Supersymmetry Via EDM (Electric Dipole Moment)

Rodney Bartlett

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Abstract

PRELIMINARY NOTE #1 -

My approach may be called quantum-gravitational. I take "educated guesses", using the present state of scientific knowledge, at what might be revealed by a future union of General Relativity and Quantum Mechanics. Educated guesses sound remote from real science, but it's the best that can be done with a theory which doesn't exist yet. Of course, the maths accompanying that theory doesn't exist either - so formal mathematics can't be used. The quantum-gravitational approach isn't meant to be purely mathematical but also physical, with the binary digits and Mobius strips that compose every fermion and boson being linked - a state at odds with our human frame of reference of seeing objects and events as separated. As the movie "Interstellar" pointed out, people will one day be able to build things they can't build now. Let's scientifically explore a few of those things. (Thanks go to Penny from TV's "Big Bang Theory" for inspiring Interstellar-related thoughts!)

At the start of the 20th century, physicist Max Planck assumed that electromagnetic radiation can only be emitted or absorbed in discrete packets, called quanta. He thought of his discovery as nothing more than a math device ... a kind of trickery. Albert Einstein developed his explanation of the photoelectric effect from this "mathematical convenience". So it appears entirely possible that another supposed mathematical trickery (Wick rotation) will find practical application in the future.

Imagine the universe actually is a holographic projection or a computer simulation where every fermion and boson is linked by the AI-generating BITS (binary digits) of 1 and 0. What happens to formal mathematical definitions when every fermion and boson is linked? The linkage means everything throughout time and space can be regarded as one particle. This is reminiscent of John Wheeler's and Richard Feynman's speculation that the entire universe consists of just one electron, zigzagging through time (the weirdness of quantum physics vanishes and no particle can exist in two places at once since the unification of everything in space and time - possibly achieved with Quantum Gravity - means only one place or event can ever exist in the universal, co-moving frame of reference where observer and observed are united). If the universe can be regarded as one particle, how can one thing be added to another thing? Then 1+1=2 cannot be true in an absolute or quantum-gravity sense. 1+1=2 would only be true in the human frame of reference (it...
would also be true in the technology and mathematics which the human frame of reference developed). These conclusions regarding 1+1=2 may be compatible not only with a QG (quantum-gravitational) approach but also with an LF (Leonardo-Faraday) one. Neither Leonardo da Vinci nor Michael Faraday appear to have trained in the formal mathematics of their time but that lack never stopped them from discovering great things.

1+1 would equal 2 if human mathematics and technology from the 21st century used general relativity's curvature of time - made circular by Wick rotation and warping spacetime - to create the universe. But I look around and see that our tech/maths is not advanced enough yet. In forwards time travel, the waves composing mass in the x-axis and y-axis rotate in the counter-clockwise direction. Compare Wick rotation to a DVD that has no end. The future destination is reached by a computer using tensor calculus to change the present coordinates in the Cosmic DVD to ones in the future. To use a simple example confined to two dimensions: -1, +i becomes +1, -i. This is interdimensional travel since it incorporates both the time and space elements of the time-space unity i.e. Wick rotation residing in the Mobius strips and figure-8 Klein bottles* composing space and mass. Backwards travel in time is identical to forward trips except for the coordinates being different and belonging to points in the past.

* 1-dimensional BITS encode two-dimensional (2D) Mobius bands instead of the untwisted Strings of String Theory or Loop Quantum Gravity (also, binary digits may be thought of as strings of 1's and 0's). A Mobius band, with its undulations and single surface, must be travelled around twice to reach the starting point. This raises the possibility that billions or trillions of Mobius strips compose every particle of matter since such particles must be turned 720 degrees (completely rotated twice) to look the same. If photons and gravitons share EDM with neutrons, it’s reasonable to conclude the symmetry means photons and gravitons are also composed of Mobius loops. Electromagnetism and gravitation aren’t identical, so a photon might be simply constructed from billions of Mobius bands while a more complex graviton might be based on a pair of Mobius strips uniting into a figure-8 Klein bottle which is immersed in the 3rd dimension.

Billions, or more, of these “Mobius Doublets” form a graviton. Photon-graviton momentum and interaction would not only produce a matter particle’s, and black hole’s, quantum spin but a pressure that’s equivalent to what we call mass or solidity. Any particle’s mass, including the Higgs boson’s or that of the bosons belonging to the nuclear forces, would be created this way. Possessing an electric dipole moment, every massive or force-carrying particle would have both positive and negative charge – capable of cancelling to produce neutrality. The imaginary numbers - essential to quantum physics - in Wick rotation would combine with Wick’s real numbers to produce time, and rotation of gravitational and electromagnetic waves would be energy forming mass on the x-axis plus dark energy forming dark matter on the y-axis.

PRELIMINARY NOTE #2 -
The photoelectric effect, plus imaginary and complex numbers, say the universe never Started with a Bang

In A Brief History of Time, Stephen Hawking said there are no boundaries or singularities in imaginary time. I know Wick rotation is regarded as mathematical convenience or trickery. But Max Planck thought of his idea of quanta as a math convenience. And Albert Einstein seems to have developed the photoelectric effect's explanation from Planck's quanta. So could Wick rotation also end up having practical application, with our so-called real time existing on the X-axis and imaginary time on the y-axis. In that case, would the lack of boundaries and singularities mean the universe has no beginning or end? The relevance of imaginary numbers to the cosmos is that complex numbers have uses in quantum field theory, special and general relativity, and spinors.

Real time and real numbers are still present, so we can't get rid of an initial singularity through a Wick rotation. This reflects the fact that Wick rotation isn't so useful in General Relativity. But Einstein's theory, though the best theory we have of gravity and the universe, is incomplete. It needs to be combined with quantum physics. In such a theory of quantum gravity, it's possible that Wick rotation is extremely useful, just as it's a very useful mathematical technique in quantum field theory. We don't live in a universe that is merely real (governed by real numbers) or exclusively imaginary but is complex, embodying a union of real plus imaginary. Then Wick rotation means there could be an additional time dimension - time and space are inseparable, so another space dimension also exists - as California Prof. Itzhak Bars has said (https://phys.org/news/2007-05-two-time-universe-physicist-explores-dimension.html). Just as E=mc^2 describes energy producing mass in known space-time, dark energy might not be the cause of alleged cosmic expansion but could account for the formation of dark matter. Thanks to astrophysicist Ethan Siegel for inspiring this paragraph.

I'm reading an article titled “Scientists Seek Life Across the Multiverse” and it says,

"If the multiverse hypothesis is correct, physicists would no longer have to find explanations for the absurdly improbable fine-tuning of the laws of nature that has made our existence possible. We are just lucky to live in a good universe among many different ones. One universe fine-tuned for life is an unlikely fluke. But one habitable universe among many is to be expected."

Another way of phrasing this is - Scientists are so eager to avoid any notion of Intelligent Design of the cosmos that they're willing to deny Earth's own scientific potential ... and their own intelligence.

Evolution can be observed in the form of adaptation of structure and function to the environment but there's no reason
to extrapolate this theory in order for it to account for life’s origin. In future centuries, human technology will
develop terraforming and incredibly advanced bioengineering of cells - amino acids, proteins, water, nucleic acids, etc
which were gathered in space or on planets and combined (science already knows these molecules exist out
there). This could account for life’s origin since it agrees with 19th-century chemist Louis Pasteur’s proving that life can
only originate from life. The origin-of-life hypothesis presented here obviously needs time travel back to a time when
there was no life. This is feasible using General Relativity’s concept of curved time (which is made circular via Wick
rotation and future warping of space-time).

It’s convenient to say Wick rotation is a form of mathematical trickery but explanation of the photoelectric effect seems
to have sprung directly from Max Planck’s idea of quanta - now called photons - which was also regarded for years as a
mathematical convenience. Could an extension of evolution spring directly from the supposed math trickery of Wick
rotation? We only need to be open to our current interpretations of science and maths not being set in stone. History
has shown that presently accepted theories always change. And we are not the endpoint of history - we’re simply one
more step passing through it.

ABSTRACT

The article begins by mentioning the accepted correlation between Albert Einstein’s relativistic equations, as well as
James Clerk Maxwell’s electromagnetic waves, with the Prandtl-Glauert equations for fluid flow. These topics are
explored in the article -

High Energy Physics, Gravitation and Cosmology, 10*(3), 875-905. [http://dx.doi.org/10.4236/jhepgc.2024.103054](http://dx.doi.org/10.4236/jhepgc.2024.103054)

The equation-free mention at the start of SUSY VIA EDM nevertheless ends with $180^\circ \Delta O = + \implies -$ (180 Degree
Change in Orientation Equals Positive Becomes Negative). Of course, it also means negative can become positive:
$180^\circ \Delta O = - \implies +$. Using this article’s new equations, the Electric Dipole Moment is introduced and the charges of the
quarks composing a neutron are transformed. EDM’s undetectability is explained from the perspective of a hypothetical
someone who doesn’t accept the Big Bang but believes the universe is literally infinite and eternal. Then quantum spin
of matter particles is discussed, and extended to astronomy’s black holes, in terms of photons and gravitons not being
elementary force-carrying particles but being in possession of EDM. The photon-graviton interaction producing
quantum spin is proposed as electromagnetic and gravitational vectors in a figure that might be called “Vector-Tensor-
Scalar Geometry”, as well as being related to quaternions plus the Higgs boson and field. Then the article returns to
black holes, showing how the inability of light to escape them leads to a 4-dimensional space-time: via binary digits or
base 2 mathematics, Mobius bands, figure-8 Klein bottles, and Wick rotation. The electric potential of photons and
gravitons is then interpreted not strictly as a neutron-identical Electric Dipole Moment but as a vast array of pulses
sharing similarities with modern computers and electronics – the binary digits of the previous sentence. As a
consequence of the electric force-carriers bringing them into existence, particles of matter and antimatter are symmetrical with bosons in the sense that every boson or fermion is, at its most fundamental level, composed of binary digits. Imaginary numbers are essential to quantum mechanics, and this article connects the imaginary numbers of Wick rotation to the nature of time. Therefore, the words here are not painting a classical picture of space-time. The 1’s and 0’s of binary digits are compatible with quantum mechanics and may be referred to as the Hidden Variables which Einstein advocated to complete quantum physics, and to give its calculations an exactness which would bring a hidden order to its chaotic randomness and superficial uncertainty. If the universe can be quantized and viewed as comprised of infinitesimal ones and zeros, how could it not obey quantum physics? And if those ones and zeros are all ultimately connected by Quantum Gravity, waves and particles could never be separated but wave-particle duality would rule. To finish, many thanks to Albert Einstein for laying the foundations of this article 105 years ago when he published a paper titled “Do gravitational fields play an essential role in the structure of elementary particles?” Immediately before submission for publication, a few topics were added to this article - dark matter, precession, the Hodge conjecture, and the Riemann hypothesis.

**Keywords:** electric dipole moment, quantum spin, mass, symmetry, black holes, vector-tensor-scalar geometry, photon-graviton interaction, 4-dimensional space-time, BITS, binary digits, topology, Mobius band, figure-8 Klein bottle, Wick rotation, imaginary numbers, hidden variables, quaternions, dark matter, precession, Hodge conjecture, Riemann hypothesis.

### Neutron EDM

There is an important correlation between Einstein’s relativistic equations and the Prandtl-Glauert equations for fluid flow, which can be seen through their pressure coefficients. Mathematically, this shows the equivalence between Einstein’s relativistic equation and the Prandtl-Glauert equation. Maxwell had already established a powerful correlation between electromagnetic waves and fluid dynamics. By building on this foundation, we can further investigate the relationship between gravitational pressure and electromagnetism, potentially uncovering new insights into the underlying physics.\(^1\) It’s well known that solutions refract electromagnetic waves of light passing through them. Similarly, the gravitational and electromagnetic (GEM) waves resulting from particles suspended in solution (the photons and gravitons of fluid space-time) would be bent around massive objects in space or gravitationally lensed and this refraction alters orientation of Fig. 1’s magnetic and electric fields. When the gravitational and electromagnetic waves enter the solution and are lensed, changing orientation by, say, 45 degrees; the electric fields no longer possess up-down motion but have a tendency to vibrate left to right. If the orientation change continues to 90 degrees, the left-right tendency becomes a certainty. The doubling from 45 to 90 is important. If the angle of incidence of the GEM waves is 90 degrees, the potential exists for the electric fields to be inverted 180 degrees.

Let’s apply this to the electric charges of subatomic particles. Imagine a mobile particle on the line of propagation which,
upon encountering the force of an advancing positive-period wave (above Fig. 1’s line of propagation), remains on the propagation line. It isn’t pushed aside but must ascend to the crest of the wave. After reaching this highest point, it moves in the opposite direction and descends to the trough of the wave’s following negative-period (below the line). Inversion from “down-up” motion to “up-down” (movement in the opposite direction) can be viewed as electrical attraction of particles becoming repulsion i.e. as the positive charge of, say, a proton switching to the negative charge of an antiproton and no longer attracting – but now repelling – an electron. ^ The previous typing can be summed up with the equation

\[ 180^\circ \Delta O = + \Rightarrow - \]

(180 Degree Change in Orientation Equals Positive Becomes Negative). Of course, it also means negative can become positive: \[ 180^\circ \Delta O = - \Rightarrow + \]

Applied to the magnetic fields of particles, North and South poles can be interchanged – as occurs with Earth’s magnetic-field reversals. Also - this motion which results in attraction and repulsion can be viewed as the pulling and pushing caused by, respectively, the Newtonian and Relativistic views of gravitation. The motion suggests a unified model of the electric, magnetic, and gravitational fields is achievable.

^ An experiment at Oxford University in England found similarly charged particles suspended in a solution can actually attract each other over long distances. [2] The level of attraction is closely linked to the solution’s pH. The pH scale used to specify the acidity of solutions indicates the activity of hydrogen ions. This activity of electrical charges could, when acting over a relatively long distance and time, affect the motion of particles and the orientation of their electric fields. The experiment had no effect on positively charged particles in water.

The neutral neutron is made up of three charged particles called quarks – two down quarks (each with a charge of -1/3) and one up quark (charge +2/3). Part of the neutron should be charged positively and another portion negatively (it should possess an Electric Dipole Moment). Many attempts to measure the distance between charged regions have found it is too small to be detected. Physicists Roberto Peccei, Helen Quinn, Frank Wilczek, and Steven Weinberg suggested the variable is not zero but a dynamical quantity that slowly lost its charge, evolving to zero, after the Big Bang. Their work on the problem led to the concept of axions, hypothetical particles that could “clear up” the neutron EDM problem. Axions are now considered one of the favourite candidates for dark matter, constituting about 85% of the matter in the universe. [3][4]

How could the electric dipole moment’s undetectability be explained by someone who doesn’t accept the Big Bang, or axions? Every particle is constantly in motion, thus permitting the possibility of positive & negative transforming. Taking the quark description of a neutron gives us \((-1/3) + (-1/3) + (+2/3)\) which, in the words of Peccei, Quinn, Wilczek and Weinberg, evolves to zero.

When minus numbers become plus and plus nos. become minus (when positive, neutral, and negative electric charges alter as a result of changes in orientation and motion) the equation is \((1/3) + (1/3) + (-2/3)\) which, in this case, represents undetectability.
Figure 1. Electromagnetic Wave — Showing the Perpendicular Magnetic and Electric Fields, Plus the Wavelength Denoted by Greek Letter Lambda λ (the Black Arrow Indicates the Direction of Propagation) (figure from https://www.istockphoto.com/vector/electromagnetic-wave-structure-and-parameters-vector-illustration-diagram-with-gm1194626452-340233881)

Note on the above classical diagram of an electromagnetic wave

In response to a message from ResearchGate colleague Tony Yuan of China's Beihang University, the author has been thinking about electromagnetic (EM) waves. Tony and his university teacher - an expert in electromagnetic waves - are absolutely correct about classic EM diagrams being inaccurate. My thoughts on this topic - classically, the photons making up an EM wave are confined to particular locations. But quantum mechanics says a photon can be in more than one position at the same time - even "smeared" throughout the entirety of space. Therefore, classical diagrams of the EM wave are wrong because the wave occupies the whole universe.

Just as EM waves are transverse, waves on the ocean are also transverse. Perhaps our observations of them are also limited to the classical - and consequently not correct. Maybe the correct view is that ocean waves, and everything else (including consciousness), fill the whole of space (and time). This agrees with Hugh Everett's idea of the universal wavefunction, which later received investigation from James Hartle and Stephen Hawking, saying the observed and observer are all mixed together.

Such an interpretation of the wave function of the universe (believing the waves at sea occupy the whole of spacetime) seems unbelievably ridiculous at first. But the strangeness may simply be due to our mistaken belief that observations and experiments describe an objective reality that's independent of us. Actually - observer and observed would be inseparably
and permanently united, with an experimenter's consciousness unavoidably influencing (biasing) an experiment.

Riemann Hypothesis, Wick Rotation, And Mercury's Precession

On the subject of axions and dark matter, these can be linked with the Riemann hypothesis as well as the x- and y- axes of Wick rotation (see Figure 4). The Riemann hypothesis is concerned with the locations of “nontrivial zeros” on the “critical line”. It says these zeros must lie on the vertical line of the complex number plane i.e. on the y-axis in Wick rotation. In the Riemann zeta function, there may be infinitely many zeros on the critical line. This suggests the y-axis is literally infinite. To truly be infinite, the gravitational and electromagnetic vectors that will be shown to produce mass – see the paragraphs before and after Figure 3 - cannot be restricted to the vertical direction but must include all directions. That means they create matter in the x-axis of known space-time and another form of mass called dark matter in the y-axis of imaginary space-time.

At the start of the 20th century, physicist Max Planck assumed that electromagnetic radiation can only be emitted or absorbed in discrete packets, called quanta. He thought of his discovery as nothing more than a math device … a kind of trickery). Einstein developed his explanation of the photoelectric effect from this “mathematical convenience”. So it appears entirely possible that another supposed mathematical trickery (imaginary time and the y-axis) will find practical application in the future.

The Riemann hypothesis is not limited to prime numbers but can also apply to the fundamental structure of the mathematical universe’s space-time. Vector-Tensor-Scalar geometry (see Figure 2) unites the fermions composing the planet Mercury with the bosons filling space-time. Thus, the hypothesis also applies to the body of Mercury itself. The planet's link to Wick Rotation means Mercury’s orbit rotates. The Riemann hypothesis is the cause of precession, which doesn’t only exist close to the Sun but throughout astronomical space-time (possibly replacing the gravitational effects in the Kuiper Belt of hypothetical Planet 9) as well as the quantum scale. Besides addressing the spatial phenomenon of precession, the Riemann hypothesis addresses the temporal phenomenon of time travel. In forwards time travel, the waves composing mass in the x-axis and y-axis rotate in the counter-clockwise direction. Compare Wick rotation to a DVD that has no end. The future destination is reached by a computer using tensor calculus to change the present coordinates to ones in the future. To use a simple example confined to two dimensions: -1, + i becomes +1, -i. This is interdimensional travel since it incorporates both the time and space elements of the time-space unity i.e. Wick rotation residing in the Mobius strips and doublets composing space and mass. Backwards travel in time is identical to forward trips except for the coordinates being different and belonging to points in the past.

SPIN – Quantum Versus Classical

An object with an electric dipole moment is subject to a torque (rotation) when placed in an external electric field. This brings up images of spinning tops but the property known to physics as quantum spin is very different. In 1925, two Dutch postgrads, Samuel Goudsmit and George Uhlenbeck, originated the word “spin” but it was an unfortunate choice of name
because any comparison of a spinning electron to a spinning top is a poor aid. The quantum spin of a particle cannot be explained in terms of classical rotation since it can only have certain values that are equal to either a whole number or half a whole number multiplied by Planck’s constant divided by 2π (a quantity called ħ-bar: symbol ħ). [5]

This quantum spin requires a different form of electrical force than one producing classical rotation. This could be a NATURAL version of the on/off or one/zero pulses used by manmade electronics and called BITS or binary digits.

As a thought experiment, visualize the photon and graviton not as indivisible elementary particles but, like the neutron, as possessing an EDM. It's known that the photon and graviton have quantum spins of, respectively, 1 and 2. Photon-graviton interaction can, using William Rowan Hamilton’s 1843 definition of quaternions as the quotient of two vectors, [6] produce 1/2 which is the quantum spin of all particles of matter. Photon spin is vector 1, graviton spin is vector 2, and their interaction can also produce 2/1 which is the quantum spin of the graviton. An assembly of countless gravitons might form the intense gravity of a stellar or supermassive black hole. The photons interacting with gravitons could be confined within the black hole by twisting the valence-conduction bands of conductors, semiconductors, and insulators. Then light could not escape black holes which, as Stephen Hawking wrote, “ain’t so black”. [7]

### 4-Dimensional Geometry and Topology

The two vectors can be pictured as adjacent sides of a parallelogram. Tensor calculus converts the coordinates of the sides into those of a diagonal representing the interaction of the sides’ vectors. The sides’ coordinates can also be changed into a point on the diagonal. A position on a line that only has magnitude is called a scalar variable and this scalar is associated with particles of spin zero. [8] Since the Higgs boson is scalar, the point on the diagonal represents the Higgs boson which is obviously related to the graviton. The Higgs field is therefore intimately related to the gravitational and electromagnetic fields. The Higgs field may be regarded as a unification of the gravitational and electromagnetic fields.
Speaking of 1/2, 2/1, and twisting of valence/conduction bands –

The twisting can be caused by the electric pulses of the BITS encoding two-dimensional (2D) Mobius bands instead of the untwisted Strings of String Theory (also, binary digits may be thought of as strings of 1’s and 0’s). A Mobius band, with its undulations and single surface, must be travelled around twice to reach the starting point. This raises the possibility that billions or trillions of Mobius strips compose every particle of matter since such particles must be turned 720 degrees (completely rotated twice) to look the same. If photons and gravitons share EDM with neutrons, it’s reasonable to conclude the symmetry means photons and gravitons are composed of Mobius loops. Electromagnetism and gravitation aren’t identical, so a photon might be simply constructed from billions of Mobius bands while a more complex graviton might be based on a pair of Mobius strips uniting into a figure-8 Klein bottle. Billions, or more, of these “Mobius
Doublets form a graviton. Photon-graviton momentum and interaction would not only produce a matter particle’s quantum spin but a pressure that’s equivalent to what we call mass or solidity. Any particle’s mass, including the Higgs boson’s or that of the bosons belonging to the nuclear forces, would be created this way. Possessing an electric dipole moment, every massive or force-carrying particle would have both positive and negative charge – capable of cancelling to produce neutrality.

^ A science paper from 2017 says all of the information in the universe is contained in two-dimensional packages trillions of times smaller than an atom (in this case, the 2D package is the Mobius Strip) [11]

As a consequence of the photons and gravitons bringing them into existence, neutrons etc. wouldn’t only be made of 2D Mobius bands and figure-8 Klein bottles that are immersed in 3D (the bottles can be regarded as projection of the info contained in the Mobius, similar to the human body being a projection of DNA’s information). So-called imaginary numbers like $i^2 = -1$ are essential to quantum mechanics. Therefore, the 4th dimension of time could well be established by the real- plus imaginary- number combination of Wick rotation existing within the structure of the Mobius.
Figure 4. WICK ROTATION: "The complex plane reveals i’s special relationship with cycles via the circle of i, also known as Wick rotation. Whenever a point on the complex plane is multiplied by i, it moves a quarter rotation around the origin or center of the plane." [Figure and quote from [13]]

To finish, many thanks to Albert Einstein for laying the foundations of this article 105 years ago when he published a paper titled “Do gravitational fields play an essential role in the structure of elementary particles?” [14]

References

7. ^“A Brief History of Time” by Stephen Hawking, Chapter 7 (Black Holes Ain’t So Black), Bantam Press, 1988