The Truth is that the Connection Between Physics and Mathematics is Not at all Mysterious

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What Is Physics?

Physics is the science dealing with the properties, changes, and interactions, etc. of matter, energy, and all other entities that exist and/or that we perceive to exist as parts of what we can detect to be our existent reality. Its most important function is to allow us to observe and to design more and better ways to observe our reality or at least what we can sense our reality to be and to use the knowledge that we gain to look for ways that we can live better, safer, more comfortable, and more fulfilling lives that are more in harmony with the functioning of reality when that is to our advantage and to seek to control the functioning of reality when that is necessary to accomplish proper goals and desires as mentioned above, etc.

To be successful in advancing Physics and for that matter all science for the most part requires us:
1. To make as many observations in as many different ways as possible and then analyze the results to find repetitive patterns of occurrence of cyclical actions, etc. that indicate recurrent structures or actions of structures that are parts of our world.
2. To look for the causes of, the structure of, and the effects generated by such cyclical patterns and actions that have been observed.
3. To look for ways that we can interact with them in such ways as to change them, such that the changes in them create results that are desired by us to make our lives better.
4. To look for and ultimately obtain a better understanding of how all of our observed reality is constructed and functions. As our understanding increases, we can in a more focused and better way accomplish all of these things.

It can be easily seen that observation is the most basic and necessary element that must be used if we are to get anywhere in our attempt to understand the world that we are parts of. We must also come to understand that science is for the most part completely useless in any attempt to understand completely random things or actions, etc. As an example, if your only sense was sight and when you opened your eyes all you saw was the random appearance and then later the disappearance at random times of random shapes of random colors, you would not be able to gain any useable understanding of your world using science. Science is only useful in a world that contains structures that are built upon logical principals that can be understood as logical rules of construction and operation or action and interaction. It is good for us that our world is built that way.

How does Mathematics Apply to Physics and All Science

The most obvious connection between Physics or any science, whether it be theoretical or applied science, and mathematics is in the need to record the quantities of or the results generated by the repetitive patterns such as the number of years (weather cycles) that occurred during and between the past ice ages, and then to use those results to calculate whether the climate shows overall cooling or warming and by how much, etc. In some cases the actual number of items is not as important as a specific accumulation of such similar items. If you desire to cover a 10 ft. by 10ft. area with sand that is 6 in. deep, it would be important to know how many cubic feet of sand was contained in each sand bag that you buy. The total number of sand grains would not help you much there since different sand grains would be of different sizes. On the other hand, you might desire to put 100 lb. of sand into the trunk of your car to get better traction in icy or snowy weather. In that case the weight of the sand in

each bag would be important to you. In all of these cases and many others in science, mathematics can be used to arrive at the desired answer. Mathematics is, of course, not limited to such simple uses.

What is mathematics?

For the most part, man's languages are abstract languages. If a man speaks the word car, no one who is not familiar with the English language would understand its meaning. This is because the sound of the word has no observational correlation to the vehicle that it represents. This is true of most spoken words in most languages. In English and many other languages, the written forms of words are composed of letters that represent sounds. This means that the written word car can only lead one back to the sound of the spoken word car and since the spoken word has no correlation to the vehicle that it represents the written word cannot do any better. Moreover, one must also know the rules that determine what sounds each letter represents in a given letter combination to even get back to the spoken sound of the word. Mathematics is a part of man's language and is also very abstract. Letters are often used in place of words and a letter in a mathematical expression may represent another complete mathematical expression so that what looks like a simple expression might actually represent a very complex extended expression. The same letters are often used in different expressions to represent 2 completely different things. To understand a given expression one must also know the relational rules that apply between the letters, etc. in that expression. If one uses a broad enough definition of mathematics it is probably possible to use mathematics to model anything that can be modeled in any abstract written language. The problem is that like all other abstract written languages, it has no direct connection with observed reality. It is often possible that in using mathematics to model some part of reality, new connections or entities can be indicated to be able to exist in reality that have not yet been observed, often because no one thought to look for them. This is very good because it can lead to new discoveries. On the other hand, when math is used too far from observed reality, the results can create beliefs that lead observers away from new discoveries. Even when the math correctly indicates the existence of some new thing with specific properties, it often cannot tell you what that thing is composed of or details of how it works to generate its properties. These things can sometimes only come to be understood through analysis of observations in and of the real world.

Case in Point

As an example, the formula E=MC>2 (where: >2=squared) tells us that matter particles can be converted into energy photons and energy photons can be converted into matter particles, but it tells us nothing about the structure of the matter particles or the energy photons or how one structure can be converted into the other. Moreover, when an energy photon interacts with an electron in an atom and frees the electron from the atom in the photoelectric effect, the photon can cease to exist as a photon. Everything that caused it to exist as it did was converted into the motion that has been added to the electron. This means that either some other substance of which the photon was constructed has been converted into motion or the photon was composed of motion that was structured in some form within it so as to give it the properties that it possessed, such as a linear velocity of the speed of light and a secondary motion that operated at ninety degrees to its direction of travel to generate its frequency, wavelength, and dynamic mass effect that allowed it to knock the electron out of the atom. The simplest and, therefore, the most likely to be true is that photons are composed of motions. If energy photons can be converted into matter particles and energy photons are composed of motions, then matter particles must also be composed of motions. These things can be easily determined by the analysis of the results of observations, but are not easily discerned by looking at the math model. If we put forth the proposition that both energy photons and matter particles are composed of simple motions, the next step is to analyze the structure of simple motions and then see how they can be stored in energy photons and matter particles to generate their properties.

<p style="text-align: center;">**Basic motion structuring Concepts**</p>
<p style="text-align: center;">**Sub-energy particles**</p>

The basic properties of simple motions in the absence of interaction are:

1. They continue to travel or change position.
2. They travel in a straight line (in the same composite direction in three dimensional space).
3. They generally travel at a speed or motion amplitude of the speed of light or less. We will call a particle that contains only one such simple motion a sub-energy particle. An individual sub-energy particle can interact only in the direction of its travel. It does not contain any internal angular motion (they possess no frequency or wave length effects). The flow of large concentrations of sub-energy particles can interact with other large concentrations of sub-energy particles at the macro size level. The repulsion between like poles of 2 magnets is an example.

<p style="text-align: center;">**Energy Photons**</p>

An energy photon contains a basic motion or sub-energy particle in it to generate its travel at the speed of light in some composite three dimensional direction. It also contains a second cyclical back and forth motion at an angle of 90 degrees to its direction of travel. In the absence of an interaction a basic motion cannot move in a cyclical manner. This is because all cyclical motions require one or more changes in direction to complete the cyclical motion pattern. Basic sub-energy particles are internally programmed to continually change position, but changes in the programming of motion amplitude (how fast it is moving) or direction can only be accomplished by external interactions with the sub-energy particle. This means that some form of external interaction must be taking place between the sub-energy particle and something else to generate the frequency and wavelength, etc. effects. Since the frequency/wavelength effect is a cyclical linear motion at a ninety degree angle to the direction of the photon's travel it must travel so far in one direction and then reverse the direction of motion. It must then travel the same distance in the other direction and then reverse the direction of motion again to complete the cycle. Since the frequency/wavelength effect in a photon is continuous and does not exhibit any missing half or whole cycles, etc., its interactions must have a 100 percent probability of occurrence and success in producing direction reversal. The easiest way to envision a structure that will produce this effect is the use of a very small fourth physical dimension (not a time dimension) that interacts at ninety degrees to the other three dimensions. Its size is such that it could just contain three sub-energy particles side by side on it. Only the center of the three positions is located in and connected to our three dimensional structure. The 2 outside positions are outside of our dimensional system and anything completely in those positions does not interact with anything in our dimensional system. An energy photon's frequency/wavelength motion travels in one direction in this fourth dimension and then interacts with the end of this dimension which causes a direction reversal. It then travels along this dimension until it reaches and interacts with the other end of it, which causes another directional reversal. That completes one frequency/wavelength cycle of motion. The faster this motion travels, the quicker it travels from one end of the dimension to the other end, so the frequency of its cycle increases. The photon can then not travel as far in its direction of travel at the speed of light during each cycle, so its wavelength is reduced. During an interaction this greater 90 degree angular motion can transfer more motion to whatever the photon is interacting with, so its dynamic mass effect is increased. A decrease in the photon's fourth dimensional motion creates the opposite effects of a lower frequency, a longer wavelength, and a decrease in dynamic mass effect in an interaction.

Another observed effect of this back and forth motion is that its effects during an interaction are not constant, but vary linearly in amplitude of effect from zero to a maximum in one direction and then back

down to zero in effect in that direction. They then increase from zero to the same maximum level in the opposite direction and then again vary linearly back down to zero effect in that same direction. This effect repeats with each back and forth cycle. The reason for this effect is that when the fourth dimensional motion is completely outside of our three dimensional structure (when it is at one end of the fourth dimension) it has zero effect in our world in an interaction. As it begins to move into our world and moves toward being completely in our three dimensional structure its effects in an interaction are limited to the part of it that is in our world and thus its effect linearly increases to a maximum when it is at the center position in the fourth dimension and completely interacts during an interaction. As it then moves out of that center position less of it is still in the three dimensional structure of our world so the effect decreases until it reaches zero again when it is located at the other end of the fourth dimension and is once again outside of our world's three dimensional structure. It then begins to travel back through the fourth dimension in the opposite direction and causes the same effect, but this time in the opposite direction.

A couple of questions still need to be addressed. First, why do all photons generally travel at the speed of light and secondly, how does motion get into the fourth dimension position of the photon? The answer is that the fourth dimension is not connected to the other three dimensions in the same way that they are connected to each other. Motion must be induced into the fourth dimension. In order for induction to take place the particle's composite three dimensional motion in its direction of travel must exceed the minimum induction value, which is the speed of light. When enough motion is added to a sub-energy particle to cause it to move faster than the speed of light that excess motion is transferred to the particle's fourth dimensional motion changing it from a sub-energy particle to an energy photon particle. Note: It is possible for a sub-energy particle to travel faster than the speed of light for a short distance. This is because the transfer of motion from the lower three dimensions to the fourth dimension is not completely instantaneous. Therefore, if a large amount of motion is added to a sub-energy particle it can travel faster than the speed of light while this transfer is taking place. It is possible to use this effect to transfer information and other things faster than the speed of light.
 Any motion that is added to the photon that would cause it to travel at a speed in excess of the speed of light is induced into or transferred into its fourth dimension motion. Experiments in Compton scattering and with low frequency photons show that interactions can cause frequency changes in photons. Energy photons can also travel faster than the speed of light for short distances due to the induction time required to transfer added motion to its fourth dimensional motion. This effect also has its part in faster than light information travel, etc., but a detailed description of faster than light travel of sub-energy and photon particles is beyond the scope of this paper.

Matter Particles

To explain how matter particles work another (fifth) dimension is utilized. Again motion is induced into it and there is a minimum threshold motion value that an energy photon must possess in order to transfer motion into this dimension. In addition to the above a transfer can only occur when the proper angular motion component is present. That is why an energy photon that possesses a little over .5 MEV can either continue to be a photon or under the proper conditions can change into an electron. This would most easily be accomplished, however, with a photon that possessed a little over 1 MEV converting into an electron and positron pair.

When a particle's motion is transferred to the fifth dimension, it is transferred back into the lower three dimensions with linear increases from zero to a maximum amount and then back down to zero in sequence such that when it reaches the maximum transmission rate into dimension 1 it begins to transfer motion into dimension 2. The amount of motion transferred into dimension 2 reaches its

maximum level just as the motion transferred into dimension 1 reaches the zero level. At the same time motion begins to transfer into dimension 3. As the motion transfer rate into dimension 3 reaches its maximum rate, the motion transfer into dimension 2 reaches the zero point and motion transfer into dimension 1 begins again. As the motion transfer rate into dimension 1 reaches its maximum level, the motion transfer into dimension 3 reaches the zero level and motion once again begins to be transferred into dimension 2 completing the cycle. When the motion is transferred into one of the lower 3 dimensions it tends to increase the photon's linear motion to greater than the speed of light. This causes the excess motion to be transferred into the particles fourth dimensional velocity to maintain the linear velocity at the speed of light. At the same time the motion that is added to the lower 3 dimensions causes the photon to travel in a curved path. The photon's path curves back upon itself to create a cyclical enclosed path of travel for the photon. If the particle's fourth dimensional wavelength fits properly into that enclosed path the proper angular motion component is present to allow the motion that is transferred back into the fourth dimension to be transferred back into its fifth dimensional motion and the inter-dimensional motion flow cycle is complete and the particle is stable. If the fourth dimensional wavelength does not properly fit into the particle's three dimensional enclosed path, the fourth dimensional motion cannot travel back into the fifth dimension, so ultimately all of the fifth dimensional motion drains out into the lower 3 dimensions and back into the fourth dimension and the particle becomes a photon again. The particle was not stable in that case. Anything that removes the angular motion component can cause the matter particle to change back into a photon. This happens, as an example, when an electron and a positron come together with low kinetic energy in an interaction because the electron's and positron's fifth dimensional motions are traveling in the opposite directions in the fifth dimension and thus the angular motion components cancel each other out causing their fifth dimensional motions to drain back into their fourth dimensional motions through the lower three dimensions and they become energy photon's or potentially an energy photon.

Since the amplitude of the matter particle's fifth dimensional motion controls the amount of curvature of the matter particle's three dimensional path, it controls the size of the matter particle. Control of this motion can allow travel of information and other things over very great or small distances in extremely short times, but this too is a subject that will not be covered further in this paper. I just mention these things to aid anyone who would like to do further research in these areas on their own.

Since man currently has no way to validate the above information by observation of the internal structures of the particles it should be regarded by man as a hypothesis. This structure can, however, explain why interactions between particles often have several possible outcomes and why there are specific probabilities that each outcome will occur, thus explaining the causes of quantum effects. Once the standing wave nature of particles is understood the wave effects of particle/wave duality are no longer a mystery since both energy photons and matter particles contain cyclical standing wave motions. The particle effects are due to the mass effects generated by the angular motion(s) contained within the particle during interactions. In a photon the angular motion is produced by its fourth dimension motion component and causes the photon's dynamic mass effect at ninety degrees to its direction of travel. In a matter particle the angular motion is produced by both its fourth dimensional angular motion component and its fifth dimensional motion component that produces an angular motion that is continually changing direction and position on the particle's enclosed path structure. It causes the particle's three dimensionally balanced static mass effect in interactions. The above hypothesis of the nature, structure, and functioning of sub-energy, photon, and matter particles was developed from the observation that matter particles and energy photons can be transformed into each other and into simple motions and from the observed properties of each and of simple motions. Very little complex mathematics was used in its development, so it can be seen that advancements in

knowledge can come by and through the use of complex mathematical models and they can also come from analysis of observed data. When all is said and done the end result is usually an understandable theory that is in accordance with observed reality and at the same time has gained much in its detailed understanding from the use of complex mathematical analysis. When both agree it is an indication of a more sure understanding.

The next step

The next question concerning the above hypothesis is: can it be used to extrapolate further understanding of the nature, structure, and functioning of our world such as at the larger scale of atoms, etc. To do so we will need to consider the concept of sub-energy field structures and how they pertain to atomic structure.

Basic Sub-energy Field Structuring Concepts

As described above, basic matter particles are essentially small standing wave machines. As such they tend to entrain sub-energy particles to create an internal sub-energy field flow through themselves. You could visualize specific input and output points on the surface of the matter particle's enclosed path structure, but you would need to consider that these points would be continually changing in position on the surface of that path because of the continually changing position of the energy photon that is traveling along that three dimensional path. The net effect would be the creation of a concentric spherical external sub-energy field flow pattern around the matter particle. Since the particle is repelled by this external sub-energy field, it would find that its balance point would be at the center point of the external field causing it to be dynamically centered within the field. The three dimensional enclosed wave would act as a carrier wave for the photon's fourth dimensional motion wave. The fourth dimensional wave would modulate the internal sub-energy field flow strength and vary its input and output field densities. The end result would be that the external sub-energy field flow would not be a single sphere of equal field density throughout, but would essentially be a set of concentric spheres of increased and decreased sub-energy field density. Those who are familiar with magnetic energy converters (often called MEC's by man) know about the cylinders of high and low kinetic energy (with colder and warmer cylindrical areas) that they produce as they create sub-energy field flows that transfer kinetic energy from the surrounding area to the MEC device to make its rotation self-sustaining. They tend to be unstable because the increased energy input causes them to continue to increase their rotation speeds, which in turn causes increases in the sub-energy field magnitude, which increases the amount of kinetic energy transferred to the MEC, which then further increases the MEC's rotation speed, etc. The end result is usually that they fly apart and destroy themselves. Matter particles work in a somewhat similar way, but can be very stable. Maybe learning to understand how matter particles control the sub-energy flow could lead to the manufacture of more stable MEC's. The MEC's produce cylindrical sub-energy field density flow patterns because they usually operate on 2 dimensional rotation while the matter particles 3 dimensional enclosed path generates 3 dimensional spherical sub-energy field flow density patterns.

Protons and neutrons are not basic matter particles, however. They are composite particles that each contains 3 basic particles. Their detailed structure is beyond the scope of this paper, but I will point out a couple of things to consider for those who desire to seek out a better understanding of them for themselves. Each of the composite particle's enclosed sub- particles has its own internal sub-energy field. These fields can be aligned in relation to each other in various ways that can result in somewhat different external sub-energy flow patterns, etc. As an example, each of the 3 sub-particles could have their internal inputs and outputs aligned at ninety degrees to each other to create a balanced output

sub-energy flow in all three dimensions. Another thing to consider is whether the fourth dimensional modulation is synchronized between the sub-particles or not, etc.

When 2 protons approach each other, their external sub-energy fields repel each other, so they would tend to be repelled away from each other. If their kinetic energy is great enough, however, they can each push through the other's external sub-energy field. If their kinetic energy is not too great they are repelled from direct interaction by the outputs of their internal sub-energy fields. Their external sub-energy fields sync together and become a single external sub-energy field around both protons. The protons will repel each other and attempt to move away from the center of the external sub-energy field, but they will be repelled back toward the center by the external sub-energy field. A stable balance point is ultimately reached where the repulsion of the external sub-energy field pushing them toward its center is equal to the repulsion between their internal sub-energy fields pushing them away from the center of the external sub-energy field. The two protons have now formed the basis of the nucleus of a helium atom. I will not cover the neutrons in this paper.

If an electron comes close to the new nucleus it will be attracted to it. I am not covering the cause of the attraction in this paper. I will leave that concept for others to develop. As it travels through the high density spheres of the nucleus' sub-energy field, those that it has passed attract it in the opposite direction. When the attraction becomes equal, or near equal, in both directions, the electron settles in the nearest low density area between 2 high density sub-energy spheres.   A second electron can settle in the same low density area if its sub-energy field is properly aligned with the first electron's sub-energy field. In atoms that contain more protons and thus more electrons, the electrons that are already in the atom at lower levels act to repel new electrons, so the sub-energy equilibrium point is reached by the new electron sooner at a higher low density area between 2 higher high density sub-energy spheres.

Conclusion

As new insights are gained much in the way of additional information possibilities can then be extrapolated from them. This is true whether the insights come from analysis of math models or of observational data. I prefer to work from the observational data end, but it seems today that most prefer the math models. Both are needed, however, to gain a full and certain understanding of reality in all of its intricacies, to the best level that man can attain. With a math model you can analyze a magnetic or electric field or a weak or strong force to determine the results of its interactions, but it can't tell you what it is actually composed of or what is going on inside of it to produce those results. It takes being able to connect it to observed reality and the ability to visualize the interactions in that light to get to an understanding of these kinds of things. I believe that there is a need for more and better preparation in the following areas:

1. The ability to visualize structures in one's mind.
2. The ability to mentally extrapolate information from those visualizations.
3. The ability to connect such attained information into a more advanced visualization, etc.
4. The ability to analyze observed reality for useful patterns of construction and functioning of its parts.
5. The ability to connect the math model results to observed reality in a way that brings about a seamless joining of concepts that all agree.

Some will, of course, always be better at working with the math and others from the observation perspective, but all should receive enough training in each to allow them to work together to achieve the best end results.

The point of these papers is to present the concept that something as common place and well understood as motion is the basis of and the most basic constituent of all things that we can observe in this world whether it be made of matter, energy, fields, or forces. I have presented how one can work from the existing observational data to arrive at that conclusion. I have given a logical explanation as to how these things can be constructed from basic motions and how they function. I have purposely presented it from the observation point of view rather than the math point of view because I believe that it is necessary to show that it is also needed to get a well-rounded and complete understanding of how the world works.