

## The Rope Hypothesis

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### Abstract

The wave model of light was born in the 17<sup>th</sup> Century and was quickly abandoned in favor of the old Corpuscular Hypothesis on the strength of Newton's authority. It flourished again in the 19<sup>th</sup> Century only to be eclipsed once again by the Corpuscular Hypothesis at the turn of the century. The participants at the 5<sup>th</sup> Solvay Conference reached a compromise in 1926 and finally merged the wave and the corpuscle into an unfathomable concoction known as 'wave-packet'. This is the official model today, but now it rests on the authority of Niels Bohr. However, the Wave-Packet Hypothesis is not about architecture. The mathematical establishment has turned the argument upside down and incongruously states that light 'behaves' as a wave or as a particle depending on the circumstances. There is, therefore, no formal physical configuration of light in Mathematical Physics that a theorist can challenge. Many in the establishment even argue that a mediator is unnecessary and dispose of one entirely in their talks. We compare the wave, particle, field, and wave-packet models championed by Classical Mechanics, Quantum Mechanics, and General Relativity against the Rope Hypothesis to underscore that a new paradigm has emerged in the centuries-old debate.

Keywords - wave, wave-packet, Quantum Mechanics, electromagnetism, Rope Hypothesis, Thread Theory, EM rope, Mossbauer Effect, field, charge, energy

#### I. A BRIEF HISTORY OF WAVES

The history of light has been a monologue of the Particle Hypothesis interrupted at times by the wave model. Hooke was the first to formally propose waves as a mediator of light in 1665.<sup>1</sup> Huygens expanded on Hooke's hypothesis in his tête-à-tête with Newton, modeling light as ripples on the surface of the waters.<sup>2</sup> Yet, it would be the ancient Corpuscular Hypothesis which would continue unchallenged until the 19<sup>th</sup> Century, primarily on the authority of Newton.

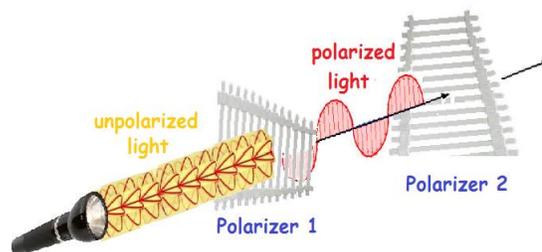
In the early 1800s, Young and Fresnel began the process of debunking the Particle Hypothesis via the seminal double-slit experiment, a behavior that could only be explained with waves.<sup>34</sup> Fresnel would reinforce the growing enthusiasm for waves (and parallel abandonment of the Particle Hypothesis) when he simulated polarization using transverse vibrations, a mechanism that is still simulated using a 'picket-fence' analogy (Fig. 1).<sup>5 6</sup> In 1820, Oersted discovered that an electric current generates a magnetic field.<sup>7</sup> A few years later, Faraday found that an oscillating magnetic field generates an electric field.<sup>8</sup> Maxwell synthesized these findings and gave the final touches to the electromagnetic (EM) wave that we have today.<sup>9 10</sup>

In the 20<sup>th</sup> Century, the mathematical physicists merged the corpuscle and the wave into an unimaginable concoction known as the *wave-packet*. This compromise followed Planck's insight that light appears to propagate in the form

of discrete packets of 'energy' which today are known as quanta.<sup>11</sup> However, wave behaviors of light could not be ruled out. The particle could not simulate observations such as Young's slit experiment and polarization, and it was unthinkable to dismiss Maxwell's entire life work. The mathematicians declared a truce and reached a compromise synthesized in Bohr's Complementarity Principle. The argument is no longer that light *is* a wave-packet (Fig. 2), but that light *behaves* at times as a wave and at others as a particle.<sup>12 13 14</sup>

Fig. 1 Fresnel's picket fence explanation for polarization

The incident beam of unpolarized light is filtered through a calcite slab which only allows the vertical component of light to go through. The horizontally oriented slab extinguishes the beam altogether.



Today, no one in the mathematical establishment is researching or brainstorming or even interested in what the mediator of light looks like anymore. No one is investigating this issue or investing funds to research such matters. The theorists simply assume that light consists of a flow of particles and use the wave model to explain certain annoying aspects that they cannot explain with corpuscles.

Fig. 2 The eyebrow-raising ‘wave-packet’

*Frustrated that they are unable to visualize the mediator of light, the mathematicians represent their beloved wave-packet with a cork-screw pierced by an arrow. The wave-packet is a predictable result of Bohr’s Complementarity, a ‘principle’ that emphasizes behavior and ignores architecture.*



## II. ‘WAVE’ AND ‘FIELD’ ARE NOT OBJECTS

The first step of the Scientific Method requires that a physicist introduce the objects with which he intends to explain the mechanisms embodied in his theory. A theorist’s inability to begin his presentation by illustrating the entities that will mediate phenomena such as the Photoelectric and Compton Effects (where a photon physically interacts with visible matter) violates the Golden Principle of Physics and takes his entire dissertation right out of Science...<sup>15 16 17</sup>

### The Golden Principle of Physics

*Physics requires an object. Physics cannot be done without an object.*

What would there be to study in a Universe devoid of objects? What would a researcher handle in the lab? What phenomena would take place? What motion would there be? What would there be to observe? To quote James Maxwell:

*“The most obvious mechanical phenomenon in electrical and magnetical experiments is the mutual action by which bodies in certain states set each other in motion while still at a sensible distance from each other... theories assume, more or less explicitly, the existence of substances the particles of which have the property of acting on one another at a distance by attraction or repulsion... We have therefore some reason to believe... that there is an aethereal medium filling space and permeating bodies, capable of being set in motion and of transmitting that motion from one part to another”<sup>9</sup>*

If an object is required to do Physics, we must establish unambiguously what we mean by *object* for the purposes of the discipline.

*object: that which has shape*

A theory of Physics is a motion picture, a film of how the proponent thinks a phenomenon happened.<sup>15 16 17</sup> Therefore, a theorist cannot avoid illustrating the objects that will play a relevant role in his theory. Every frame in the film must have an image in order for the audience to follow the plot. Any attempt to elude this requirement renders a theory of Physics unintelligible.

The scientific definition of the word *object* summarily sweeps aside the 19<sup>th</sup> Century transverse wave as well as the 20<sup>th</sup> Century wave-packet in one stroke. A flag may be said to wave. Ocean water may be said to wave. It cannot be said that ‘a’ wave waves. There is no physical entity called ‘wave’ because the word *wave* is a verb. Vibrations and other undulating motion must necessarily be mediated by physical entities. Otherwise, the theorist is tacitly filling in the blanks with spirits.

Yet, many professional ‘physicists’ and sites promote the startling notion that light is a vibration of nothing...

*“Electromagnetic waves differ from mechanical waves in that they do not require a medium to propagate.”<sup>18</sup>*

*“The idea that there had to be a medium for electromagnetic waves was the single most reactionary preconception that slowed down 19th century physics... it made sense to have a wave that wasn’t the motion or jiggling of some physical medium”<sup>19</sup>*

Those theorists who are uncomfortable with the lack of a medium believe, rather, that they’ve solved the problem by substituting ‘nothing’ with a mediator they refer to as ‘field’. They argue that the medium that is vibrating is the electric and/or magnetic *field*...

*“The correct answer is, the light is the field... I would say the electromagnetic field is the medium... the electromagnetic field oscillates... If nothing oscillates there are no waves”<sup>19</sup>*

*“An electromagnetic field (also EM field) is a physical field... The electromagnetic field extends indefinitely throughout space... the electromagnetic field can be regarded as a smooth, continuous field, propagated in a wavelike manner...”<sup>20</sup>*

Indeed, it is Maxwell who proposed over a hundred years ago that the electromagnetic ‘field’ was the mediator of light.

The fatal problem with the ‘field’ is that even Maxwell, as well as others, made clear that the word *field* does not

qualify as an object for the purposes of Physics. ‘Field’ is an abstract concept that means *region*:

“The electromagnetic field is that part of space which contains and surrounds bodies in electric or magnetic conditions.”<sup>9</sup>

“a field is a physical quantity... a value for each point in space and time”<sup>21</sup>

“A magnetic field is a picture that we use as a tool to describe how the magnetic force is distributed in the space around and within something magnetic... magnets have two poles and that depending on the orientation of two magnets there can be attraction (opposite poles) or repulsion (similar poles). We recognize that there is some region extending around a magnet where this happens. The magnetic field describes this region.”<sup>22</sup>

Therefore, whenever we see the word ‘field’ we must simply replace it with the term ‘region’ so as not to mislead anyone. It instantly becomes apparent that ‘a’ *region* cannot cause physical effects. ‘A’ *region* can neither interact with atoms nor induce matter to vibrate, among other reasons, because a region is always of something else.

Last but not least, the ubiquitous ‘particle’ of Quantum Mechanics also fails to qualify as an object. It lacks the property that would allow it to be listed as one: shape. Theorists do not think of the photon as a tiny spec of dust. They propose rather that the photon is a zero-dimensional (0D) ‘point’ particle with no mass.<sup>23 24</sup> The photon is officially described and presented as a non-entity. In Physics, however, there is no object that is zero-dimensional or infinite. Therefore, those who illustrate the photon as a flying dot to simulate phenomena such as the photoelectric effect and the double-slit experiment are not representing the 0D point ‘particle’ championed by Quantum. If, on the other hand, the heretic alleges that his photon is a 3D ball, firstly, his proposal is inconsistent with the Quantum catechism. Secondly, this photon is unable to simulate any of the behaviors observed in the lab unless he invokes magic.

The task of a physicist is to discover the invisible entity that mediates light. The Golden Principle of Physics rejects *wave*, *field*, and *0D particle* and demands instead a genuine object before the theorist is allowed to present his theory. That’s what we intend to do here. We will propose an alternative to particles, waves, fields, and wave-packets that can simulate fundamental architectural and behavioral properties of light and the atom.

### III. QUANTUM’S PLANETARY ATOM

Mathematical physicists also find it difficult to illustrate the simplest of all atoms. Quantum Mechanics maintains that the invisible subatomic world is entirely comprised of discrete

particles. The Standard Model synthesizes the official version of how the subatomic world looks (Fig. 3).<sup>25</sup> This model proposes that the electron is a discrete elementary particle: a ‘point’ bead. The electron is conveniently *both* infinitesimal and 0D, having and lacking shape simultaneously. The proton is also portrayed as a discrete corpuscle, but it is not a member of the chart because it is allegedly comprised of three ‘point’ quarks: two up and one down (Fig. 4). Thus, the hydrogen atom consists of a 0D electron bead that orbits a proton bowling ball made of three 0D ‘particles’ (Fig. 5). What is there to illustrate?

Fig. 3 The Standard Model of Particles of Quantum Mechanics

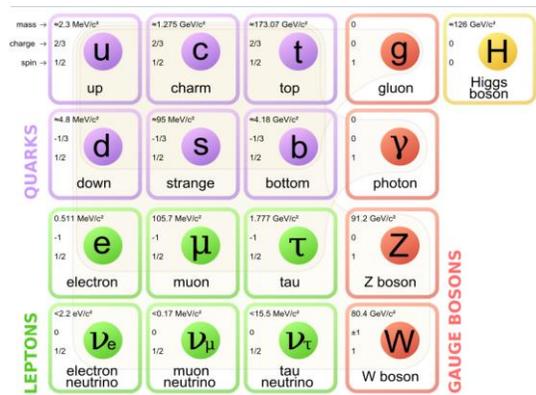


Fig. 4 The proton: two up and one down 0D ‘point’ quarks bound by springs (blue). We arbitrarily illustrate these quarks as 2D projections of 3D balls for else there would be nothing to see. Each spring is a gluon. However, Quantum theorists never justify or have any use for the interconnecting springs. The theory is that gluon particles are ‘exchanged’. Quantum has yet to rationalize how exchanged units generate attraction.

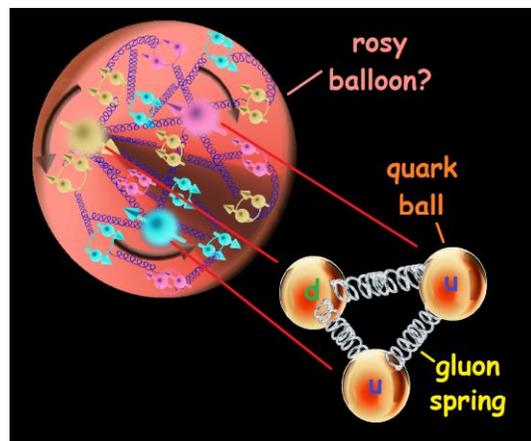
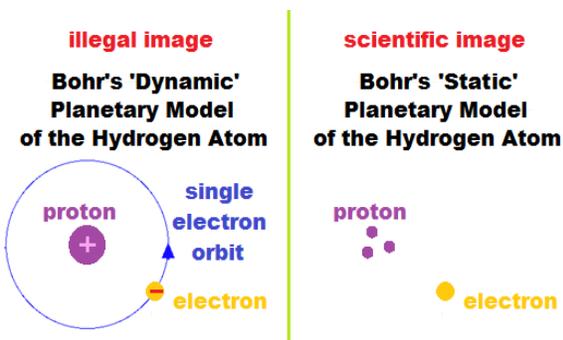


Fig. 5 A picture of a movie

Quantum presents a dynamic model of its planetary atom. The electron is shown circling a proton. Plus and minus signs are added to illustrate that the particles are 'charged', introducing yet more activity into the picture. The Quantum atom is motion within a photograph: a statue that moves. All this is illegal in Science because by definition an object is 'that which has shape' (a static concept). It is surrealistic to present an object with a line representing motion in a static image. Do we perchance present a cow with a squiggly line representing its itinerary? Can a cow be depicted without movement? In the figure on the right, we remove the surrealistic orbit and math signs and replace the proton with three quarks.



The official version of the hydrogen atom fails because the illustrations of the sub-structures have nothing in common with the physical interpretations of the equations that purport to explain them. The proton is illustrated as three quark balls interconnected by gluon springs (Fig. 4).<sup>26</sup> However, the discussion never alludes to or has any use for these springs or explains how the gluon springs are attached to the quark balls. The springs give the misleading impression that there is a permanent connection between quarks. The theory explains instead that gluons move around, speed up, break up, recombine, and *interact* with the quarks.<sup>27 28</sup> The theory is that the *exchange* of gluons holds quarks together.<sup>29 30 31</sup> In fact, the reason Quantum has failed to incorporate the graviton into the Standard Model is that theorists find it rather difficult to explain the force of pull (attraction) with discrete corpuscles.<sup>32</sup>

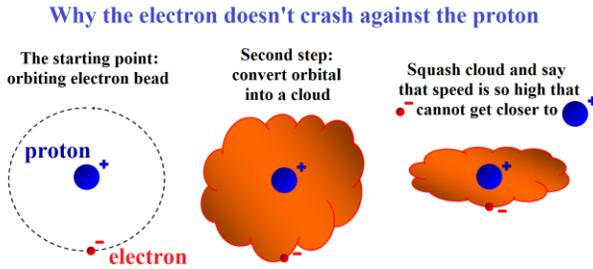
It is furthermore self-evident that any way we wish to place three marbles they never end up forming a sphere, and Quantum does not propose that they do. What the theorists do instead is encapsulate the quark balls in a balloon (Fig. 4). This enclosure is never identified or justified. It is not a physical membrane. The skin of a nucleon is a *region* in which the gluon-quark soup is mysteriously trapped. When we remove this gratuitous eggshell, there is no impediment for the gluon springs to fly out of the nucleon. It is then that the reason the theorists placed the artificial balloon becomes apparent.

The electron is said to be negative and the proton positive, but neither designation gives us insight into the physical mechanism of attraction. Notwithstanding this shortfall, it escapes intuition to rationalize what prevents the electron from crashing against the proton. The theorists begin their answer to this question by converting their circular orbit into a spherical region around the proton in which the electron bead may be found. Essentially, they describe a fish wading in the center of an ocean. This 'cloud' model of the electron does not refer to the electron bead itself, but to the atmosphere that encapsulates the proton like bees around a hive.<sup>33 34</sup> From then on the theorists go back and forth between the cloud and the bead, so one must be careful not to lose track of which of the two they are referring to. The theory is that as it is drawn by the proton, the electron *bead* gains speed (kinetic energy) at the expense of distance (potential energy). The 3D *cloud* in which the bead swims becomes narrower or smaller, depending on the theorist. However, since a cloud can only squash so much (for unknown physical mechanisms), at some point the speed of the electron bead is so fast – presumably around the proton – that it cannot overcome the remaining distance to the nucleus (Fig. 6). This is the compression limit of the cloud and a measure of how close the electron bead can approach the proton.

Of course, these interpretations are no more than qualitative extensions of the mathematical description. Saying that kinetic energy is increased at the expense of potential energy is not a mechanism. This description fails to identify the physical object that is coming in contact with the skin of the electron bead and blocking its plunge into the center of the atom. If the theorist now converts the electron back into a diffused wave (the cloud itself) to defend Quantum theory, then the entire discussion loses all meaning. Is the cloud itself speeding? What is the distance between the cloud and the proton if the cloud encapsulates the proton? It is this back and forth word-wizardry that allows Quantum to get away with its eye-popping 'explanations'. Theorists can always repeat in the end what Feynman said half in jest: "...nobody understands Quantum Mechanics."<sup>35</sup> The icing on the cake is that during the phenomenon known as *electron capture*, the electron does indeed overcome distance and spontaneously crashes against the proton.<sup>36</sup> Both 'particles' merge and convert into a neutron (Fig. 7).

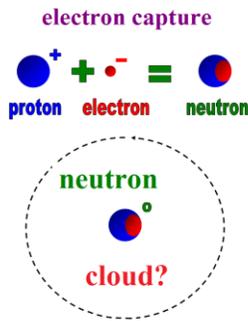
A more fundamental structural problem with the entire Quantum proposal is that the hydrogen atom has a single electron. How did this single bead disperse and become a cloud? By what physical process? What the theorists have done is cover all the bases by making the electron 1) a point particle, 2) a 'wave' that extends in integral segments around the proton,<sup>37</sup> and 3) a cloud that encapsulates the nucleus. The Quantum electron is a bead, a hula hoop, and an egg shell all in one! Of course, such a proposal is difficult to justify or to challenge.

Fig. 6



whenever we look at an electron, we always find a whole point-like particle here or there, never something spread out into a ring... the electron is a particle, but one that does not definitely exist here or there at any instant of time. It has an indefinite position that is spread evenly around its orbit... At any instant of time the electron could potentially be found anywhere in its orbit, and so, while not literally so, it is effectively spread out into a rotating ring... In essence, the electron is a particle that behaves as if it is in many places at once!"<sup>39</sup>

Fig. 7 Inverse Beta Decay



In other words, the so-called ‘particle’ of Quantum Mechanics is a misleading word. The word *particle* means ‘discrete little ball’ to ordinary laymen. Everyone thinks of ‘particle’ as a tiny 3D corpuscle. This is not what the Quantum theorists are talking about. The official stance is that the electrons (as well as the quarks and gluons) that form the atom cannot be imagined, let alone illustrated, because of various reasons:

Quantum theorists parry these objections to their theory stating that a particle is not really a body and that therefore it is futile to attempt to illustrate electrons and atoms. They advance two arguments in support of this assertion:

- a. The electron is a promise. It hasn't *happened* yet. The electron is a probability, a mathematical function, both a noun *and* a verb.
- b. The electron never stops moving.
- c. It cannot be established where the electron is until it is there.
- d. The electron is everywhere at once: a cloud.

1. The planetary model depicted in Fig. 5 does not represent its official version of the atom. The Quantum H atom cannot even be imagined because protons and electrons are not objects, but rather ‘possibilities’ – potentials rather than actuals. They are not things like *rocks*, but verbs such as *run* and *swim*... These verbs magically morph into rocks only when observed and/or measured...

If the electron is not a particle in the normal sense of the word, if it is rather a ‘probability’ or ‘potential’, it simply does not qualify as an object for the purposes of Physics. The theorist cannot begin his presentation about ionization or electricity by pointing to a ‘probability’. What image is he going to put on the screen? Nevertheless, ‘probability’ is irrelevant to the question of structure. The inability to pinpoint the exact location of an electron is out of topic. We are not asking, ‘*where* is the electron located?’, but ‘*what* does it look like?’

“The fact that quantum systems, such as electrons and protons, have indeterminate aspects means they exist as possibilities rather than actualities. This gives them the property of being things that might be or might happen, rather than things that are. This is in sharp contrast to Newtonian physics where things are or are not... It is important to note that the superposition of possibilities only occurs before the entity is observed. Once an observation is made (a position is measured, a mass is determined, a velocity is detected) then the superposition converts to an actual.”<sup>38</sup>

Alternatively, if the theorist presents the electron as a diffused cloud that encapsulates the proton, this proposal cannot be reconciled with either the ‘probability function’ or the discrete bead. It is dishonest and deliberately misleading to use the word ‘particle’ to refer to a ‘probability function’ or to a cloud, more so when some claim to have filmed electrons and atoms.<sup>40 41 42</sup> Is it a cloud or a bead that is speeding? Is an electron a dispersed cloud or is the cloud the region where we can find an electron? Does hydrogen have many beads or one bead in the region around the proton? Is the cloud an orbital or an encapsulating balloon? What does the speed of the bead and its inability to approach the proton have to do with the cloud or the orbital region? The duplicitous word ‘particle’ enables the theorist to go back and forth. The theorist treats the word ‘particle’ as a 3D ball to explain phenomena such as ionization and electricity. On

2. The electron never stands still... or worse... the electron is alleged to be at many places at once:

“common sense leads us to a model of the atom—and hence rocks, trees and people—that cannot exist in our universe! So what does an atom look like? Clearly, an atomic electron can't stand still...

the other hand, when fundamental structural questions are raised – such as why the electron doesn't fall into the nucleus – the theorist denies the corpuscular nature of the electron and argues that the authentic, college-level notion of 'particle' is a bit 'more complicated'. It is the constant manipulation of the electron from particle to cloud to 'probability' that renders the physical interpretations of Quantum Mechanics suspect.

However, the arguments with which theorists shield their atom suffer from a more fundamental flaw: in Physics, *object* precedes *motion*.<sup>43</sup> We must have a noun before we can place a verb in a sentence of Physics. Only objects can perform actions. It is irrational to propose that there is movement without an object. Nevertheless, all matter in the Universe is in motion. A dog is always moving. It breathes even when it sleeps. Does this prevent us from illustrating a dog? Hence, the theorist cannot talk about 'speeding' or 'kinetic energy' of an electron without an electron. He needs to provide a standalone image of an electron before he moves it or talks about locating it. If the theorist converts the particle into a cloud, the physical mechanism of this metamorphosis must be included in the manuscript.

From a dynamic standpoint, Quantum also offers no explanation for why the electron bead jumps back and forth between energy levels during Bohr's Quantum Jump (*Fig. 8*).<sup>44</sup> What entity pushes and pulls the discrete marble back and forth? Without a physical object mediating the transaction, the mathematician is in effect introducing spirits and magic in that space.

The reality is that a quick Internet image search of the word 'atom' *only* shows the thoroughly debunked Rutherford–Bohr planetary atom.<sup>45,46</sup> The planetary model is also the one illustrated in both the Wikipedia and the Encyclopedia Britannica. It is the version that is taught to the masses in high school and illustrated in college to explain phenomena such as ionization,<sup>47</sup> electricity,<sup>48</sup> and valence bond theory.<sup>49</sup> Therefore, we have not misrepresented or exaggerated anything. The image depicted in *Fig. 5* faithfully illustrates what all of humanity visualizes and draws when someone mentions the word *atom*. If the planetary atom is not the official Quantum atom, the mathematicians have a single recourse and that is to provide an image of the authentic atom they plan to do all of their explanations with.

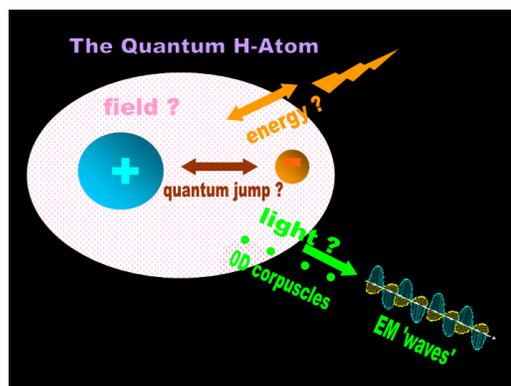
To recap, the Standard Model of Quantum Mechanics depicts the electron as a discrete particle. Until the Standard Model is officially modified via an article in a respectable, peer-reviewed journal that includes pictures and descriptions of dispersed clouds and waves and 'probabilities', we have to continue with the model that Quantum has illustrated for the last hundred years and which everyone is familiar with and uses. Of course, if the theory is that the electron spontaneously morphs from scattered cloud to point particle or vice versa at the whim of the mathematician's wand, the mechanism of that miraculous transformation has to be outlined in detail as well. Otherwise, the proponent is again

attempting to elude the requirement of the Golden Principle and introducing black magic. The bottom line is that the illustrations with which contemporary Quantum theorists begin their dissertations are divorced from the mathematical descriptions they propose for the workings of the atom and its components. Interconnecting *springs* are irreconcilable with particle *exchange*. The balloon enclosure of nucleons is unaccounted for. Electrons are simultaneously particles, clouds, and 'probabilities'. Niels Bohr summarized all of this irrationality of Quantum Mechanics in one of his closing arguments:

*"isolated material particles are abstractions, their properties on the quantum theory being definable and observable only through their interaction with other systems... we must... be prepared to meet with a renunciation as to visualization in the ordinary sense... every word in the language refers to our ordinary perception. In the quantum theory we meet this difficulty at once in the question of the inevitability of irrationality characterizing the quantum postulate."*<sup>50</sup>

*Fig. 8 Quantum Jump*

*The Quantum version of the hydrogen atom fails to answer practically every important question. What is the mysterious 'field' that binds the electron to the proton? What physical object or medium prevents the electron from drifting away? Why doesn't the negative electron fall into the positive nucleus if opposite poles attract? What physical object induces the discrete electron bead to jump back and forth between 'energy' levels, specifically, what entity pushes or draws it back out? What is this mysterious 'energy' stuff that the atom absorbs and emits? Does the atom emit light in the form of 0D point corpuscles or as EM 'waves'? If waves, what is a wave? What physical object is it that is oscillating as it leaves the atom in the form of light? The Golden Principle of Physics demands answers to each of these questions.*



Making assumptions such as that the micro-universe is mediated by particles is not illegal. The Standard Model would simply be one proposal. What is illegal is for the theorists to claim that Quantum Theory has been proven and is now a fact. These are mighty claims coming from those who have no idea what an atom or an electron looks like.

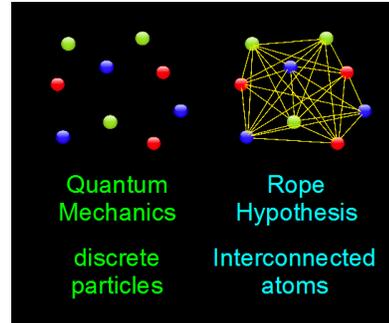
forks out at the boundary of the atom and curves around, forming the electron shell. The electron balloon encapsulates the urchin-like proton and helps maintain the integrity of the atom (*Fig. 12*). [Compare this model against the Quantum atom which is perpetually illustrated dynamically (*Figs. 5 and 8*)! The Golden Principle of Physics renders this portrait illegal.



#### IV. THE ROPE HYPOTHESIS

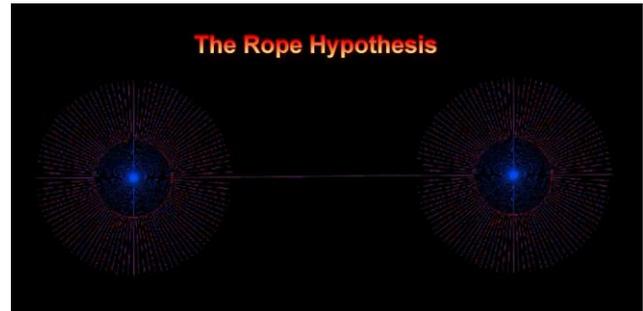
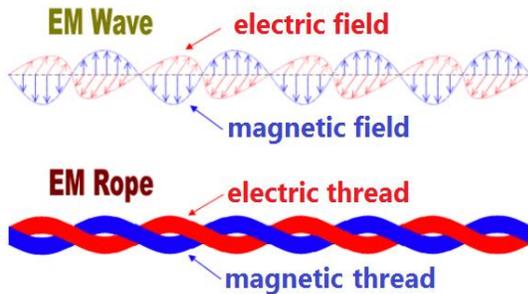
Let us assume that the transverse EM ‘wave’ that the theorists have been entertaining for the last 200 years takes the form of a DNA-like rope that *extends* between any two atoms. (For simplicity’s sake we will only consider the hydrogen atom.) The electro-magnetic (EM) rope consists of two twined threads that permanently bind any two atoms (*Fig. 9*). Therefore, whereas Quantum Mechanics assumes that the entire matter of the Universe consists of disconnected particles, the underlying hypothesis of the Rope Model is that all atoms are interconnected (*Figs. 10 and 11*). We will use the term *Thread Theory* to refer to the set of phenomena that this model can explain.

*Fig. 10 Quantum discreteness vs. Rope interconnectedness*



*Fig. 11 Two atoms bound by the EM rope*

*Fig. 9 The transverse wave of Mathematical Physics vs. the EM rope of the Rope Hypothesis*



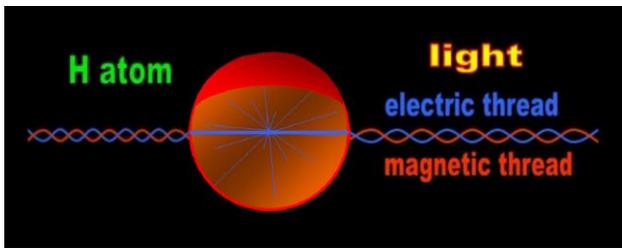
The assumption that the EM ropes extend from every atom in the Universe to our test atom conduces to a different architecture of the atom than the one proposed by Quantum Mechanics and enables the model to simulate features and behaviors that the Particle Hypothesis is unable to. Under the Rope Model, the electric thread continues straight to the center of the atom and out the other end. (We use the adjectives *electric* and *magnetic* for simplicity’s sake and to be consistent with convention. There is no need to change these terms.) The electric threads from every atom in the Universe form a star-like structure known as the *proton* which forms the center of our atom. The magnetic thread

The superficial reader may stumblingly dismiss this description as nothing but a cosmetic and trivial substitution of the word *field* with the word *thread*. Hence, we restate that *field* is an abstract concept that means ‘region’. A *thread* is a physical object. Another major difference is that the EM ‘fields’ *travel* one way: from source to target. The EM rope physically *extends* between and *binds* any two atoms.

At face value, the rope architecture readily explains why the electron does not spiral into the nucleus, an issue that was of utmost concern to theorists at the beginning of the 20<sup>th</sup> Century.<sup>51</sup> If the electron is an orbiting bead as Quantum proposes, there would be nothing preventing the discrete ball from losing energy and spiraling into the nucleus, especially if the actors have different polarities (*Figs. 6 and 7*). The positive proton bowling ball should attract the negative electron marble towards itself. If instead we visualize the electron as a balloon that encapsulates the proton star, it becomes clear that there is a physical barrier to collapse.

Fig. 12 *The EM rope model of the atom and light*

The electric thread (blue) goes straight through the center and out the other end of the atom. All electric threads extending from every atom in the Universe converge upon the center of the atom and form a star-like entity known as the proton. This architecture already has a chance of answering an intriguing question raised by Richard Feynman.<sup>35</sup> The magnetic thread (red) forks out at the boundary of the atom and curves around. All the magnetic threads from every atom in the Universe converge upon the atom and weave its electron shell which encapsulates the proton. The electromagnetic, transverse ‘wave’ of Classical and Quantum Mechanics is nothing but a lengthwise cross-section of the EM Rope.



V. THREAD THEORY APPLIED TO QUANTUM JUMP

Thread Theory holds that both phenomena – Quantum Jump and why an electron doesn’t spiral into the nucleus – are simulated by the expansion and contraction of the electron balloon, a behavior induced by torsions of the universal ropes converging on the atom. Electron shell expansion and contraction pay back in kind by torquing the rope, a perturbation sensed by the atom at the other end which is bound to it because of the simple fact that the threads fork out and constitute its proton and electron shell as illustrated in Fig. 12. It is this torquing of the rope which we identify as light. EM torsion is a bidirectional 3D ‘wave’. The atom is a tiny heart pumping ‘torsion waves’ to every atom in the Universe. The Rope Model of the expanding and contracting electron shell suggests that Quantum numbers specify a single location on its surface (Fig. 13).

VI. SPEED, WAVELENGTH, AND AMPLITUDE

Researchers have determined that the frequency ( $f$ ) of light and its wavelength ( $\lambda$ ) are inversely proportional, a relation which they synthesize in the following simple equation:

$$c = f \lambda$$

where  $c = 300,000 \text{ km/s}$

In other words, if we increase the frequency, we must decrease the wavelength (and vice versa) in order to ensure that light travels at a constant speed. Neither particles nor waves justify this equation. Whether we choose the particle or the wave hypothesis, there is no physical impediment to increasing both the frequency and the wavelength (i.e., faster than light [FTL]). (Fig. 14)

Fig. 13 *Quantum Numbers under the Rope Hypothesis*

- $n$  – The radius of the electron shell
- $l$  – The latitude of a location along the shell
- $m$  – The longitude of a location along the shell
- $s$  – Spin of the rope where it forks

Measuring from one side of the balloon, the rope spins CW. From the other side of the electron, that same rope will necessarily spin CCW. This explains why two ‘electron beads’ in an ‘orbital’ cannot have the same ‘spin state’.<sup>52</sup>

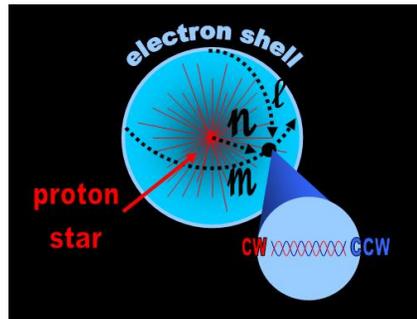
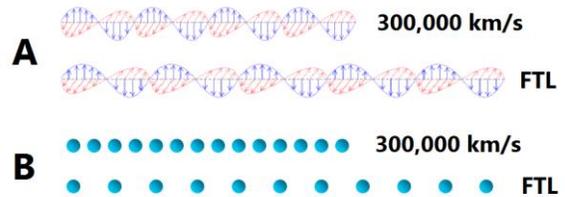


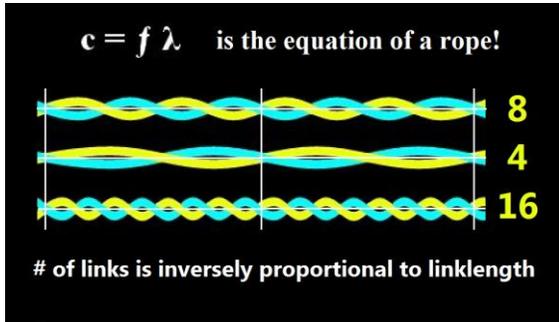
Fig. 14 *FTL*

A. What physically prevents both the frequency and the wavelength to increase and thus compel a wave of light to travel faster? B. What physically prevents discrete photon particles from traveling faster?



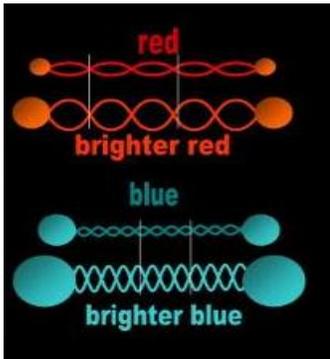
Thread Theory proposes that ( $c = f \lambda$ ) is the equation of a rope. No other entity we can imagine can simulate this heretofore mystical relation. If we count 8 links on a one-meter long, two strand rope, unwinding it results in 4 longer links and winding it results in 16 shorter links (Fig. 15). In other words, the lengths of the links (wavelength) are inversely proportional to the number of links (frequency).

Fig. 15 Only a rope architecture can simulate why  $c$  is a constant resulting from the inverse relation between frequency (# of links) and wavelength (link-length)



Note that the rope handily simulates another *sine qua non* feature of ‘waves’: *amplitude*. The links can be taller (higher intensity) or shorter (lower intensity) (Fig. 16). In contrast, Quantum cannot explain why any of the particles moves up and down to create the amply verified sinusoidal pattern of an electromagnetic wave. What entity would compel a particle to change direction away from an imaginary axis? What compels a particle to go forward (transversally with respect to the oscillation) if it is busy going up and down?

Fig. 16 The amplitude of EM rope determines the intensity of light: there is more rope per unit length.



Classical and Quantum Mechanics also have trouble justifying why the two fields of a transverse EM wave oscillate around a straight axis, run perpendicular to each other, and induce each other into being. The EM rope, on the other hand, architecturally meets all three requirements. Two coiled, tightly pulled, DNA-like strands have no choice but to run at 90° to each other and twine around an axis (Fig. 15).

## VII. MOSSBAUER EFFECT

Einstein apparently was the first to formalize that light travels at the same speed in a vacuum independent of the motion of the source.<sup>53</sup> For still mysterious reasons, we can’t add the speed of the train to the light it emits.

In a related issue, Mossbauer showed that when an atom locked in a lattice emits light it does not recoil like a cannon would when it shoots a cannonball.<sup>54 55</sup> If a photon were a ball, the atom would be knocked backward as the photon is hurled forward.

Mathematical Physics got around these inexplicable behaviors by making the photon massless and by fudging with semantics.<sup>56 57</sup> A massless cannonball would certainly explain why a cannon does not recoil, but then the theorists need for the photon to have greater than zero mass when it collides against electrons during the Photoelectric and Compton Effects. The justification the theorists give for this peculiar behaviors is that although the photon has no mass, it does possess both momentum and energy.<sup>58 59 60</sup>

These explanations are outside the bounds of Science because according to Mathematical Physics both momentum (p) and energy (E) require mass (m):

$$p = m * v \quad E = m * c^2$$

There would be no momentum or energy without mass using the mathematical establishment’s very own system, its way of thinking, and its vocabulary.

The bottom line is that the mathematicians want to have their cake and to eat it, too. They want the photon to simultaneously have and lack mass. They tinker with the language and argue that here, *mass* means ‘quantity of matter’ and there, *mass* is a function of motion. The massless photon is devoid of matter and *is* pure momentum and energy. Therefore, neither the independent speed of light nor recoilless emission has a rational physical interpretation today. These observations are simply described mathematically.

Under the Rope Model of Light and the Atom, Einstein’s constant speed independent of the motion of the source and Mossbauer’s recoilless emission have down-to-Earth explanations that anyone can readily visualize:

Independent speed of light. An atom slides along the rope like a bead on an abacus. The atom reels in the two threads that make up the EM rope in the direction of travel and releases them at its rear (Fig. 17)

Recoilless emission. A free atom such as one comprising a gas vibrates, expands and contracts, and moves back and forth. Such motions are greatly reduced for an atom locked in the lattice of a solid (Fig. 18). The atom is not ‘emitting’ anything. The EM rope is simply twirling in place without much or any movement of the atom in which it ends.

Fig 17 An atom slides from left to right and absorbs the two threads of the rope along this path into itself. They become part of its structure. It releases two rear ones in the process. Thus, torsion along this rope is independent of the movement of the atom.

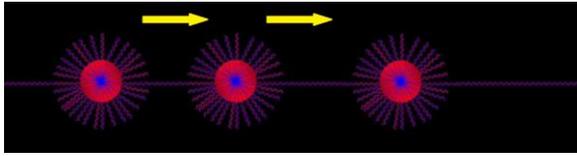
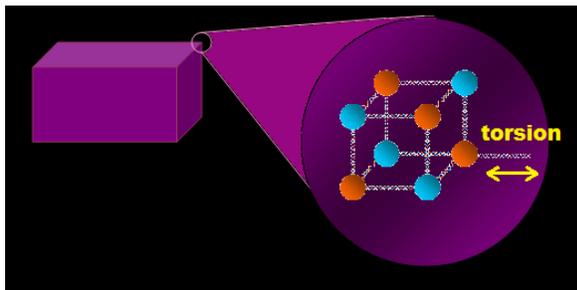


Fig 18 An atom is limited or stopped from vibrating when it is wedged in the lattice of a solid. The atom continues to expand and contract and to generate torsion on the rope irrespective of the motion of the atom.



### VIII. ELEMENTARY CHARGE

Milligan measured the *elementary charge* on the electron to be  $1.6 \times 10^{-19}$  coulombs without ever establishing what this number is a measure of in physical terms. A coulomb is the ‘charge’ transported by a constant current of 1 ampere per second, where an ampere is the flow rate of discrete electron beads through a given point on a wire. All these units were established based on the *assumption* that electricity consists of a flow of discrete beads. These parameters also rely on one another. *Elementary charge* is defined in terms of *charge*, a term which the mathematicians have trouble pinpointing unambiguously to this day:

*“the physical property of matter that causes it to experience a force when placed in an electromagnetic field.”*<sup>61</sup>

*“An elementary charge is the electrical charge carried by a single electron.”*<sup>62</sup>

where the *electrical charge* is:

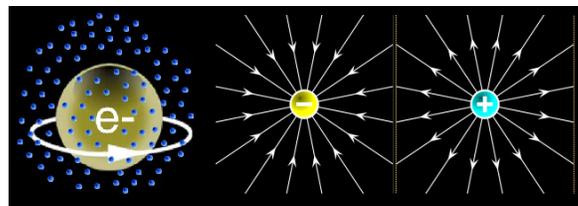
*“a characteristic of a unit of matter that expresses the extent to which it has more or fewer electrons than protons.”*

These are not scientific definitions. They are guessing games. We still have no idea *what* the mathematicians are referring to. What is it about the architecture or structure or shape of ‘charge’ that grants it the ‘property of experiencing a force’? What *thing* is it that is ‘carried’ by an electron?

What Milligan measured was the rate at which an oil drop would move in an electric field after factoring out gravity, electric forces, size, viscosity and other parameters. In other words, the measurement of  $1.6 \times 10^{-19}$  coulombs is a relation to these parameters. The mathematicians still have no clue *what* ‘charge’ or ‘elementary charge’ mean in *physical* terms. They can at best provide a number and units related to other units. They cannot draw a picture of *charge*. There is no standalone image of *charge* because it is a mathematical concept. As all mathematical concepts, *charge* is a dynamic concept; *charge* embodies motion. *Elementary charge* is a measure of some unknown moving something that equals  $1.6 \times 10^{-19}$  coulombs.

Nonetheless, several sites provide images of what the mathematicians vaguely visualize when they use the term *elementary charge of the electron* (Fig. 19). They illustrate *elementary charge* as a swarm of bees surrounding a beehive, describing it as consisting of ‘tiny particles’ that surround the electron. Or they portray *charge* as lines extending away or towards the electron.

Fig 19 Quantum Mechanics lives with the notion that elementary charge consists of tiny particles or mysterious lines that surround the discrete electron bead. These ad hoc particles and lines have never been identified, and how these particles relate to  $1.6 \times 10^{-19}$  coulombs is an even bigger mystery.



If the electron is about as small as it can get in Quantum, what other particles could there possibly be that are smaller and swarm around the electron? It seems more likely that the mathematicians are creating ever more mysterious *ad hoc* corpuscles and inexistent lines to plug holes in their never-ending particle map. The only positive thing that does emerge from official attempts to illustrate *elementary charge* is that the mathematical establishment perceives *charge* as being ‘something’ that surrounds the electron surface.

Thread Theory proposes that *charge* consists of friction everywhere on the surface of the electron shell. An atom perpetually pumps back and forth, contracting and expanding during the process that is commonly known as

*quantum jump*. Therefore, at the location where the electric and magnetic threads separate, there is an imperceptible friction as the rope winds and unwinds itself. This occurs in the segment between the expanded and contracted electron shell. It is the aggregate of these frictions all around the electron balloon that we refer to as *elementary charge* (Fig. 20).

### IX. ENERGY

Einstein condensed energy and mass into a single popular equation that relates these two parameters:  $E = mc^2$ . However, as late as the 1970s, Richard Feynman candidly confessed that everyone in the mathematical guild was still trying to figure out *what* Einstein was talking about:

*"It is important to realize that in physics today, we have no knowledge of what energy is."* <sup>35</sup>

To make matters worse, the term *mass* has no formal definition either. Everyone is taught to say in school and firmly believes that mass is the 'quantity of matter' or a measure of the amount of matter. <sup>63</sup> However, Wheeler and Taylor dismissed this notion as false:

*"Nature does not offer us any concept as 'the amount of matter.' History has struck down every proposal to define such a term. Even if we could count number of atoms or by any other counting method try to evaluate amount of matter, that number would not equal mass."* <sup>64</sup>

Therefore, the establishment invokes words such as *energy* and *mass* daily to make their cases, but no one has been able to define either term.

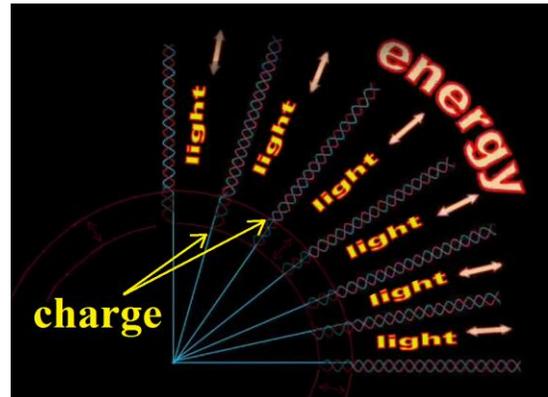
What has been established without a doubt *by definition* is that higher energy is associated with higher frequency and shorter wavelengths and that energy 'emanates and is absorbed by an atom:

*"the blue light has a higher frequency of vibration (or a shorter wavelength) than the red light... an X-ray photon has a large energy (and a small wavelength) compared with a photon of optical light... atoms can absorb... energy... If no other photons are absorbed by the atom, the electron will eventually drop back down to the lower energy ground state. However, the atom has to lose energy to do this, and so it releases a photon of the same energy as the one it absorbed (albeit most likely into some other direction from which it was absorbed). This process is called emission because a photon of light is emitted by the atom, again at a very specific wavelength."* <sup>65</sup>

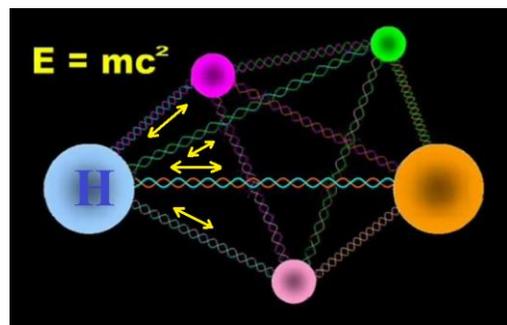
What are the mathematicians describing in physical terms?

Under the Rope Hypothesis, the interpretation is that the theorists are describing the torsion along each rope that converges on our atom. An atom 'emits' or 'absorbs' a link of rope every time the atom contracts or expands during a quantum jump. It is the aggregate of radial torsions along every EM rope that the mathematicians have dubbed 'energy' (Fig. 20). Under the rope model, the interpretation of the  $E=mc^2$  equation is that every 'unit of mass' (the hydrogen atom) in the Universe emits light to our atom at 300,000 km/s and vice versa (Fig. 21).

*Fig 20 Light consists of torsions of each EM rope. Torque is generated by the expansion and contraction (quantum jump) of the electron balloon (red) that encapsulates the proton (blue) (convergence of all electric threads). Torsion propagates in both directions along an EM rope. The composite emission/reception of all these radial signals is what the mathematicians have known as 'energy'. Likewise, the aggregate friction all around the electron shell where each E-thread and M-thread rolls and unrolls back and forth against each other during a quantum jump is what they have identified as 'charge'.*



*Fig 21  $E = m c^2$  means that every H-atom ('unit of mass') in the Universe 'emits' torsion at  $c$  to all others and vice versa.*

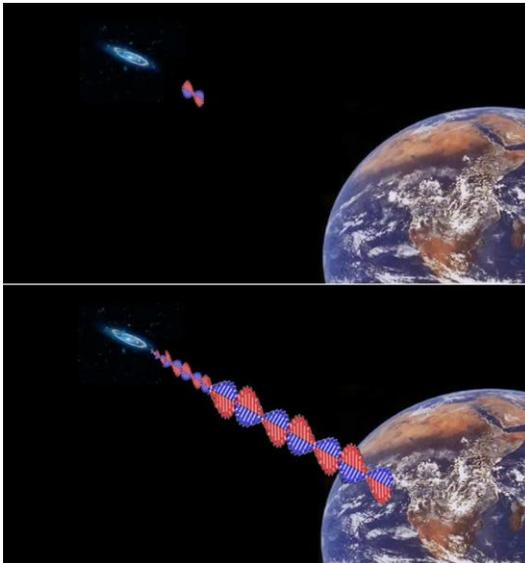


## X. ARCHITECTURE AND MASS

One question that arises is whether a rope can stretch so far. Does the EM rope extend from the Andromeda Galaxy all the way to our eyes here on Earth two million light-years (mly) away?

Let's allow Quantum Mechanics to answer this question first since the mathematicians have never addressed the issue. Do photon corpuscles travel the 2-mly distance in a straight line from there to here? Does the sinusoidal EM wave extend from there to here? Doesn't it get generated when an atom quantum jumps? If not, where does the wave start? Where does it end? Does the 2D transverse wave *travel* eons like a boat or does it *extend* uninterruptedly from galaxy to galaxy (Fig. 22)?

*Fig 22 Does the Classical and Quantum Mechanical EM wave travel (upper image) or extend (lower image) from the Andromeda Galaxy to your eye? Where does the wave begin? Where does it end? These questions have never been asked, let alone answered by neither Classical nor Quantum Mechanics.*



It is actually quite surprising to discover that most professional physicists are not even aware that the official stance is that light does not travel in the form of discrete particles at all. The official version is that light always travels as a wave.

*“Light travels as a wave, but departs and arrives as a particle.”<sup>66</sup>*

The ‘particle’ researchers detect photons in the form of discrete particles only at source and target. Since measurement is at the core of Mathematical Physics, the theorists give lip service to the wave nature of light.

Therefore, whenever anyone illustrates light as a series of corpuscles traveling through a medium they are misrepresenting both Classical and Quantum Mechanics. Light is detected in the labs as a particle only at source and target. In between it is Maxwell who reigns supreme: light ‘travels’ as a transverse wave. However, few care what light is or does when they are not measuring it.

The problem, again, is that ‘wave’ does not qualify as an object for the purposes of Physics. Nevertheless, even if we concede that a wave is an object, the question still remains: where does the wave begin and end? Does a wave extend uninterruptedly for over 2 million light years?

Under the Rope Hypothesis, every EM rope begins at an atom and ends in another. An EM rope does indeed extend from the Andromeda Galaxy all the way to the Earth. An EM rope (as well as the constituent thread) is the longest and thinnest entity we can imagine. A given rope torques and the atom in the eye in which it ends receives an almost imperceptible pulse. It is this pulse that we process as light in our brains. Although Andromeda is comprised of countless atoms, it is 2.2 million light years away. That’s why we can barely see the galaxy.

## XI. CONCLUSIONS

The Rope Model and Thread theory can be used to give rational physical interpretations to the most important architectures and behaviors of light and the atom whereas the 3D corpuscle of Classical Mechanics cannot justify a single one. The wave, the wave-packet, and the 0D ‘point’ particle of Quantum Mechanics need not be considered at all. They do not qualify as objects for the purposes of Physics. The Golden Principle of Physics rejects all three.

Einstein once said: *“I have deep faith that the principle of the universe will be beautiful and simple.”* It is. A rope is as simple and as symmetric as it can get. Once we simulate light, gravity, electricity, and magnetism with a DNA-like rope, all experiments suddenly fall into place and have a rational physical interpretation. In this context, ‘rational’ means that we can make a motion picture of the theory and people can understand the mechanism by merely watching the documentary.

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*“It was discovered that electrons had a property called spin, that is, the electron was spinning as it circled the nucleus. It’s the alignment in these electron spins that results in the magnetic properties of iron... In summary, a magnet is a collection of microscopic crystal domains that have their electron spins aligned.”*

<sup>53</sup> A. Einstein, [On the electrodynamics of moving bodies](#), Annalen der Physik **17** (June 30, 1905) 891-921.

*“light is always propagated in empty space with a definite velocity  $c$  which is independent of the state of motion of the emitting body.”*

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*Photoelectric Effect: “If a photon has an energy at least as big as the work function, the photon energy can be transferred to the electron and the electron will have enough energy to escape from the metal.”*

*Compton Effect: “Although photons have no mass, they do have momentum... Some of the energy and momentum is transferred to the electron...”*

<sup>60</sup> M. Austern et al., [What is the mass of a photon?](#), Physics FAQ, University of California Riverside (2008)

*“Does the photon have mass? After all, it has energy and energy is equivalent to mass... Photons are traditionally said to be massless. This is a figure of speech... The proportionality constant is called the particle’s “mass”  $m$ , so that  $\mathbf{p} = m\mathbf{v}$ ... In special relativity... the best we can do is relate them via the particle’s “relativistic mass”  $m_{rel}$ .*

$$\mathbf{p} = m_{rel}\mathbf{v}$$

*Even though these photons cannot be brought to rest, and so the idea of rest mass doesn’t really apply to them, we can certainly bring these “particles” of light into the fold of equation (1) by just considering them to have no rest mass. That way, equation (1) gives the correct expression for light,  $E = pc$ ... and that makes it very useful.”*

<sup>61</sup> [charge](#), Wikipedia

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*“the measure of an object’s resistance to acceleration... when a force is applied”*

*“the amount of matter in an object”*

*(NOTE: The above are irreconcilable definitions. The mathematicians have simply defined mass in two different ways to cover all the bases. Either mass is the quantity of matter or it has to do with the ability to move it. The same dead cat on the Moon offers less resistance to being moved despite that the quantity of matter has not changed.)*

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