

What's Ultimately Possible in Physics?

Since physics is a subset of the information that man has gained in his endeavor to acquire knowledge and understanding, of the ultimate nature of reality and his attempt to use that knowledge and understanding to obtain the ability to manipulate and control reality to serve his needs and desires, what is ultimately possible in physics is a complete knowledge and understanding of reality along with the ability to fully use that knowledge and understanding to its fullest or maximum extent to control reality in all areas that are considered under the purview (limited information set) of physics.

I could stop here and try for the prize for the most to the point and concise essay in the contest, but my guess is that a more elaborate dissertation is desired in which I tackle a description of some of the difficulties that man will encounter and must overcome in order to make his objective mentioned above a part of reality, so I will do so, give my opinion, and let you make the final decision as to whether it will ever be achieved.

When it comes to understanding reality your position is important

Perspective is ultimately the greatest difficulty. All observers have either a global or local perspective. One who has the global perspective (often called God's perspective) exists or can exist separate from the structure (reality) that is being observed. He has the ability to observe all elements of the observed structure in a way that does not alter it in any way. As an example, if the world was created by God, he could have built sensors into each point in space in our reality that could sense the presence of any entity at that point, but would operate separately from the entities in our reality on external power that would give him complete knowledge of the condition of all entities in our reality without affecting our reality in any way. For this to work he would have to be very fast in his ability to analyze the outputs of the great multitude of sensors in real time. If he desired to have the ability to make changes to the structure at will, he would have to be able to directly interface with our reality in all places and on all levels in which he would desire interaction to make changes in the structure and the range of such interaction would have to be as fine or as gross as needed to accommodate the full range of interactions that he would ever desire to make. If he desired to be able to control individual particles of matter or energy and also desired to be able to control the interactions between galaxy clusters this range of interaction would have to be built into the structure and he would have to have the ability to control it all in real time. A person with such a true global perspective could not only know the complete condition of his creation at all times, if he was fast enough, he could also extrapolate the present conditions out so that he would know all future conditions of his creation if he did not interact with it any more and he could also extrapolate out the affects that any proposed changes would make in the future. He could determine and plan for the affects that any direct change that he made would generate and could compensate for any undesirable changes. He could easily possess the ability to continually know and understand the complete reality structure and at the

same time he could make any changes in it in real time. He could, therefore, easily accomplish man's goal stated above.

We, however, do not have that perspective. Our perspective is the local perspective. A person in a local perspective exists within and is a part of the reality that he is observing. He can only make observations of reality by interacting directly with it. This causes a problem because any observation utilizes interactions that at least to some degree change the reality that is being observed. The severity of the problem is dependent on the relationship of various scale components between the object being observed and the object(s) that are used in the interaction(s) that generate the observation. The primary scale components that are involved are size, mass, and motion amplitude. All of these things can affect the accuracy of the observation and even change the properties of the object of the observation. The problem is minimized when the test object that interacts with the observed object to generate the observation is as small as possible, as low in mass as possible, and as fast as possible in comparison to the object that is being observed. In our reality electromagnetic radiation (the energy photon) has proven to be a very useful test object to make observations of objects over a very wide range of size, mass, and motion amplitude variability. It does have its limits, however.

Problems of scale

Variations in size of the object used to make the observation (the test object) primarily affect the accuracy of the observation as long as all other variables such as mass and motion amplitude remain the same. Generally, the larger the size of the test object, the less accurate the observation will be.

The motion amplitude of the test object mainly generates two effects, one desirable and the other undesirable. Motion generates a mass effect so that the greater the motion amplitude, the greater is the effect on the object being observed in terms of its motion being changed, which is usually undesirable. At the same time if you bounce the test object off of the observed object it will reach the observed object, bounce off of it, and return to you to be sensed faster if you increase its motion amplitude. This means that the object that you are observing will have moved a much smaller distance during that time so your measurement of its position will be more accurate and this is usually desired.

An increase in the mass of the test object affects the observed object in much the same way as an increase in its motion amplitude because both are caused by increased motion. The increase in the overall motion contained in the test object when its mass is increased is not aligned in the direction of its motion toward the observed object as it is traveling toward it or in the direction away from the observed object when it is traveling away from the observed object after it has bounced off of it because that additional motion is trapped within cyclical motions within the particles that make up the test object. This means that the observed object is affected negatively the same as if the mass were less, but the motion amplitude were greater, but the test object does not travel faster to or from the observed object, so the advantage of greater accuracy of position

information is not present as it would be with a less massive test object with a greater motion amplitude.

How all this affects us

We live our lives out within limited ranges of these variables and we are not capable of directly observing things and changes in them that occur outside of our range of observation of these variables. We cannot slow our observation down to directly observe a plant growing or speed it up to view the details of an explosion. We cannot change our size scale to directly view an electron or alter it in the other direction to directly view the edge of the universe. We also cannot vary our mass to directly interact with an electron without altering its properties nor can we change it in the other direction to allow us to directly move a mountain. We have, however, developed tools such as microscopes and telescopes, etc. that can make observations in areas that are outside of our range of direct observation and can convert them into a form that we can observe in an indirect way through the conversion provided by the device. Indirect observation can never be considered to be as good and accurate as direct observation because there could be unknown unobservable variables that could affect the observation results or errors in the conversion from the unobservable observation form into a form that we can observe directly. For most of the practical observations that we make of our reality in living our daily lives we find that the results are generally within our range of operation, so we do not generally have great problems in this area. Our main problem is that as the objects studied have gotten smaller, had smaller masses, and had greater motion amplitude we have reached the limit of trying to observe the smallest objects that we know to exist, with the smallest masses that we know to exist, and with the greatest motion amplitudes that we know to exist, so we don't have an object to use as a test object to interact with these objects except the same type of object that we are observing. This is like trying to determine the position and motion amplitude of a rolling bowling ball by rolling another bowling ball of equal mass toward it at a known speed and waiting for it to bounce off of it and return to us so we can use the time taken for the round trip to determine its position and then doing it again to see the change in position so we can determine its motion amplitude. Depending on the relationship between the motion amplitudes of our test ball to that of the ball we are observing, it would be likely that the interaction would significantly change the motion amplitude and possibly the direction of travel of the ball we are observing so that our readings would be inaccurate. In addition these small objects that we are observing are not like small solid bowling balls, but are composed of composite motions that are continually changing in size, mass, and position and the test objects that we are using to interact with them are doing the same. The end result is that we do not always get the same result from the interaction, but instead get a range of results. Because of the structure of the variable size, mass, and position curves, some results are more likely to occur than others so probabilities of each possible result can be determined, but the actual result that will occur from any individual interaction cannot be determined both because man still does not at present understand the various variable's structures and even if he did he would also have to develop ways to observe

them dynamically so that an interaction could be synchronized to occur at the specific point in the motion cycles of the variables of both particles that would generate the desired specific outcome from the range of possible outcomes. These advances can and will be made at some point, but at this point man has mostly abandoned any attempt to understand these things and has instead developed a whole branch of physics to merely accept the probabilities as the ultimate limit of knowledge in this area and has built up an elaborate rationalization called quantum physics to justify it. This has led to further rationalizations such as much of string theory, etc. that attempt to explain reality in terms that deny any possibility of understanding the underlying causes of the probabilities, but instead consider reality itself to be variable and uncertain, thereby, generating uncertain results. To summarize, man would have to overcome these physical difficulties to gain a full knowledge, understanding, and ability to control reality in the area of physics. He would have to either leave the universe and gain the ability to view, analyze, and control it completely in real time to get a true global perspective or at least be able to find a way to interact with it without making any changes to it. At this time neither of these options seems very likely. That being said it is important to remember that we do not need to know most things to the absolute degree to make use of the knowledge that is gained even if it is only approximate. We only need results that are adequately accurate to the needs of the purpose to which it is applied. When a radar gun is used to determine the speed of an oncoming car to see if its speed is within the speed limit, the speed will only be determined to some level of accuracy due to many reasons of its construction and the wave lengths of the electromagnetic waves that are used as the test objects, etc., but it only needs to be accurate to plus or minus one half of a mile per hour or so to work for its intended purpose. This means that even if we never attain the goal of a complete knowledge, understanding, and ability to control reality, it is still a worthy goal to try to attain because the closer we can come to that goal the better off we will be if we use the knowledge, understanding, and control abilities gained in a rational and reasonable way for the betterment of all. Now that some of the aspects of man's relationship to and with reality have been covered, I will now cover some of the problems that man has as a part of his societal relationships with other men and as a result of his basic makeup that can result in the inability to gain and accept new knowledge and understanding resulting in a slow down in progress or even stagnation for prolonged periods of time as I hinted at above in reference to some current theories.

Man's hindrance to his own progress in physics

The problem described above concerning rationalizing away things that are not presently understood is not uncommon in physics, as it is also not uncommon in many other areas of life. On the surface level it is always easier to accept present understandings the way they are than to do the work necessary to determine if they are really true and man generally has a predisposition to desire that things be simple and easy with as little work involved as possible. It is always easier and in today's scientific community much safer for one's career opportunities to put out papers that agree with the presently accepted beliefs of the leaders of the scientific community than to do all the work to come up with some new insight and then risk one's career by presenting

it to the scientific community, especially if it says that present scientific beliefs are wrong. It is a basic part of man's nature to desire to be right in his understandings and not wrong. It is even more important for most to be seen and believed by others to be right. Being wrong, therefore, is a source of great embarrassment. When you add to this the fear of loss of economic benefits and societal position it is no wonder that only those who have a strong desire to know the truth and share it with the world, first do all the work necessary to uncover a new insight and then fight the established system to try to get it out to the world. To be fair it needs to be pointed out that man's built in limitations contribute somewhat to these types of behaviors. Man's mental functions are relatively slow in comparison to the amount of information that he can encounter in the world around him in a given time. As a result it is not possible for a man to check out for accuracy and completely search out an in depth understanding of all of the information that is presented to him in his life. This means that he has to specialize into narrow areas and trust others to take care of his needs in other areas of his life for him. He must learn to trust in the knowledge and expertise of those others to properly take care of his needs in the areas that are outside of his specialty. As understandings become more complex, it becomes necessary to focus more narrowly in ones specialty. One negative result of this is that by tunneling down farther and farther into a more and more narrow tunnel of information it is easy to lose the overall picture and go down a dead end for a prolonged time that would have been easy to spot if a broader understanding had been obtained. Another problem is that new insights often require one to have or at least start with an attempt to gain an overall general understanding of the subject. Often it is the combination of bits of information from various areas that point to a new important broad based understanding that has been overlooked by those who have a narrow focus on only an extremely limited information set. As an example, if you are a particle physicist working on proton-to-proton collisions you might first try to cause a collision between two low velocity protons and notice that they seem to mostly just bounce off of each other. If you increase their velocities to near the speed of light you notice that the collisions now produce many new particles of matter all of which have various rest masses, lifetimes, and produce various paths in a magnetic field, etc. You might spend much time cataloging all these variations looking for new particles or new variations of behavior of those already known. On the other hand you might not notice that the total rest mass of all these particles exceeds that of the two original protons while at the same time the total three- dimensional composite motion of all these new particles is less than the total composite motion of the original two protons or you might not put this altogether to see that some of the original linear motion of the two original protons has been converted into new particles of matter. If you miss this you might not come to the insight that matter particles are completely composed of motion. If you are looking for the overall view of things, however, you might not only notice these things, but also remember that particles of matter such as electrons can be converted into energy photons under the right conditions so energy photons must also be composed completely of motion. At this point you would have opened up a whole new way of looking at the entities that make up our world because you have shown that only one basic substance (motion) composes everything that we can observe in this world. You only need to find out how that motion is trapped or stored in these entities in such a way that causes the attributes of energy photons on the one hand and the properties of matter particles on the other hand and you are well on your way to opening up a whole new level of understanding of reality. Of course when it has later become accepted and better understood by the scientific community it will be pointed out that it was such a simple observation that anyone

should have seen it, but it is easy to ignore the basic substance from which all the trees in the forest are made when you are busy trying to just identify all of the different types of trees in the forest. Another problem that is common to man that would make it less likely that someone would think of things in that way is that man tends to get channeled into paths of thinking by what has been previously learned so that it would not seem natural to think of some things that seem to be different than the way that things are thought to be. In the example above, man is used to thinking of matter as a thing that can exist vary well when it is just standing still to his appearance. Matter can move, of course, but the motion is thought of as just a property of the matter and not as an entity of itself. It, therefore, requires a great change in previous beliefs to see motion as the true entity and the matter as only one type of expression of that motion. In reality matter is a composite of several motions, but you should get the idea. Because man has a relatively short lifetime and also a relatively short attention span within that life span, it is usual to look at things the way they are at present and to try to extrapolate what they will be like in the future by just extending the present conditions out in the way that man currently thinks they will go based on present understanding. This means that you could expect to get many essays that will say that some theory of quantum gravity or string theory, etc. will ultimately turn out to be found to be the right one to describe reality because that is what is currently being worked on by the individual being asked to give the answer. If man's lifetime was say two-hundred years and his attention span covered all of it he would remember that most of the fields of physics that are the new hot areas at this time did not even exist one-hundred and fifty years ago. This would include string theory, quantum physics (QED, QCD, quantum gravity, etc.), nuclear physics, particle physics (the standard model), etc., and to a great degree even atomic physics. It would be very naïve to believe that at least as many new areas and divisions of physics as have come about in the last one-hundred and fifty years could not be added in the next one-hundred and fifty years. Some of today's divisions will likely also be found to be dead ends and will pass away into history. As man's knowledge of the structure of the world increases it might be that the term physics itself may pass away into history as a more logical information structure replaces today's systems. To categorize all known information that has to do with the structure of the universe it might start with basic systems structuring that would contain the basic rules and concepts of structuring and encompass an overall explanation of the various levels and areas of structure. Hierarchically this would be the prime entry point for beginners to seek out desired information. Within this would be various levels of information such as dimensional structuring and within these levels would be areas of focus such as primary vector structuring containing information about the structure of, interfaces between, and interactions that occur through these interfaces between the first three dimensions, fourth vector structuring, which would contain information about the structure of, interconnectivity, and interactions that take place between the fourth dimension and the primary vector structure, and fifth vector structuring that would contain information about the fifth dimension and its interconnectivity and interactions with the fourth and primary vectors. There would be other levels such as motion entity structuring that would explain how motion works in general within the dimensional system structure and would include areas for the structure of all motion entity types such as sub-energy, energy photons, and matter particles, etc. On top of all of that would be advanced systems structuring that would tie all of the levels and their areas into an overall complete structure of the universe. This would be the highest level hierarchically and would be the entry point for advanced users. We could expect that there will be many new fields of technology developed such as structured field technology

and intelligent data structuring, etc. It can be expected that some of what seem today to be absolute limits such as the size scale problem mentioned above may be overcome or at least our area of scale will be expanded to allow us to understand and control things that are currently considered impossible. All of these types of changes have already occurred to one degree or another in the past history of the increase in knowledge and it can be expected that they will continue to occur in the future. Man always likes to believe that he has almost figured out everything that can be figured out, but history has shown over and over again that such a bet is not a very good one to take.

Problems with the scientific community's organizational structure

The current organizational structure of the scientific community is limiting scientific advancement. Four different types of Scientists and scientific development paths are necessary to create maximum growth of scientific knowledge, understanding, and application development. The first is the experimental scientist who gathers the observational information used at all levels. He must not only receive training in the current advancement level, the questions that are currently in need of answers, and the experimental observations that are needed to allow those questions to be intelligently answered, but also must be expertly trained in the development of the equipment and methods of observation necessary to carry out the proper observations accurately. The second is the structural pattern analyst. He must be trained from a very early age to analyze systems and recognize patterns in their structures starting from the overall global structure and working down to the individual subsystem structures through the various hierarchical layers to spot new overall insights as to the structural composition of the systems at all levels. He should emphasize those patterns that have been passed over by others, but offer potential for advancement. This level is currently pretty much left out of the scientific establishment structure. These are the people that would spot wrong paths being taken in the community by finding new right paths or by following patterns out to discover dead ends and would generate the new large-scale insights to be searched out, in many cases opening up completely new areas of inquiry. The third group is the path flow structuring specialist. He would work with structural pattern analysts to establish new information paths from new insights and follow paths already established to flesh out the depth of knowledge and determine the detailed hierarchical structure and connections within and between such paths. Finally the fourth type is the application specialist. He uses the scientific information that has been gained to develop useful applications for society. Currently the path flow structuring (or some similarity to it) and application specialist divisions are over emphasized, the experimental scientist division is somewhat undermanned and under funded except in certain areas that are considered important at the path flow structuring level, and the structural pattern analyst area is basically non-existent. The result is that many new applications based on current levels of understanding are developed and new details are being found and processed within already existent knowledge subsystems, but very few new overall insights in large-scale system structuring are being made. Many wrong paths are being pursued with no corrections being generated from the top side down as ought to be the case. Each of the four divisions should be autonomous and have its own

funding stream that is separate from the others to maximize the necessary cooperation between the divisions. A commission made up of an equal number of members from each division should oversee the overall coordination between the divisions. The brief nature of this paper does not allow me to cover all of the internal structural details within each division or those of the interoperability between the divisions, etc., but only to cover some of the basic concepts. One final thought in this area is that good insights and ideas do sometimes come from those who are not officially trained to produce them. It is not a disgrace to the scientific community that this sometimes happens, but it is a disgrace when such useful information is discouraged or ignored in order to make it look to the world that the formal education is required for it to be possible to have such insights. It would be good to have a division of the scientific community to actively provide a channel to receive and evaluate such insights and ideas and work with those who have valuable information to assure that their ideas are tested for validity and if found out to be so, are recognized by the scientific community. All who significantly add to scientific knowledge, understanding, or application should receive the same reward commensurate to their level of contribution regardless of their background or training level.

Possible exterior limits on man's ability to gain physics knowledge

The most obvious limit and one that people do not usually desire to think about is that if the world had a beginning, it will also likely have an end. Currently it looks like there was a beginning to the world and that it will also have an end. That end currently looks to be very far off. The problem is that we do not really know enough about the structure of the world to know when or exactly how that end will come about. We can only look out so far and it appears that there may be more out beyond our limit of observation. There could be some unknown new phenomena traveling toward us at a great multiple of the speed of light that is currently just outside of our range of observation that will destroy the whole universe when it gets here. It could be moving so fast that by the time it can be observed, we may only have a few days left before total destruction. As long as there are unknowns, we cannot be sure that one of those unknowns will not destroy us or even the whole universe at any time. The ultimate irony would be to discover all, but the last unknown and just as we are about to get an understanding of it we are destroyed by it. Of course, such an unknown would not at present need to destroy the whole universe to stop man from attaining his goal of ultimate physics understanding. It would only need to affect the earth in such a way that man could no longer live on the earth. This scenario is not as far out as an unknown new phenomenon that would destroy the whole universe. It would only take something such as a very large asteroid hitting the earth to destroy man's ability to live here. Because man is not currently able to observe and predict the long-term motions of all such entities, it cannot be ruled out. It is, therefore, currently impossible for man to know whether he will have enough time to develop the ability to overcome such local catastrophes, so it is also impossible for man to know how far he can go toward his goal of attaining what is ultimately possible in physics. As man's knowledge increases his ability to control the reality around him also grows. It is certainly possible that at some point man could gain so much power over his reality that he could easily destroy himself by a single accident or from a lack of knowledge of all of the effects of some action that he takes. When you add to this the fact that there are some unstable people that would purposely try to destroy the world if they could, you can see that

man's long-term survival is not as sure as it may appear to be at first glance. One reasonable way to handle this type of scenario is to try to establish settlements beyond the planet earth on the moon, mars, and later other worlds. Risky new experiments could be done on these settlements making it less likely that the earth would be destroyed by our lack of knowledge of what we are doing or from an unintended accident. If earth was somehow destroyed, man might still be able to continue on elsewhere. If it was only made uninhabitable for a time, man might even be able to resettle it again later from the settlements. Such settlements should be made so that they are self-sufficient so they could survive without the earth.

A possible unscientific affect on what is ultimately possible in physics

Now that I have provided some general information on natural and manmade structures that could hinder man's attempt to attain the fullness of his goal to obtain what is ultimately possible in physics, I will give my opinion of that possibility, which is that it is probably not possible for man to obtain that goal to its ultimate extent, but I would also not recommend that man give up the attempt because much gain will still come from the attempt during all the time that he is trying. This does not mean that it is impossible for man to at some time actually be in the condition of having the ultimate knowledge, understanding, and ability to apply all that is possible in physics, but most in today's scientific community would not likely desire to hear about how that could possibly come about because it comes from what is presently considered a very unscientific source, which is the Christian New Testament scriptures. According to the scriptures Jesus Christ will return to the earth and rule the earth for a thousand years. The scriptures also say that at that time his people will know even as they are known. The implication is that just as God knows his people, his people will know him. If this includes all of God's knowledge of this creation, man at that time would actually meet the goal of knowing and understanding all that is ultimately possible in physics. Since the scriptures say that death will be done away with, etc. it appears that application of that knowledge will also take place. So, after thousands of years of trying, man could obtain the goal, not by his own efforts, but as a free gift from God (the only one with the true global perspective) to his people. Now that I have committed what is often reported as the two unpardonable sins against the scientific establishment of mentioning that it is not perfect, but that it is in need of some modification and mentioning God as possibly existing that one would expect to result in this paper being disqualified out of hand, I will wait to see what happens as a part of my scientific experiment. It is always good to be a part of two experiments at the same time, both FQXI's and mine.