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The Max Born Asymmetry Topples the Many-Worlds Theory

Author: Jeffrey H. Boyd*

Affiliation: * Retired. 57 Woods Road, Bethany, CT, 06524-3103 USA

Jeffrey.Boyd@alumni.harvard.edu

Abstract:

All "interpretations" of Quantum Mechanics (QM) are predicated on the assumption that quantum mathematics is correct. We disagree. The Born rule implies that nature may have a hidden asymmetry: $|+\psi|^2 = |-\psi|^2$ = probability. If nature uses $-\psi$ then physicists would not recognize that their math is 100% wrong. This hypothesis could explain the mystery that quantum math appears to be the most accurate and productive mathematics humans ever possessed, the source of our high-tech economy, yet scientists cannot agree on what the quantum world is like: does it exist, are there infinitely many worlds, etc. If we change our wave-function from $+\psi$ to $-\psi$, that will mean that quantum particles follow zero-energy "Elementary Waves" backwards. This asymmetry does not conform to Noether's Theorem because it does not involve physical space, rather an error in the human imagination. Wave-function collapse no longer occurs when a quantum particle is observed. It occurs when a free particle is emitted: when the particle selects which in-coming Elementary Wave to follow backwards. This undermines the foundations of the many-worlds theory. A superposition of states collapses as a particle is emitted, becoming only one state, located in only one world, not many.

Type (Method/Approach): No one previously recognized the Born rule could hide a "Born Asymmetry": $|+\psi|^2 \equiv |-\psi|^2$. If so, it would be so immense, pervasive, insidious, and invisible that it could explain all quantum "weirdness" even though quantum math is the most accurate and productive science ever.

1. Introduction

The term "Max Born asymmetry" arises from the Born rule. In 1926 Max Born at University of Göttingen was exploring a statistical approach to quantum collisions and published his idea that a wave-function Φ represented the probability of an electron scattering in a certain direction.

Fig. 1. Max Born (1882-1970), author of the "Born rule" in 1926.

Before his article was published in *Zeitschrift für Physik*, he added a footnote and modified his idea to say that **probability was proportional to the *SQUARE* of Φ.** This idea was immediately accepted as being the correct interpretation of how to understand quantum equations. (4-6)

1.1 Definition of the "Born Asymmetry"

No one saw that the Born rule creates the possibility of what we will call a "Born Asymmetry" ($|+\psi|^2 \equiv |-\psi|^2$ = probability). If nature uses $-\psi$ but humans use $+\psi$, that will mean that QM equations, although wrong, would yield the same probability predictions as nature. Therefore, QM could be successful in its probability predictions, even though it has an incorrect picture of reality.

Fig. 2. A thought experiment using two symmetrical trees. They are negatives of each other. Suppose the left is how QM portrays the tree using wave-function ψ. The right is how Nature defines the tree, using wave-function $-\psi$. **This illustrates the "Max Born asymmetry."**

In this article we explore this asymmetry. Over the last decade the author has unearthed a mountain of empirical evidence that supports the idea that nature uses $-\psi$, and free particles follow zero-energy waves coming from the detectors. This author has published more than 20 scholarly articles in peer-reviewed journals of physics, mathematics, and chemistry documenting this.

Hugh Everett's Many-Worlds Theory will be discussed in section 3 below.

Thomas Kuhn said, in his book *The Structure of Scientific Revolutions*, that every paradigm shift faces the same obstacle, which is that scientists hear the new idea as being unintelligible gibberish. The task of this article is to convince the reader that our new paradigm is not incomprehensible garbage. (50)

1.2 Noether's Theorem does not apply

Does Noether's Theorem apply to the Max Born Asymmetry? It states that every differentiable symmetry of the action of a physical system with conservative forces has a corresponding conservation law.

This theorem only applies to continuous and smooth symmetries over physical space. Ours is an asymmetry not a symmetry, and ours is not over physical space. We are talking about an arithmetic mistake. We claim that physical space follows probability amplitudes that are the negative of what experts believe them to be. Thus, we are comparing physical space to an illusion.

This asymmetry is internal to the human imagination. When we examine it, we discover that only one of these two arrangements of space exists, and it is not the one that QM has chosen.

Mark Twain said that the reason that truth can be stranger than fiction is that fiction needs to be plausible. Sometimes reality is so bizarre that no reasonable person would imagine it.

Plate tectonics is a perfect example. Alfred Wegener was an outsider to geology, an intruder. In 1912 he proposed that there had once been a super-continent for which he coined the name "Pangaea", meaning "all lands" (pan + γαῖα, after Pangäa). He said Pangaea had broken apart and today's continents drifted into their current positions. India slammed into Eurasia, creating the Himalayas. Geologists rejected Wegener's ideas as preposterous. There was no force on earth strong enough to move continents, they all agreed. For 50 years Wegener's idea was thought to be rubbish. Today it is called "plate tectonics". (61)

In both plate tectonics and Max Born's Asymmetry, Mark Twain is correct. No sensible person would imagine that nature could behave in such an absurd way. The only defense against the charge that we present unintelligible gibberish, is that our proposal conforms to nature.

Noether's Theorem does not apply to the Max Born Asymmetry.

1.3 Quantum weirdness

Quantum mathematics became the most accurate and productive mathematics humans ever had, and it all pivoted around the Born rule. Yet it was recognized from the beginning that there was a problem. QM could not be visualized or even understood. In German it was referred to as "*Anschaulichkeit,"* meaning "not visualizable". It was a seemingly insoluble puzzle that the most precise and fertile mathematics of all time cannot answer the simplest question: what is nature like? What does it look like? Does it even exist? (1-3,39)

Niels Bohr and the Copenhagen interpretation said that no quantum world exists. It is only mathematics. The Copenhagen and the many-worlds interpretations are the most popular worldviews held by professional physicists today.

In other branches of mathematical physics there is such an intimate relationship between the mathematics and physical reality that when you see the one, you instinctively grasp the underlying other.

Professor James J. Binney of Oxford University says, "There is universal agreement that quantum mechanics is not properly understood." (3)

Professor David Mermin of Cornell University says, "Shut up and calculate." He also says, "Quantum mechanics has proved that the moon only exists when people look at it." (56,57)

Christopher Fuchs, a proponent of Q-Bism (Bayesian interpretation of quantum math) embraces solipsism. Q-Bism asserts that the physical world does not exist. They say that what we mistakenly call "reality" is an apparition that is generated when our observations cause wave-function collapse. At the periphery of our perception there is a phantasmagoria or hallucination which we mistakenly call "reality". (43,44)

Aaron Becker says that whenever a quantum particle must choose between two paths, it goes in both directions simultaneously (in a superposition). Becker's idea is refuted in the article you are now reading. (2)

The Transactional Interpretation of John G. Cramer and Ruth Kastner says the quantum realm only makes sense if time goes both forwards and backwards at the same time. In this article time never goes backwards. (36-37,48-49)

1.4 The Orthodox consensus is wrong

The orthodoxy in physics is to say that the math works and there are many different "interpretations," and no way to prove which interpretation is correct. Therefore, we should use the equations and avoid thinking about what they mean. But that is impossible. How do you turn off your brain?

We reject that orthodoxy for three reasons:

A. Quantum math does not work. It fails the simplest task but succeeds at complex tasks.
B. All the "interpretations" are wrong if the math is wrong.
C. What this article offers is not, technically, an "interpretation" of QM, because we reject a starting assumption of quantum mathematics.

There is one and only one possible answer to the quagmire. It is the answer contained in this article.

1.5 What motivates the author?

Although the author is not a physicist, he humbly requests the reader's attention, because the author is offering to clean out a sewer that no one else knows how to clean. This author is a retired M.D. physician. He has never taken a single physics course. Interlopers can sometimes serve a useful purpose in science, as Alfred Wegener (not a geologist) showed with Pangaea. (61)

What would motivate an outsider to propose a preposterous idea? Such an outsider might feel it is his **duty**. When he knows his duty, a soldier will follow it even if he dies while trying. Such duty involves acting selflessly and helping others without any reward or personal gain. This author has never earned, and never expects to earn, a penny from the ideas written in this article.

We would expect such an outsider to experience a cacophony of emotions. He might regret that he is a soldier. He might say to himself, "If the experts despise our way of thinking, why can't they explain themselves in plain language, instead of turning away and offering no coherent rebuttal?" He might feel honored to champion an idea that the experts don't want to hear if that idea is likely to trigger a renaissance in science and technology. He might think, "Even though I am fighting against impossible odds, it is rewarding to feel that my life matters".

2 Following a zigzag path through many topics covered by the new paradigm

Our premise is that the Born rule could be hiding an unexpected asymmetry: $|+\psi|^2 \equiv |-\psi|^2$ = probability. We are exploring the hypothesis that nature uses wave-functions like ($-\psi$ or $-\Phi$) that are the negative of those of QM.

As we said, we will discuss Hugh Everett's Many-Worlds Theory in Section 3, below.

The Max Born asymmetry is worth exploring because it could be so pervasive in its implications that it would explain how quantum mathematics could be so accurate and productive, while it does not allow us to understand how nature is organized. We know the correct equations, or do we? If our equations are all the negative of nature's equations, what would that mean?

This requires that we re-think everything. "Everything" is a large topic. No one has a roadmap.

This article will now launch off rambling across a wide variety of scholarly fields, for the purpose of "re-thinking everything". Perhaps we will make mistakes, but we cannot fail to explore the wilderness. This article follows the zigzag path that is typical of paradigm shifts. Alfred Wegener for example did not limit his discussion to one topic such as the geology of Italy, which was typical of geology articles in 1912. He discussed ALL the continents and also explained how the Himalayas came into existence.

We request the reader's patience. Although the following discussion zigzags through apparently unrelated subjects, there is an overall plan, which is to explore how nature might look if we changed quantum equations from ψ to $-\psi$. This is no small undertaking.

2.1 Richard Feynman's QED

If you want evidence that "$-\psi$" means that waves and quantum particles travel in opposite directions, consider how Richard Feynman and Albert Hibbs use the calculus of variations. They define the symbol "ψ" to be a propagator or kernel, which integrates across all pathways from particle source to detector (point "a" to point "b"). A negative propagator "$-\psi$" would therefore integrate across all pathways from "b" to "a" as we will now show. (12,27,40-42)

Fig. 3 (left) shows Feynman and Hibbs' model, and Fig 3 right shows ours. We say the propagator $-\psi$ starts working **BEFORE** the particle begins to move. Our propagator starts in the lower right corner, at (x_2, t_1) and travels across an infinite number of pathways from "b" to "a". Whereupon the particle selects only one pathway to traverse (see upper right corner of Fig. 3. Wave function collapse (the choice of one specific pathway) occurs as the particle leaves the gun. We do not know which single pathway wins the competition, nor do we know its specific Lagrangian action. (12-13,27)

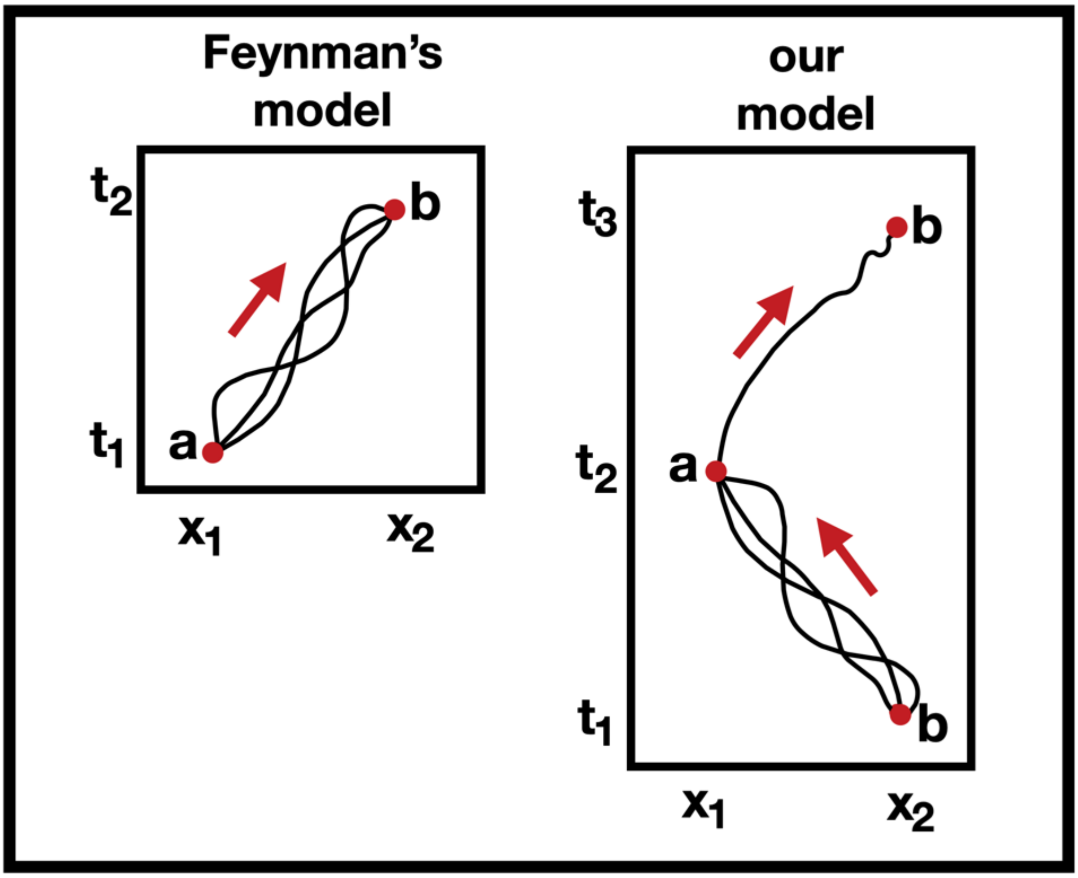

Fig. 3. Left: Feynman says that every photon takes all pathways from "a" to "b" simultaneously. We say the propagator integrates backwards across all pathways, but the photon then traverses only one.

A law of calculus is that when you integrate in the opposite direction, you get the negative of the function:

$$\int_b^a f(x)dx = -\int_a^b f(x)dx \qquad \forall f$$

equation 1

Therefore,

$$\int_b^a \psi(x)dx = -\int_a^b \psi(x)dx \tag{2}$$

Because of the Born rule ($|+\psi|^2 \equiv |-\psi|^2$ = probability), our equations yield precisely the same answer as Feynman's QED. But **our picture of reality is drastically different than Feynman's (Fig. 3).**

Our model resolves a notorious conflict between Feynman and his students. Feynman insisted that every quantum particle traverses ALL the possible pathways from "a" to "b" simultaneously, and there are an infinite number of such pathways. For example, when a single photon travels from a single point on your computer or smartphone screen up into your retina, it always takes ALL possible routes simultaneously according to Feynman. Do you think that makes sense?

His students say this is absurd. One particle can only take one pathway. But Feynman insisted his students were wrong because his calculations are more accurate the more different pathways he includes in his model. For example, a scattering experiment might use ten Feynman diagrams to predict the results. The calculations are more accurate if they include a hundred Feynman diagrams, and even more so if it includes a thousand.

Gerald Gabrielse's group reports on 891 eighth-order Feynman diagrams and showed that the electromagnetic fine structure constant 〈 = 137.035,999,710. To arrive at that number they used multiple supercomputers scattered in many nations, over the course of a decade. That is an astonishing degree of accuracy, but it required an assumption that every photon simultaneously traverses 891 different pathways from "a" to "b". (46)

In other words, Gabrielse's results require quantum weirdness.

Our model resolves this conflict between Feynman and his students. To reiterate, we say that the propagator $-\psi$ traverses every possible pathway from detector "b" to particle source "a" (bottom right of Fig. 3). Then the photon takes only one pathway back from "a" to "b" (top right of Fig. 3). We agree with Feynman that the calculations are more accurate if you integrate ψ across all possible pathways, and we agree with his students that a single particle can only travel one pathway.

We have eliminated the quantum weirdness intrinsic to Feynman's QED.

2.2 Definition of "Elementary Waves"

Our thought experiment is based on the idea that a quantum wave $-\psi$ moves in the opposite direction as quantum particles. (51-55) This proposal is difficult to ponder because it contradicts our assumptions about how reality works. Wave-particle duality, for example, is wrong.

We will call these negative waves ("$-\psi$") "Elementary Waves" and we call the new idea the "Theory of Elementary Waves (TEW)".

The idea of "negative waves" does not imply time reversal. **Our theory forbids time reversal.** We mean "negative" in the sense that time goes forwards and a quantum particle follows backwards in 3-dimensional space a zero-energy wave coming from the detector. This might at first sound self-contradictory, but we request the reader to suspend disbelief.

As we said earlier, such Elementary Waves make a drastic difference in our understanding of free particles, such as in the double-slit experiment. The difference would be that such particles are following backwards Elementary Waves that are coming from the detector (i.e., from the target screen). They would need to be zero-energy waves, and below we will show that the term "zero-energy waves" is not an oxymoron.

2.3 Definition of "Bi-Rays" and how they explain the Bell test experiments

There is a more sophisticated model using Elementary Rays to build "Bi-Rays" that can explain the Bell test experimental data. In TEW we say that everywhere in space there are zero-energy Elementary Waves are travelling in all directions and at all wavelengths. This leads to the possibility that every elementary ray has a mate, namely an identical ray moving coaxially in the contralateral direction. We refer to this as a "Bi-Ray".

We showed in previous publications that such a Bi-Ray model predicts that the coincidence rate of Alice and Bob both seeing a photon simultaneously in a Bell test experiment is $sin^2(\theta_2 - \theta_1)$, where θ_n is the angle at which each of them sets their polarizer. The theory of Bi-Rays contradicts Einstein's "local realism", because the Bi-Ray model is "**nonlocal** realism". The Bell test experiments cannot distinguish between the predictions of TEW and those of QM, because that is not what they were designed to do.

Bi-Rays never go faster than lightspeed. To explain this, we need to throw a monkey-wrench into the habitual way that scientists calculate the speed of light, namely by drawing "light-cones". Their stopwatch starts much too late. The stopwatch needs to start when Elementary Waves leave the detectors (see Fig. 3 bottom right), moving toward the 2-photon source. By the time the photons are emitted, the ballgame is already half over. Therefore, nature's light-cone is twice the size of the scientists' light-cone. If you double the size of your light-cone, particles following Bi-Rays never go faster than the speed of light.

The Bi-Ray explanation of the Bell test experiments makes more sense than the QM explanation. Yet at the University of Innsbruck no one knows about the Bi-Ray explanation. Why? Because outside of Amritsar, journal editors suppress information about TEW. In Amritsar this author is listened to; elsewhere he is censured. TEW suffers the fate of every paradigm shift, namely that it is years before it achieves widespread recognition.

Wegener was long dead before his idea of Pangaea and "continental drift" was accepted. The turning point was submarine warfare during World War-2. Sonar revealed there were mountains on the ocean floor, contradicting the conventional wisdom that the ocean floor was flat sand. The mid-Atlantic ridge supported the theory called "sea floor spreading." Like every paradigm shift, Wegener's idea took a long time before anyone thought it made sense.

2.4 Definition of "wave-function collapse"

With TEW the term "wave-function collapse" acquires a new definition. It no longer occurs when a particle is observed or measured. It occurs when a free particle is emitted from a particle gun (see Figs. 3 and 5). All wave interference occurs **before** a particle leaves the gun**. No wave interference occurs after a particle leaves the gun.**

As the particle leaves the gun, it does so having selected which of many in-coming Elementary Waves it will henceforth follow backwards.

After that it becomes a deterministic experiment. The particle follows backwards its chosen wave with a probability of 100%, goes through one and only one of the two slits (it doesn't matter which slit) and inevitably strikes that point on the target screen from which its Elementary Wave is emanating.

In Section 3 below, we will show that because wave-function collapse has been moved to when a particle is leaving the gun, all the assumptions that led to the many-worlds interpretation of Hugh Everett are wrong. (39)

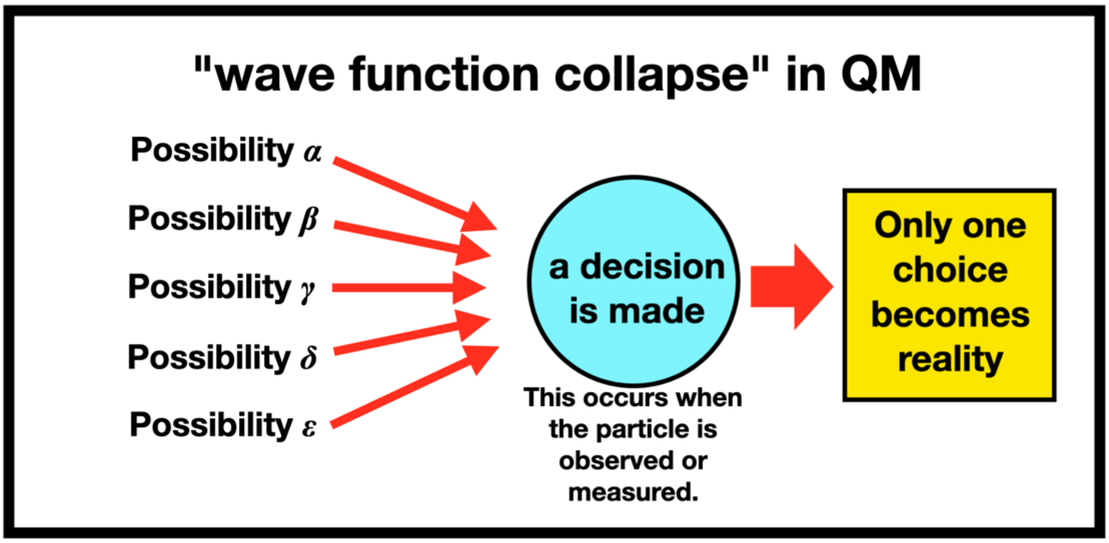

Fig. 4. The meaning of "wave function collapse" in QM. The possibilities on the left live in Hilbert space and consist of eigenstates.

As we said before, if you start a stopwatch when the particle leaves the gun, then you are missing the first and decisive half of the ballgame. It is like a soccer game in which one team has decisively won an overwhelming score of 891 to zero during the first half. At that point a quantum expert arrives in the bleachers and starts his or her stopwatch to determine how the game will turn out. The quantum expert believes he or she is watching a soccer match and doesn't realize it is only the second half of a game that has already been decided.

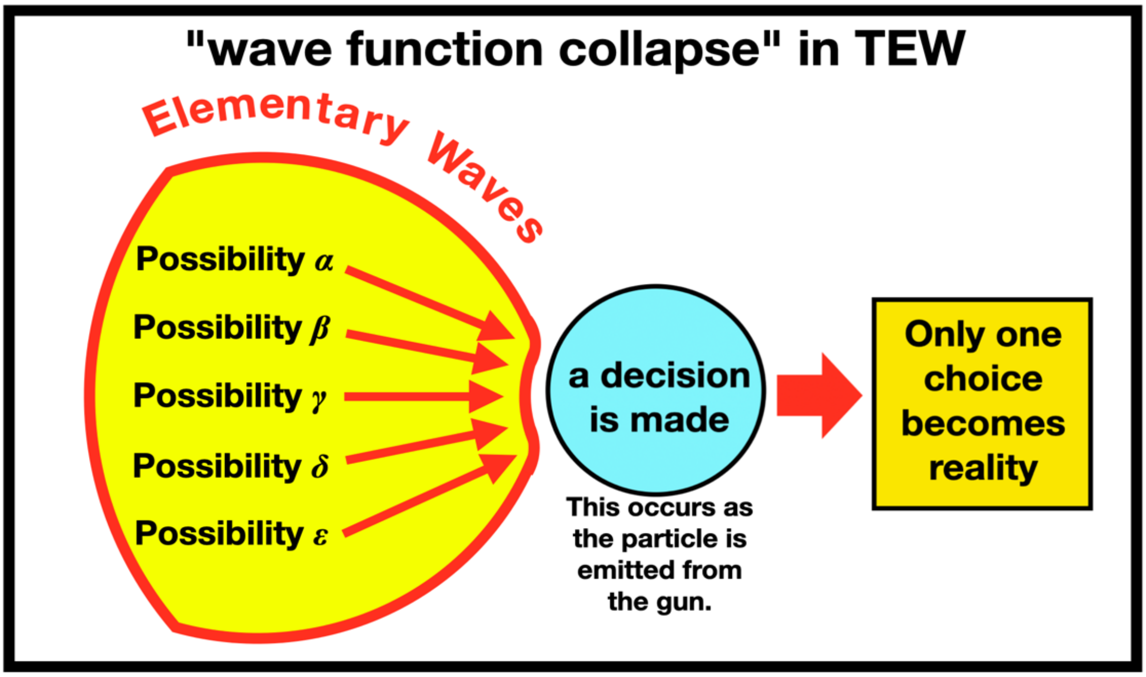

Fig. 5. The meaning of the term "wave function collapse" in TEW. The Elementary Waves on the left move from the detector to the particle gun, moving through 3-dimensional space in real time, before the particle leaves the gun.

2.4.1 "Wave-function collapse" in the classical world

Schrödinger's cat's health is determined when it breathes or does not breathe cyanide gas. When we open the lid and look, we become aware of what had been previously decided.

In the real world the future changes when something decisive happens. For example, on June 28, 1914, there were two futures that were in a superposition. If a student named Gavrilo Princip fired his pistol and assassinated Archduke Franz Ferdinand of Austria, then World War-1 would be the future. If he had not pulled the trigger, then WW-1 would not have started.

WW-1 did not start because someone read the newspaper the following morning and saw the headline. This is analogous to saying that wave-function collapse does not occur when you observe or measure a quantum state. An electron does not have an infinite number of eigenstates before it is measured. It has only the one eigenstate that you discover by measuring it.

If you erroneously believe something decisive happens when you open your newspaper on June 29, 1914, and read about yesterday's news, then you could envision a multitude of parallel worlds, each with a different newspaper. But if you think that something happened when Gavrilo Princip pulled the trigger, then the superposition of states is collapsed by Princip's finger on the trigger. After he pulls the trigger then "reality" collapses into just one tragic direction, in which Austria, Bosnia, Russia, France, England, Germany, Italy and the Ottoman Empire all declare war on each other. One million soldiers from India served in that war, and 17,000 died, all because Gavrilo Princip fired his pistol.

Fig. 6. Wave-function collapse in the real world. The future (called "WW-1") might have been averted if Gavrilo Princip had not pulled the trigger in the city of Sarajevo, Bosnia on June 28, 1914.

The world envisioned by TEW is like the real world, in that each time there is a superposition of states, the different possibilities collapse into a single reality when something decisive happens. That decision is located at the particle gun, not at the detector.

We say that QM and Hugh Everett are wrong when they say that the quantum world plays by different rules than the classical world. We say the rules are the same, or at least very similar. There is no boundary between the two realms. The classical world is a transparent veneer over the quantum world. When you open our eyes every morning, what you see is the quantum world.

2.6 Time is radically revised

We need to completely overhaul our concept of time. It is different than anything in the science textbooks. No, time does not go backwards. Yes, lightspeed is still the speed limit. Yes, the present is where we live and there are no wormholes into the past or future.

What is different is that when we do experiments with free particles, we need to start the stopwatch long before the particles are first emitted. This is a fundamental change in how we use a stopwatch, especially in Bell test experiments.

Time in the quantum world needs to be divided into the following segments:

1. Nothing is happening
2. Things are getting prepared to happen: a range of options is brewing
3. The options are presented to the decision-maker (such as a particle)
4. A decision is made, often at random, but it reflects the strength of the options
5. The quantum processes unroll, usually in a pre-determined pattern
6. The results are implemented, and those “results” may be visible to humans

QM is only aware of step 6, which is when an observation or measurement is made.

In the double slit experiment (discussed in section 8 below), step 2 begins when Elementary Waves leave all the potential detectors and move at lightspeed toward the particle gun. Step 2 is when everything important happens, which is nanoseconds before the particle leaves the gun.

In other words, the quantum world acts in a pattern like the human world. Things don’t just happen. Rather there is a preparatory buildup of plans and anticipations, expectations, influences, possibilities, biases, and options. We say, “The future is pregnant with possibilities.” All the choices are eventually presented to the particle as a range of choices, of which the particle must make an irrevocable choice of one before it leaves the gun. No other choices will be made after the particle leaves the gun.

3. The Many-Worlds Theory

Hugh Everett proposed in his doctoral thesis at Princeton University in 1957 that the entire universe is described by one wave-function that has within it all possible realities. According to quantum theory particles such as electrons exist in several superpositions in the quantum realm, but when they are observed the superpositions collapse into just one value. “Superposition collapse” is a discontinuity in quantum mathematics.

The Many-Worlds Theory eliminates superposition collapse, but at a great cost.

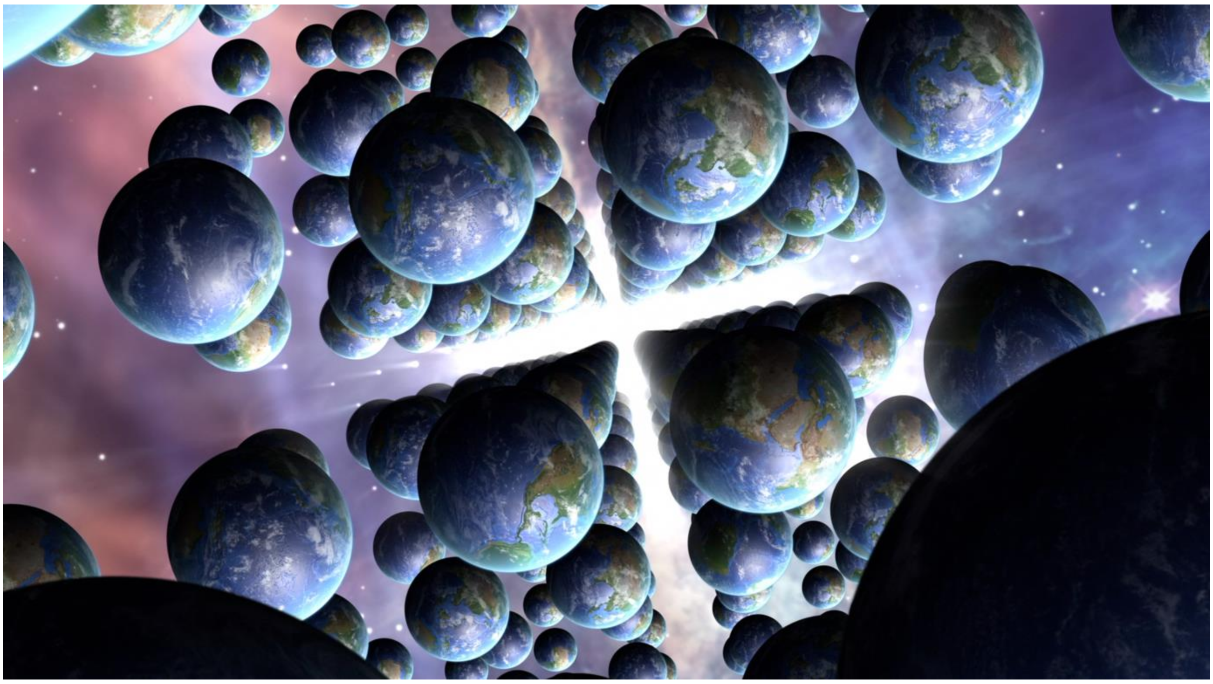

Fig. 7 In the Many-Worlds Theory there is no wave-function collapse because every quantum states takes every possible value in one of the worlds.

Everett said that we should respect the integrity of the quantum wave-function and allow it to define what is real. Therefore, the universal wave-function would exist forever, and would produce an endless proliferation of branching universes. He rejected the idea that the classical world is more important than the quantum wave-function.

John Wheeler was his thesis adviser, who took the idea to Copenhagen where it was rejected by Bohr. The hallmark of the Copenhagen Interpretation is, "This is just mathematics, there is no physical reality that corresponds to it."

We naturally assume that human experience in the classical realm is important. But Everett said we should take the quantum realm, rather than the classical realm, as our definition of "reality". By shifting the center of gravity from the classical to the quantum realm, Everett was able to eliminate the "wave-particle collapse" problem. But at what price?

What is called the "measurement problem" concerns how an electron transitions from the quantum to the classical realm. Subsequently this was called "decoherence", but we will ignore decoherence since the concept did not exist in Everett's time.

Everett proposed that wave-function collapse does not occur. The universal wave-function continues, with every quantum particle in a superposition forever. The scientists observing the system are also in a superposition. What we call "wave-function collapse" consists of the universe bifurcating into multiple almost identical copies, in one of which a particle emerges from super-position with one specific value which you observe, but in a carbon-copied universe the particle and you see the particle with another specific value, and that universe also contains a different replica of you. Thus overall, there is no wave-function collapse because when you sum across all universes, the electron takes every possible value.

Everett was an intensely shy man. He avoided discussing his Many-Worlds Theory in public. He went from Princeton to the Pentagon where he worked on game theory, which was applied to nuclear war strategy. Everett created the war strategy called "Mutual Assured Destruction" (MAD), which mandated that any nuclear attack from Russia would be countered by a launch of all nuclear devices from American airplanes, submarines, and missiles. That would provoke a similar attack of Russia on the United States. The idea was that the world would be protected from nuclear war because the leaders deciding to go to war would know that within an hour, they themselves would be dead.

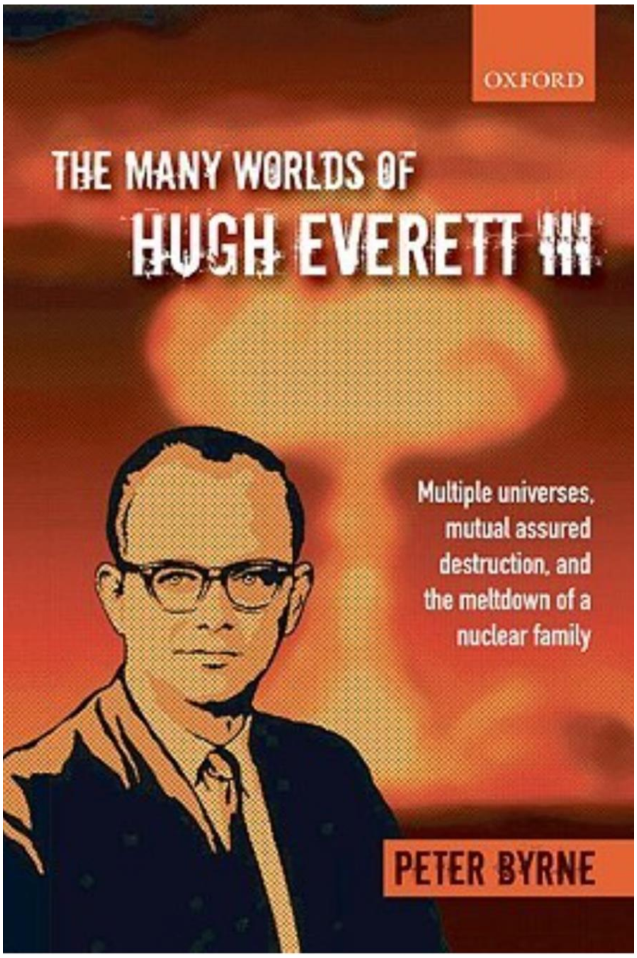

Fig. 8. Everett was an autistic genius, whose children said he was cold and remote, like a piece of furniture sitting at the dining room table, mute. He never touched his children, not even once.

When Everett died at age 51 his family followed his instructions. His body was cremated, and the ashes put out with the household trash at the curb for the garbage truck to take to the town dump.

3.1 TEW refutes the Many-Worlds Theory

The many-worlds theory depends on the assumption that every time you make a measurement on a quantum system you force the system to take one specific value. The assumption is that every particle in the quantum realm is in a superposition with many values, whereas particles in the classical realm are never in a superposition.

The discontinuity between the two realms is a notorious and glaring flaw in QM mathematical theory.

In TEW we deny that is how nature works. We claim that the electron has one specific value **before** it is measured. The universe is incapable of bifurcating when we observe something because nothing changes when we observe something, except that we become aware of the single electron state that had previously already existed.

This is easier to understand for free particles because they have a date of birth and a date of measurement. We claim that such a particle takes its one value when it is born. Therefore, when a scientist later measures it, there is no collapse of the wave-function. This destroys the foundations of the many-worlds theory.

Schrödinger's cat has two futures in superposition, in one of which it is dead and in the other it is alive. Superposition collapse has nothing to do with human observation. The superposition collapses when the cat breathes cyanide and suffers brain death.

In the real-world decisions are made when something decisive happens. You, for example, might be facing two possible futures, in one of which you are married, whereas in the other you are not. The decision is made (i.e., there is "wave-function collapse") at the altar when you make a commitment to your partner, or when you fail to make a commitment. The word "decision" means that you cause wave-function collapse by selecting one future, whereupon the other future becomes unreal, or it becomes a fantasy.

Everyone knows there are forks in the road of life. Everyone knows that when you take one fork, you will never know what your life would have been like if you took the other fork. In their personal lives, even quantum physicists say, "Well, we have to make a decision."

Until you commit, you confront a superposition of future states, one married, the other not. That is why a wedding is a scary and irreversible commitment. After you marry there is only one you, now with a partner, and the other universe "you" vanishes. The unmarried "you" does not peel off into a separate universe. Even if you later get divorced, you will never again be married for the first time.

3.2 Why QM never imagined Elementary Waves

The reason it never occurred to quantum physicists to think that there is no superposition of anything in our universe, is because they observed from experiments that wave interference and other conditions change the outcome data. They did not think those changes could be projected backwards in time to when the particle left the gun. That is because they never imagined Elementary Waves that would carry information from the detectors to the particle source prior to particle emission, which in our model is forwards in time but backwards in 3-dimensional space.

If you allow for the existence of zero-energy Elementary Waves which quantum particles follow backwards, then all the assumptions of the Many-Worlds Theory are refuted. That also means that the quantum realm behaves in a pattern like the classical world, in that decisions are made long before an observation is made.

It is easy to understand this if we consider Schrödinger's cat. According to QM wave-function collapse occurs when humans open the box lid and observe the cat. According to the Many-Worlds Theory there is a replication of universes, and in one universe you exist observing a live cat, while in the other universe a replica of you exists observing a dead cat.

We reject that metaphysics. We say that the decisive moment is when the cat's brain dies from cyanide, long before anyone opens the lid. Our description fits reality as we know it. We deny that the quantum world plays by entirely different rules than the rules we know governing the classical world.

QED. We claim that TEW has refuted the Many-Worlds Theory. But our work is not yet finished, because we still need to build the mathematics of TEW and answer the myriad of questions that our audience asks at this point.

4. Wave-Particle Duality

The reason scientists cannot visualize the quantum world is because of the erroneous doctrine of wave-particle duality. It started in 1907 when Einstein proposed that light could be considered as particles (historically called the "corpuscular theory") or waves, and that both viewpoints were valid.

We propose wave-particle divorce.

When scientists ponder the double-slit experiment, they erroneously think that it proves wave-particle duality. This will be discussed in Section 8 below.

This erroneous idea about the timing and location of wave-function collapse has created mysticism in physics. Hardheaded mathematicians, including John von Neumann the greatest mathematician in early quantum theory, said that human consciousness is interwoven with complementarity. (60)

This mysticism has inspired "healers" such as Deepak Chopra to teach that quantum physics is the road to miraculous medical healing.

Deepak Chopra M.D., born in New Delhi in 1946, is the most influential faith healer in America today, with 2.7 million followers on Instagram. He claims his "quantum healing" can cure cancer. If you improve your attitude and lifestyle, the cancer will go away, and quantum physics proves it. (35)

We will show that quantum mysticism arises from a mathematical error. In the red boxes below, we will present a simple mathematical principle that will explain the PDEs in the double-slit experiment.

The wave-particle duality error led physics down the rabbit hole during the 1920's, when it was said that human observation of quantum phenomena is what made them exist. Those variables that were measurable were called "observables." This led to the creation of a whole scholarly field of mysticism called the "measurement problem".

To reiterate, at risk of being repetitive, the whole puzzle about why human observation is the defining feature of quantum science arises because of the false belief in wave-particle duality, which arises from a failure to recognize the Max Born asymmetry, as we will show.

Historians have blamed the Copenhagen positivism on Ernst Mach. It wasn't his fault.

5. The Max Born Asymmetry Solves the Mystery

If we boil the preceding discussion down to its bare bones, two bones emerge:

#1. QM is the most accurate and productive mathematics humans ever possessed.

#2. QM mathematics cannot answer the simplest questions: is there a coherent picture of the quantum world? Does the quantum world even exist?

Only the Max Born asymmetry explains how those two facts could be true.

Aside from this article, the only solution to this enigma is, "Try not to think about it." Pith your brain the way you would pith a frog in high school biology class.

6. Is there empirical evidence that Elementary Waves exist?

The Purcell effect proves the existence of Elementary Waves. (47,59) It is the enhancement of an atom's spontaneous emission rate by its environment. In 1946 Edward M. Purcell discovered a massive increase in the spontaneous emission rate of Rydberg atoms when they are injected into a resonant cavity. If λ is the wavelength of the emitted photon,

$$\textbf{The Purcell factor} \equiv F_p \equiv \left(\frac{2g}{\Gamma_{cav}}\right)\left(\frac{2g}{\Gamma_{atom}}\right) = \frac{3\lambda^3 Q}{4\pi^2 V} \tag{3}$$

$$g = \frac{\mu}{\hbar}\sqrt{\frac{2\pi\hbar\omega}{V}} = \text{the vacuum Rabi frequency} \tag{4}$$

$$Q = \frac{\omega}{\Gamma_{cav}} = \text{the cavity quality factor} \tag{5}$$

A Rydberg atom (such as sodium, cesium, beryllium, magnesium, or calcium) is heated in an oven, then a laser excites the outer electron to a higher energy state, and the atom is injected into a microcavity. The outer electron will drop to a lower energy level and emit a photon 500 times faster if the cavity is resonant than if it is not.

If the diameter of the cavity is a multiple of $\lambda/2$ then the cavity is the right size for that atom, and we say that it is "resonant" or that it has an "available state" or "mode of the cavity" which is resonant.

The pivotal question is: **"How does the atom know the size of the cavity in which it is located?"** The answer in physics textbooks is that the atom knows because of the "resonance" or because of an electrical image reflected off the walls of the cavity. This is circular verbiage.

Does a quantum wave from inside the atom go outside the atom, survey the environment, and if the environment is inhospitable, the quantum wave goes back inside and tells the electron, “Forget it! Stay where you are.” We don’t think so.

Empirical evidence tells us that information about the diameter of the cavity is transmitted into the atom. This “transmission” involves no transfer of energy. **In this article we will rename the “available state” and call it an “Elementary Wave” that lives inside that cavity.**

When an excited Rydberg atom enters the cavity, the zero-energy Elementary Wave penetrates the atom and triggers the electron to drop to a lower energy state and emit a photon. The photon then follows that Elementary Wave backwards.

QED. The Purcell effect provides empirical evidence for the existence of Elementary Waves.

7. Are there wave-equations that would be compatible with the wave-function –*ψ*?

Most people cannot imagine how a wave equation could describe a particle following a zero-energy wave backwards. This section constructs possible equations. Whether these are the equations used by nature, is unclear.

7.1 A plane wave moving to the left reflects off a quantum particle α

Our one-dimensional model (Fig. 9) says that an Elementary Wave is a zero-energy plane wave that starts at the detector, moves to the quantum particle, and sometimes it reflects off the particle (as if the particle were a solid barrier orthogonal to the trajectory of the wave), and as it reverses directions the wave blossoms from a plane into a Schrödinger wave by methods we will explain.

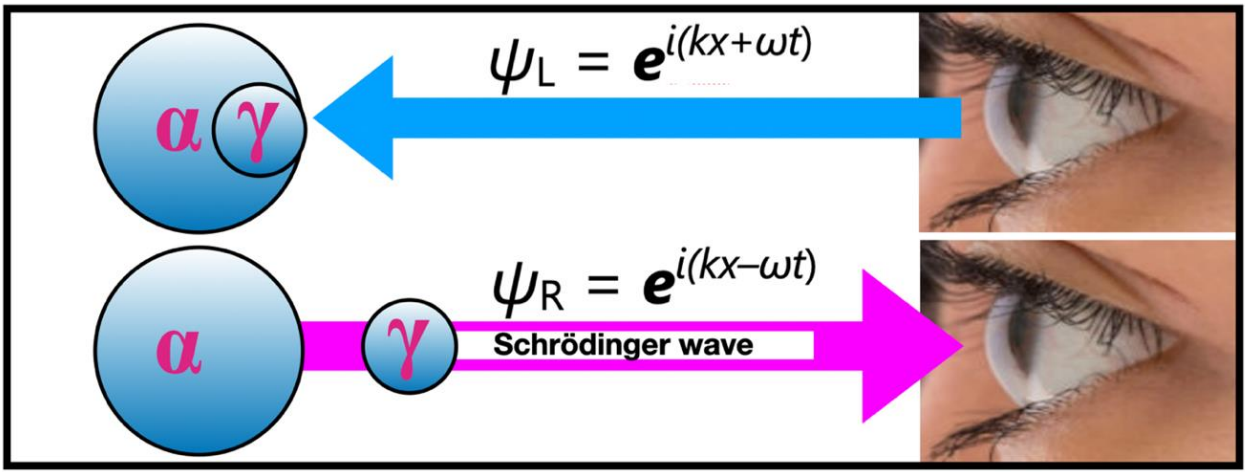

Fig. 9. Top: plane wave ψ_L emanates from your eye (the detector). At particle **α** it reflects and becomes a Schrödinger wave carrying photon **γ** back to your eye. If you close your eye, then ψ_L vanishes.

$$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2} \qquad \textbf{(6)}$$

$$u_{tt} = c^2 u_{xx}$$

Wave Equation

We start with a standard wave equation and set $u = e^{i(kx\pm\omega t)}$ in one dimension.

Our model differs from the behavior of most linear PDEs. Normally you would think that Eq. 6 would have two solutions that are equal but going in opposite directions [to the left ($\psi_L = e^{i(kx+\omega t)}$), and to the right ($\psi_R = e^{i(kx-\omega t)}$)]. That would lead you to think these solutions can be added linearly ($A\psi_L+B\psi_R$) to get another solution.

However, in our model ψ_R is not a mirror image of ψ_L. The wave to the right blossoms immediately from a plane into a Schrödinger wave by methods we are about to describe, and instantly acquires a particle **α** or photon **γ** to carry in its truck bed. ψ_L is incapable of becoming a Schrödinger wave.

Since we cannot simply add the two solutions [$(A\psi_L+B\psi_R)$] in the normal way, therefore we will need to invent another symbol, ***Æ*** as the name of this conglomerate [$A\psi_L+B\psi_R$ + particle (**α** or ***γ***)] in which ψ_L is an ordinary plane wave whereas ψ_R is a Schrödinger wave. In our model, the particle is not simply a wave packet. As we said above, we propose **wave-particle divorce.**

What you call a "wave packet" is changed in our model into a truck bed that can carry a physical particle with weight and momentum. The particle (**α**) is not the same as the wave packet, just like a boulder is not the same as the bed of a pickup truck. In our model the "pickup truck" is devoid of energy. All the momentum and energy are intrinsic to the boulder (particle).

We enfold the Schrödinger equation within other equations that change the meaning and behavior of a Schrödinger equation. In other words, the Schrödinger wave equation in our model is peculiar in its behavior, and you will be surprised at how different our Schrödinger wave equation behaves, than what you would expect. Everyone else thinks of a Schrödinger wave as a straight arrow. We think of it like the letter "J" that starts in one direction, then makes a hairpin turn and folds back on itself. As it makes the "U" turn it transforms from a plane into a Schrödinger wave.

Usually, people think of a Schrödinger wave moving a particle from source to detector. In our model every Schrödinger wave had a pre-history, preceding the movement of the particle. That pre-history started ***before*** the particle left the source. A plane wave ψ_L came from the detector, reflected off particle **α** and metamorphized into a Schrödinger wave ψ_R carrying the particle back toward that detector. If you gloss over the details, that means that ***a particle moves towards a detector because it follows backwards a zero-energy plane wave*** $\boldsymbol{\psi_L}$ ***emanating out of the detector.***

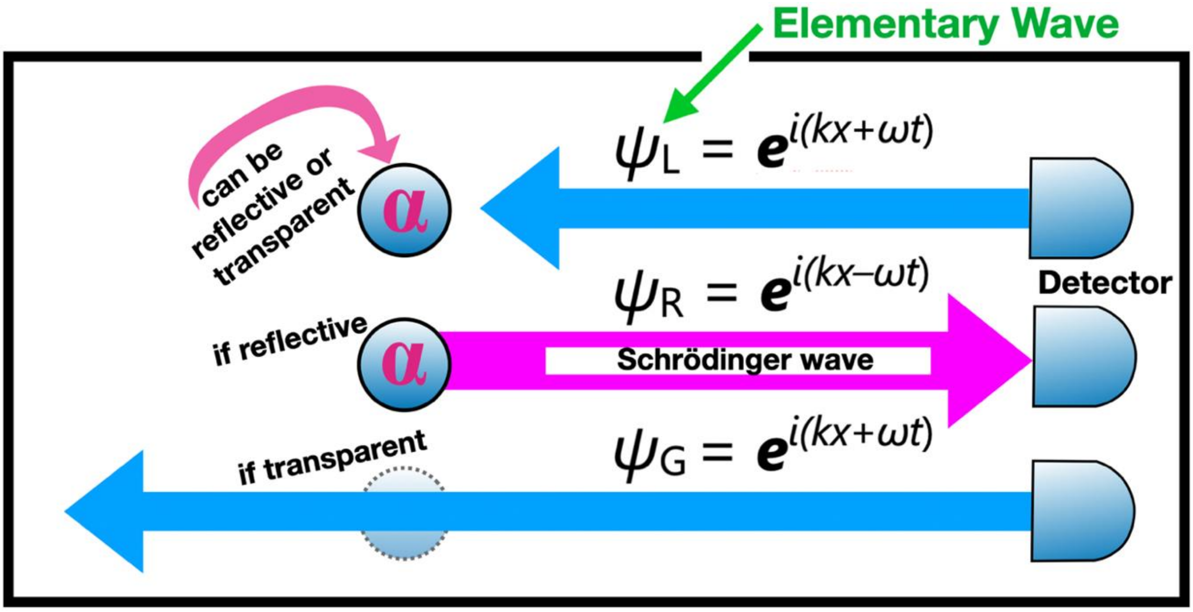

Fig. 10. This is a more complete presentation of our model than was Fig. 9.

The vast majority of Elementary Waves (bottom of diagram) pass through the quantum particle and vanish over the horizon, having no impact on reality. "G" means "ground". The quantum particle makes a random choice whether and when to change from transparent to reflective. When the particle decides to become reflective (middle diagram), the wave ψ_L reflects as if it hit a barrier, and as the wave reverses directions ($\psi_L \rightarrow \psi_R$) it blossoms from a plane into Schrödinger wave by the method described below.

Our model applies only to free particles. Our mechanism does not change how bound particles are understood. The Periodic Table, chemistry, atoms, molecules, biochemistry, and harmonic oscillators are no different with TEW than with garden variety QM. The reason is that if a wave and particle are oscillating in circles, it makes no difference whether they are travelling in the same or opposite directions. We have published articles in the Journal of Advances in Chemistry in which we developed a Periodic Table for TEW. In the TEW world the Periodic Table is based on negative orbitals rather than orbitals. But on a practical level, our revised Periodic Table and the standard QM Periodic Table act the same.

In our model there is only one free particle with no spin and no charge, in no electromagnetic field. Our particle looks and acts like cricket balls or baseball. We are keeping our model as simple-minded as possible. This article would be even harder to understand if we included all the possibilities. For example, this author suspects that not all Elementary Waves are the same. This author suspects there are 17 different kinds of Elementary Waves, one for each particle in the Standard Model.

7.2 How a plane wave moving to the right (ψ_R) blossoms into a Schrodinger wave (ψ_R)

According to our model an Elementary Wave that has reflected off a quantum particle (middle of Fig. 10) blossoms from a plane into a Schrödinger wave. (38)

No energy is required to make this transformation. Both the plane and the Schrödinger waves are zero-energy waves.

We define a few variables

$$\lambda = \frac{2\pi\hbar}{mv} \tag{7}$$

where m and v are the mass and velocity of the particle. We define

$$k = p/\hbar \quad \text{and} \quad p = mv \tag{8}$$

where p is the momentum of the particle.

We define

$$E = \text{kinetic energy} + \text{potential energy} \tag{9}$$

$$E = \frac{1}{2}mv^2 + u = \frac{p^2}{2m} + u \tag{10}$$

Taking the second derivative $\partial^2/\partial x^2$ of the wave function $\psi_R = e^{i(kx-\omega t)}$ we get:

$$\frac{\partial^2\psi_R}{\partial x^2} = \frac{\partial^2}{\partial x^2}(e^{i(kx-\omega t)}) = (ik)^2\psi_R = -k^2\psi_R = \frac{p^2}{\hbar^2}\psi_R \tag{11}$$

$$\hbar^2\frac{\partial^2\psi_R}{\partial x^2} = p^2\psi_R \tag{12}$$

Multiplying both sides of Eq. 10, $\left[E = (p^2/2m) + u\right]$, by ψ_R, we get:

$$E\psi_R = \frac{p^2\psi_R}{2m} + u\psi_R \tag{13}$$

and inserting Eq. 12, we get the **Time Independent Schrődinger Equation** (TISE):

$$E\psi_R = -\frac{\hbar^2}{2m}\frac{\partial^2\psi_R}{\partial x^2} + u\psi_R \ \ \textbf{= TISE} \tag{14}$$

We can now derive the **Time Dependent Schrödinger Equation** by differentiating our wave equation:

$$\psi_R = e^{i(kx-\omega t)} \qquad \text{by } \partial/\partial t\text{:}$$

$$\frac{\partial\psi_R}{\partial t} = -i\omega\psi_R \tag{15}$$

We can substitute that into Eq. 14 (TISE) and that gives us:

We define $E = \hbar\omega$. Multiplying that by ψ_R we get:

$$E\psi_R = \hbar\omega\psi_R \tag{16}$$

$$-\frac{i}{\hbar}E\psi_R = -i\omega\psi_R = \frac{\partial\psi_R}{\partial t} \tag{17}$$

$$E\psi_R = -\frac{\hbar}{i}\frac{\partial\psi_R}{\partial t} = i\hbar\frac{\partial\psi_R}{\partial t} \tag{18}$$

$$i\hbar\frac{\partial\psi_R}{\partial t} = -\frac{\hbar^2}{2m}\frac{\partial^2\psi_R}{\partial x^2} + u\psi_R \quad = \textbf{TDSE} \tag{19}$$

which is the **Time Dependent Schrődinger Equation.**

7.3 Summary of wave equations governing Elementary Waves

In summary, we presented a model based on one-dimensional waves and simple-minded, spinless particles, and we ignored electromagnetism, the strong, and weak forces.

Our model starts with a plane wave (ψ_L) arising from the detector and moving to the left. When it encounters a particle **α** it usually passes through that particle, causing no interaction, and is lost over the horizon (we call it (ψ_G)). However, the particle **α** randomly decides to change from transparent to reflective, whereupon the plane wave reflects off the particle as if it had encountered a solid wall orthogonal to the wave. As the wave reflects off **α** it reverses direction ($\psi_L \rightarrow \psi_R$) and simultaneously blossoms into a Schrödinger wave moving toward the detector. This is the life history of every Schrödinger wave involved with a free particle.

When a free particle strikes a detector, it is following backwards a zero-energy Elementary Wave that emanates from that detector.

8. How can zero-energy waves accomplish anything?

It is widely but incorrectly taught that every wave carries energy. (58)

In the quantum world, such as in Schrödinger waves, no energy is carried by the wave. Quantum equations predict how nature is likely to behave, but they do not push nature to behave in that way.

The Schrödinger wave carries a Hamiltonian operator or a momentum operator, but it carries no raw energy. Neither a Schrödinger wave nor other Elementary Waves can push or pull particles. These waves can do no work.

All energy is carried by particles and is interchangeable with mass. What classical physics considers to be "waves" (such as ocean waves) consists of the movement of particles.

Elementary waves flow in the opposite direction as the flow of energy. Scientists have difficulty wrapping their minds around that previous sentence. If energy flows from "a" to "b" (particle gun to target), then Elementary Waves previously flew from "b" to "a".

8.1 Summary

This article has been exploring the hypothesis that nature might harbor unusual waves that quantum particles follow backwards. We call them "Elementary Waves". We are exploring that idea because we are forced to confront it if we think about the "Born Asymmetry". So far, we have demonstrated that there is empirical evidence that such waves exist (Purcell effect), and that it is conceivable that wave equations could describe such weird waves. We have demonstrated that having zero-energy does not disprove the existence of Elementary Waves.

9. The Double-slit experiment, including an explanation of Complementarity

We are exploring the idea that the Born rule hides a "Born Asymmetry" ($|+\psi|^2 \equiv |-\psi|^2$ = probability). To ponder this, we embarked on a zigzag course of rethinking all of science. If we change our equations from $+\psi$ to $-\psi$ it would not change much about QM. The Standard Model of particle physics and the Periodic Table and chemistry and harmonic oscillators would remain unchanged. The dislocation would be confined to our understanding of free particles, which follow backwards zero-energy waves coming from the detectors. This leads us to confront the double-slit experiment, because it is the most important example of how we think about free particles.

Elementary Waves originate from every point of the target screen in the double-slit experiment.

9.1 The axioms of Elementary Waves in this experiment

The following red boxes give the axioms that govern the PDEs of the double-slit experiment. These rules are counter-intuitive and should be memorized.

Two partial differential wave equations (for Elementary Waves) can be added together iff ("if and only if") they originate from the same point of origin.

All Elementary Waves originating at point "z" are linear (can be added together into a wavefront), but two Elementary **Waves originating from neighboring points of origin ("z_1" and "z_2") cannot be added together: they are allergic to one another.**

This is the key to understanding everything about the Double-slit experiment, especially complementarity, as you will see. It also explains the absence of "plane waves" (Fig. 10).

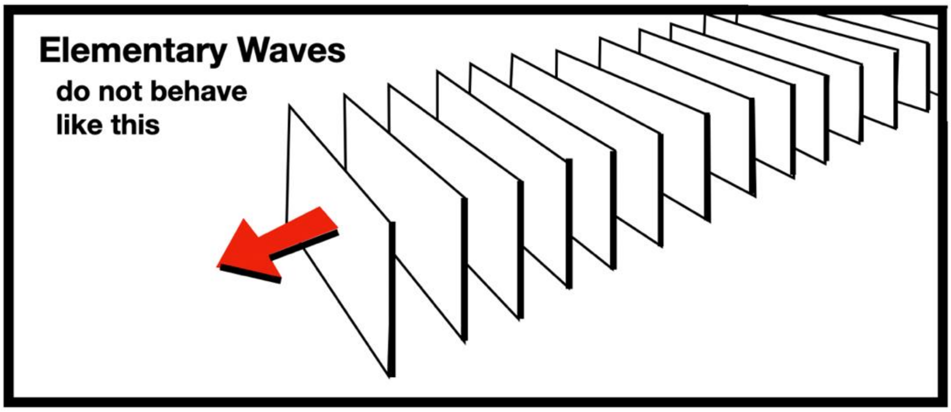

Fig. 11. Even though we call them "plane waves," Elementary Waves do not form a plane (a flat wavefront) marching across the Double-slit experiment with a succession of planes parallel to the target screen. It would be less confusing if we called them "plain" rather than "plane" waves.

By this we mean that partial linear differential wave equations from neighboring points on the target screen ("z_1" and "z_2") cannot be added together: they are allergic to one another.

Each point "z" on the target screen emanates elementary waves in all directions and at all wavelengths. Almost all of them can be ignored. Only the waves moving toward the two slits (A and B) at a wavelength that corresponds to the de Broglie wavelength of the particle that is about to be fired from the gun, are relevant. The linear PDE's governing such waves from a single point "z" can be added together even after they have passed through the two slits. Thus, there is wave interference as they impinge on the gun. This interference pattern of waves moving from the two slits toward the particle gun, is why we have an interference fringe pattern in the final dataset on the target screen.

The particle, sitting in the gun, sees a zillion incoming waves, one from each point on the target screen. The amplitude of the approaching waves is shaped by the wave interference. The particle makes a random decision about which incident wave to follow backwards. **That decision is when wave-function collapse occurs.**

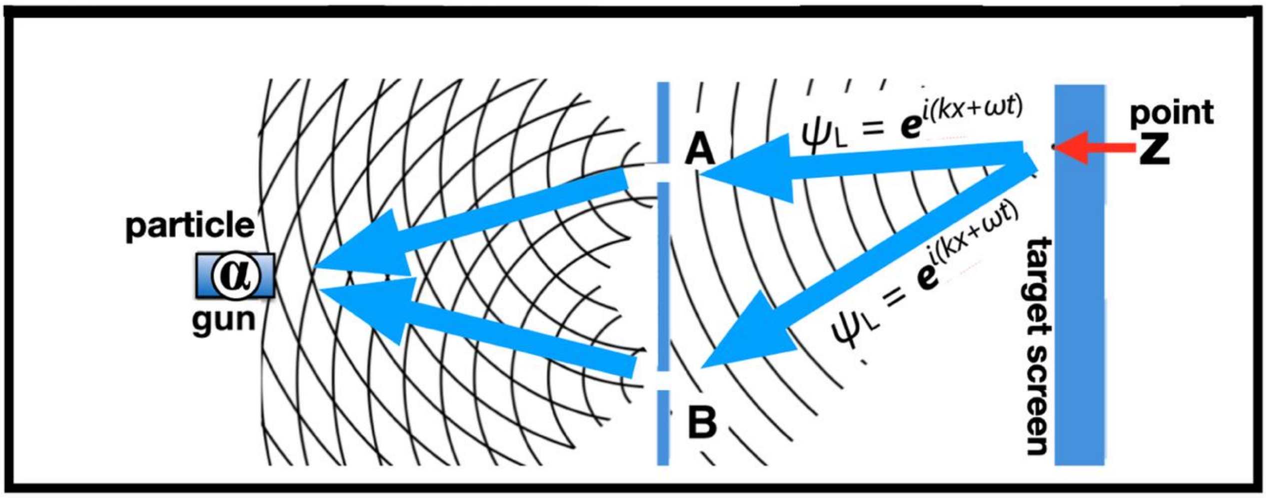

Fig. 12. Blue arrows representing plane waves ψ_L originate at the detector (at point z) and move to the left, impinging on particle **α** (in the particle gun). There is wave interference caused by the two slits. This diagram implies that "point z" is only one of a zillion points on the target screen doing the same thing.

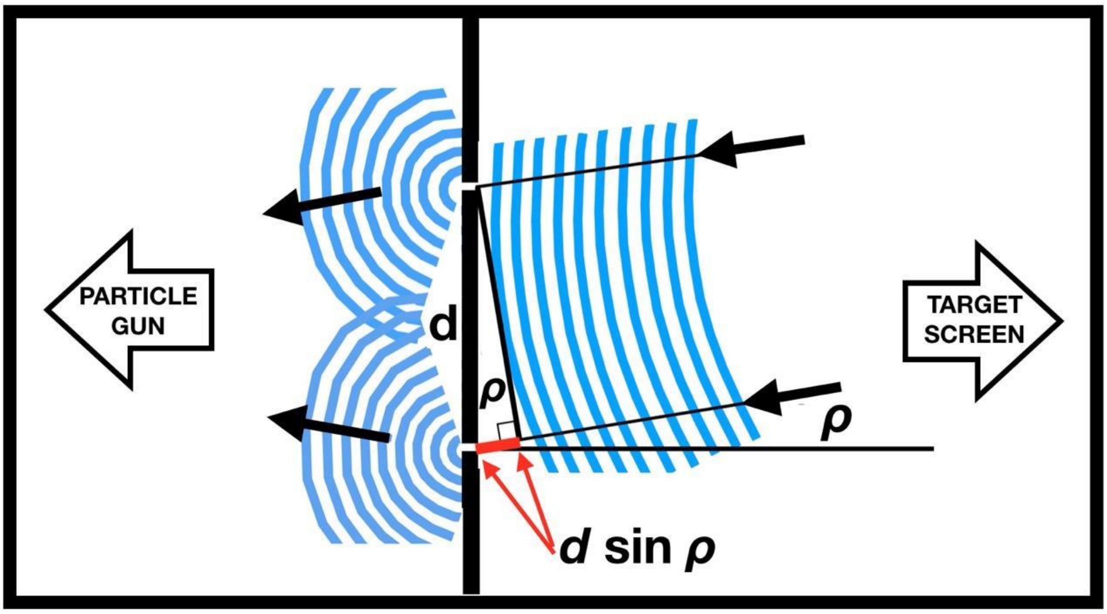

Fig. 13. Thomas Young's equation ($m\lambda = d \sin \rho$); note that the waves are traveling in the opposite direction as what Young assumed.

9.2 Complementarity explained

What does the wave pattern inscribed on the target screen mean? It is a snapshot of the wave interference impinging on the particle gun. In Fig. 14 you see a thicket of Elementary Waves interfering as they approach the particle gun on the left.

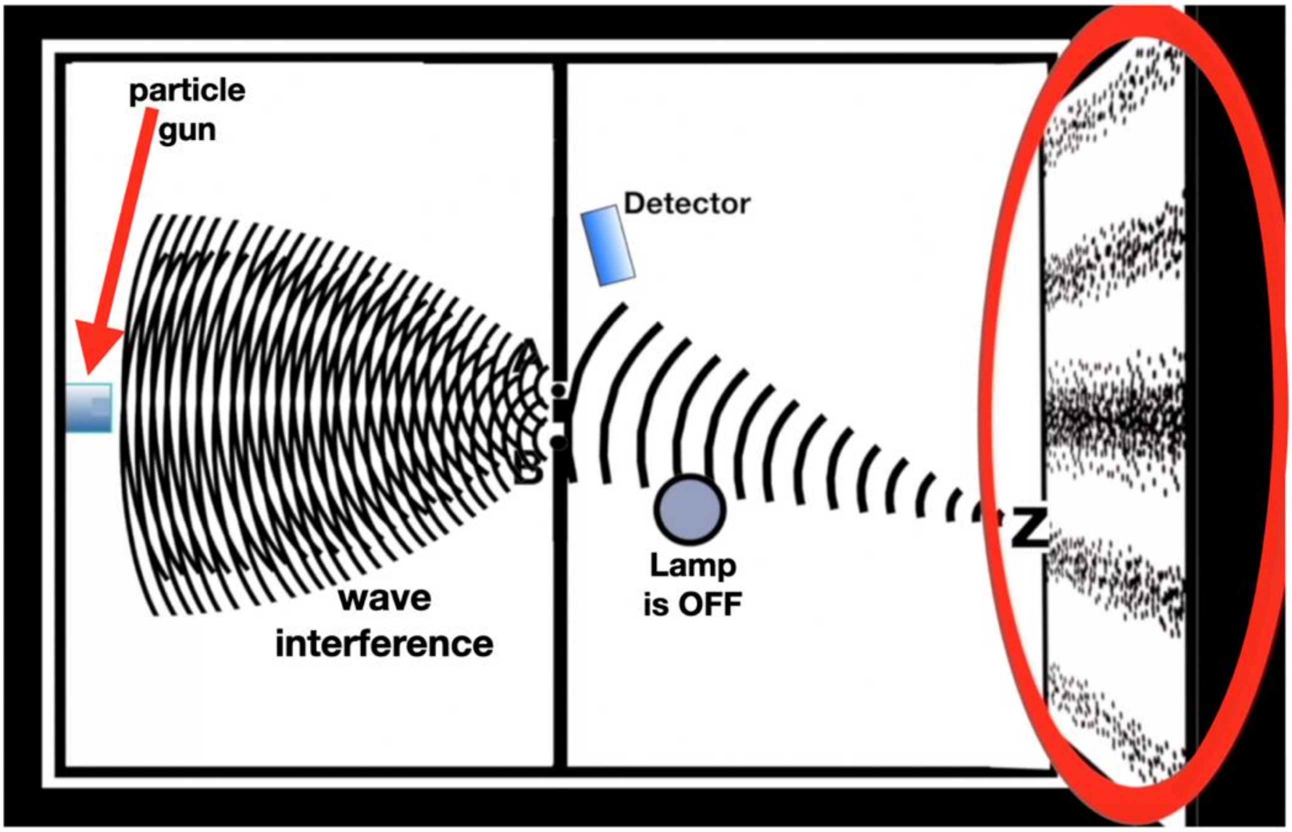

Fig. 14. This diagram of a double-slit experiment shows a robust wave pattern on the right, which is a snapshot of the wave interference impinging on the particle gun (on the left). Although this diagram also contains a "Detector" and "Lamp", the lamp is off and has no affect.

This thicket of incident waves impinging on the gun is portrayed on the target screen as a robust wave pattern on the right (circled in red). Inside this apparatus (in Fig. 14) there is also a small lamp and detector, but the lamp is "OFF" so it has no impact at all.

Complementarity is explained in the two red boxes above. It is a mathematical rule governing PDEs and has nothing to do with human observation. Human consciousness is irrelevant. For that reason, a double-slit experiment would work the same if it were on another planet.

When the lamp is "ON", (Fig. 15) it damages the Elementary Waves as they pass backwards through the two slits. It fries their brains so that they forget that they were all born at point "z". If the lamp is "ON" then the wave travelling to the left through slit A thinks it was born at slit A. It cannot be added together with the partial differential equation for the wave passing through slit B, because the two waves no longer recognize that they are siblings of the same one parent ("z").

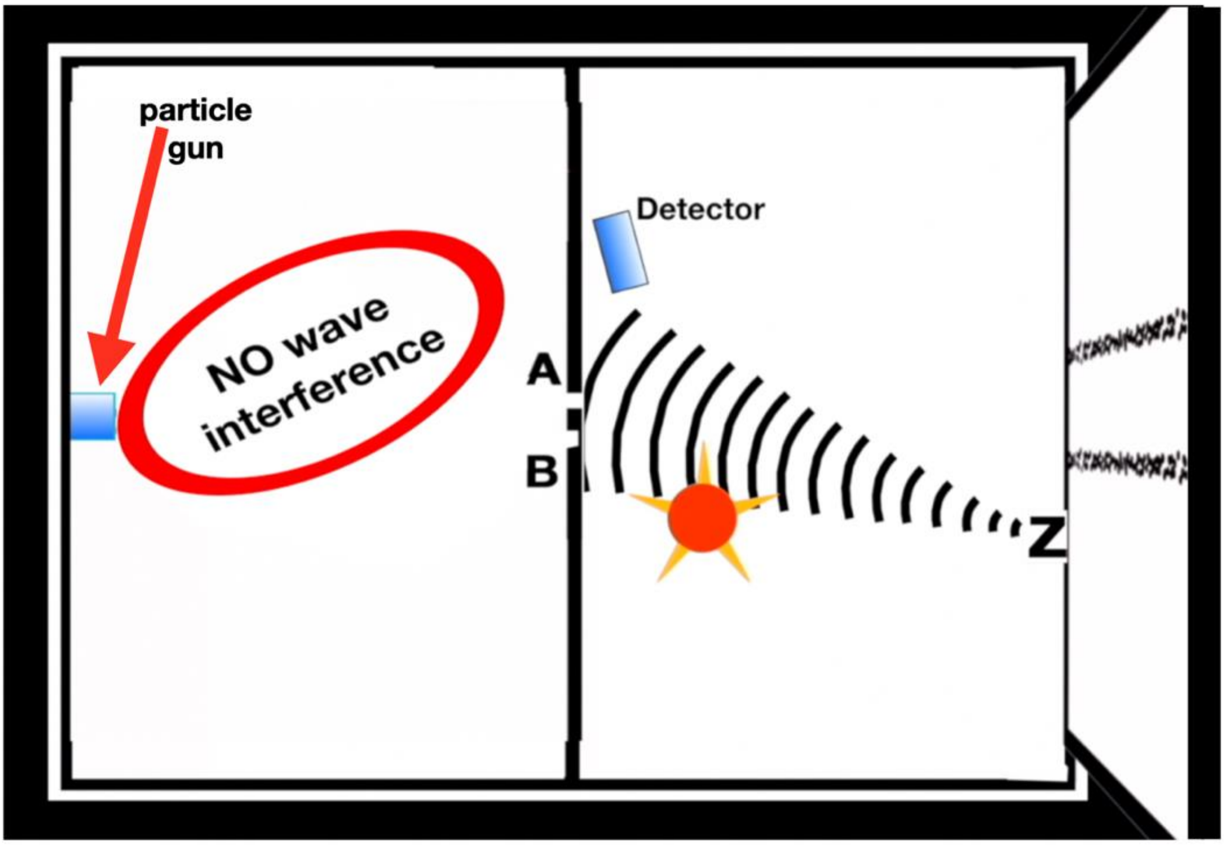

Fig. 15. When the little lamp is "ON" its energy damages the zero-energy Elementary Waves travelling to the left, so they "forget" that they were all born at point "z."

9.3 An experimental design that will produce different results if TEW is true

In TEW all wave interference precedes particle emission, whereas in QM no wave interference precedes particle emission. Therefore, we can use the time when the gun is fired to separate the two expected outcomes.

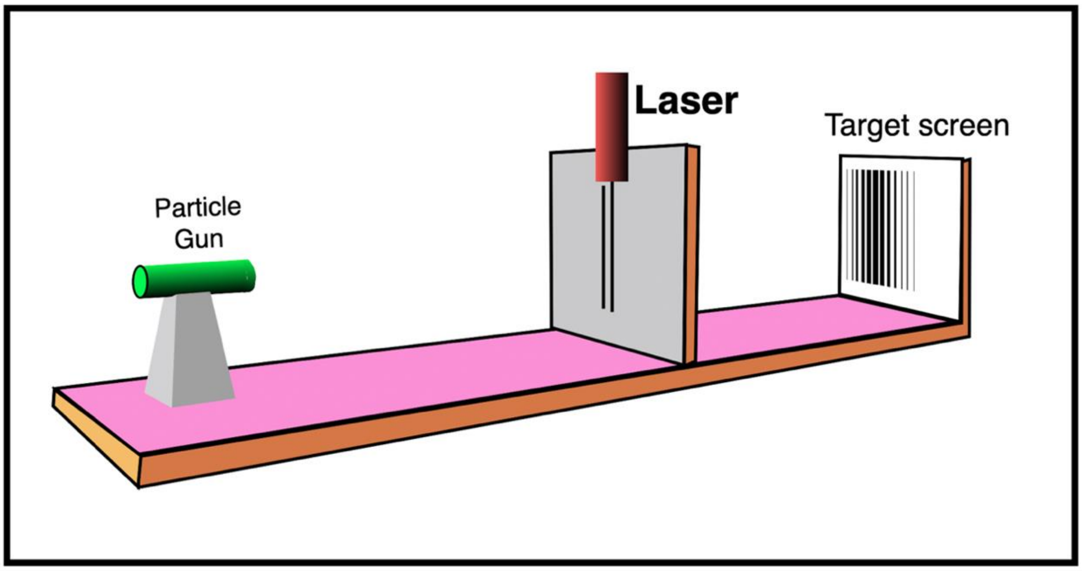

Fig. 16. Experimental design that will produce these results if the waves and particles travel in opposite directions: a wave pattern skewed to the left.

Fig. 16 shows an ordinary double-slit experiment with a laser added atop the right slit. Particles are fired one at a time, after which there is a pause. The laser leaves the right slit open until that nanosecond when a particle is fired from the gun, whereupon the laser fires down and closes the right slit.

If QM is correct there should be only one single vertical line on the left side of the target screen.

If TEW is correct all wave interference has finished before the right slit is closed. Therefore, the wave interference pattern will be embedded in the particles that traverse the left slit. We should therefore see a wave interference pattern skewed to the left.

If this experiment produces the results we predict, it will contradict the doctrine of Complementarity. With this experiment we will know which slit a particle used, AND we will simultaneously see an interference fringe pattern.

We have published other experimental designs that will produce different outcomes depending on which directions the waves travel vis-à-vis the particles.

10. The Bell test experiments

We described above a more advanced and sophisticated version of TEW, which concerns Bi-Rays. So far you have been introduced to the idea that there is always an Elementary Wave lurking in the environment, ready to help us connect a detector to a particle source. Somehow these waves are always available when we need them, always ready to travel in the direction we need and at the wavelength we need.

This implies that everywhere in space there are an infinite number of zero-energy Elementary Waves, travelling in all directions and at all wavelengths. If you think about this, you will discover that it implies that every elementary ray has a mate, which is an identical ray moving co-axially in precisely the opposite direction. We call such a pair a "Bi-Ray". We postulate that quantum particles, such as photons can follow this pair of Bi-Rays, as shown in Figure 17.

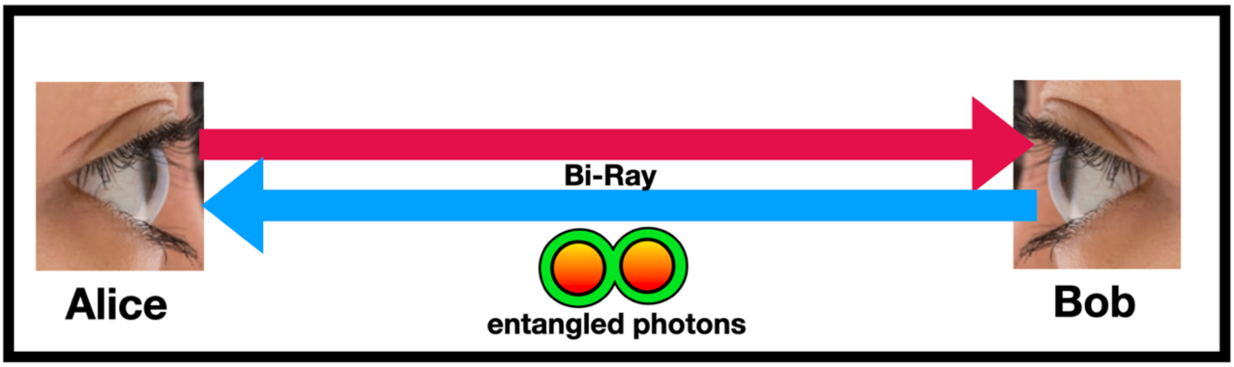

Fig. 17. Two Elementary Rays moving co-axially in opposite directions form a Bi-Ray. A pair of entangled photons, emitted from a Source in the center of this contraption will move in opposite directions, one to be seen by Alice and the other by Bob.

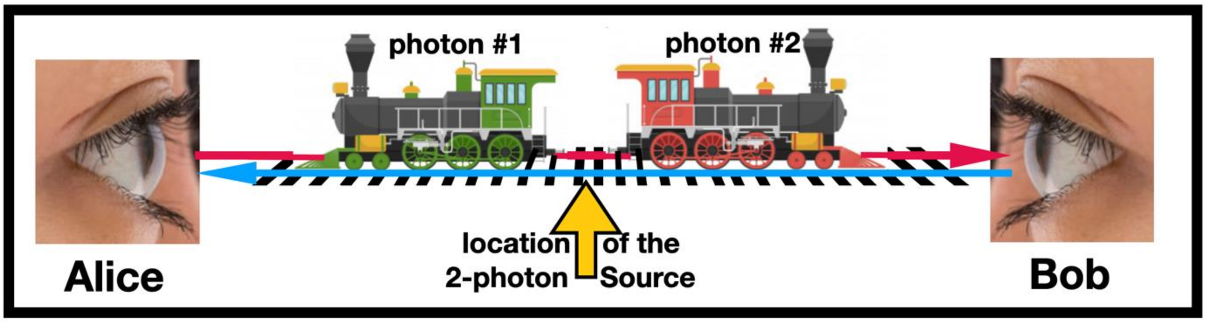

Fig. 18. We need one and only one assumption for the theory of Bi-Rays to explain the Bell test experimental results. The assumption is that the probability of a locomotive following a railroad track is the amplitude of it following one rail, times the amplitude of it following the other rail.

What makes two Elementary Rays, moving in contralateral directions, coherent? It is the photons.

The one and only assumption is that the probability of a photon (shown here as a locomotive) following a Bi-Ray is the amplitude of it following one track times the amplitude of if following the other track. If we make that assumption, then the coincidence rate of Alice and Bob both seeing a photon simultaneously is $sin^2(\theta_2 - \theta_1)$, where θ_n is the angle of Alice or Bob's polarizer.

If we change the 2-particle source so that the photons are emitted orthogonal to one another then the coincidence rate would be $cos^2(\theta_2 - \theta_1)$.

We have published this mathematics often, and we will not reproduce it here.

Given that the Bell test experiments can be explained by the theory of Bi-Rays, there are various reasons for saying that our explanation is better than the QM explanation.

However, when researchers at Innsbruck University conduct Bell test experiments they claim that their research has proved that Einstein's local realism is wrong, QM is correct, and they never mention TEW. Why? Because they never heard of TEW. This is the result of the editors of leading science journals refusing to publish information about TEW.

11. How we see stars?

If we see the world because photons are following backwards Elementary Waves emanating from our retina, then how can we see stars, most of whose photons have already been traveling thousands or millions of years before they reach our retina? We propose that Elementary Rays which those photons had been following dovetailed end-to-end with intervening Elementary Rays which dovetailed end-to-end with Elementary Rays emanating from our retinas. Thus the Elementary Ray issuing from our retina does not need to reach a star on the other side of the Milky Way, 107,000 light-years away. It only needs to reach a short distance to connect end-to-end with another Elementary Ray.

12. Summary

The Born rule implies that nature might contain a corresponding asymmetry: $|+\psi|^2 \equiv |-\psi|^2$ = probability. If there is such an asymmetry, then we would understand nature in a very different way if we switched our wave function from ψ to $-\psi$. This article explores that idea. It is a vast idea and requires us to meander through many different subjects. Nothing in our scholarly training prepares us for how scary and challenging this is. Nothing prepares us for how stupid this makes us feel.

To reiterate, we have been exploring the idea that quantum weirdness may vanish if we switch our wave function from ψ to $-\psi$. What would that mean? It means that wave-particle duality is wrong. Quantum particles follow zero energy waves backwards. We have discussed "zero-energy waves" and showed that this term is not an oxymoron.

When waves and particles are swirling around in tiny ellipses, or when there is a field theory such that there are no particles, it would make no difference whether quantum particles followed waves backwards or forwards. The problem is free particles, where it would make a visible difference. Free particles are only a tiny fraction of QM.

To explore this possibility, we showed there is empirical evidence to support this notion (Purcell effect), and that it is possible to develop wave equations compatible with the idea. We showed how the double slit experiment is better explained by this notion than by wave-particle duality. We told the reader how to find our articles about the Bell test experiments.

12.1 Demolition of the Many-Worlds Theory

Our theory, TEW, has moved the timing and location of wave-function collapse from when a quantum system is measured, to when a quantum system is created. We claim that electrons in the real world are not in a superposition of many different spin values. Rather electrons carry the one spin we observe when we measure them, and they carry that spin long before we measure them. This radical redefinition of wave-function collapse totally undermines the assumptions that led to the Many-Worlds Theory.

We claim that there are superpositions of states, but that is before something decisive happens. By "decisive" we mean that a particle is emitted following one specific Elementary Wave and no other. By "decisive" we mean that you made an irreversible commitment in your marriage vows. You may subsequently get divorced, but your first marriage will always be your first marriage.

When something decisive happens, the "Many-Worlds" of Hugh Everett collapse into one world in which you must live in the future. Everyone knows this is true, except for quantum experts, who believe that the quantum world plays by totally different rules. The problem quantum experts cannot solve is how it is possible that a classical world is built on the foundation of a quantum world, if the two contradict one another. This is the mysticism called the "measurement problem."

The theory of quantum computers is based on the persistence of a superposition of states until an observation is made. In other publications we have developed the TEW theory of quantum computers. (28) This paragraph illustrates why this article is so long and rambling. It is impossible to introduce a paradigm shift without helping the reader with the dozens of questions that arise in the reader's mind.

12.2 Why not ignore the Born Asymmetry?

Given how difficult it is to think about the Born Asymmetry, does it matter? Why bother? Why not just ignore the problem?

That is exactly what science has done for the last century. QM has stumbled along developing elegant equations and fabulous gadgets, even though we are lost inside a labyrinth.

We know how to talk in equations. But when a student asks, "What does that equation mean?" We say, "This is the goose that laid the golden egg; don't question the goose."

So, the answer is, "No, we don't need to confront the Born Asymmetry." But it is possible that thinking through the Born Asymmetry could lead to a renaissance of science and technology that would be a godsend to our grandchildren. You never know.

12.3 Request addressed to the Reader

Finally, the author has a request from the reader.

If the reader thinks there is merit in this article, we request that you send an email to the author, volunteering to serve as an anonymous reviewer for a scholarly journal, including the reader's name, email address, and academic credentials. If the author does not respond, assume he is overwhelmed, and do not stop knocking at the author's door until he answers.

The author is unable to get American journals to publish his ideas because he is not well-connected. He is an outsider. When new scientific ideas are published in America, it is because they are submitted by someone who is well-connected. If the submitted article contains bizarre ideas, the editor asks for the name, email address and academic credentials of several potential reviewers who can evaluate the quality of the work and advise the editor whether to publish.

When this author submits articles to American academic journals of physics and mathematics, he is unable to provide the editor with the names of several potential reviewers. The result is that in America the editors take one look at our work, arrive immediately at the thought, "This is garbage! We are not going to risk the reputation of our journal on some dingbat article that no one will vouch for!" And with that, the editor rejects the article within 15 minutes.

The volunteer needs to commit to providing an instant response if an American journal editor asks for a review, like within 24 hours or so.

Editors of Council for Innovative Research journals are also invited to serve as blind reviewers for scholarly journals located in America or Canada. Think about it. It is in the interest of the Council for Innovative Research to support this author's efforts to publish his ideas elsewhere. Everyone would say, "Amritsar was the first to recognize this as valuable."

Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this article.

YouTube videos

This article is replicated (without the mathematics) in a YouTube video that the author posted on May 30, 2022, on the playlist "What does Einstein think of your smartphone?" The video has a title, "Einstein's asymmetry topples the Many-Worlds Theory" or "The Max Born asymmetry topples the Many-Worlds Theory". The video is about 15 minutes in length, amusing, and crafted to appeal to teenagers who abhor mathematics. The author's YouTube channel is "Dr. Jeffrey H. Boyd".

Author Biography

The author lives in Connecticut, USA. He has graduated with diplomas from Harvard, Yale, Brown, and Case Western Reserve Universities and has been trained in mathematics, theology, medicine, psychiatry, and epidemiology. He is ordained as a priest in the Episcopal Church of the United States. As a physician (medical doctor) he has worked and taught in many settings, including as an epidemiologist on the faculty of the National Institutes of Health in Bethesda, Maryland, USA. He has never taken a physics course, not in high school, college, nor in graduate school. For half a century he worked as an M.D. psychiatrist. In 2020 he retired and has devoted himself to TEW and making YouTube videos. The author learned about TEW and Bi-Rays from his cousin Lewis E. Little. That cousin did the hard work, this author added bells and whistles.

Jeffrey H. Boyd (wearing a suit and tie) is the second from right, at Gurudwara Sachkhand Darbar, Hamden, CT, USA. Everyone is masked because of the COVID-19 pandemic.

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