

Tomorrow's Physics Alters Information Technology Which Alters Global Economics and Social Science

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Abstract -

Hidden Variables are presently hypothetical factors based on the belief that the theory of quantum mechanics is incomplete. Their identification would lead to exact predictions, not just probabilities, for the outcomes of measurements. Albert Einstein is the most famous proponent of hidden variables (it will be shown that the variables are compatible with entanglement, what Einstein called the result of “spooky action at a distance”). Their existence would vindicate his belief that quantum mechanics is lacking something. If probability is deleted at the universe's most fundamental level, computer-generated random numbers (and the online security which is based on them) will become vulnerable to computer hackers. Addressing the security of credit cards, a partial remedy would be to develop a worldwide system for increasing each person's standard of living that totally eliminates money in all its forms. Then there'd be no credit-card details for hackers to steal. This radical step seems to be possible because the human instinct to survive is much greater than other drives such as self-interest and greed. If money ceases to be an option, people will freely share and cooperate if that's the only way to not merely ensure survival, but to actually improve everyone's standard of life. The security of government and military records that are encrypted online depends on people eventually realizing that we're all invisibly and permanently connected (by Hidden Variables). Then hurting others in any manner is the same as hurting yourself and hackers would simply have no motive to hack in evil ways. Realization of our invisible/permanent interconnectedness would also be of great assistance in achieving post-economic sharing and cooperation. This invisible, permanent connection affects not just every part of space (including on Earth) but also every part of time, since physics says space and time can never be separated - giving living beings a conscious existence that continues after death and, bizarrely, before conception.

Keywords -

Hidden variables; Entanglement; Quantum mechanics; Albert Einstein; Probability; Random numbers; Computers; Online security; Hackers; Credit cards; Money-free

world; Government and military records; Sharing and cooperation; Golden Rule; World peace; Eternal life

Article -

BACKGROUND PHYSICS

Hidden Variables are presently hypothetical factors based on the belief that the theory of quantum mechanics is incomplete. Their identification would lead to exact predictions, not just probabilities, for the outcomes of measurements. Albert Einstein is the most famous proponent of hidden variables. Their existence would vindicate his belief that quantum mechanics is lacking something. Much of the physics community seems to have confused the terms Locality[^] and Hidden Variables for decades. Our understanding of quantum mechanics is correct in the sense that the idea of locality is incorrect and has to be given up in favour of experimentally-verified entanglement, where a particle instantaneously affects another regardless of distance in space-time (what Einstein called *spukhafte Fernwirkung*, spooky action at a distance). As will be shown, hidden variables can be compatible with entanglement. Should the hidden variables be mathematical and the most fundamental units composing everything in the universe^{^^}, probability would be deleted at the most basic level, restoring Isaac Newton's (1642-1727) deterministic physics and Albert Einstein's (1879-1955) conviction that, to quote him, "God does not play dice".

[^] "Local" refers to the requirement that cause and effect occur at the same place, with no action at a distance occurring.

^{^^} There are 4 scientists I know of that support the idea of the universe being composed of information/mathematics:

a) In 1990, John Wheeler (1911-2008) suggested that information is fundamental to the physics of the universe. According to this "it from bit" doctrine, all things physical are information-theoretic in origin. (1)

b) Erik Verlinde says gravity is not a fundamental force of nature, but an emergent phenomenon. In the same way that temperature arises from the movement of microscopic particles, gravity emerges from the changes of fundamental bits of information, stored in the very structure of spacetime. (2)

- c) Cosmologist Max Tegmark hypothesizes that mathematical formulas create reality (3)
- d) "Pioneered (in the late 1980's) by Rafael Sorkin, a physicist at the Perimeter Institute in Waterloo, Canada, the theory (causal sets) postulates that the building blocks of space-time are simple mathematical points that are connected by links, with each link pointing from past to future." (4)

If present-day physicists like Erik Verlinde and Max Tegmark are correct in thinking the universe has a mathematical foundation, that foundation – plus the nature of hidden variables – could be the electronic BITS (BInary digITS) of 1 and 0, which comprise what is known as base-2 mathematics. The equations of 19th-century Scottish physicist and mathematician James Clerk Maxwell show that electromagnetic waves have a component that travels backwards in time. (5) Richard Feynman, 20th-century winner of the Nobel Prize in Physics, used these "advanced" waves to explain antimatter. (6) Einstein's equations say gravitational fields carry enough information about electromagnetism to allow Maxwell's equations to be restated in terms of these gravitational fields. This was discovered by the mathematical physicist George Yuri Rainich. (7) Therefore, gravitational waves also have advanced components going back in time.

1's and 0's composing electromagnetic and gravitational waves would compose both "advanced" waves going back in time and "retarded" waves going forward in time. The retarded components with +x motion in time can obviously cancel the advanced components with -x motion in time, producing entanglement. 17th century scientist Isaac Newton's idea of gravity acting instantly across the universe could be explained by gravity's ability to travel back in time, and thereby reach a point billions of light years away not in billions of years, but in negative billions-of-years. That is; the negative/advanced component of a gravitational wave would already be at its destination as soon as it left its source, and its journey is apparently instant. This has shown that the hidden variables of 1 and 0 can produce entanglement of waves and, as stated in the article's first paragraph, "hidden variables can be compatible with entanglement." Can this compatibility become a truly universal process, occurring throughout space-time? To do so, it would need to apply to elementary particles of matter e.g. electrons as well as any particles with mass e.g. Higgs bosons.

PARTICLES CAN BE ENTANGLED SINCE THEY EMERGE FROM ENTANGLEMENT OF ELECTROMAGNETIC AND GRAVITATIONAL WAVES

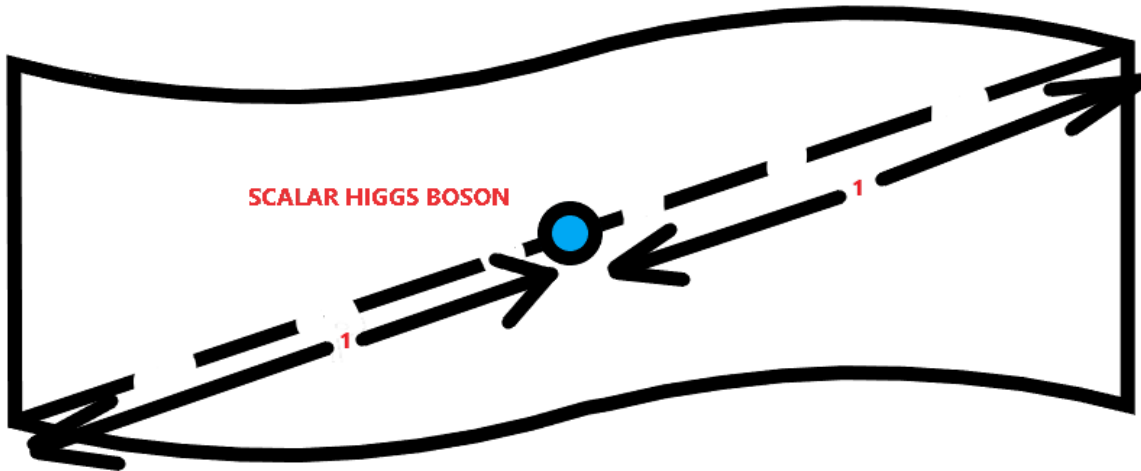


Figure 1 -

VISUALIZING QUANTUM SPIN AND VECTOR/TENSOR/SCALAR QUANTITIES

(drawn by author using Microsoft's "Paint" program)

Particles can be produced by the theory that mass emerges from electromagnetic and gravitational waves interacting via vector-tensor-scalar geometry. The vectors of photon and graviton (the waves' excitations) are represented by two adjoining sides – one horizontal, one vertical – of a parallelogram as well as by their resultant diagonal. When changing from the coordinates of the sides and diagonal to those of a single, scalar[^] point on the diagonal; tensor calculus requires transformation in a precise manner. In this case, quantum spin will be addressed and the calculus begins with Stephen Hawking's observation that "What the spin of a particle really tells us is what the particle looks like from different directions." (8) Like an arrow with one tip pointing upward, the spin-1 photon must be turned one full revolution (360 degrees) to look the same and again be pointing up. Like an arrow with two tips (one pointed up, one down), the spin-2 graviton must be turned half a revolution (180 degrees) to look the same. Its constant interaction with the photon means it turns two half-revolutions while the photon turns one revolution. The half of the diagonal representing the photon can be assigned the value 1 while the half portraying the graviton is $\frac{1}{2} + \frac{1}{2}$.

[^] A scalar quantity is completely described by its magnitude, is without direction, and is associated with spin-0 particles. It is representable by a position on a line which, in the diagram above, is the central blue and black dot on the diagonal.

The next step in the calculus is to balance the arithmetic (equivalent to performing the same operation on both sides of an equation). Since one half of the diagonal was subject to addition ($\frac{1}{2} + \frac{1}{2}$), interaction and balancing with the other half-diagonal must be subjected to subtraction.

$$1 - (\frac{1}{2} + \frac{1}{2}) \quad \text{or} \quad (\frac{1}{2} + \frac{1}{2}) - 1$$

In either case, the result is spin 0 (turning through zero revolutions to look the same)

Matter and antimatter can exist because division is the same as repeated subtraction e.g. 4 subtracted from 20 five times equals zero, therefore $20 \div 4 = 5$. Instead of repeating the subtraction used above, the photon's spin is divided by the graviton's spin and this leads to production of matter particles of spin $1 / 2$. (In terms of Stephen Hawking's observation that "What the spin of a particle really tells us is what the particle looks like from different directions", the quantum spin of matter particles is $1/1$ divided by $2/1$ ie $1/1$ multiplied by $\frac{1}{2} = 1 / 2$.) In other words, photon-graviton interaction forms the emergent property of mass (just as hydrogen-oxygen interaction produces wetness) and if the mass emerging from photon-graviton interaction is $125 \text{ GeV}/c^2$ (with spin 0), the Higgs boson becomes a by-product of the former interaction (relating the graviton to the supposedly unrelated Higgs boson, as well as the gravitational field to the allegedly unrelated Higgs field).

I.T., POST-ECONOMICS AND FUTURE SOCIETY

"Networked computers send each other random digits to serve as keys to unlock mathematical codes – (which are) encrypting online passwords, credit card data and much more." (9)

If probability is deleted at the universe's most fundamental level, computer-generated random numbers (and the online security which is based on them) will become vulnerable to computer hackers. A partial remedy would be to develop a worldwide system for increasing each person's standard of living that totally eliminates money in all its forms. Then there'd be no credit-card details for hackers to steal. This may appear to be an extremely radical step. But just because money has been making the world go round for thousands of years does not mean money must remain the way of the world forever. Idealistic and naïve as it appears, the future way of the world could be based on

sharing and cooperation. The human instinct to survive is much greater than other drives such as self-interest and greed. If money ceases to be an option, people will freely share and cooperate if that's the only way to not merely ensure survival but to actually improve everyone's standard of life.

What about the "much more" in this section's first sentence? What about things like government and military records that are encrypted online? People will eventually realize that we're all invisibly and permanently connected[^] by the electronic binary digits that are the universe's foundation: like, to use a 2-dimensional example, the objects in a computer image that seem to be a lot of separate objects but are really just one thing (strings of 1's and 0's). Defying our bodily senses (which are limited and subject to illusions), every person is united by these strings of binary digits. We can, if we wish, express this as – you and I are the same person in many ways. When people realize that hurting others in any manner is the same as hurting yourself, the Golden Rule (treat others as you would like to be treated yourself) will spring to life and World Peace will be inevitable. Then hackers would simply have no motive to hack in evil ways. Realization of our invisible/permanent interconnectedness would also be of great assistance in achieving post-economic sharing and cooperation.

[^] "Bernard Beitman, a visiting psychiatry and neurobehavioral sciences professor at the University of Virginia, (says there is) an invisible network that connects everyone and everything. There's no evidence for this, but he's not the first one to pursue this fringe line of thinking. Austrian biologist Paul Kammerer believed coincidences arise out of unknown forces, or waves, that he called seriality. He wrote a book on the subject in 1919. Albert Einstein even commented on it, saying it was "by no means absurd." And in the 1950s, psychiatrist Carl Jung came up with a similar idea, his so-called synchronicity theory." (10)

IMMORTALITY WITHIN SOCIETY

Does this invisible interconnectedness only persist during this lifetime (meaning it isn't truly permanent but merely temporary)? Or does its permanence affect not just every part of space (including on Earth) but also every part of time, since physics says space and time can never be separated - giving living beings a conscious existence that continues after death and, bizarrely, before conception? When his engineer friend

Michele Angelo Besso died, Albert Einstein wrote a letter of condolence to the Besso family, including his now famous quote: 'Now he has departed from this strange world a little ahead of me. That means nothing. People like us, who believe in physics, know that the distinction between past, present and future is only a stubbornly persistent illusion.' This suggests the following interpretation of his statement - if someone is alive in what we call the present, they must continue to be alive at any point in the future, all points of which have no actual separation from the present (though that future life would not be in the form we know). So there would be life after death. If all times in the past are united with the present, there must also be life before conception (possibly in the same form as the after-death transformation, making this present existence a brief interlude necessary for development of our eternal form).

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