# *Physics' One Slippy & Two Goofies*

# *On*

# *The Very Fundamental*

## *(That Have Prevailed Until Now)*

**by**

**K.C. Wong**

**With a friendly introduction to Calculus that you absolutely can understand and follow.**

Here, in just several tens of pages you are taken from Grade school to Graduate School, and beyond. In very readable layman's language, frontiers-pushing Physics are being talked; the whatnot that previously could only be got but not taught. Not only that, deciphered are the plenty many "mysteries" that generations of physicists and billions of dollars/euros of investments have endeavored to unlock. Just turn the pages with your own mind to see if there is even a slight exaggeration.

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This book is an investment that you want to keep, self-enrich with, then pass on.

Norah & Paul,

You might not have known, your unwavering support and understanding have enabled me to turn my “lost” decade into a sustained journey of discovery that forged extra edges out of me, ones that I never was even aware of having, let alone thought possible to cut with such.

Gin,

Thank you for your substantial support once upon a time;
that is how I choose to remember you.

K.C.

# Content

# Prologue

**The Slip: Elementary particles** are not single-polarly-charged; they are **all bi-polar**. Ergo, Electrons are not (just) negatively charged; while, protons are not (just) positively charged. They all embody both the ying and yang, both the negative and positive charges, inside one same elementary entity. Hence, there is **no need** for the made-up "**Neutrons**" or the likes to "balance the books"; nor is there the need to construe any spooky "**anti-particles**" such as the "Positrons" to wonder. T.D. Lee and C.N. Yang (Nobel Laureates, 1957) mathematically proved that the physical world is not totally and purely symmetric (**Parity in Weak Interaction being violated**); nature does have a preference for "Positive Helix": for an Electron to (self) spin and orbit (around the nucleus) in one same direction. Such was experimentally proven by C.S. Wu and her associates shortly afterwards. With the realization that elementary particles are bipolarly charged, I shall **decipher and explain** how Mother Nature's said preference comes about, and (much) more . . .

**First Goof**: "**FORCE**", **F**, should have been defined as Mass, **m**, multiplied by Velocity, **v**, ( i.e. $\mathbf{F} = \mathbf{mv}$); but **not** as Mass, **m**, multiplied by Acceleration, **a**, (i.e. $\mathbf{F} \neq \mathbf{ma}$), as per the Newtonians. This **redefinition** leads to a most general formula that **embraces** the Newtonians' $\mathbf{F} = \mathbf{ma}$ as a special case at one end of the spectrum and the Einsteinites' $\mathbf{E} = \mathbf{mc^2}$ as another special case at the other end while accounting for all the Quark Particles generated from high energy laboratories as in-betweens.

"$\mathbf{F} = \mathbf{ma}$", rather, should have been regarded as a special/restricted case of Gravity, **G**, (or the severity) of a force ( i.e. the change of a Force with respect to, w.r.t., time, **t**); ergo, $\mathbf{G} = \mathbf{dF/dt} = \mathbf{d(mv)/dt}$, where "**d**" stands for Calculus' "to differentiate". This makes more than a mere semantic difference; the logical conclusion is that "**Gravity**" a la Newton (why apples/raindrops keep falling on his/my head) is **not** due to any "**fundamental force"** of nature at all ! ! !

Let mass, **m**, be changeable whose state is a function of distance, **x**, i.e., **m(x)**, I shall point out how, from **F=mv**, the Newtonians' **Force =ma** and the Einsteinites' **Energy =mc²** can both be embraced and derived. Furthermore, I shall also derive, basically, from **F=mv** :

$$F_x - d(F_{x'})/dt = 0$$

(where $F_x$ denotes **F** being differentiated w.r.t. Distance, **x**; and, **x'** denotes **dx/dt**, or velocity)

Readers of advanced mechanics, physical sciences, engineering, management science, mathematics, economics, and certain social sciences, etc. will recognize this as the Euler-Lagrange equation in the Calculus of Variations, the foundation for optimality.

Let the said mass be that of a particle that can change/pulverize over time/distance; now, **Classical Mechanics** is **unified** with **Quantum Mechanics**.

I shall shed light on the **Uncertainty Principle** of Quantum Mechanics with this seemingly unrelated mathematical derivation. Also, with this reformulation/reconceptualization of "Force", let us see if "gravity" as pondered by Newton can be quantified to realize "**Quantum Gravity**".

**Second Goof**: **Light** does **not** propagate at a **constant speed**; rather, light propagates at a **constant acceleration**, proven herein with newly, originally derived, re-construed equations. Maxwell's triumphant unification of electricity with magnetism has engendered the overly simplified:

$$C = \frac{1}{(\mu_o \epsilon_o)^{1/2}}$$

Had he heeded his own advice: "Simplify things to not that simple.", re-write the above as:

$$\mathbf{C \times C = C^2} = \frac{1}{\mu_o \epsilon_o}$$

Einstein should have realized that the propagation of light, which is definitely an electromagnetic phenomenon, per Maxwell's derivation, should have been construed as an **ACCELERATION** [a Speed, **C**, (being) multiplied (by its own)]. The logical conclusion should of course be that **constant acceleration** (not any "Relativistic" observation made by an apocryphal third party observer made known by means of only god knows how to a system concerned to be physically enacted upon) **leads to infinity** (if given enough embedded energy); and of course, if an electromagnetic wave can be accelerated, it can equally well be decelerated, and hence eternal constancy in a light beam's propagation is a fallacy.

Indeed, striped of all the technicalities, Maxwell's mathematical statement is a simple well-known fact: an electromagnetic wave's propagation (which should have been regarded as an acceleration) is inversely proportional to, or, being inversely hindered by, the existences of (1) resistance in the flow of electricity, $\epsilon_o$ , which is more generally known as the "permitivity" of electron flow, and (2) resistance due to the presence of (opposing) magnetism, $\mu_o$ ,which is more generally known as the "permeability" of magnetism.

By the mere fact that light accelerates, the "wonder" why (a) light (beam), perceived as being propagated at the same "speed" in every, even in the opposing, direction, can now be easily, logically, and physically explained, and mathematically proven with Calculus. It also answers the question: **why the sky is (mostly) dark**, if lights keep on coming from all directions at a constant speed, incessantly?

Still seeking the holy grail, the **Grand Unification Theory**, to unify the Strong Force, Weak Force, Electromagnetic Force, and the Force of Gravity? It is right under your nose! The Strong Force that binds particles (now that they are all bi-polar) is just the well known magnetic force which is strong but only effective at a very close distance; while, the Weak Force that leads to electronic decay is due to the lack of synchronization of magnetic forces: a circulating Bitron's (known as Electron/Positron hitherto) "facing" polarity does not sync up with that of the "faced side" of its Biclusteron (a clustering of Bitrons known as Proton hitherto) the former is orbiting around. Last, but certainly not the least, is the fact that Gravity, a la Newtonians, is no fundamental force at all; it is just the consequence of a mass' movement that the normal Force/ Momentum equations/characterizations can accommodate.

Interested? Please read on to see how my claims are substantiated (and what, much, more I have to say), with substantial originally derived (absolutely new, to the best of my knowledge) equations that deliver results totally consistent with the well known facts, and that dispel a number of myths in Physics, and that can make clear certain nebulous hitherto. The said equations are made with the use of just some simple "Differential Calculus". Even without any inkling in Calculus, for the following text is long in explanation written totally with highly readable words for the laymen, one should be able to enjoy the whatnot that could only be got but not taught to this very day to even the ones educated to the graduate school level.

Note that my purpose here is to present my original findings/ thinkings. As is, it is already quite lengthy. So, please pardon me for not elaborate on certain what I regard as well known facts to those who are interested in the field. Should you need further clarifications, a Web search with the key words should produce some readable first references.

# Appendix I : A Friendly Introduction to Calculus

Need some hand-holdings to understand (some of) the above-stated equations? Is Calculus, a.k.a. "Advanced Mathematics", not your cup of tea? If you know how to chop up an onion into rings, you are more than capable of grasping Calculus' fundamental. Without any more ado, let us begin the journey of thousand days (should you be willing to press on afterwards) with a single easy step.

Like a coin, Calculus is made up of two sides: "Differentiation" and "Integration". Differentiation is to differentiate, or better be understood as to divvy up an object, infinitesimally, so as to arrive at manageable "derivatives". Integration is just the oppose act of Differentiation: it is to integrate or to sum the derivatives back into a whole, with the result known, unceremoniously, as an “anti-derivative”.

Suppose you have an onion which is a perfect sphere, with just one, the outer-most, (infinitesimally thin) layer. How can you find out the surface area of this perfectly-sphered onion? So you chop up the said onion vertically into rings. Severe an onion ring across its narrow band, there you have a strip of onion in front of you. The area of such a strip (not a perfect oblong object due to the ring's curvature) could then be approximated by a rectangle (length X width). Severe and approximate the rest, altogether, there you have a pretty good estimate of the interested onion's surface area. The accuracy of the approximations should improve if you chop up the onion into more and narrower rings. The completely accurate calculation should come when you “take it to the limit” by chopping the onion into an extremely large number (limitless) of infinitesimally narrow rings. That is the significance of the "take it to the limit" concept in Calculus and the essence of Differentiation.

Now let us walk the talk. Mathematically, how do you slice the perfectly-sphered onion infinitesimally; ergo, how does Differentiation work? Suppose you want to differentiate a variable r, as in radius, whose power/exponent is 2 as in:

$$r^2$$

Firstly, just simply multiply the variable, r, by the value of its exponent, 2, to get 2r ( . . . not the final answer yet). Then, subtract the exponent's value by 1 (2 - 1) to finally arrive at:

$$2r^{2-1} = 2r^1 = 2r$$

More generally, the power/exponent of a variable could be any, n. Then to differentiate:

$$r^n$$

Simply multiply r by n and subtract 1 from its exponent to get:

$$nr^{n-1}$$

The size/volume of a (perfect) sphere is to be calculated by

$$V= (4/3)\pi r^3$$

Here, $\pi$ is a constant/fixed number (whose value is 3.1416. . .), just as much as 4/3. The radius, r, is the variable, to be differentiated. Apply the illustrated differentiation method to chop up the perfectly-sphered onion:

Firstly, multiply the variable, r, by the value of its exponent, 3, to get

3r (. . . not yet finished)

thence subtract 1 from its exponent 3 to arrive at

$$3r^{3-1} = 3r^2$$

Now don't forget to multiply back the numbers 4/3 and $\pi$:

$$((4/3)\pi)3r^2 = 4\pi r^2$$

Which is the exact formulae for calculating the surface area of a sphere.

In Calculus notation, we want to differentiate, d, a volume, V, with respect to, w.r.t, its radius, r :

$$dV/dr = d((4/3)\pi r^3)/dr = 4\pi r^2$$

And the result of the act of differentiation: $4\pi r^2$ is known as the derivative. Since it is the result of performing differentiation on V the first time around, it is referred to as the first derivative. In general, the first derivative signifies how the dependent variable (V here in this case) changes with respect to the independent variable (r here in this case). Hence, the first derivative specifies the rate of change of the dependent variable upon a unit change in the independent variable. Here, the finding says the rate of change of (not the absolute change in) a sphere's Volume with respect to the sphere's (unit) change in its radius is given by the sphere's (change in ) surface area, or the (change in the number of, "onion") rings: lengthening the radius by a unit to add one more "unit-fied" ring would enlarge the volume proportionally, and at that rate.

It is now about time to bring the other side of the Calculus: Integration into the picture. Integration is symbolize by ∫ ; it is a shorthand order to sum/ add up. The integration symbol ∫ differs from the summation symbol ∑ in "continuity". As Calculus deals with infinitesimal number of units (just as much as a line is made up of an infinitesimal number of points), any Calculus' operations, integration in particular, is continuous in nature. Whereas, summation adds up unities, such as integers, which are discreet, non-continuous, in nature.

Simply stated, to integrate is just to continuously sum up the infinitessimals concerned from one end to another. Line up and string back all the sliced up rings, there you have your onion back. Slip in more (proportionally sized) rings (made possible by lengthening the radius concerned), you enlarge your onion/sphere accordingly, as being discoursed above.

As Integration is just diametric to Differentiation, to integrate, you just reverse the steps you do to differentiate. To illustrate the essence, let us just to integrate simply 2r (a derivative, arrived at, hitherto), ergo,

$\int 2r\,dr$ (here dr is to denote that integration is to be w.r.t. the variable r)

Firstly, you add 1 back to the variable's exponent or power ($r = r^1$ to begin with):

$r^{1+1} = r^2$ (not yet done . . . )

Then divide the variable cum its reconstituted power by the added-back exponent (now is 2) :

$(r^2) / 2$

Now do not forget to multiply the given number 2, as in the given 2r, to begin with, to finally arrive at:

$(2)(r^2) / 2 = r^2$

Which is, of course, exactly the same old expression first used to illustrate differentiation as stated above.

In general, a variable could have been exponentiated to any, n, power, as in:

$$r^n$$

To integrate such an expression, first of all, add 1 to its exponent n:

$$r^{n+1} \qquad \text{( not done as yet . . . )}$$

Then divide the expression by the now added-up exponent, n + 1, to arrive at:

$$r^{n+1} / (n + 1)$$

In Calculus' notation:

$$\int r^n \, dr = r^{n+1} / (n + 1)$$

To illustrate in particular, to integrate the derivative of a sphere, its area, as found hitherto:

$$\int 4\pi r^2 \, dr = 4\pi r^{2+1} / (2 + 1) = (4/3)\pi r^3$$

Which is of course the formulae for a sphere, as it should be. As there is a derivative generated as the result of differentiation, the result of an integration $(4/3)\pi r^3$ is just being called, unceremoniously, as the anti-derivative.