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Review Article

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Explaining Why Light Slows in Glass

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1. Introduction

As I write, it is passing 111 years since Albert Einstein unwittingly explained why light slows in glass and yet today this is still thought to be a mystery. Once one knows the refractive index of a particular sample of glass from measurements of it, all of classical wave optics can be enumerated and explained. This is hypnotically convincing but what is not explained is why light appears to slow in glass in the first place, it just does that but we don't know why. This ignorance is so unnecessary and so wanton that, once one does understand it, it becomes almost impossible to understand the mind-blindness of the most recent 111 years.

In this paper I will do my best to explain this without resorting to any needless extravagance in the way of over-complex mathematics and unintelligible or abstract formulas.

2. First, We Need A Better Understanding of Gravity

Gravity is a field effect that compresses the scale of any space and time that exists within the gravitational field. The only difference between Newton's classical treatment of gravity and the treatment under the General Theory of Relativity is that with the classics we simply ignore the space-time scale compression effect, not only because from most practical points of view it is utterly trivial, but also because it was not understood or expected prior to 1915. The gravitational force field is the first spatial derivative of the scale compression function. One cannot say that the force field and the scale compression field are independent or that one causes the other because both are merely symptoms of the overall gravitational field's existence. The relationship between these two symptoms of any gravitational field is very simple. The time and space scale compression field is the integral of the force field and the force field is the derivative of the scale compression field. In order to analyse this situation we must use natural exponential (or natural ratio-metric) arithmetic.

This turns out to be a bit of a problem for most people because the entire global mathematical industry exists in wanton ignorance and denial of even the very existence of the exponential numerical domain. This is very silly because exponential numbers were first described and employed by John Napier about 430 years ago. It is just that as Napier was working within a neurolinguistic vacuum, he assigned the name logarithms to his new exponential numbers. The kindergarten numbers that we all know and understand are the anti-logarithm of the underlying exponential ratios. We are to consider here the natural effect of gravity and so we must use no human enumerated exponential base number but the well-known natural constant e. So, it is very simple, let there be a natural exponential number y and the equivalent kindergarten number x. Napier showed that $x = e^y$ and that $y = \ln(x)$. You say "one" to which my answer must be "one-what?" We may not pick any arbitrary human-designated unit for one because while all of those units do relate to each other, it turns out that because of what Einstein explained about gravity in 1915, we know only of the local ratio-metric or exponential properties of them but as to any absolute values, no such values exist; therefore any naive kindergarten counting of those squashy and undefined units must fail.

Given a separation of r within a gravitational field, we know from Newton that the relative gravitational field strength is proportional to $1/r^2$, where r is the range from the centre of the source of the field. This is only a valid approximation where r is very large, but the radius of the Earth, for instance, is very large. We must now move r into the exponential numerical domain and whenever r is stated in the natural exponential form I will refer to it as r'. Please note that $1/r^2$ becomes -2r'. Or more concisely, $1/r^2$ and -2r' mean the same thing, but $1/r^2$ is grossly misbehaved because of the vast scale variance as r becomes very small. We can then state the obvious, namely that:

$$1/r^2 = e^{(-2r')}$$

There is no highfalutin gravitational mathematics here, all I have done so far is to transpose Newtonian numeral language into the natural exponential numerical domain. We can reason that the space and time scale compression field is the integral of the force field. So we can also reason that e^(-2r'), that is the force field,

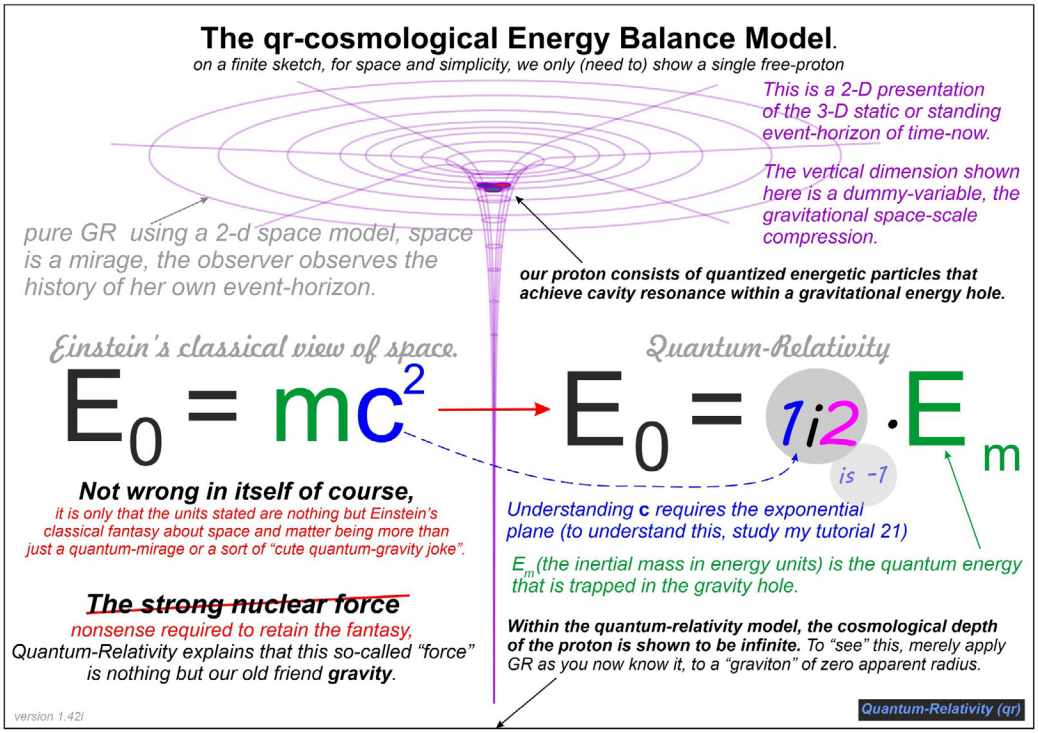
is the same as the space-time scale compression field because Leonard Euler showed us about 300 years ago that e^x is always the same, no matter how often we differentiate it with respect to x or form its integral with respect to x (Hint; let x = -2r')!

3. What is Matter and Why does it form a Gravitational Field?

We are now delving into a subject that I call quantum-relativity (qr). Within this subject we become forced to acknowledge that there is no space-time continuum, everything that happens occurs at the event-horizon of time-now. This is an absolute sudden discontinuity in the fabric of space and time, what happened moves into the past and the future lies perpetually beyond the event-horizon of time-now formed at the ever present instant.

The relationship between space and historic depth is always a constant, you call that constant c or *"the speed of light"*. However, converting back from the exponential form, the relationship simply becomes -1/1.i1 where the 1.i1 refers one times a polarity rotation of one quadrant. The speed of light is -1/1.i1. The expression -1/1.i1 means one unit of historic spatial depth per unit of imaginary history passed since emission. If we square that to find c^2 we get simply -1. In the special case where $E_0 = mc^2$ we must change the units of m into E_m, where E_m is the inertial mass stated in energy units. So we can say that $E_0 = -E_m$. The energy invested in the mass, E_m, exists within tiny gravitational energy holes into the event horizon of time-now that lead all the way back down to the time origin (infinitely in the past).

The energy in the mass is positive, but only with respect to the time origin. From our own elevated perspective standing at the event-horizon of time-now, the energetic substance of any nucleonic particle appears to us to exist in a cavity resonance within its own private infinite gravitational energy hole. I have attempted to draw a picture of this nucleonic gravitational field using a two-dimensional space model and using my third (vertical) isometric dimension to depict the depth of the space-time scale compression field within the nucleonic gravity hole. The membrane depicted is a two dimensional section of the 3D event-horizon of time-now. The associated force field is the gradient of the membrane shown. Please consider the following diagram:



4. Explaining Why Light Appears to Slow in Glass

The simple diagram shown above explains the unified form of all of the nucleonic matter in the Universe. It clearly explains why light appears to slow in glass; there is quite simply more space within the glass, so near to the particulate matter of the glass and its associated nucleonic gravitational space-time scale compression holes. The so-called "speed-of-light" never changes, but it only appears to slow as it moves through a denser space-time scale regime than that experienced in free space (high vacuum).

5. Conclusion

While this model might make some people feel uncomfortable, please bear in mind that this model predicts the tiny apparent charge radius of the proton being about one thousand times smaller that the emitted gamma wavelength and it shows the strong nuclear force to be just gravity at the nucleonic scale, and so it simplifies our view of the universe to an absurd extent and explains everything, even explaining how the hawk can focus on her prey or why you can spot the bread from the eggs on your breakfast plate. I claim Occam's razor here; why should I tolerate the absurd complication

of a discrete strong nuclear force when by eliminating it with my gravitational explanation, I can suddenly understand why light slows in glass? Light slowing in glass remains a mystery with the absurdly over-complex accounts employed by others.

Appendices

1) The Strong Nuclear Force

The force field of the nucleon is given by the slope of the space-time scale compression function. Notice the steep slope of the compression function at the point of proton cavity resonance. This force field is just our old friend gravity but we have labelled that as if it were yet another mystery of the Universe; "the strong nuclear force". No such discrete force exists, that force is just gravity at the nucleonic size scale. What have we been saying here? Please do not eliminate our mysteries? You might like your mysteries but I am much happier without any such creepy superstitious ignorance.

2) The Gamma wavelength and the apparent proton charge radius

With the changing nucleus within any nuclear reaction, every individual nucleon is crushed by an increase in the local gravitation field surrounding it. The gravitational crushing of any nuclear reaction results in the excess energy being emitted in the Gamma band. It makes no difference if the gravitational crushing occurs within a nuclear fusion or nuclear fission reaction and this confirms that the emitting aerials must be the charge faces of the individual protons in the crushed nucleus. In this model we must abandon the idea that the nucleus consists of nucleons with fixed proton or neutron identity but rather that every member of the nucleus can engage in identity exchange whenever the need arises. A neutron has no mechanism with which to radiate energy and none do so, only protons can radiate off any excess energy, but any neutron member of the nucleus just becomes a proton whenever it needs to.

The proton charge face is the radiating aerial for the Gamma band quanta. The charge radius of the proton appears to be about 250 times too small to be the quarter wave dipole emitter of a Gamma band quanta. However, this is no mystery at all, the gravitational space-time field scale compression ratio at the proton charge face is about 250 times more compact by linear dimensions than we observe in near free space (high vacuum). While every quanta of electro-magnetic radiation remains, until its detection, entangled with the historic emitter (a proton in this case), there is no scale entanglement, the wavelength looses the scale compression as each quanta emerges from the gravitational field of the emitting nucleus.

3) Every material object supported at the face of the Earth experiences the same uniform gravitational force, I must explain how this works

Every nucleonic particle at the subatomic scale experiences the same local nucleonic tides created by the Earth's gravitational field. This very small force from every individual nucleon adds up to impact the force on every larger object, irrespective of size and irrespective of the atomic weight of the nuclei in the atomic structures of the molecules that form the object. There is no, or virtually no, additional tidal effect at the level of an entire nucleus, atom or molecule. So, we find the gravitational force on every object is proportional to the total number of nucleons (the inertial mass). Gravity is only a really strong property of matter at the subatomic scale, but the weak nuclear force and molecular electro-chemical binding energy are both clearly the natural consequences of the local atomic and molecular gravitational field.

For further study and learning about the new mathematics one requires with Quantum-Relativity see;
https://www.gnqr.co.uk/
gnqr stands for Gauss-Newton Quantum-Relativity.