (“sulphur” vs. “sulfur”).

Some, for example, have a sulfur atom at a certain place; when two sulfur atoms […] put one of those sulfur hooks here; …

I:3-6, par 3

There are in the cell tiny particles called microsomes, and it is now known that that is the place where proteins are made. But the microsomes are not in the nucleus, where the DNA and its instructions are. Something seems to be the matter. However, it is also known that little molecule pieces come off the DNA—not as long as the big DNA molecule that carries all the information itself, but like a small section of it. This is called RNA, but that is not essential. It is a kind of copy of the DNA, a short copy. The RNA, which somehow carries a message as to what kind of protein to make goes over to the microsome; that is known. When it gets there, protein is synthesized at the microsome.

The term ‘microsome’ is used in correctly (four occurences). Microsomes are only present in cells ruptured from centrifusion. Feynman gave this lecture in 1961, three years after the term "ribosome" was introduce by Richard B. Roberts, in his Introduction to the book *Microsomal Particles and Protein Synthesis*, where he wrote: "During the course of the symposium a semantic difficulty became apparent. To some of the participants, "microsomes" mean the ribonucleoprotein particles of the microsome fraction contaminated by other protein and lipid material; to others, the microsomes consist of protein and lipid contaminated by particles. The phrase “microsomal particles” does not seem adequate, and “ribonucleoprotein particles of the microsome fraction” is much too awkward. During the meeting the word "ribosome" was suggested; this seems a very satisfactory name, and it has a pleasant sound. The present confusion would be eliminated if “ribosome” were adopted to designate ribonucleoprotein particles in sizes ranging from 35 to 100S." A Google Scholar search of the Biology, Life Sciences, Environmental Sciences, Medicine, Pharmacology and Veterinary literature for the year 1961 yields 81 hits for "microsomal particles", 108 hits for "ribonucleoprotein particles", and 274 hits for "ribosomes", suggesting that by 1961 the term "ribosome" was already in popular use.

There are in the cell tiny particles called ribosomes, and it is now known that that is the place where proteins are made. But the ribosomes are not in the nucleus, where the DNA and its instructions are. Something seems to be the matter. However, it is also known that little molecule pieces come off the DNA—not as long as the big DNA molecule that carries all the information itself, but like a small section of it. This is called RNA, but that is not essential. It is a kind of copy of the DNA, a short copy. The RNA, which somehow carries a message as to what kind of protein to make goes over to the ribosome; that is known. When it gets there, protein is synthesized at the ribosome.

I:3-8, par 2

… there *are* mountain-forming processes and vulcanism, …

Unpopular spelling of ‘volcanism’.

… there *are* mountain-forming processes and volcanism, …

I:3-8, par 3

… but perhaps it will not be too long before someone realizes it is an important problem, and really work it out.

Grammatical error ('someone…work' vs. 'someone…works').

… but perhaps it will not be too long before someone realizes it is an important problem, and really works it out.

I:5-1, Fig 5-1

$$\mathrm{S} \propto \mathrm{t}^2$$

The distance should be denoted with 'D' to correspond with the text (see unnumbered equation in par 4).

$$D \propto t^2.$$

I:5-3, par 4

… the lifetime of the π°-meson. By observing in a microscope the minute tracks left in a photographic emulsion in which π°-mesons had been created one saw that a π°-meson …

The (3) '$^\circ$' should be superscripted zeros '^{0}'.

… the lifetime of the π^0-meson. By observing in a microscope the minute tracks left in a photographic emulsion in which π^0-mesons had been created one saw that a π^0-meson …

I:5-8, Fig 5-9, caption

... a diameter of 2×10^{-7} meter (2000 A).

Wrong symbol for Angstrom ('A' vs. 'Å').

... a diameter of 2×10^{-7} meter (2000 Å).

I:5-9, par 4

Then the total area covered by the nuclei is $N\sigma/A$.

Incorrect statement. The total (not fractional) area covered by the nuclei is $N\sigma$.

Then the fraction of the area covered by the nuclei is $N\sigma/A$.

I:5-10, par 1

... in honor of Enrico Fermi (1901-1958).

Wrong year (1958 vs. 1954)

... in honor of Enrico Fermi (1901-1954).

I:5-10, second unnumbered equation

$$\Delta x = h/\Delta p$$

Inaccurate statement of uncertainty relation.

$$\Delta x \geq \hbar/2\Delta p$$

I:5-10, third unnumbered equation

$$\Delta t = h/\Delta E$$

Inaccurate statement of uncertainty relation.

$$\Delta t \geq \hbar/2\Delta E$$

I:5-10, par 5

... where h is a small quantity called "Planck's constant" ...

Inconsistent with preceding unnumbered equatrion in which has been corrected from $\Delta x = h/\Delta p$ to $\Delta x \geq \hbar/2\Delta p$. Also, the description should be expanded along the lines of I:6-10, par 3 (see errata below), and the emphasis changed from quotes to italics.

... where $\hbar$ is a small fundamental constant called the *reduced Planck constant* ...

I:6-2, par 4

... or $P(H) = p(T) = 0.5$.

Wrong symbol for probability ('p' vs. 'P').

... or $P(H) = P(T) = 0.5$.

I:6-3, par 1

The results of the experiment are given in Table 6-1.

Incorrect lack of plural ('experiment' vs. 'experiments').

The results of the experiments are given in Table 6-1.

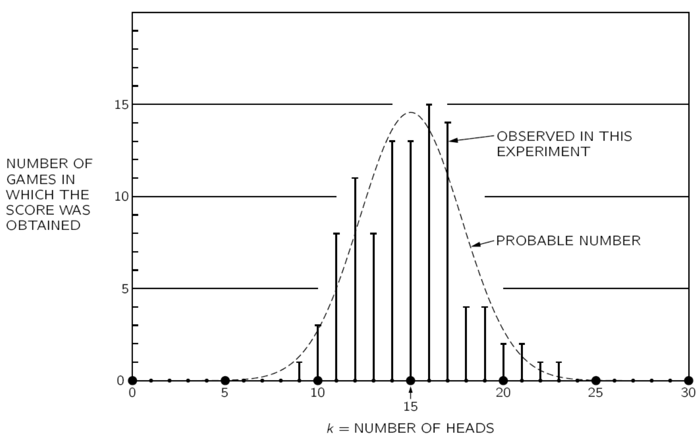
I:6-3, Table 6-1

This table is inconsistent with the text. It is also inconsistent with the data graphed in Fig. 6-2. It is therefore suggested to change the table as follows:

11	16	17	15	17	16	19	18	15	13	100 trials
11	17	17	12	20	23	11	16	17	14	
16	12	15	10	18	17	13	15	14	15	
16	12	11	22	12	20	12	15	16	12	
16	10	15	13	14	16	15	16	13	18	
14	14	13	16	15	19	21	14	12	15	
16	11	16	14	17	14	11	16	17	16	
19	15	14	12	18	15	14	21	11	16	
17	17	12	13	14	17	9	13	19	13	
14	12	15	17	14	10	17	17	12	11	

I:6-3, Fig 6-2

This figure is inconsistent with the text. It is also inconsistent with the Table 6-1. It is therefore suggested to change the figure as follows:



I:6-4, par 1

…the total number of heads obtained was 1492. The fraction of tosses that gave heads is 0.497,

These (two) changes need to be made to make the text consistent with the adjusted Table 6-1 and Figure 6-2 (‘1492’ vs. ‘1493’ and ‘0.497’ vs ‘0.498’, see corrections above).

…the total number of heads obtained was 1493. The fraction of tosses that gave heads is 0.498,

I:6-5, Fig 6-5 and caption

The (2) '$D(N)$' should be 'D_N' (see text).

I:6-6, par 1

The expected value of D_N is then $D_{N-1}^2 + 1$.

Missing exponent ('D_N' vs. 'D_N^2').

The expected value of D_N^2 is then $D_{N-1}^2 + 1$.

I:6-6, Eq 6.9

$$D_N^2 = N \tag{6.9}$$

Missing (expectation) brackets ('D_N^2' vs. '$\left\langle D_N^2 \right\rangle$').

$$\left\langle D_N^2 \right\rangle = N \tag{6.9}$$

I:6-6, par 4

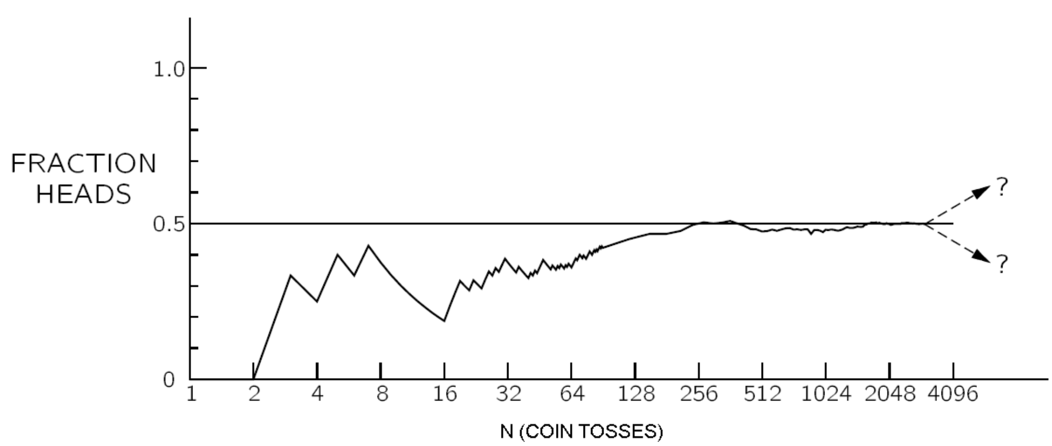
The graphs of Fig. 6-2 represent…

Incorrect plural ('graphs…represent' vs 'graph…represents').

The graph of Fig. 6-2 represents…

I:6-7, Fig 6-6

This graph does not accurately reflect the (above corrected) data in Table 6-1 and Figure 6-2, and the x-axis lacks a label.



I:6-9, par 4

Velocities may have any value, but are most likely to be near the most probable or expected value $<v>$.

Inaccurate statement: velocities are most probable to be near the most probable value of velocity, which for the skewed distribution of velocities under discussion is different than the expected value of velocity. Furthermore, since $<v>$ means the expected value of v, a different symbol (v_p) must be used for the most probable value of v.

Velocities may have any value, but are most likely to be near the most probable value v_p.

I:6-9, Fig 6-9

Since $<v>$ means the expected value of v, a different symbol must be used for the most probable value of v. $<v>$ should therefore be replaced by v_p (see correction for I:6-9, par 4).

I:6-10, Fig 6-10(a)

A piece of the curve is missing.

I:6-10, Eq 6.22

$$[\Delta x][\Delta v] \geq h/m \tag{6.22}$$

Inaccurate statement of uncertainty principle.

$$[\Delta x][\Delta v] \geq \hbar/2m \tag{6.22}$$

I:6-10, par 3

... nature demands that the product of the two widths be at least as big as the number h/m, where m is the mass of the particle and h is a fundamental physical constant called *Planck's constant*.

Inconsistent with Eq. (6.22) which has been corrected from $[\Delta x]\cdot[\Delta v] \geq h/m$ to $[\Delta x]\cdot[\Delta v] \geq \hbar/2m$. Also, since the reduced Planck constant has already been introduced in I:5-10, par 5, introducing it again here is redundant.

... nature demands that the product of the two widths be at least as big as the number $\hbar/2m$, where m is the mass of the particle.

I:7-2, par 3

III. The squares of the periods of any two planets are proportional to the cubes of the semimajor axes of their respective orbits: $T \sim a^{3/2}$.

Incorrect symbol for "proprtional to", " $\sim$ " vs. " $\propto$ ".

III. The squares of the periods of any two planets are proportional to the cubes of the semimajor axes of their respective orbits: $T \propto a^{3/2}$.

I:7-4, Fig 7-4

Incorrect capitalization (2x, small 's' vs. capital 'S'), once in the figure text and once in the caption.

I:7-5, par 4

Two men, Adams and Leverrier, ...

Misspelled name ('Leverrier' vs. 'Le Verrier')

Two men, Adams and Le Verrier, ...

I:7-6, par 1

They did pay attention to Leverrier, ...

Misspelled name ('Leverrier' vs. 'Le Verrier')

They did pay attention to Le Verrier, ...

I:7-9, par 1

This experiment has been called "weighing the earth." Cavendish claimed he was weighing the earth, but what he was measuring was the coefficient G of the gravity law. This is the only way in which the mass of the earth can be determined.

Inaccurate statement. While Cavendish's experiment has been called "wieghing the earth," by some people, Cavendish himself never claimed to be "weighing the earth." The experiment he performed measured the Earth's density compared to that of water. Nor did Cavendish attempt to determine the gravitational constant G. G was not explicitly calculated until 85 years after Cavendish's experiment, by Cornu and Baille. See: Cavendish, H. "Experiments to determine the Density of the Earth", Philosophical Transactions of the Royal Society of London, (part II) 88 p.469-526 (1798); Cornu A. and Baille J. B. (1873), Mutual determination of the constant of attraction and the mean density of the earth, C. R. Acad. Sci., Paris Vol. 76, 954-958; Clotfelter, B. E. (1987), The Cavendish Experiment as Cavendish Knew It, American Journal of Physics 55 (3), 210-213, http://www.alphysics.com/cavendishexperiment/Clotfelter.PDF; Falconer I. (1999), Henry Cavendish: the man and the measurement , Measurement, Science & Technology 10 (6): 470-477. Also useful are http://en.wikipedia.org/wiki/Henry_Cavendish#The_density_of_the_Earth and http://en.wikipedia.org/wiki/Cavendish_experiment (which refers to FLP being in error).

This experiment has been called "weighing the earth" by some people, and it can be used to determine the coefficient G of the gravity law. This is the only way in which the mass of the earth can be determined.

I:8-4 par 3

This idea was invented by Newton and by Leibnitz, ...

Misspelling of proper name ("Leibnitz" vs. "Leibniz").

This idea was invented by Newton and by Leibniz, ...

I:8-5, par 1

... where we took ε as 0.1 and 0.01 sec successively, ...

Typographical error ('0.01' vs. '0.001').

... where we took ε as 0.1 and 0.001 sec successively, ...

I:8-9, par 5

In the time Δt the particle moves horizontally a distance $\Delta x \sim v_x \Delta t$, and vertically a distance $\Delta y \sim v_y \Delta t$. (The symbol "$\sim$" is read "is approximately.")

Incorrect symbol for "approximatel equal to", "$\sim$" vs. "$\approx$" (three occurences).

In the time Δt the particle moves horizontally a distance $\Delta x \approx v_x \Delta t$, and vertically a distance $\Delta y \approx v_y \Delta t$. (The symbol "$\approx$" is read "is approximately.")

I:8-9, Eq 8.14

$$\Delta s \sim \sqrt{(\Delta x)^2 + (\Delta y)^2} \qquad (8.14)$$

Incorrect symbol for "approximatel equal to", "$\sim$" vs. "$\approx$".

$$\Delta s \approx \sqrt{(\Delta x)^2 + (\Delta y)^2} \qquad (8.14)$$

I:8-10, Eq 8.15

$$v = \frac{ds}{dt} = \sqrt{(dx/dt)^2 + (dy/dt^2)} = \sqrt{v_x^2 + v_y^2} \qquad (8.15)$$

Typographical error ('(dy/dt^2)' vs. '$(dy/dt)^2$').

$$v = \frac{ds}{dt} = \sqrt{(dx/dt)^2 + (dy/dt)^2} = \sqrt{v_x^2 + v_y^2} \qquad (8.15)$$

I:9-7, par 1

... the velocity is all in the, y-direction at the start, and is of magnitude 1.6300.

Too much accuracy ("1.6300" vs. "1.630" – see unnumbered eq.s on this page).

... the velocity is all in the, y-direction at the start, and is of magnitude 1.630.

I:9-7, unnumbered equations

$$
\begin{aligned}
1/r^3 &= 7.67 \\
a_x(0.1) &= -0.480\times 7.67 &&= -3.68 \\
a_y(0.1) &= -0.163\times 7.67 &&= -1.250 \\
v_x(0.15) &= -0.200 - 3.68\times 0.1 &&= -0.568 \\
v_y(0.15) &= 1.630 - 1.25\times 0.1 &&= 1.505 \\
x(0.2) &= 0.480 - 0.568\times 0.1 &&= 0.423 \\
y(0.2) &= 0.163 + 1.50\times 0.1 &&= 0.313
\end{aligned}
$$

For consistency with the newly recalculated values in Table 9-2 (see following errata), these equations should be changed.

$$
\begin{aligned}
1/r^3 &= 7.677 \\
a_x(0.1) &= -0.480\times 7.677 &&= -3.685 \\
a_y(0.1) &= -0.163\times 7.677 &&= -1.250 \\
v_x(0.15) &= -0.200 - 3.685\times 0.1 &&= -0.568 \\
v_y(0.15) &= 1.630 - 1.250\times 0.1 &&= 1.505 \\
x(0.2) &= 0.480 - 0.568\times 0.1 &&= 0.423 \\
y(0.2) &= 0.163 + 1.505\times 0.1 &&= 0.313
\end{aligned}
$$

I:9-8, Table 9-2

Several of the values in this table are inaccurate. The calculation should be made more carefully and the table data should be replaced with the results:

t	x	v_x	a_x	y	v_y	a_y	r	1/r^3
0.	0.500		-4.000	0.000		0.000	0.500	8.000
		-0.200			1.630			
0.1	0.480		-3.685	0.163		-1.251	0.507	7.677
		-0.568			1.505			
0.2	0.423		-2.897	0.313		-2.146	0.527	6.847
		-0.858			1.290			
0.3	0.337		-1.958	0.443		-2.569	0.556	5.805
		-1.054			1.033			
0.4	0.232		-1.112	0.546		-2.617	0.593	4.794
		-1.165			0.772			
0.5	0.115		-0.454	0.623		-2.449	0.634	3.931
		-1.211			0.527			
0.6	-0.006		0.018	0.676		-2.190	0.676	3.241
		-1.209			0.308			
0.7	-0.127		0.342	0.706		-1.911	0.718	2.705
		-1.175			0.117			
0.8	-0.244		0.559	0.718		-1.646	0.758	2.292
		-1.119			-0.048			
0.9	-0.356		0.702	0.713		-1.408	0.797	1.974
		-1.048			-0.189			
1.	-0.461		0.796	0.694		-1.200	0.833	1.728
		-0.969			-0.309			
1.1	-0.558		0.856	0.664		-1.019	0.867	1.536
		-0.883			-0.411			
1.2	-0.646		0.895	0.623		-0.862	0.897	1.385
		-0.794			-0.497			
1.3	-0.725		0.919	0.573		-0.726	0.924	1.267
		-0.702			-0.569			
1.4	-0.795		0.933	0.516		-0.605	0.948	1.174
		-0.608			-0.630			
1.5	-0.856		0.942	0.453		-0.498	0.969	1.100
		-0.514			-0.680			
1.6	-0.908		0.947	0.385		-0.402	0.986	1.043
		-0.420			-0.720			
1.7	-0.950		0.950	0.313		-0.313	1.000	1.000
		-0.325			-0.751			
1.8	-0.982		0.952	0.238		-0.230	1.010	0.969
		-0.229			-0.774			
1.9	-1.005		0.953	0.160		-0.152	1.018	0.949
		-0.134			-0.790			
2.0	-1.018		0.955	0.081		-0.076	1.022	0.938
		-0.038			-0.797			
2.1	-1.022		0.957	0.002		-0.002	1.022	0.936
		0.057			-0.797			
2.2	-1.017		0.959	-0.078		0.074	1.020	0.944
					-0.790			
2.3								

I:9-8, Table 9-2, bottom text

$v_y = 0.796$

For consistency with the newly recalculated table values this should be changed to

$v_y = 0.797$

I:10-3, Eq 10.4

$$f = \frac{d}{dt}(mv), \tag{10.4}$$

Inconsistent notation for magnitude of force ('f' vs 'F').

$$F = \frac{d}{dt}(mv), \tag{10.4}$$

I:10-3, Eq 10.5

$$f_x = \frac{d}{dt}(mv_x), \tag{10.5}$$

Inconsistent notation for force component ('f_x' vs 'F_x').

$$F_x = \frac{d}{dt}(mv_x), \tag{10.5}$$

I:10-7, par 3

That the velocities *before* and *after* an elastic collision are equal is not a matter of conservation of momentum, but a matter of conservation of *kinetic energy*.

Inaccurate statement ("velocities" vs. "speeds").

That the speeds *before* and *after* an elastic collision are equal is not a matter of conservation of momentum, but a matter of conservation of *kinetic energy*.

I:10-7, par 3

That the speeds of the bodies rebounding after a symmetrical collision are equal to *each other*, however, is a matter of conservation of momentum."

Inaccurate statement ("speeds" vs. "velocities").

That the velocities of the bodies rebounding after a symmetrical collision are equal to and opposite *each other*, however, is a matter of conservation of momentum."

I:10-9, par 3

Even though the law $f = ma$ is false, …

Inconsistent notation for magnitude of force (‘f’ vs ‘F’).

Even though the law $F = ma$ is false, …

I:11-1, par 1

"For instance if we look at a vase that is left-and-right symmetrical, then turn it 180° around the vertical axis, it looks the same."

Untrue statement (for a 3-dimensional vase). What Feynman actually said was, "If you have a *picture of a vase* which is left and right symmetrical, then you could flip the picture over around a vertical axis and it would again look the same." However Feynman’s statement would be true only if the “picture” was a silhouette.

"For instance if we look at a silhouette of a vase that is left-and-right symmetrical, then turn it 180° around the vertical axis, it looks the same."

I:11-2, par 3

… so we find that

$$dx'/dt = dx/dt'$$

Typographical error (there should be no prime on the t).

… so we find that

$$dx'/dt = dx/dt$$

I:11-8, Fig 11-7

Vector $\mathbf{v}_1$ should be perpendicular to the left leg of angle $\Delta\theta$.

I:11-8, Fig 11-8

The measurement line for the angle $\Delta\theta$ should be an arc centered at the intersection of $\mathbf{v}_1$ and $\mathbf{v}_2$. The velocity vectors in this figure should be “parallel and equal to their counterparts in Fig. 11-7” (as described in the text).

I:11-8, par 3

… that is, we draw $\mathbf{\Delta}$ as the difference of the two vectors, right?

‘$\mathbf{\Delta}$’ should be ‘$\Delta\mathbf{v}$’ (see Figs. 11-7 and 11-8).

… that is, we draw $\Delta\mathbf{v}$ as the difference of the two vectors, right?

I:11-8, par 3, 3rd unnumbered Eq

$$\Delta\theta = v\left(\Delta t/R\right), \quad \text{or} \quad \Delta\theta/\Delta t = v/R$$

Misplaced parentheses.

$$\Delta\theta = \left(v\Delta t\right)/R, \quad \text{or} \quad \Delta\theta/\Delta t = v/R$$

I:11-8, Eq 11.16

$$a = v^2/R \tag{11.16}$$

Missing "perpendicular" sign on acceleration ('a' vs'$a_\perp$') .

$$a_\perp = v^2/R \tag{11.16}$$

I:12-3, par 4

On the other hand, it is a remarkable fact that the drag force on an airplane is approximately a constant times the square of the velocity, or $F \sim cv^2$.

Incorrect symbol for "approximatel equal to", "$\sim$" vs. "$\approx$".

On the other hand, it is a remarkable fact that the drag force on an airplane is approximately a constant times the square of the velocity, or $F \approx cv^2$.

I:12-5, par 4

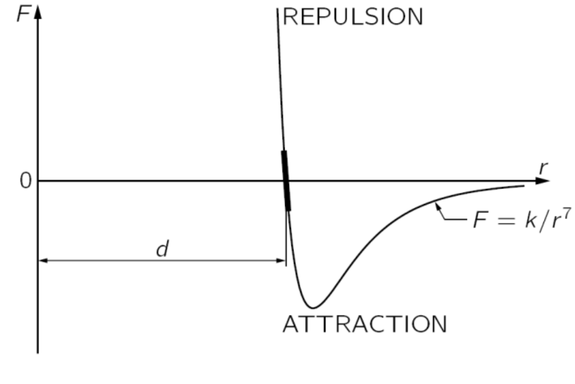
…, the reason for this form of the law is not really under-understood.

One 'under' too many.

…, the reason for this form of the law is not really understood.

I:12-6, Fig 12-2

Using the Lennard-Jones intermolecular potential the distance 'd' should be much larger; the curve should look like this:



I:12-8, Eq 12.3

$$\mathbf{F} = q_1 q_2 \mathbf{r} / r^3. \tag{12.3}$$

Missing constant of proportionality $1/4\pi\varepsilon_0$.

$$\mathbf{F} = q_1 q_2 \mathbf{r} / 4\pi\varepsilon_0 r^3. \tag{12.3}$$

I:12-9, Fig 12-3

The magnetic poles of the U-magnet are mislabeled. – to deflect the electron beam upwards, 'N' and 'S' have to be exchanged.

I:12-11, par 1

…This means that although the laws of force from the point of view of Joe would look like…

Wrong term ("laws of force" vs. "laws of motion").

…This means that although the laws of motion from the point of view of Joe would look like…

I:12-11, par 1

… the laws of force as looked upon by Moe would appear as…

Wrong term ("laws of force" vs. "laws of motion").

… the laws of motion as looked upon by Moe would appear as…

I:12-11, 3rd unnumbered Eq

$$m\frac{d^2x'}{dt^2} = F_{x'} - ma.$$

Incorrect statement (see 1st unnumbered Eq on this page).

$$m\frac{d^2x'}{dt^2} = F_{x'} = F_x - ma.$$

I:12-12, end of par 2

… describe correctly the way in which Euclid's geometry is "weird," …

Wrong physicist ('Euclid' vs. 'Einstein'):

… describe correctly the way in which Einstein's geometry is "weird," …

I:13-1, par 2

... has a kinetic energy *T* (or K.E.) due to its motion during the fall, and a potential energy *mgh*, abbreviated *U* or P.E.,

Inconsistent punctuation.

... has a kinetic energy *T* (or K.E.) due to its motion during the fall, and a potential energy *mgh*, abbreviated *U* (or P.E.),

I:13-1, par 4

Thus the rate of change of the kinetic energy is $-mg\left(dh/dt\right)$, which quantity, miracle of miracles, is the rate of change of something else! It is the time rate of change of mgh !

Wrong signs ('minus' inserted in two places).

Thus the rate of change of the kinetic energy is $-mg\left(dh/dt\right)$, which quantity, miracle of miracles, is minus the rate of change of something else! It is minus the time rate of change of mgh !

I:13-2, par 1

… and the tangential force F_t is not mg but is weaker by the ratio …

Wrong sign.

… and the tangential force F_t is not $-mg$ but is weaker by the ratio …

I:13-2, par 1

… but is weaker by the ratio of the distance *ds* along the path to the vertical distance *dh*.

Ratio is inverted (see following unnumbered Eq).

… but is weaker by the ratio of the vertical distance *dh* to the distance *ds* along the path.

I:13-2, par 1

Thus we get $-mg\left(dh/dt\right)$, which is equal to the rate of change of mgh as before.

Wrong sign.

Thus we get $-mg\left(dh/dt\right)$, which is equal to the rate of change of $-mgh$ as before.

I:13-3, par 1

... the integral of the component of the force along the curve times the differential displacement $d\mathbf{s}$, ...

Incorrect notation. (‘$d\mathbf{s}$’ vs. ‘ds’). $\mathbf{F}\cdot d\mathbf{s} =$ (component of $\mathbf{F}$ in the direction of $d\mathbf{s}$) $\times$ ds),

... the integral of the component of the force along the curve times the differential displacement ds, ...

I:13-4, par 1

As we know, the force is GM/r^2 times the mass m,

Wrong sign.

As we know, the force is $-GM/r^2$ times the mass m,

I:13-4, par 4

$$W_{12} = \int_1^2 \mathbf{F}\cdot d\mathbf{s} = \int_1^2 -GMm\frac{dr}{r^2} = -GMm\left(\frac{1}{r_2}-\frac{1}{r_1}\right)$$

Wrong sign on right-hand side.

$$W_{12} = \int_1^2 \mathbf{F}\cdot d\mathbf{s} = \int_1^2 -GMm\frac{dr}{r^2} = GMm\left(\frac{1}{r_2}-\frac{1}{r_1}\right)$$

I:13-5, par 1

$$W_{34} = \int_3^4 \mathbf{F}\cdot d\mathbf{s} = -GMm\left(\frac{1}{r_4}-\frac{1}{r_3}\right)$$

Wrong sign on right-hand side.

$$W_{34} = \int_3^4 \mathbf{F}\cdot d\mathbf{s} = GMm\left(\frac{1}{r_4}-\frac{1}{r_3}\right)$$

I:13-5, par 1

In the same fashion, we find that $W_{45}=0$, $W_{56}=-GMm\left(1/r_6-1/r_5\right)$, $W_{67}=0$, $W_{78}=-GMm\left(1/r_8-1/r_7\right)$, and $W_{81}=0$

Wrong signs on right-hand sides (2 of them).

In the same fashion, we find that $W_{45}=0$, $W_{56}=GMm\left(1/r_6-1/r_5\right)$, $W_{67}=0$, $W_{78}=GMm\left(1/r_8-1/r_7\right)$, and $W_{81}=0$

I:13-5, par 1

$$W = GMm\left(\frac{1}{r_1}-\frac{1}{r_2}+\frac{1}{r_3}-\frac{1}{r_4}+\frac{1}{r_5}-\frac{1}{r_6}+\frac{1}{r_7}-\frac{1}{r_8}\right).$$

Wrong signs (8 of them).

$$W = GMm\left(\frac{1}{r_2}-\frac{1}{r_1}+\frac{1}{r_4}-\frac{1}{r_3}+\frac{1}{r_6}-\frac{1}{r_5}+\frac{1}{r_8}-\frac{1}{r_7}\right).$$

I:13-5, footnote

The energy is $½\left(v_x^2+v_y^2\right)-1/r$ in the units of Table 9-2.

Incorrect statement. In table 9-2 the units are chosen such that $GM \equiv 1$, but $m \neq 1$ here, so there is a missing factor of m in the expression for energy.

The energy per unit mass is $½\left(v_x^2+v_y^2\right)-1/r$ in the units of Table 9-2.

I:13-6, par 3

… all exerting graviational pulls on each other.

Incorrect spelling of 'gravitational'.

… all exerting gravitational pulls on each other.

I:13-6, par 3

…Newton's law of gravity and then we notice that what is left is the same as the time derivative of…

Wrong sign.

…Newton's law of gravity and then we notice that what is left is minus the time derivative of…

I:13-8, par 1

Answer: $d\mathbf{C} = G\left(dm\mathbf{r}/r^3\right)$.

Wrong sign. (See Fig. 13-5: the positive x-axis points away from the sheet, and the field vector $\mathbf{C}$ points toward the sheet.)

Answer: $d\mathbf{C} = -G\left(dm\mathbf{r}/r^3\right)$.

I:13-8, par 1, unnumbered Eq

$$dC_x = G\frac{dmr_x}{r^3} = G\frac{dma}{r^3}.$$

Wrong signs (two of them). (See error I:13-8, par 1)

$$dC_x = -G\frac{dmr_x}{r^3} = -G\frac{dma}{r^3}$$

I:13-8, par 1, unnumbered Eq

$$dC_x = G\mu 2\pi\rho\frac{d\rho a}{r^3}.$$

Wrong sign. (See error I:13-8, par 1)

$$dC_x = -G\mu 2\pi\rho\frac{d\rho a}{r^3}$$

I:13-8, par 2

we merely note that G, gravity, plays the same role as $1/4\pi\varepsilon_0$ for electricity.

Wrong sign (compare Newton's gravitational force and Coulomb's electrical force, as given in section I:12-4). Also, missing word ('gravity' vs. 'for gravity').

we merely note that $-G$, for gravity, plays the same role as $1/4\pi\varepsilon_0$ for electricity.

I:13-8, par 3

Also, the force *between* the the two plates is clearly twice as great as that from one plate, namely $E = \sigma/\varepsilon_0$,

Wrong word ('force' vs 'field'): E is the electric field.

Also, the field *between* the the two plates is clearly twice as great as that from one plate, namely $E = \sigma/\varepsilon_0$,

I:13-8, Eq 13.17

$$C_x = 2\pi G\mu a\int_a^\infty \frac{dr}{r^2} = 2\pi G\mu a\left(\frac{1}{a}-\frac{1}{\infty}\right) = 2\pi G\mu\,. \tag{13.17}$$

Wrong signs (three of them). (See error I:13-8, par 1)

$$C_x = -2\pi G\mu a\int_a^\infty \frac{dr}{r^2} = -2\pi G\mu a\left(\frac{1}{a}-\frac{1}{\infty}\right) = -2\pi G\mu\,. \tag{13.17}$$

I:13-8, Fig 13-5

For notational consistency $\vec{\mathrm{C}}$ should be changed to $\boldsymbol{C}$.

I:13-8, Fig 13-5, caption

> The gravitational force *F* on a mass point…

It is the gravitational <u>field</u> ***C*** at the mass point that is shown in the figure and discussed in the text, not the <u>force</u> on the mass point.

> The gravitational field ***C*** at a mass point…

I:13-9, par 2, 5th unnumbered Eq

$$\frac{dx}{r} = \frac{dr}{R} .$$

Wrong sign. (See preceding Eq.)

$$\frac{dx}{r} = -\frac{dr}{R} .$$

I:13-9, par 2, 6th unnumbered Eq

$$dW = -\frac{Gm' 2\pi a \mu\, dr}{R} ,$$

Wrong sign. (See error I:13-9, par 2, 5th unnumbered Eq.)

$$dW = \frac{Gm' 2\pi a \mu\, dr}{R} .$$

I:13-9, par 2, 7th unnumbered Eq

$$W = -\frac{Gm' 2\pi a \mu}{R} \int_{R-a}^{R+a} dr ,$$

Wrong sign (See error I:13-9, par 2, 6th unnumbered Eq.) and wrong order of integration (assuming we are integrating from $x = -a$ to $x = a$, and taking x positive to the right in Fig 13-6, so that r ranges from $R + a$ to $R - a$.) (Note: two wrongs make the equation right in this case. Nonetheless the following changes are recommended for consistency with the corrections to the preceding (unnumbered) equations .

$$W = \frac{Gm' 2\pi a \mu}{R} \int_{R+a}^{R-a} dr .$$

I:13-9, par 3

Making the same calculation, but with P on the inside, we still get the difference of the two r's, but now in the form $a+R-(a-R)=2R$, or twice the distance from the center;

Wrong order of integration (inside the sphere, where $R<a$, integrating from $x=-a$ to $x=a$, implies that r ranges from $a+R$ to $a-R$ (See error I:13-9, par 2, 7th unnumbered Eq.) , wrong sign (two of them: '$2R$' vs. '$-2R$' and 'twice the distance' vs. 'minus twice the distance').

Making the same calculation, but with P on the inside, we still get the difference of the two r's, but now in the form $a-R-(a+R)=-2R$, or minus twice the distance from the center;

I:14-1, par 4

... the component of displacement in the direction of force times **F**.

Incorrect notation ('**F**' vs. 'F'). $\mathbf{F}\cdot d\mathbf{s}=$ (component of $d\mathbf{s}$ in the direction of $\mathbf{F}$) $\times$ F),

... the component of displacement in the direction of force times F.

I:14-2, unnumbered Eq

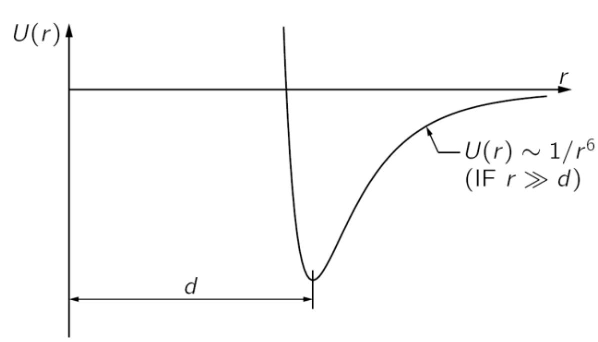
$$\boldsymbol{\Delta}(v^2)=\frac{2}{m}\mathbf{F}\cdot\boldsymbol{\Delta}\mathbf{s}$$

Only vectors should be bold ('$\boldsymbol{\Delta}$' vs. 'Δ').

$$\Delta(v^2)=\frac{2}{m}\mathbf{F}\cdot\Delta\mathbf{s}$$

I:14-5, Fig 14-3

Using the Lennard-Jones intermolecular potential the distance 'd' should be much larger; the curve should look like this:



I:14-5, Fig 14-3

$$U(r) \sim 1/r^6$$

Incorrect symbol for “proprtional to”, “ $\sim$ ” vs. “ $\propto$ ”.

$$U(r) \propto 1/r^6$$

I:14-7, last par

Since the potential energy, the integral of $(\mathbf{force})\cdot(d\mathbf{s})$ can be written as m times the integral of the $(\mathbf{field})\cdot(d\mathbf{s})$, a mere change of scale ...

Two sign errors (‘**force**’ vs. ‘–**force**’ and ‘**field**’ vs. ‘–**field**’).

Since the potential energy, the integral of $(-\mathbf{force})\cdot(d\mathbf{s})$ can be written as m times the integral of $(-\mathbf{field})\cdot(d\mathbf{s})$, a mere change of scale ...

I:14-8, par 1

… and we wish to know the potential Ψ at some arbitrary point p. This is simply the sum of the potentials at P due to the individual masses taken one by one:

Incorrect capitalization (‘P’ vs. ‘p’).

… and we wish to know the potential Ψ at some arbitrary point p. This is simply the sum of the potentials at p due to the individual masses taken one by one:

I:14-9, par 3

The mathematicians have invented a glorious new symbol, ∇, called “grad” …

The gradient symbol should be bold (‘ ∇ ’ vs. ‘$\boldsymbol{\nabla}$’).

The mathematicians have invented a glorious new symbol, $\boldsymbol{\nabla}$, called “grad” ...

I:14-9, par 3

... called “grad” or “gradient” which is not a quantity but an *operator* which makes a vector from a scalar.

Two errors: there should be a comma before “which,” and the second “which” should be “that.”

... called “grad” or “gradient,” which is not a quantity but an *operator* that makes a vector from a scalar.

I:14-9, Eq 14.14

$$\mathbf{F} = -\nabla U, \quad \mathbf{C} = -\nabla\Psi. \tag{14.14}$$

The gradient symbol should be bold (‘∇’ vs. ‘$\boldsymbol{\nabla}$’), two occurences.

$$\mathbf{F} = -\boldsymbol{\nabla} U, \quad \mathbf{C} = -\boldsymbol{\nabla}\Psi. \tag{14.14}$$

I:14-9, par 3

Using ∇ gives us a quick way of testing whether we havea real vector equation or not,

The gradient symbol should be bold (‘∇’ vs. ‘$\boldsymbol{\nabla}$’).

Using $\boldsymbol{\nabla}$ gives us a quick way of testing whether we havea real vector equation or not,

I:14-9, par 3

… Eq. (14.14) means precisely the same as Eqs. (14.11) and (14.12);

Incomplete statement (and lack of plural ‘s’ for Eqs 14.14).

… Eqs. (14.14) mean precisely the same as Eqs. (14.11), (14.12) and (14.13);

I:14-9, par 3

… and since we do not want to write three equations every time, we just write ∇U instead.

The gradient symbol should be bold (‘∇’ vs. ‘$\boldsymbol{\nabla}$’).

… and since we do not want to write three equations every time, we just write $\boldsymbol{\nabla} U$ instead.

I:14-9, par 4

It is easy to show from Eq. (12.10) that the force on a particle due to magnetic fields is …

Incorrect reference.

It is easy to show from Eq. (12.11) that the force on a particle due to magnetic fields is …

I:14-9, par 4, unnumbered Eq

$$\phi(\mathbf{r}) = \int \mathbf{E} \cdot d\mathbf{s},$$

Wrong sign (see preceding text).

$$\phi(\mathbf{r}) = -\int \mathbf{E} \cdot d\mathbf{s},$$

I:15-9, above Eq 15.10

Momentum is still given by mv, but …

Vectors should be bold (‘v’ vs. ‘$\mathbf{v}$’).

Momentum is still given by $m\mathbf{v}$, but …

I:15-10, Eq 15.15

$$c^2(2m)\frac{dm}{dt} = 2mv\frac{d(mv)}{dt}.$$

Not a real error, but for better comparison with Eq 15.14 and par 1 on p. I:15-11, this should be changed to

$$c^2(2m)\frac{dm}{dt} = 2m\mathbf{v} \cdot \frac{d(m\mathbf{v})}{dt}.$$

I:16-5, par 1

…, which means that the displacement x is equal to the velocity times the time:

Prime on x missing.

…, which means that the displacement x' is equal to the velocity times the time:

I:16-6, par 1

We have already (Fig. 15-3) discussed …

Nothing is “discussed” in figures.

We have already (Fig. 15-3) seen …

I:16-7, par 2

…from a car to the left moving with speed u, we see the same collision…

Does not fit the argument and Fig. 16-3(b) .

…from a car moving to the left with speed u, we see the same collision…

I:16-7, Fig 16-3

The u vectors and the x-components of the v vectors should have the same length and the same length in (a) and (b)..

I:16-8, par 1

Before the collision we have $p \sim 2m_w u$, …

Incorrect symbol for "approximatel equal to", " $\sim$ " vs. " $\approx$ ".

Before the collision we have $p \approx 2m_w u$, …

I:16-9, par 4

For instance, when a *K*-meson disintegrates […] the idea that a *K* is made …

The (2) '*K*' should not be italic.

For instance, when a K-meson disintegrates […] the idea that a K is made …

I:17-2, par 2

… in Fig. 17-1(c). A patricle, …

Incorrect spelling of 'particle'.

… in Fig. 17-1(c). A particle, …

I:17-6, par 2

Next we must find the new momentum p'_x. This is just the energy E times v', ...

Missing prime (" E " vs. " E' ")

Next we must find the new momentum p'_x. This is just the energy E' times v', ...

I:19-3, par 3

If, instead of gravitation, we have a pseudoforce due to acceleration, ...

Misspelling ('pseudoforce vs. 'pseudo force').

If, instead of gravitation, we have a pseudo force due to acceleration, ...

I:19-3, par 3

... and this force is "balanced" by the "force of inertia," which is a pseudoforce ...

Misspelling ('pseudoforce vs. 'pseudo force').

... and this force is "balanced" by the "force of inertia," which is a pseudo force ...

I:19-6, par 2

… , the moment of inertia should be $mL^2/3$, …

Incorrect capitalization ('m' vs. 'M').

… , the moment of inertia should be $ML^2/3$, …

I:20-3, par 2

Likewise, if we associate with the *yz*-plane the *x*-component of our newly invected vector, …

Incorrect spelling of 'invented'.

Likewise, if we associate with the *yz*-plane the *x*-component of our newly invented vector, …

I:20-5, par 5

... and we want to think in terms of the rotating coordinate system, then we have to add the pseudoforce $\boldsymbol{F}_c$.

Misspelling ('pseudoforce vs. 'pseudo force').

... and we want to think in terms of the rotating coordinate system, then we have to add the pseudo force $\boldsymbol{F}_c$.

I:20-6, par 2

The magnitude of the vector ΔL is thus …

Vectors should be bold ('ΔL' vs. '$\Delta \boldsymbol{L}$').

The magnitude of the vector $\Delta \boldsymbol{L}$ is thus …

I:20-6, Fig 20-2

$\Delta\mathbf{L}$ should join $\mathbf{L}_0$ and $\mathbf{L}_1$, and the perpendicular indication between $\Delta\mathbf{L}$ and $\mathbf{L}_0$ should be removed (because $\mathbf{L}_0$ and $\mathbf{L}_1$ have the same length but different orientations, so $\Delta\mathbf{L}$ cannot be perpendicular to either).

I:21-6, par 1

So we put (21.10) into (21.9), and get …

Incorrect reference.

So we put (21.10) and (21.9) into (21.8), and get …

I:22-5, Table 22-1, bottom line

$1 + .00022486\Delta$

Fractional decimals should begin with "0."

$1 + 0.00022486\Delta$

I:22-6, par 1

… what will the answer be? Of course it will be some number close to 0.0022511Δ. Not exactly 0.0022511Δ, …

Wrong number ('0.0022511Δ' vs. '1+0022511Δ') (2 occurrences).

… what will the answer be? Of course it will be some number close to 1+0022511Δ. Not exactly 1+ 0022511Δ, …

I:22-6, Table 22-2, 3rd line

$$\therefore 2 = (1.77828)(1.074607)(1.036633)(1.090350)(1.000573)$$

Wrong number ('1.090350' vs. '1.0090350').

$$\therefore 2 = (1.77828)(1.074607)(1.036633)(1.0090350)(1.000573)$$

I:22-6, Table 22-2, 4th line

$$= 10\left[\frac{1}{1024}\left(256+32+16+4+0.254\right.\right] = 10\left[\frac{308.254}{1024}\right]$$

Missing parentheses after 0.254 .

$$= 10\left[\frac{1}{1024}\left(256+32+16+4+0.254\right)\right] = 10\left[\frac{308.254}{1024}\right]$$

I:22-7, par 3

Now, 444.73 is 256 + 128 + 32 + 16 + 2 + 0.73.

Wrong numbers ('2' vs. '8 + 4').

Now, 444.73 is 256 + 128 + 32 + 16 + 8 + 4 + 0.73.

I:22-9, par 1

The y-value would be i, and so we would…

Arithmetic error: The complex number is i, its imaginary part is then 1.

The y-value would be 1, and so we would have $10^{is} = 1i$, or ...

I:22-9, par 2

… it is best to multiply "512" by "128." This gives $0.13056 + 0.99144i$.

Arithmetic error. (see Table 22-3).

… it is best to multiply "512" by "128." This gives $0.13056 + 0.99159i$.

I:22-9, par 2

Thus we choose "64"… This then gives $-0.01350 + 0.99993i$.

Arithmetic error. (see Table 22-3).

Thus we choose "64"… This then gives $-0.01308 + 1.00008i$.

I:22-9, par 2

Therefore $\log_{10} i = 0.68226i$.

Arithmetic error.

Therefore $\log_{10} i = 0.68184i$.

I:22-9, Table 22-4, leftmost column heading

$p = \text{power} \cdot 8i$

Arithmetic error. ('$8i$' vs. '$8/i$').

$p = \text{power} \cdot 8/i$

I:22-10, par 1

We worked it out before., in the base 10 it was $0.68226i$,

Arithmetic error. (See correction for I:22-9 par 2.)

We worked it out before., in the base 10 it was $0.\ 68184i$,

I:22-10, par 1

… but when we change our logarithmic scale to e, we have to multiply by 2.3025, and if we do that it comes out 1.5709.

Arithmetic error. (See correction for I:22-10 par 1, above. Also note that the following statement, that “it differs from the regular $\pi/2$ by only one place in the last point” is true when “it” equals 1.570 because $\pi/2$ = 1.571, to 3 digits accuracy.)

… but when we change our logarithmic scale to e, we have to multiply by 2.3025, and if we do that it comes out 1.570.

I:23-2, par 1

Now, since if two complex numbers are equal, their real parts must be equal *and* their complex parts must be equal, …

‘complex parts’ should be ‘imaginary parts’

Now, since if two complex numbers are equal, their real parts must be equal *and* their imaginary parts must be equal, …

I:23-4, par 1

Finally, going even further back, we see that the physical x, which is the real part of the complex $\hat{x}$, …

Incorrect statement. See definition of x in 23-3, par 4.

Finally, going even further back, we see that the physical x, which is the real part of the complex $\hat{x}e^{i\omega t}$, …

I:23-4, Fig 23-2

The curve should be more asymmetrical and the maximum should be slightly below ω_0 (due to the damping).

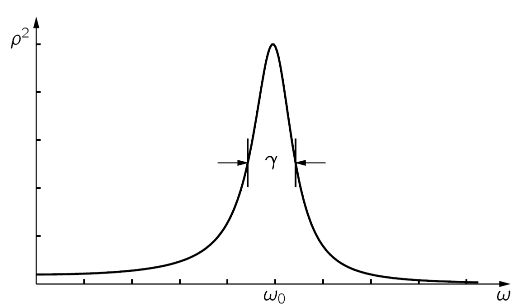


Fig. 23-2. Plot of ρ^2 versus ω.

I:23-5, par 6

... $1/C$ is analogous to a spring constant k, and R is analogous to the resistive coefficient γ.

Needs clarification.

... $1/C$ is analogous to a spring constant k, and R is analogous to the resistive coefficient $c = m\gamma$ in Eq. (23.6).

I:23-6, par 2

the second derivative of $\hat{q}$ is $(i\omega)^2\hat{q}$; the first derivative is $(i\omega)q$.

Missing caret on (final) 'q'.

the second derivative of $\hat{q}$ is $(i\omega)^2\hat{q}$; the first derivative is $(i\omega)\hat{q}$.

I:23-6, unnumbered equation before Eq 23.18

$$q = \frac{\hat{V}}{L(i\omega)^2 + R(i\omega) + \frac{1}{C}}$$

Missing caret on 'q'.

$$\hat{q} = \frac{\hat{V}}{L(i\omega)^2 + R(i\omega) + \frac{1}{C}}$$

I:23-9, Fig 23-11, caption

…and (b) $K^- + p \rightarrow K^0 + n$.

Wrong reaction product ('K^0' vs '$\overline{K}^0$' see part (b) of figure).

…and (b) $K^- + p \rightarrow \overline{K}^0 + n$.

I:24-3, Fig 24-1

The horizontal axis should be labeled 't' and have an arrowhead, similar to the 'x' axis.

I:24-6, par 1, unnumbered Eqs

$$x = e^{-\gamma t/2}\left(Ae^{i\omega\gamma t} + A^{*}e^{-i\omega\gamma t}\right),$$
$$dx/dt = e^{-\gamma t/2}\left[\left(-\lambda/2 + i\omega_{\gamma}\right)Ae^{i\omega\gamma t} + \left(-\lambda/2 - i\omega_{\gamma}\right)A^{*}e^{-i\omega\gamma t}\right],$$

Typographical error ('$\omega\gamma$' vs. 'ω_{γ}' in the exponets of e - four occurences).

$$x = e^{-\gamma t/2}\left(Ae^{i\omega_{\gamma} t} + A^{*}e^{-i\omega_{\gamma} t}\right),$$
$$dx/dt = e^{-\gamma t/2}\left[\left(-\lambda/2 + i\omega_{\gamma}\right)Ae^{i\omega_{\gamma} t} + \left(-\lambda/2 - i\omega_{\gamma}\right)A^{*}e^{-i\omega_{\gamma} t}\right],$$

I:24-6, Eq 24.21

$$A_I = \left(v_0 + \gamma x_0/2\right)/2\omega_{\gamma} \tag{24.21}$$

Wrong sign.

$$A_I = -\left(v_0 + \gamma x_0/2\right)/2\omega_{\gamma} \tag{24.21}$$

I :25-4, Fig 25-4

The horizontal axis is labelled x, but it should have the label t.

I :25-6, par 1

But of course $n \sim t$, so…

Incorrect symbol for "proprtional to", "$\sim$" vs. "$\propto$".

But of course $n \propto t$, so…

I:26-2, Fig 26-1

Superfluous dot at bottom end of vertical line.

I:26-3, par 5

… the light goes to the mirror in such a way that it comes back to the point B' in the *least possible time*.

There should be no 'prime' on B – the light reflected by the mirror goes to B.

… the light goes to the mirror in such a way that it comes back to the point B in the *least possible time*.

I:26-4, par 3

… noting that

$$EXC = ECN = \theta_i, \quad \text{and} \quad XCF = BCN' = \theta_r,$$

we have …

Incomplete statement. The equation on the left is always true, regardless of the distance between *X* and *C*, but the second equation is only approixmately true when *X* is close to *C.* In fact, $XCF = BCN' + CBX$, and $CBX \to 0$ when $X \to C$. See Fig 26-4.

… noting that

$$EXC = ECN = \theta_i, \quad \text{and} \quad XCF \approx BCN' = \theta_r \text{ when } X \text{ is near } C,$$

we have …

I :27-1, par 3

…, and $s + d \sim 2s$.

Incorrect symbol for “approximatel equal to”, “ $\sim$ ” vs. “ $\approx$ ”.

…, and $s + d \approx 2s$.

I :27-1, Eq 27.1

$$\Delta \sim h^2/2s \,. \tag{27.1}$$

Incorrect symbol for “approximatel equal to”, “ $\sim$ ” vs. “ $\approx$ ”.

$$\Delta \approx h^2/2s \,. \tag{27.1}$$

I:27-5, Fig 27-7

Rightmost tic mark is too far right (should be at point W).

I:27-6, Fig 27-8

Vertical guideline for right focal point is too short (should extend slightly above x-axis, as per left focal point guideline).

I:28-4, par 3

… the x-component of $d^2\mathbf{e}_{r'}/dt^2$ is simply the acceleration of x itself at an earlier time, …

Incorrect statement. The *x*-component of the second derivative of the unit vector is the acceleration of *x* at an earlier time *divided by r* (as correctly reflected in Eq. 28.6).

… the x-component of $d^2\mathbf{e}_{r'}/dt^2$ is simply the acceleration of x itself at an earlier time divided by r, …

I :28-6, par 2

Next, we may test what happens when we have two sources side by side a few centimeters apart (Fig. 28-3).

Not specific enough, since the wavelength of the sources is not given.

Next, we may test what happens when we have two sources side by side several wavelengths apart (Fig. 28-3).

I :28-6, Fig 28-3

The figure should be changed to more accurately reflect what Feymman was doing in the classroom and what is written in I:29-5, par 2. The two oscillaters were 25 cm apart and the wavelength of the oscillations was 10 cm, so the oscillators should be 2.5 wavelengths apart, not 3.5 wavelengths apart as shown.

I :29-4, par 1

We shall derive the constant of proportionality in the next chapter.

Incorrect reference. (Section 31-5 actually)

We shall derive the constant of proportionality in chapter 31.

I:29-6, Fig 29-9

Consistency error (‘ $\mathbf{A}_r$ ’ vs. ‘ $\mathbf{A}_R$ ’). The body text uses $\mathbf{A}_R$ and so should the figure.

I:30-1, Fig 30-1

All the ‘A_i’ vectors should have the same length.

I:30-2, par 3

… so we have $4/9\pi^2$ times the maximum intensity, which is about 0.047, …

Incorrect value (‘0.047’ vs. ‘0.045’).

… so we have $4/9\pi^2$ times the maximum intensity, which is about 0.045, …

I:30-2, par 6

…, we get the first minumum of the curve.

Incorrect spelling of ‘minimum’.

…, we get the first minimum of the curve.

I:30-2, Fig 30-3

According to the text and caption there are n oscillators in the line, yet there are n+1 (oscillator) dots drawn on the line in the figure, which explains the ‘x’ through the last dot; it would be clearer to remove the last dot, leaving the ‘x’ in place.

I:30-4, par 4

… and let us say that we wish to discuss the scattered beam, which is leaving at an angle θ_{out} .

Needs figure reference for clarification.

… and let us say that we wish to discuss the scattered beam, which is leaving at an angle θ_{out} (Fig. 30-4).

I:30-4, par 4

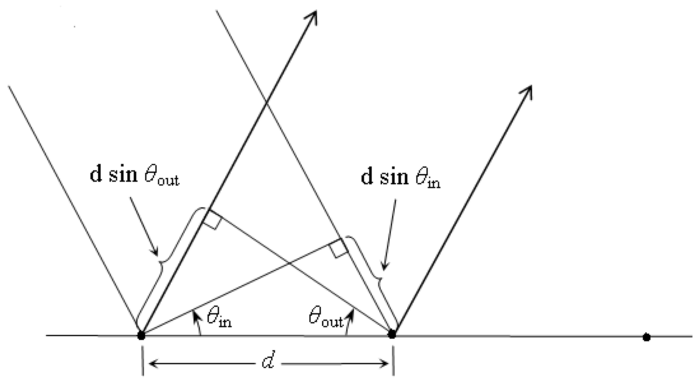
… with a phase shift from one to the other which, as we see, is $\alpha = -d \sin\, \theta_{\text{in}} / \lambda$.

Incorrect statement. See Eq. (30.7).

… with a phase shift from one to the other which, as we see, is $\alpha = -2\pi d \sin\, \theta_{\text{in}} / \lambda$.

I:30-4, Fig 30-4

Scattered rays should be indicated by arrrowheads for clarity. (Rays are incoming from left and scattered to right.)



I :30-6, par 2

In other words, $2\pi d \sin\theta / \lambda' = 2\pi m$, so $nd \sin\theta$, which is Δ, is λ' times n, or $mn\lambda'$.

Error in formula.

In other words, $2\pi d \sin\theta / \lambda' = 2\pi m$, so $nd \sin\theta$, which is Δ, is $m\lambda'$ times n, or $mn\lambda'$.

I:30-7, footnote

This is because Rayleigh's criterion is a rough idea in the first place, It tells you where it begins to get ...

Wrong punctuation mark (‘,' vs. ‘.’).

This is because Rayleigh's criterion is a rough idea in the first place. It tells you where it begins to get ...

I:30-8, par 1

… the colors that we see on oil fims, …

Incorrect spelling of ‘films’.

… the colors that we see on oil films, …

I:30-8, par 5

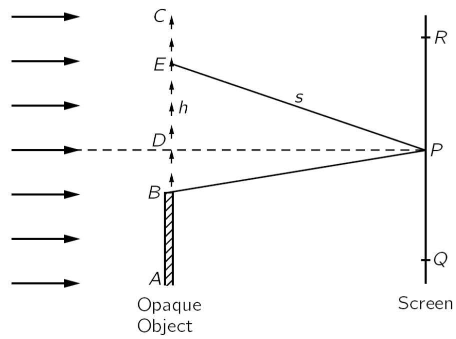
…, and oscillates about in a very peculiar manner near this edge (Fig. 30-8).

Incorrect reference (‘30-8’ vs. ‘30.9’).

…, and oscillates about in a very peculiar manner near this edge (Fig. 30-9).

I:30-8, Fig 30-7

The labels F, G and s_1 are superfluous, and according to the description in I:30-9,par 2, h should be the distance ED.



I:30-9, par 2

Now the path difference $EP - DP$ is $h^2/2s$, …

Inacccurate statement.

Now the path difference $EP - DP$ is approximately $h^2/2s$, …

I:30-10, par 1

… be the *XY*-plane, […] on the *Z*-axis …

Consistency error: ‘X’, ‘Y’, and ‘Z’ should be lower case (see Eq. 30.14).

… be the *xy*-plane, […] on the *z*-axis …

I:30-10, par 3

… the point Q from the axis (the distance ρ in Fig. 30-9), for those changes that we need to take into account, ...

Incorrect reference (‘30-9’ vs. ‘30.10’).

… the point Q from the axis (the distance ρ in Fig. 30-10), for those changes that we need to take into account, ...

I:30-11, par 1

… where we have written ∞ for $(r/c)\infty$, …

Wrong symbol; ‘r’ should be ‘ω’ (r is just the integration variable).

… where we have written ∞ for $(\omega/c)\infty$, …

I:31-2, par 3

We take a circumstance in which the effects from the other atoms is very small relative to the effects from the source.

Grammatical error (‘effects is’ vs. ‘effects are’).

We take a circumstance in which the effects from the other atoms are very small relative to the effects from the source.

I:31-3, par 3

... which could exist without the plate, i, e., from E_s, by multiplying by the factor ...

Wrong punctuation mark (‘i, e.,' vs. ‘i.e.’).

... which could exist without the plate, i.e. from E_s, by multiplying by the factor ...

I:31-4, Eq 31.9

$$E_s = E_0 e^{i(\omega t - z/c)}. \tag{31.9}$$

The ‘ω’ is misplaced; it should be outside the parentheses.

$$E_s = E_0 e^{i\omega(t - z/c)}. \tag{31.9}$$

I:31-5, par 2

... the velocity of the charges retarded in time the amount z/c ...

Missing word ‘by'.

... the velocity of the charges retarded in time by the amount z/c ...

I:31-5, par 3

… area, is equal to $N\,\Delta Z$, where N is the number of atoms per unit volume of the plate. Substituting $N\,\Delta Z$ for …

Typographic error (‘ΔZ’ vs. ‘Δz’, 2x).

… area, is equal to $N\,\Delta z$, where N is the number of atoms per unit volume of the plate. Substituting $N\,\Delta z$ for …

I:31-9, par 7

It is really $\mathbf{F}\cdot\mathbf{V}$, but …

Typographic error (‘$\mathbf{V}$’ vs. ‘$\mathbf{v}$’).

It is really $\mathbf{F}\cdot\mathbf{v}$, but …

I :32-3, par 3

…with $e = 1.5188\times 10^{-14}$ mks.

Typographic error.

…with $e = 1.5188\times 10^{-14}$ (mks).

I:32-5, par 1

… then the energy we receive can be found by compounding the two complex number vectors A_1 and A_2, one at angle ϕ_1 and the other at angle ϕ_2 (as we did in Chapter 30) …

Incorrect reference.

… then the energy we receive can be found by compounding the two complex number vectors A_1 and A_2, one at angle ϕ_1 and the other at angle ϕ_2 (as we did in Chapter 29) …

I :32-6, par 2

…from a laser a source in which the interference frequency, the time at which the phase is kept constant, …

Incorrect terminology and wrong preposition. (What Feynman actually said was “...in which the interference ... ugh... frequenc-, the time at which the phase is kept is constant, ...” obviously struggling for words.)

…from a laser a source in which the time during which the phase is kept constant, …

I:32-6, par 8

If the incident beam has the electric field $\boldsymbol{E} = \boldsymbol{E}_0 e^{i\omega t}$ at the point…

Typographic error (caret is missing), and clarification needed: The caret notation for complex quantities is used on both scalars and vectors in FLP Vols. I and II. Here it appears on a vector for the first time. However, it is only defined on scalars (in chapter 23). To avoid any possible confusion it is suggested that a footnote be added to explain precisely what the caret notation on vectors means

If the incident beam has the electric field† $\boldsymbol{E} = \hat{\boldsymbol{E}}_0 e^{i\omega t}$ at the point…

---

†When a caret appears on a vector it signifies that the *components* of the vector are complex: $\hat{\boldsymbol{E}} \equiv \left(\hat{E}_x, \hat{E}_y, \hat{E}_z\right)$.

I:32-6, par 8

From Eq. (23.8), the amplitude will be...

$\hat{x}$ is a vector quantity, not an amplitude.

From Eq. (23.8), the response will be...

I:32-6, Eq 32.15

$$\hat{\boldsymbol{x}} = \frac{q_e \boldsymbol{E}_0}{m(\omega_0^2 - \omega^2 + i\omega\gamma)} \tag{32.15}$$

Typographical error: (caret is missing, "$\mathbf{E}_0$" vs. "$\hat{\mathbf{E}}_0$").

$$\hat{\boldsymbol{x}} = \frac{q_e \hat{\boldsymbol{E}}_0}{m(\omega_0^2 - \omega^2 + i\omega\gamma)} \tag{32.15}$$

I:32-7, par 4

The total amount of energy that would pass through this surface σ in a given circumstance is proportional both to the incoming intensity and to σ, and would be

$$P = \ldots \tag{32.18}$$

Inaccurate statement. P is power, not energy.

The total amount of energy that would pass through this surface σ in a given circumstance is proportional both to the incoming intensity and to σ, and the total power would be

$$P = \ldots \tag{32.18}$$

I:32-8, par 2

This low-frequency limit, or the free electron cross section, is known as the *Thompson scattering cross section*.

Misspelled name ('*Thompson* vs. '*Thomson*')

This low-frequency limit, or the free electron cross section, is known as the *Thomson scattering cross section*.

I:33-1, Fig 33-1

y-axis is missing from 4th graph ($E_y = 0$, $E_x = 1$).

I:33-5, par 5

We know that is is not possible to …

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

We know that it is not possible to …

I:33-7, Fig 33-6

The dashed line labeled '–1' should be dotted for consistency with the text in par 5.

I:33-7, caption to Fig 33-6

In (b) the incident wave is linearly polarized in the direction shown by the dotted electric vector.

The polarizaion is indicated by dashed – not dotted – arrows (compare to caption for Fig. 33-4).

In (b) the incident wave is linearly polarized in the direction indicated by the dashed arrows.

I:33-7, par 7

Now we use a trick. We know that in both (a) and (b) of Fig. 33-6 the electric field in the glass must produce oscillations of the charges which generate a field of amplitude –1, polarized parallel to the incident beam, and moving in the direction of the dotted line.

Missing comma before 'which'.

Now we use a trick. We know that in both (a) and (b) of Fig. 33-6 the electric field in the glass must produce oscillations of the charges, which generate a field of amplitude –1, polarized parallel to the incident beam, and moving in the direction of the dotted line.

I:34-3, Fig 34-3, caption

The $x'(t)$ curve for a particle moving at constant speed $v = 0.94c$, a circle.

Missing word ('moving, a circle' vs. 'moving in a circle'),

The $x'(t)$ curve for a particle moving at constant speed $v = 0.94c$ in a circle.

I:34-3, par 2

Instead, there are very sharp pulses of electric field spaced at time intervals $1/T_0$ apart, where T_0 is the period of revolution.

Incorrect statement.

Instead, there are very sharp pulses of electric field spaced at time intervals T_0 apart, where T_0 is the period of revolution.

I:34-3, par 2

…a curve which is very close to a cycloid-it is called a *hypocycloid.*

Error in geometric nomenclature.

…a curve which is very close to a cycloid - it is called a *curtate cycloid*….

I:34-3, par 5

From Eq. (12.10) we know that the force on a particle in a magnetic field is given by…

Incorrect reference.

From Eq. (28.2) we know that the force on a particle in a magnetic field is given by…

I:34-6, par 6

…what is the electric field produced in the direction *c*?

Wrong symbol for direction, it does not match Fig. 34-9.

…what is the electric field produced in the direction *C*?

I:34-7, par 2

So all the oscillations of frequency ω_1 in the time $\Delta\tau$ are now found in the interval $\Delta\tau = (1 - v/c)\Delta\tau$

Error in formula. ($\Delta\tau$ instead of Δt)

So all the oscillations of frequency ω_1 in the time $\Delta\tau$ are now found in the interval $\Delta t = (1 - v/c)\Delta\tau$

I:34-9, below Eq 34.19

What is the significance of a component of *k*, …

Vectors should be bold ('*k*' vs. '**k**').

What is the significance of a component of **k**, …

I:(34-10 to) 34-11, par 1

Therefore, when light is shining on a charge and it is oscillating in response to that charge, there is a driving force in the direction of the light beam.

Wrong word ('charge' vs. 'light').

Therefore, when light is shining on a charge and it is oscillating in response to that light, there is a driving force in the direction of the light beam.

I:34-11, par 6

(called the deBroglie relations)

Incorrect spelling of proper name ('deBroglie' vs. 'de Broglie').

(called the de Broglie relations)

I:35-2, par 2

… dark-adapted vision is amost entirely …

Incorrect spelling of 'almost'.

… dark-adapted vision is almost entirely …

I:35-4, par 1

That is, we do not try to define what consititutes a …

Incorrect spelling of 'constitutes'.

That is, we do not try to define what constitutes a …

I:35-9, par 3

There is an instrument called an opthalmoscope …

Incorrect spelling of 'ophthalmoscope'.

There is an instrument called an ophthalmoscope …

I:37-3, Fig 37-2

Both h_1's and both h_2's should have hats, as per Eqs. 37.2 – 37.4 ('h_1' vs. '$\hat{h}_1$' and 'h_2' vs. '$\hat{h}_2$').

I:37-4, par 7

The intensity can have any value, and it shows inteference.

Incorrect spelling of 'interference'.

The intensity can have any value, and it shows interference.

I:37-8, par 2

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 $P_{12}' = P_1' + P_2'$.

I:37-11, 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 $\Delta x = h/\Delta p$.

Inaccurate statement of uncertainty relation.

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 $\Delta x \geq \hbar/2\Delta p$.

I:37-11, par 5

The uncertainties in the position and momentum at any instant must have their product greater than Planck's constant.

Inconsistent with preceding inline equation which has been corrected from $\Delta x = h/\Delta p$ to $\Delta x \geq \hbar/2\Delta p$.

The uncertainties in the position and momentum at any instant must have their product greater than half the reduced Planck constant.

I:38-2, par 4

Then after it has come out through the hole, we know the position vertically—the y-position—with considerable accuracy—namely $\pm B$.

In III:2 where I:38 is reproduced, there is an informative footnote at this point.

Then after it has come out through the hole, we know the position vertically—the y-position—with considerable accuracy—namely $\pm B$. †

---

† More precisely, the error in our knowledge is $\pm B/2$. But we are now only interested in the general idea, so we won't worry about factors of 2.

I:38-3, par 1

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

Inconsistent with Eq. (38.3) 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 $\hbar/2\Delta y$, …

I:38-3, Eq. 38.3

$$\Delta y \Delta p_y \approx h \qquad (38.3)$$

Inaccurate statement of uncertainty relation.

$$\Delta y \Delta p_y \geq \hbar/2 \qquad (38.3)$$

I:38-6, 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,

I:38-6, 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 $p \approx \hbar/a$.

I:38-6, par 2

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

Wrong constant (‘h’ vs. ‘$\hbar$’).

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

I:38-6, par 3

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.

I:38-6, Eq 38.10

$$E = h^2/2ma^2 - e^2/a. \tag{38.10}$$

Wrong constant (‘h’ vs. ‘$\hbar$’).

$$E = \hbar^2/2ma^2 - e^2/a. \tag{38.10}$$

I:38-6, Eq 38.11

$$dE/da = -h^2/ma^3 + e^2/a^2\ , \tag{38.11}$$

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

$$dE/da = -\hbar^2/ma^3 + e^2/a^2\ , \tag{38.11}$$

I:38-6, Eq 38.12

$$\begin{aligned} a_0 = h^2/me^2 &= 0.528 \text{ angstrom} \\ &= 0.528 \times 10^{-10} \text{ meter.} \end{aligned} \tag{38.12}$$

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

$$\begin{aligned} a_0 = \hbar^2/me^2 &= 0.528 \text{ angstrom} \\ &= 0.528 \times 10^{-10} \text{ meter.} \end{aligned} \tag{38.12}$$

I:38-6, Eq 38.13

$$E_0 = -e^2/2a_0 = -me^4/2h^2 = -13.6 \text{ ev.} \tag{38.13}$$

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

$$E_0 = -e^2/2a_0 = -me^4/2\hbar^2 = -13.6 \text{ ev.} \tag{38.13}$$

I:39-1, par 6

Why not wait a half a year, or a year, until we know the mathematics of probability better, ...

Unnecessary indefinite article 'a'

Why not wait half a year, or a year, until we know the mathematics of probability better, …

I:39-2, par 2

… is worth while having, …

Spelling error: "worthwhile" (adjective) is one word.

… is worthwhile having, …

I:39-4, par 3

Did we forget to include the factor 2? No; of all the atoms, only half are headed toward the piston. The other half are headed the other way, and if we take $\langle v_x^2 \rangle$, we are averaging the *negative* v_x's squared, as well as the positive v_x's. So when we just take $\langle v_x^2 \rangle$, without looking, we are getting twice as much as we want.

Incorrect statement. The average of v_x^2 for positive v_x equals the average of v_x^2 for all v_x. The factor ½ comes into play in Eq. (39.5), the pressure on the piston, because only half the atoms are moving toward the piston (as already explained in the text).

Did we forget to include the factor 2? No; of all the atoms, only half are headed toward the piston. The other half are headed the other way, so the number of atoms per unit volume *that are hitting the piston* is only $n/2$.

I:39-5, par 5

This γ, then, is 5/3, because 5/3 - 1 = 2/3 for a monatomic gas like helium.

Unclear wording.

This γ, then, is 5/3 for a monatomic gas like helium, because 5/3 - 1 = 2/3.

I:39-8, par 3

…it is an interesting property that the differential area of a sphere of unit radius is $\sin\theta d\theta$ times 2π, and that is the same as the differential of $\cos\theta$.

Inaccurate statement, and missing reference. (In the original lecture Feynman underlined $\sin\theta d\theta$ on the blackboard when he said “and that is the same as the differential of $\cos\theta$.” He also said (after “...sphere”) “we’ve talked about it before.”)

…it is an interesting property that the differential area of a sphere of unit radius is $\sin\theta d\theta$ times 2π (see Fig. 32-1). And $\sin\theta d\theta$ is the same as the differential of $-\cos\theta$.

I:39-9, par 2

The average of the velocity v_2 in any direction is zero.

Vectors should be bold (‘v_2’ vs. ‘$\mathbf{v}_2$’).

The average of the velocity $\mathbf{v}_2$ *in any direction is zero.*

I:39-9, Eq. 39.21

$$½m_1v_1^2 = ½m_2v_2^2 \tag{39.21}$$

Missing average symbols (2ce).

$$\left\langle ½m_1v_1^2 \right\rangle = \left\langle ½m_2v_2^2 \right\rangle \tag{39.21}$$

I:39-11, Eq 39.24

$$\frac{1}{2}Mv_{\text{CM}}^2 = \frac{3}{2}kT. \tag{39.24}$$

Missing average symbol.

$$\left\langle \frac{1}{2}Mv_{\text{CM}}^2 \right\rangle = \frac{3}{2}kT. \tag{39.24}$$

I:39-11, par 4

$$\begin{aligned} \frac{1}{2}Mv_{\text{CM}}^2 &= \frac{m_A \frac{3}{2}kT + 2m_Am_B \left\langle \mathbf{v}_A \cdot \mathbf{v}_B \right\rangle + m_B \frac{3}{2}kT}{M} \\ &= \frac{3}{2}kT + \frac{2m_Am_B \left\langle \mathbf{v}_A \cdot \mathbf{v}_B \right\rangle}{M}. \end{aligned}$$

Three errors: missing average symbol on left, and $2m_Am_B \left\langle \mathbf{v}_A \cdot \mathbf{v}_B \right\rangle$ should be $m_Am_B \left\langle \mathbf{v}_A \cdot \mathbf{v}_B \right\rangle$ on right (2ce).

$$\begin{aligned} \left\langle \frac{1}{2}Mv_{\text{CM}}^2 \right\rangle &= \frac{m_A \frac{3}{2}kT + m_Am_B \left\langle \mathbf{v}_A \cdot \mathbf{v}_B \right\rangle + m_B \frac{3}{2}kT}{M} \\ &= \frac{3}{2}kT + \frac{m_Am_B \left\langle \mathbf{v}_A \cdot \mathbf{v}_B \right\rangle}{M}. \end{aligned}$$

I:40-2, Fig 40-2

$$\frac{\mathrm{n}(\mathrm{h})}{\mathrm{n}(\mathrm{O})}$$

Typographical & consistency error (‘$\mathrm{n}(\mathrm{O})$’ vs. ‘n_0’).

$$\frac{\mathrm{n}(\mathrm{h})}{\mathrm{n}_0}$$

I:40-3, par 1

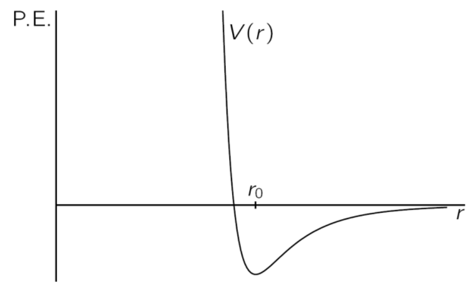
…, and no equilbrium can be maintained at all.

Incorrect spelling of 'equilibrium'.

…, and no equilibrium can be maintained at all.

I:40-3, Fig 40-3

Using the Lennard-Jones intermolecular potential, the curve should look like this:



I:40-7, par 2

Then at a given temperature, in addition to kinetic energy kT, it has internal vibrational or rotational energy. So the total U includes not just the internal kinetic energy, but also the rotational energy, and we get a different value of γ.

Inaccurate and unclear statement - the kinetic energy of the center of mass is $\frac{3}{2}kT$.

Then at a given temperature, in addition to kinetic energy $\frac{3}{2}kT$, it has internal vibrational and rotational energies. So the total U includes not just the kinetic energy, but also the rotational and vibrational energies, and we get a different value of γ.

I:41-3, par 3

Now suppose that this oscillator is in a very thin gas of other.atoms, …

Superfluous period ('other.atoms' vs. 'other atoms').

Now suppose that this oscillator is in a very thin gas of other atoms, …

I:41-3, par 3

… its kinetic energy of oscillation is ½*kT*, and since it is a harmonic oscillator, its entire energy of motion will become *kT*.

The entire energy of a harmonic oscillator is its (kinetic) energy of motion plus its potential energy.

… its kinetic energy of oscillation is ½*kT*, and since it is a harmonic oscillator, its entire energy will become *kT*.

I:41-3, par 3

And that is, of course, the way a hot stove cools on a cold night by radiating the light into the sky, …

Potentially inaccurate statement. If the stove is hot enough (and the night is cold enough), the stove will heat the air near it, setting up a superadiabatic temperature gradient, convection will set in, and that will be the dominant cooling mechanism. If the temperature difference between stove and air is low enough, then convection will not set in and radiative cooling may dominate.

And that is, of course, the way a warm stove cools, by radiating the light into the sky, …

I:41-3, par 4

…,but pretty soon it can maintain its *kT* of kinetic energy in spite of…

Error in phrase.

…,but pretty soon it can maintain its *kT* of energy in spite of…

I:41-4, par 6

The formula for the cross section which we derived (Eq. 31.19) did not have the damping included.

Incorrect reference ('31.19' vs. '32.19') and wrong word ('which' vs. 'that')

The formula for the cross section that we derived (Eq. 32.19) did not have the damping included.

I:41-4, par 6

It is not hard to go through the derivation again and put in the resistance term which we neglected.

Missing comma before 'which.'

It is not hard to go through the derivation again and put in the resistance term, which we neglected.

I:41-5, Fig 41-3

(Labels on the ω-axis:)… $\omega_0 - \gamma$ and $\omega_0 + \gamma$

Labels not in accordance with context or realistic vertical scale (cfr Fig. 23-2)

(Labels on the ω-axis:)… $\omega_0 - \gamma/2$ and $\omega_0 + \gamma/2$

I:41-5, Fig 41-3, Caption

The peak is the resonance curve $1/(\omega - \omega_0)^2 + \gamma^2/4$.

Missing brackets in denominator.

The peak is the resonance curve $1\Big/\Big[(\omega - \omega_0)^2 + \gamma^2/4\Big]$.

I:41-9, Eq 41.18

$R_N^2 = NL^2$

Missing (expectation) brackets.

$\left\langle R_N^2 \right\rangle = NL^2$

I:41-10, last par

… of the number of atoms was by the the determination of how far …

Unnecessary repetition of 'the'.

… of the number of atoms was by the determination of how far …

I:43-2, par 1

What this means, of course, is that 1/60 of the molecules happen to be close enough to what they are going to hit next that *their* collisions will occur in the next minute.

Incorrect statement ('minute' vs. 'second').

What this means, of course, is that 1/60 of the molecules happen to be close enough to what they are going to hit next that *their* collisions will occur in the next second.

I:43-3, par 1

$e^{-1} = 0.37...$

Incorrect statement ($e^{-1} = 0.367879...$)

$e^{-1} \approx 0.37.$

I:43-3, Fig 43-1

Total area covered is $\sigma n_0 dx$

Missing subscript in label (' σ ' vs. ' σ_c ')

Total area covered is $\sigma_c n_0 dx$

I:43-6, Fig 43-2

Gas with $\mathrm{N_I}$ ions per unit volume

Incorrect symbol (' $\mathrm{N_I}$ ' vs. ' n_i ')

Gas with n_i ions per unit volume

I:43-10, par 2

…done above in considering the flow of electric current in an ionized gas,…

Incorrect reference.

…done above in considering molecular diffusion,…

I:43-10, par 2

… where $(\gamma - 1)kT$ is the average energy of a molecule at the temperature *T*.

Mathematical error. [By Eq. 39.11 $PV = (\gamma - 1)U$, by Eq. 39.12 $PV = NkT$, and for an ideal gas, $U = Nu$, where u is the average kinetic energy of a molecule.]

… where $kT/(\gamma - 1)$ is the average energy of a molecule at the temperature *T*.

I:44-2, par 2

We have seen how these two process,...

Grammatical error ('process' vs. 'processes')

We have seen how these two processes,...

I:44-2, par 6

Some time afterwards, Clausius made a simpler derivation that could be understood more easily than Carnot's very subtle reasoning. But it turned out that Clausius assumed, …

Wrong scientist (twice). Cfr. J.H. Hannay: Carnot and the field formulation of elementary thermodynamics.

Some time afterwards, Clapeyron made a simpler derivation that could be understood more easily than Carnot's very subtle reasoning. But it turned out that Clapeyron assumed, …

I:44-3 par 1

Only Clausius' simplified version, that everybody read, was incorrect.

Wrong scientist. (See error I:44-2, par 6.)

Only Clapeyron's simplified version, that everybody read, was incorrect.

I:44-5, par 4

... following the curve marked (3) (Fig. 44-5, Step 2).

Incorrect reference ('Step 2' vs. 'Step 3').

... following the curve marked (3) (Fig. 44-5, Step 3).

I:44-7, 4

Likewise, since (4), the expansion from *d* to *a*, …

Wrong process.

Likewise, since (4), the compression from *d* to *a*, …

I:44-12, par 7

Because it is not worth while duplicating…

Spelling error: "worthwhile" (adjective) is one word.

Because it is not worthwhile duplicating…

I:45-2, par 2

…one might at first be inclined to think that $P = \left(\frac{\partial U}{\partial V}\right)_T$,

Sign error.

…one might at first be inclined to think that $P = -\left(\frac{\partial U}{\partial V}\right)_T$,

I:45-3 par 4

… Eqs. (45.3) and (45.7) are the basic equations from which all the result of the subject can be deduced.

Plural needed ('result' vs. 'results')

… Eqs. (45.3) and (45.7) are the basic equations from which all the results of the subject can be deduced.

I:45-4, par 1

…we can deduce the relationship between the amount of heat needed to maintain a constant temperature when the gas expands, and the pressure change when the gas is heated!

Missing condition.

…we can deduce the relationship between the amount of heat needed to maintain a constant temperature when the gas expands, and the pressure change when the gas is heated at constant volume!

I:45-4, Eq. 45.9

$$\frac{\Delta U}{\Delta Z} = -T\left(\frac{\partial E}{\partial T}\right)_Z - E$$

Sign error.

$$\frac{\Delta U}{\Delta Z} = T\left(\frac{\partial E}{\partial T}\right)_Z - E$$

I:45-4, par 2

The answer is that a real battery gets warm when charge moves through the cell. The internal energy of the battery is changed, first, because the battery did some work on the outside circuit, and second, because the battery is heated.

It is unclear in the book (though clear on the tape) that Feynman is making a parenthetical remark about a battery with losses due to Joule heating, in the midst of a discussion of an ideal reversible battery (without such losses).

(The answer is that a real battery gets warm when charge moves through the cell. The internal energy of the battery is changed, first, because the battery did some work on the outside circuit, and second, because the battery is heated.)

I:45-5, par 1

All we need do is construct a cell that works on the reaction,...

Missing word 'to'

All we need to do is construct a cell that works on the reaction,...

I:45-5, par 4

Now we are ready to transform our results into chemists' language with the following rules: $U \to H$, $P \to -V$, $\Delta V \leftrightarrow \Delta P$.

The correction proposal from FLP_Commemorative_Issue_Vol_I_Errata.pdf should not have been applied. If we use the original statement "$U \to H$, $P \to -V$, $V \to P$" , to substitute the symbols in (45.7) accordingly and do the sign arithmetic, we get correct chemist's equations. (But of course, the correction proposal below for: I:45-5, par 4, unnumbered equation, must be applied first.)

Now we are ready to transform our results into chemists' language with the following rules: $U \to H$, $P \to -V$, $V \to P$.

I:45-5, par 4, unnumbered equation

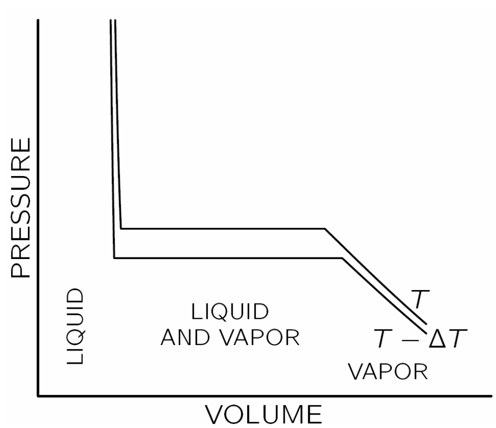
$$\left(\frac{\partial H}{\partial P}\right)_T = T\left(\frac{\partial V}{\partial T}\right)_P + V$$

Sign error.

$$\left(\frac{\partial H}{\partial P}\right)_T = -T\left(\frac{\partial V}{\partial T}\right)_P + V$$

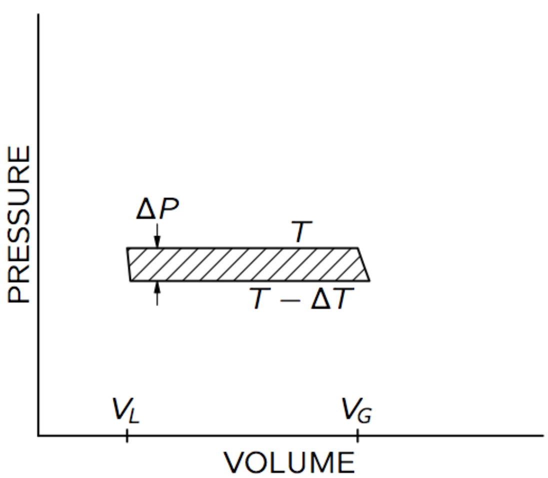
I:45-6, Fig 45-3

In the figure, the V -value of the left-most point on the horizontal part of the isotherm at temperature T is smaller than the V -value of the left-most point on the horizontal part of the isotherm at temperature $T - \Delta T$. This indicates that the saturated liquid line on which both of these points lie, has a negative slope in the pressure-volume diagram. This indicates a pretty exotic substance / equation of state. It may be provable that such a binodal cannot exist. Remedy: redraw by shifting the left half of upper isotherm slightly to the right while shortening its horizontal part. We use the van der Waals isothermals with reduced temperatures of 0.89 and 0.92, respectively.



I:45-6, Fig 45-4

This figure must be redrawn to correspond to the corrected Fig. 45-3. Furthermore, the inner region of the closed curve should be shaded as stated in the text in I:45-7, par 1, and the tick mark belonging to the V_G label should be moved slightly to the left so that it represents the *V*-coordinate of right-most point of the horizontal part of the isotherm at temperature *T*.



I:45-6, par 4

We will now make a cycle out of the two isothermal lines by connecting them (say by adiabatic lines) at the ends of the flat sections, as shown in Fig. 45-4.

Incomplete statement.

We will now make a cycle out of the two isothermal lines by connecting them (say by adiabatic lines) at both ends of the upper flat section, as shown in Fig. 45-4.

I:45-6, par 4

The little jiggle in the lower right-hand corner of the figure will make little difference and we will neglect it.

When Fig. 45-4 is corrected as shown above there is no "little jiggle in the lower right-hand corner of the figure," so this sentence should be struck.

I:45-7, par 1

…is the volume of the liquid, both volumes measured at the vapor pressure.

Missing condition.

…is the volume of the liquid, both volumes measured at the vapor pressure at temperature T.

I :45-7, par 2

…where $U_G - U_L$ is the internal energy per mole in the liquid minus the internal energy per mole in the gas,…

Reversed order in wording.

…where $U_G - U_L$ is the internal energy per mole in the gas minus the internal energy per mole in the liquid,…

I:45-7, Eq 45.16

$$n = \left(\frac{1}{V_A}\right) e^{-(U_G - U_L)/RT} \tag{45.16}$$

Wrong symbol ('A' vs. 'a'). See Eq. (42.1).

$$n = \left(\frac{1}{V_a}\right) e^{-(U_G - U_L)/RT} \tag{45.16}$$

I:45-7, par 2

However, they will turn out to be exactly the same if we assume $L - U_g =$ const, instead of $L =$ const. If we assume $L - U_g =$ const, independent…

Error in formula (twice)

However, they will turn out to be exactly the same if we assume $U_G - U_L =$ const, instead of $L =$ const. If we assume $U_G - U_L =$ const, independent…

I:45-7, par 2

There is an important point missing here that Feynman said in his original lecture. At the end of the paragraph add the following sentence:

Since the pressure is constant while the volume is changing, the change in internal energy $U_G - U_L$ is equal to the heat put in L minus the work done $P(V_G - V_L)$, so $L = (U_G + PV_G) - (U_L + PV_L)$.

I:45-7, par 3

Introducing the latent heat for melting, M/mole, …

Typographic error ('M' vs. '*M*').

Introducing the latent heat for melting, *M*/mole, …

I:45-8, par 1

... where c is the speed of light and σ is a constant.

Incomplete information. The constant σ has a name.

... where c is the speed of light and σ is called the *Stefan-Boltzmann constant*.

I:45-8, Eq 45.17

$$\left(\frac{\partial U}{\partial V}\right)_T = 3P = T\left(\frac{\partial P}{\partial T}\right)_V - P$$

A part of Feynman's original lecture is missing here, which has created some confusion (see, for example, https://carnot.physics.buffalo.edu/archives/2007/06_2007/msg00075.html. It is therefore recommended that the following footnote be added:

In the case $\left(\frac{\partial P}{\partial V}\right)_T = 0$, because in order to keep the oscillator in equilibrium at a given temperature, the radiation in the neighborhood of the oscillator has to be the same, regardless of the volume of the box. The total quantity of photons inside the box must therefore be proportional to its volume, so the internal energy per unit volume, and thus the pressure, depends only on the temperature.

I:45-8, par 1

The pressure of radiation varies as the fourth power of the temperature, and the energy content of the radiation, $U/V = P/3$, also varies as T^4.

Incorrect statement ('energy content vs. 'total energy density') and incorrect algebra ('$U/V = P/3$' vs. '$U/V = 3P$')

The pressure of radiation varies as the fourth power of the temperature, and the total energy density of the radiation, $U/V = 3P$, also varies as T^4.

I:45-8, 2nd line of 1st unnumbered Eq

$$= \int_{\omega=0}^{\infty} \text{energy density } \omega \text{ and } \omega + d\omega$$

Missing word 'between'.

$$= \int_{\omega=0}^{\infty} \text{energy density between } \omega \text{ and } \omega + d\omega$$

I:46-1, Title

Ratchet and pawl

Needs a footnote. Since the engine is *simultaneously* in contact with resevoirs at different temperatures, it can never work in a reversible way, nor achieve the efficiency of a Carnot cycle, not even in the limit of zero power, as claimed by Feynman. There is an (unaccounted for) irreversible heat transfer from the warmer gas (in the vane box) to the cooler gas (in the ratchet and pawl box), which implies that the process is only quasistatic, not reversible. See Parrando and Espanol, Am. J. Phys **64**(9),1125 (1996).

Ratchet and pawl*

*See Parrando and Espanol, Am. J. Phys **64**(9),1125 (1996) for a critical analysis of this chapter.

I:47-7, after Eq 47.23

…, where m is the mass of a molecule aud μ is the molecular weight.

Incorrect spelling of 'and'.

…, where m is the mass of a molecule and μ is the molecular weight.

I:48-2, par 4

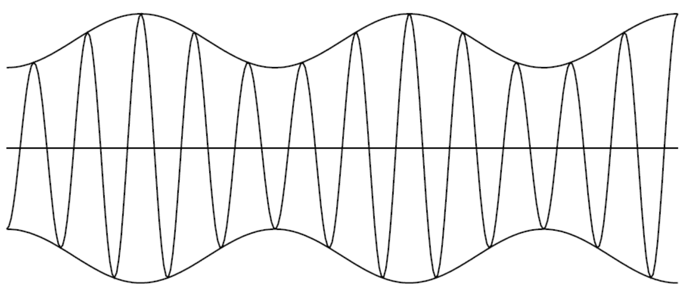
Although (48.6) says that the amplitude goes as $\cos\frac{1}{2}(\omega_1 - \omega_2)$, …

The argument of the cosine is missing the factor 't'.

Although (48.6) says that the amplitude goes as $\cos\frac{1}{2}(\omega_1 - \omega_2)t$, …

I:48-4, Fig 48- 4

According to Eq 48.9 the minima of the audio signal and the maxima of the carrier signal cannot coincide. To correct this error the figure should be mirrored on the x-axis, so it looks like this:



I:48-4, Fig 48- 5

'ω_{M}' should be 'ω_m' (two occurences)

I:48-8, par 4

Now, the square root is, after all, ω, so we could write this as c^2k/ω.

Inaccurate statement.

Now, the square root is, after all, ω/c, so we could write this as c^2k/ω.

I:48-9, Eq 48.24

$$\frac{\partial^2\phi}{\partial x^2} + \frac{\partial^2\phi}{\partial y^2} + \frac{\partial^2\phi}{\partial z^2} - \frac{1}{c^2}\frac{\partial^2\phi}{\partial t^2} = \frac{m^2c^2}{h^2}\phi. \tag{48.24}$$

Wrong constant ('h' vs. '$\hbar$', see Eq. 48.22).

$$\frac{\partial^2\phi}{\partial x^2} + \frac{\partial^2\phi}{\partial y^2} + \frac{\partial^2\phi}{\partial z^2} - \frac{1}{c^2}\frac{\partial^2\phi}{\partial t^2} = \frac{m^2c^2}{\hbar^2}\phi. \tag{48.24}$$

I:48-10, par 1

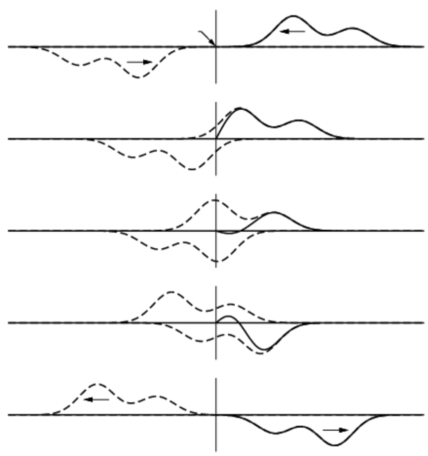
Second, it is a wave equation which, if we try a plane wave, would produce as a consequence that $-k^2+\omega^2/c^2=m^2c^2/h^2$, …

Wrong constant (‘h’ vs. ‘$\hbar$’, see Eq. 48.22).

Second, it is a wave equation which, if we try a plane wave, would produce as a consequence that $-k^2+\omega^2/c^2=m^2c^2/\hbar^2$, …

I:49-1, Fig 49-1

For consistency with the text ‘v’ should be changed to ‘c’ (two occurences) . Also, there are some inaccuracies in the waveforms (especially in the 3rd row from the top), which should look like:



I:49-4, Fig 49-4, label

$$e^{i\omega t}\left[e^{ik_xx+ik_yy}\right]$$

Sign error; inconsistent with text (see reference to Fig. 49-4 just before Eq. (49.10)) .

$$e^{i\omega t}\left[e^{-ik_xx+ik_yy}\right]$$

I:49-5, Eq 49.11b

$$\phi=\left[-4\sin k_xx\sin k_yy\right]\left[e^{i\omega t}\right]. \qquad (49.11b)$$

Sign error.

$$\phi=\left[4\sin k_xx\sin k_yy\right]\left[e^{i\omega t}\right]. \qquad (49.11b)$$

I:49-6, 2nd Eq in Eq 49.14

$$m\frac{d^2y}{dx^2} = \ldots$$

Incorrect independent variable (‘x’ vs. ‘t’).

$$m\frac{d^2y}{dt^2} = \ldots$$

I:50-6, Eq 50.18

$$a_n = \frac{2}{T}\int_0^T f(t)e^{-in\omega t}\,dt \quad (n \geq 1). \tag{50.18}$$

Missing hat (‘a_n’ vs. ‘$\hat{a}_n$’).

$$\hat{a}_n = \frac{2}{T}\int_0^T f(t)e^{-in\omega t}\,dt \quad (n \geq 1). \tag{50.18}$$

I:50-7, Fig 50-3, caption

… for 0 < t < t/2,

Incorrect capitalization (‘t/2’ vs. ‘T/2’).

… for 0 < t < T/2,

I:50-8, par 1

In a similar way, by first obtaining the Fourier series for the function and using the energy theorem,…

Missing function.

In a similar way, by first obtaining the Fourier series for the function $f(t) = (t - T/2)^2$ and using the energy theorem,…

I:50-8, par 3

From the equality $\cos^2\theta = ½(1 - \cos 2\theta)$, we have …

Sign error.

From the equality $\cos^2\theta = ½(1 + \cos 2\theta)$, we have …

I:50-8, Eq 50.27

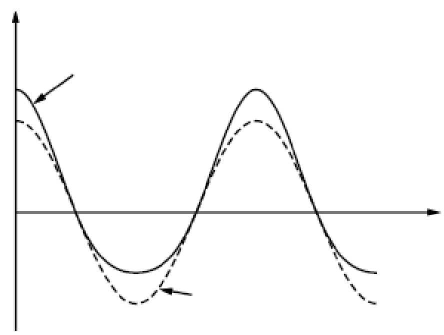
$$x_{\text{out}}(t) = K\left(\cos\omega t + \frac{\varepsilon}{2} - \frac{\varepsilon}{2}\cos 2\omega t\right). \tag{50.27}$$

Sign error (see error I:50-8, par 3).

$$x_{\text{out}}(t) = K\left(\cos\omega t + \frac{\varepsilon}{2} + \frac{\varepsilon}{2}\cos 2\omega t\right). \tag{50.27}$$

I:50-8, Fig 50.5

It's hard to see the described flattening at the bottom of the non-linear response curve – should look more like this:



I:50-9, Eq 50.28

$$\chi_{\text{out}} = \ldots$$

Typographic error ('χ' vs. 'x'):

$$x_{\text{out}} = \ldots$$

I:50-9, below Eq 50.31

We say that the amplitude of $\cos\omega_1$ is modulated …

The argument of the cosine is missing the factor 't'.

We say that the amplitude of $\cos\omega_1 t$ is modulated …

I:51-1, Fig 51-1, caption

… and half-angle $\theta = \sin^{-1} v / c_w$

Fraction is inverted ('v / c_w' vs. 'c_w / v').

… and half-angle $\theta = \sin^{-1} c_w / v$

I:51-2, par 1

This light is sometimes called Çerenkov radiation, because it was first observed by Çerenkov.

Misspelled name. Cherenkov is written with a cedille below the C. It should either have a hacek (caron) above the C or it should be spelled Cherenkov. ('Çerenkov' vs. 'Cherenkov' – two occurences)

This light is sometimes called Cherenkov radiation, because it was first observed by Cherenkov.

I:51-8, Fig 51-11

The velocity curve seems to end at a final value for $\lambda = 0$; actually it should go to infinity. Tthe y-axis label should be changed from V to v_{phase} for consistency with the text. Also, instead of sepating the axis label from its units with a comma, it would be better to enclose the units in parentheses.

I:52-3, par 4

… coriolis forces …

Incorrect capitalization

… Coriolis forces …