The Scaling Operator (%) in the Time-Independent Schrődinger Wave Equation

by

Douglass A. White, Ph.D.

Giandinoto has derived a formula that relates e, pi, phi, c, time and recursive wavelengths to the state functions of the time-independent Schroedinger Wave Equation. (See his paper referenced on the home page of Dr. White's Website.) In this brief article I first demonstrate the relation between phi and (%). Then I explore the role of Planck's constant in the wave equation discussed by Giandinoto and the appearance of another key constant (%) = 3.16227766.... m in a close relation to Planck's constant as part of the Fundamental Quantum Factor (ħ c). Then I consider how energy and space interact with this Funcamental Quantum Factor to produce observable phenomena. Finally I briefly consider the problem of resolution and the relationship of the known to the unknown.

Giandinoto derives the following equation.

* $\Psi_n (x,t) = \psi_n (x)\, e$^(-2 $\pi\, i\, c\, t$ / Φ^2 λ_{n+2})

White's Scaling Operator (%) relates to phi in the following manner.

$\underline{\%} = \sqrt{2}\,(2\Phi - 1)$ [($\underline{\%}$) = (% / b); (b) = 1 m; (%) = 3.16227766... m]

$\underline{\%} = \sqrt{2}\,(\varphi + \Phi)$

$\varphi + \Phi = (\underline{\%} / \sqrt{2})$

$\varphi = (2\sqrt{2}) / (\sqrt{2} + \underline{\%})$

$\Phi = (\sqrt{2} + \underline{\%}) / (2\sqrt{2})$

Φ^2 = $(3\sqrt{2} + \underline{\%}) / (2\sqrt{2})$

White's Scaling Operator (%) relates to the Time Independent Wave Equation in the following manner.

We notice that (ct / λ_{n+2}) is a pure number ratio of two displacements just like (% / b). Going back into Giandinoto's derivation we find he explores time-independent wave functions where there is a single subatomic particle, and he treats its motion in one dimension x such that the potential energy is then a function of x only. He looks at a simple formula:

* $\Psi_n (x,t) = \psi_n (x)\, e$^ $-iEt / \hbar$

He then substitutes for E the Einstein / de Broglie identity for energy:

* $E = 2 \pi \hbar c / \lambda$

He obtains:

* $\Psi_n (x,t) = \psi_n (x)$ e^ -i 2 π ħ c t / λ_n ħ

He then cancels Planck's constant and proceeds to consider n-recursive wave functions where $n = 1, 2, 3, ...\infty$.

Dr. White notes that

* ħ c = % @ (Where @ is 10^-26 J = (b / %)^52 J, and J = 1 J)

Substituting (%@) instead of the (ħ c) component into Giandinoto's substitution rather than canceling the h-bars gives

* $\Psi_n (x,t) = \psi_n (x)$ e^(-2 i π % @ t / ħ λ_n)

Using the expression for infinitely recursive wavelengths in terms of phi that he derives at the beginning of his paper ($\lambda_n = \Phi$^2 λ_{n+2}), Giandinoto obtains an outcome of

* $\Psi_n (x,t) / \psi_n (x)$ = e^(-2 i π % @ t / ħ Φ^2 λ_{n+2}).

Here I have retained my substitution while plugging in Giandinoto's derived phi value.

We want to find a constant value for @ = 10^-26 Joules that justifies using it here in this way. Otherwise it looks arbitrary. We note that

* ([π **e**]^2 / ε_o b) = 2.861355x10^-26 J.

Here we write the quantum charge unit as (**e**) to distinguish it from the natural log number (e) that we also must use in the paper. Multiplying this whole expression by (π / 9) takes it to 0.9988x10^-26 J. The factor (1/9) can be expressed purely in terms of constant ratios in geometry: (Ss / As b)^2, where (Ss) is the volume of a unit sphere and (As) is the area of the same sphere, and (b) is its radius set at one meter so that the spheres have meaning in physical space. In a moment we will arrive at a justification for choosing 1 meter for our unit radius.

* ([π **e**]^2 / ε_o b) (π) (Ss / As b)^2 = @ = 10^-26 J.

We reorganize a bit and then take it back to our original Fundamental Quantum Factor (FQF) relation: (ħ c = % @).

* (π / ε_o b) (π **e** Ss / As b)^2 = @ = 10^-26 J. Thus,
* (π % / ε_o b) (π **e** Ss / As b)^2 = ħ c. Then we prepare it for our exponent:
* (π % / c ε_o b) (π **e** Ss / As b)^2 = ħ.

This expression tells us a lot about the nature of h-bar and its cozy relation to c. We discover that it is basically the relation between two interacting quantum charges and the permittivity of the vacuum. Light speed mediates it with the geometry of physical space in which (%) and (b) play fundamental roles. Note the relationship here to the fine structure constant: $\alpha = e^2 / (4\pi\varepsilon_o \hbar c)$. The whole expression boils down to $[(\pi^2)(2/3)]^2 (\% / b)\, \alpha = 1$.

Furthermore,

* $Mp = \mathbf{e}\, \% / c = 1.69001151062 \times 10^{-27}$ kg
* $Mp = \pi\, b\, \mathbf{e} / c = 1.67895685233 \times 10^{-27}$ kg (This is even closer.)

Experiment gives $1.67262171 \times 10^{-27}$ kg, but this is close enough for now. (See notes at end of paper.) Thus we can go back and rewrite our exponent using our derived values for (Mp) and ($\hbar$). We'll start with the first Mp value.

We first substitute ($h\, c / \lambda$) for the energy (E), and then substitute our value for h-bar in relation to it (we will handle the level of precision issue later):

* $-iEt / \hbar = (-i\, \pi\, \varepsilon_o\, h\, \%\, b)\, (As\, b / \pi^2\, Mp\, Ss)^2\, (t / \lambda)$.

Then we can insert Giandinoto's phi-findings and the exponent into the whole wave equation.

* $\Psi_n(x,t) / \psi_n(x) = e^{[(-\, i\, \pi\, \varepsilon_o\, h\, \%\, b)\, (As\, b / \pi^2\, \Phi\, Mp\, Ss)^2\, (t / \lambda_{n+2})]}$

This version shows phi and also includes (%) and (b). It tells us a lot about Planck's constant and how particles seem to arise from waves of energy. $(As\, b / Ss)^2 = 9$.

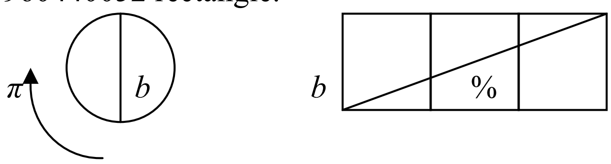
* $\Psi_n(x,t) / \psi_n(x) = e^{[(-9\, i\, \varepsilon_o\, h\, \%\, b / \pi^3\, Mp^2\, \Phi^2)\, (t / \lambda_{n+2})]}$

There is a slight discrepancy between the two exponents.

* $2\, \pi\, c = 1.88365156725 \times 10^9$ m/s
* $(\pi\, \varepsilon_o\, h\, \%\, b)\, (As\, b / \pi^2\, Mp\, Ss)^2 = 1.91956359769 \times 10^9$ m/s

The mass of the proton varies according to its conditions. Measurements vary according to the methods and instruments used. Thus we always have a fudge factor. Generally if we can come within .01 of the ratio we are studying we are close enough for most purposes. Ultimately an uncertainty creeps in.

The pure number Scaling Operator Ratio (SOR) (%) and pi are so close that they tend to interact a lot. The scaling operator is the diagonal of a 1x3 square. Pi is the ratio of a circle's circumference to its diameter. They are analogous ratios, one as a straight line and the other as a curve. They may be the closest these two modalities come to meeting. Diagonals of shorter rectangles approach (b) as a limit, and longer diagonals approach the rectangle's long side as a limit. So (%) is something like the real world Fibonacci for phi. You can make a pi rectangle, but it is irrational. It has a length of 8.86960440052.... meters. You can not make an integer number of squares from a 1x8.86960440052 rectangle.



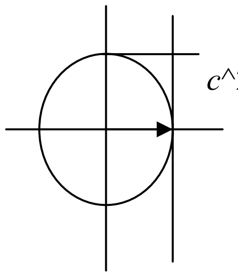
If we substitute $(\pi b)^2$ for %^2 in our expression above, we get

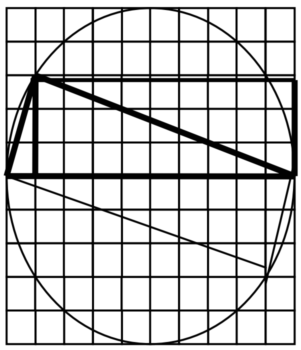
* $(\varepsilon_o h b / \pi \%) (As b^2 / Mp Ss)^2 = 1.89977534644\times10^9$ m/s

We are now within .01 of 1.88....., and we have not made any essential changes to the expression. It is still in terms of the same constants. Using a series of powers and roots of $(\% / \pi b)^n$, where n can be any appropriate integer we can adjust a result to within any tolerance we like with no change to the basic relationship we are looking at. How this happens in the physical world is an extremely interesting subject and involves the study of fractals, chaos theory, probability, the uncertainty principle, number theory, phi, *e*, heterodyning, phase matching and interference, and so on. How it occurs in the human mind is a subject concerned with psychology, physiology, consciousness, meditation, metaphysics, creativity, mortality, and so on.

Going back to Giandinoto's original equation, notice that the component $(2 \pi c)$ in the exponent is faster than the speed of light by the factor of two times pi, which is one loop around the photon's path of oscillation times how far the photon travels in space within a second of time. There is a natural tension between h-bar and *c*. Light speed is the kinetic urge to stretch out and make an unbounded space. H-bar is the gravitational urge to hold tight in a little ball. The result of this opposing tension is that photons form little impulses that move at light speed, but must oscillate as they go. It is a win-win situation. H-bar wins, and *c* also wins. The energy in the spring is the frequency of the oscillation. When the energy is weak, h-bar relaxes its grip and the spring stretches out with longer wavelengths and slower frequency. When the energy is high, h-bar tightens its grip. The wavelengths shrink and the frequency increases. Neither the speed nor the ball grip changes. What we get instead is the apparent relative motion of the terminals stretching or squeezing the spring. This was Einstein's insight into special relativity.

From his insight combined with that of de Broglie comes the Great Velocity Equation (GVE) in which light seems to bifurcate into a matter wave and a phase wave. The null photon has a frequency of zero and an infinite wavelength. You will never see such a photon, because it has no energy. As soon as some energy gets packed into the photon, it gets a frequency due to its oscillating tension with h-bar. Photons with zero frequency are in pure space. The forward motion of an unobservable "vacuum" photon is *c* and the oscillating motion is *c*. It creates a Cartesian grid of c^2. As soon as a photon starts to oscillate, the oscillating path increases beyond *c*. In other words, when the observable photon goes 3×10^8 meters in a second, that is its "matter" velocity. But the photon actually travels much farther due to the oscillations. This is its "phase" velocity which is always faster than c in observable photons. The more energy the photon has, the faster the phase velocity goes, but the matter velocity is always *c*. The phase velocity can not actually go infinitely fast because it is tied to the energy that is in the frequency. The total mass energy of the universe compressed into a tiny ball is its upper limit. When the photon reaches the energy level where it starts self-interacting, it forms a particle. A "particle" is a photon passing through a wave guide condition. It then appears to slow down and go at less than *c*. The wave guide can be self-created or due to interaction with other phenomena. It seems that there is always an orthogonal relation between the matter wave and the phase wave when photons enter particle mode, and the two wave types then interact with respect to *c* with the velocity equation relation. The product of the two equals the dimensions of the "Cartesian grid" of the null photon in pure space. The matter wave is the overall trajectory of the photon as it progresses through space (e.g., the *x*-axis). The phase wave is the wave front as it interacts with other physical objects or photons (e.g., the *y*-axis). The two are essentially orthogonal.





(3) / (1) = (3.162) / (1.054)

* Vq Vp = c^2. (Vq is the matter velocity, and Vp is the phase velocity.)

The units of this relation are arbitrary. They can represent distance, energy, speed, time, so long as all the units are the same. If the units differ, the relationship gets more complex but still holds. For example the Fundamental Quantum Factor ($\hbar$ *c*) sets up the same relation with (%), but the components have different dimensional units. The lines in the right triangles above that have the GVE ratio represent the matter velocity with the shorter line and the phase velocity with the longer line relative to the intermediate line that represents light speed. If you cut the tilted rectangle in half with a diameter you get scaled down versions of the triangles with the same ratios.

* $(\hbar c) = (\%) (@)$

The lines in the above grid drawing are also set up according to the FQF relation so you can study how the fractal structure works visually.

The factor (@) represents the energy portion. We can deplete or increment the energy portion simply by including some set of powers or roots of a factor $(\% / b)^n$ where n is an integer. The energy then shifts with a corresponding change in frequency and wavelength, but the fundamental relation ($\hbar c$) remains unchanged. The property can then change. For example, ($\hbar c / \%$) is energy, ($\hbar / c \%$) is mass.

Of course you can say, well, why not just plug in any number? That is the old Quantum Uncertainty Principle. The new principle says that you can not do that because (%) and (b) are constants of physical space that are grounded in the fundamental particles that occupy that physical space at a certain resolution. You can slide up and down the scale all you want, but you must use the metric of the scale and there are limits to how far you can go in either direction. Study these relations.

* $Mp = \pi e b / c = e \% / c.$ (approximately equivalent as noted above)

* $(\pi \% / \varepsilon_o b) (\pi e Ss / As b)^2 = \hbar c$

From here on (e) is the charge quantum since we are not doing any more exponential type wave functions in this part of the article. Every other component of these expressions is a constant. Thus (%) and (b) must also be constant. The relationship among pi, b, and % is fundamental to all of mathematics and physics. It also has a deep connection to the phi ratio and its “real world” event mechanism, the Fibonacci relation.

Generally speaking an Observer is free to set the level of resolution of his observation procedure. However, at certain levels of precision he always encounters a region of uncertainty. This situation is compounded by the inversion of certainty that occurs in the crossover between the mental mathematical world and the physical material world. Specific events can be given precise numbers, but the outcomes can not be predicted except within a range of probability. The observer gains continuity in his mind only by arbitrarily “leaping” over chunks of unknown. You can feel a field, but you can not know it precisely. We know intuitively that reality is a continuum, but the mind can not grasp that intellectually because the mind thinks only in thoughts and thoughts are quantum impulses. That is how we distinguish one thought from another. The paradox is that if you directly experience continuity (wholeness), then you are not thinking. Wholeness is an unknown something else. A thought is knowledge of a part from a viewpoint. Continuity is an undefined phenomenon. The occurrence of uncertainty is due to contact with undefined fields or gaps or unknowns, whatever you want to call them. Exploration is the exciting adventure of hazarding out into these unknowns to see what happens if you do this or that.

The principle of the unknown derives from an Observer defining a viewpoint. That becomes what is known. Anything else is unknown. Thus we create what we know and what we do not know by our choices. The funny thing is that the observer's viewpoint (what he knows) is NOT the observer but only his viewpoint. The undefined field of the unknown is much closer to who the Observer really is. That is why it is so hard to see yourself and we invent all sorts of mirrors. We generally see others better than we see ourselves. Real science involves a willingness to get honest and sort out what is known and what is unknown. Then you come to the adventure of finding out who you really are and what you are doing here with the viewpoint you currently hold.

A technique for adjusting precision

In any measurement we must define our level of precision by our measurement standard and the tools we choose to use and within the resolution limits imposed by the uncertainty principle on conjugate properties.

Consider the example of the "proton rest mass".

* $Mp = e \% / c =$ 1.690011510x10^-27 kg

* $Mp = \pi\, b\, e / c =$ 1.678956852x10^-27 kg

We can choose to measure it under various laboratory conditions or we can choose to describe it theoretically in terms of various invariant relationships. The proton's rest mass is basically the relation between the charge quantum and light speed within a spatial displacement. Let's start with the first version.

Dividing by the factor $(\% / \pi\, b)$ gives 1.678956852x10^-27 kg $(\pi\, b\, e / c)$.

Dividing also by $\sqrt{(\% / \pi\, b)}$ gives 1.673456669x10^-27 kg

This second result is just under half way between the proton and the neutron.

Mp = 1.67262171.....x10^-27 kg

Mn = 1.67492729.....x10^-27 kg

The proton is more stable than the neutron and thus dominates the universe

statistically.
The average mass is probably closer to 1.6730828x10^-27 kg.
Dividing by the square root of the %-to-pi ratio brings it down almost to this average: 1.67345661x10^-27 kg. To bring it closer to that average we have to use the 6th iterated square root. At this point we really just have to decide what the target is, given the variety of possible conditions. For most purposes 1.67x10^-27 kg is accurate enough.

A Final Note on (*ħ c*) and the Fine Structure Constant Related to (% / *b*)

* $\hbar c = (e^2 / 4 \pi \varepsilon_o \alpha) = (\pi^3 \% e^2 / 9 \varepsilon_o b)$
* $(1 / 4 \alpha) = (\pi^4 \% / 9 b)$
* $(3/2)^2 = (\alpha \pi^4 \% / b)$
* $(3/2)^2 = (\alpha \pi^4 \underline{\%})$

The (3/2) is the relation (*Oo* *b*^2 / Ss), or very generally: the circumference of a unit sphere (*Oo*) times its radius squared (*b*^2) divided by its volume (*Ss*).

This suggests that the mysterious Fine Structure Constant may represent the relationship between pi, %, and b in a setting of spherical geometry. Perhaps what we see here is the interaction of Newtonian-Cartesian-Euclidean space time with Einsteinian-Bohrian-Wheelerian space time, an integration of rigid grids and bubbly quantum foam.

References

Giandinoto, Salvatore. "Incorporation of the Golden Ratio Phi into the Schrodinger Wave Function Using the Phi Recursive Heterodyning Set." St. Louis, MO: Advanced Laser Quantum Dynamics Research Institute, 2007.

White, Douglass. **Observer Physics: a New Paradigm.** (Essays on Topics in Modern Physics and Mathematics.) Yung-ho, Taiwan: DeltaPoint, 2003. See Dr. White's Website for this work and many more articles: www.dpedtech.com. Dr. Giandinoto's article also is accessible from Dr. White's Website.