"The Scientist & Mystic Within" by Ken Koskinen

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Check this box out on my website. It's intended to inform visitors of any new additions to the site and to keep you up-to-date on what's on the planning boards. It also keeps repeat visitors, who have surfed all the sections before, informed. Visitors can simply view any new additions. You can also subscribe to our website RSS Feed.

A GRAND BEGINNING!

To celebrate the launching of my website I've posted my ebook *"What I Told My Son About the Bible: Things the Clergy Doesn't Want You to Know."* It's about 185 pages of

About Ants Publications

Ants stands for (**A**)nswers (**N**)onsense (**T**)ruthfully and the "s" pluralize(**s**) and stands for repeatedly. Ken Koskinen is the founder of ***Ants Publications*** and this site is currently a vehicle to post his writings; but eventually others may also be able to contribute.
Ken writes academic essays, books, poetry and some short comedy pieces. His writing is not well suited for certain individuals.
He does not for example accept the teachings of any major world religion. There are many myths and teachings that are nonsense and he writes factual rebuttals. He exercises the freedom of the press but it isn't his intention to offend others. Please do not read his material if you aren't open-minded.

Ken primarily writes from a scientific mode of mind. This means his information processing leads with reason and observation but intuition and emotion assist. When he writes serious essays and books he uses the persona, "Ken Koskinen." When he writes poetry he's "The Naked Psalmist." When he writes comedy he takes on one of several personae such as "Ken the Wildman" or "SureFoot Helms."

People who want to discuss the issues and themes raised on this site are invited to log on to the ***Ants FORUM***. It might take time to attract some traffic to the venue but "big things always grow from small beginnings." You can also post your opinions and/or questions in ***Comments***.

All downloads are free of charge. The plan is to make all posted writings available to anyone who wants them. Even if some people are short of cash they can still learn from and enjoy them. Hopefully others will make donations. Keep in mind ***Ants Publications*** isn't a registered charity and therefore cannot send receipts for tax deduction purposes.

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entertaining and informative discussions between a scholarly Father "Dad" and his intellectually gifted son, an early teen named "Charlie." When Charlie asks Dad about the Bible the fun begins.

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About the Author

I was born in Helsinki, Finland but immigrated with my family to Toronto, Canada when I was about 2 -1/3 years old. My Finnish given name is "Jarmo Olavi Koskinen" but I use the English nickname "Ken" Koskinen. I'm a naturalized Canadian and have lived most of my life in Ontario, Canada. I studied at Centennial & Niagara Colleges in Ontario but earned my BSc. at Ambassador College in Pasadena, California. I majored in psychology but also studied history and biblical subjects.

I love to write. As a writer my goals are to inform/educate, stimulate/challenge and inspire/entertain readers. I write serious pieces as well as some comedy. Over the last several years I have taken a great interest in science with an emphasis on physics & cosmology. I am currently writing my first science book, ***"The Big Vibe: Steps Towards a Theory of Everything."*** In this work I hope to add to the quilt of theoretical science. I do not currently plan to make it available on this site since I hope to publish with a scientific book publisher. However you can learn more about current unsolved scientific mysteries by reading my posted essays.

I enjoy working out with the 1/2" thick steel cable skipping rope I invented, ***"The Skip Walker/Jogger."*** I use it to skip walk; that is, I skip rope while walking for several miles. You can view my video of me skip walking. I've also written the lyrics to a light country/rock song ***"The Unemployment Line."*** I'm neither a musician nor a good singer but you can view me singing the song, without accompaniment. I hope somebody with some real talent, like Billy Ray Cyrus, contacts me and puts music to it and turns it into the next big hit! I've also invented a very good carpet cleaning detergent and a skin cream that helps to clear up blemishes and outbreaks. It is also a good topical dressing on burns. Both of these products are in the research and development stage.

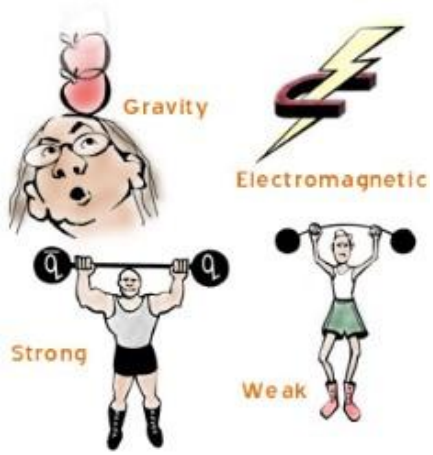
I also love nature, comedy, good food and beer. I love to learn and enjoy the mystical awareness and feeling of being alive while exploring & experiencing life within ***"All That Is!"*** It is the "everything" in which we have our being!

The Scientist and Mystic Within

The Standard Model

I love science. It's one of humanity's greatest achievements. It is based on reason/logic, observation/detection & experiment/repeatability. It requires that theories make predictions that can be tested and confirmed or falsified. All together these elements make it stand out as our most objective probe into the nature of things. Much good work has been done. The tiny, atomic and subatomic realm is best understood via quantum mechanics. Its chief theory is called the *"Standard Model of Elementary Particle Physics."* It tells us of the fundamental or elementary particles that make up mater and three major forces: strong and weak nuclear forces and the electromagnetic force. These particles are thought of as forming the bedrock of things; which is to say they have not been found to be composites or made of even tinier things. So far there hasn't been a firm detection that proves a tinier particle realm exists.

The Standard Model is a very powerful theory but it is incomplete. It includes a small handful of primary particles that interact to make up common mater. This class of particles is termed fermions and includes electrons and quarks. Different quarks combine to form the nucleons such as protons and neutrons that make up atomic nuclei. The electrons orbit around the nuclei of ions (charged atoms), atoms and molecules. This group also includes the neutrino which appears during nuclear processes such as nuclear fusion and radioactive decay. These scoot off at nearly the speed of light and rarely interact with other particles. The Standard Model also includes the force carrying particles that belong in a group termed bosons. It includes photons (electromagnetic force's carrier), gluons (strong nuclear force's carrier, there are eight different ones), W+, W- & Z particles (weak nuclear force's carriers). These force carrying bosons carry the energy of the forces between mater building particles or fermions but there are also other particles classed as bosons. [1]



There is also what is called virtual particles. These are very short-lived versions of real particles as they lack the energy required to be permanent. We can't directly detect them but can see the result of their interactions and these are also depicted in mathematical models. There are also anti-mater or anti-particle counterparts to mater particles. These are believed to have identical qualities such as energy/mass but are opposite in other qualities such as electrical charge. Whether there are differences in the expected identical qualities is being tested at CERN. [2] The electron, for example, carries a positive electrical charge while its anti-particle counterpart, called the positron, carries a positive charge. Anti-particles are short-lived since when they interact with or contact their opposites both annihilate in burst of high energy radiation. Luckily our world is dominated by mater particles and anti-mater particles only arise in tiny isolated amounts in high energy particle interactions.

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[1] http://particleadventure.org/index.html [Return to 1]

[2] http://beyond-einstein.web.cern.ch/beyond-einstein/pages/videos.html & choose Dr. Michael Doser's video. [Return to 2]

These do not normally even combine to form even the simplest anti-atom. It is sometimes suggested that anti-mater galaxies might exist somewhere in our universe. These should emit the same kind of light as mater galaxies so we can't tell from regular telescopic studies. However, if they exist and one collided with a mater galaxy the resulting gamma ray burst would be stupendous. We have observed colliding galaxies but have never seen anything like that.

The Standard Model is very successful as it explains much of the physics related to the micro-realm. Unfortunately there are three problems related to mass that it doesn't explain. The first and perhaps major one is we don't how particles get their mass and yet all the particles have mass except the photon. Even the neutrino has been shown to have a tiny mass. A lot of research has been done and continues at particle accelerators in search of a boson termed "the Higgs" or "Higgs boson." It is a theoretical particle that is believed by many physicists to be the active agent that gives the Standard Model particles their mass. (Models appeal to several different Higgs bosons so it isn't just a search for one particle). It might turn out the Higgs doesn't exist and nature uses some other mechanism to give particles mass.

The second problem is called *the hierarchy problem*. Simply put the question is: why is gravity so much weaker than the other three known particle physics forces i.e. the strong and weak nuclear forces and the electromagnetic force? The weakest of the three is the weak nuclear force. Gravity compared to the electromagnetic force, which is the other long ranged force is about 40 powers of 10 i.e. 10^{40} weaker! It is unknown why there should be such a wide range or hierarchy in the energy of the forces. We also see another wide spread amongst the masses of mater building particles. The range goes from the lightest which is the neutrino, then the electron and finally the quarks. The top quark is the most massive fundamental particle.

The third problem is called *the hierarchy of flavors problem*. So far we have detected three different flavors or generations of fermions that differ in mass. This is to say there are three different electrons and each with a different weight/mass; ditto for neutrinos. Quarks come in three different flavor pairs; i.e. six quarks all together. The lowest generation of all three fermion types is common in most interactions but it is unknown why the other two exist.

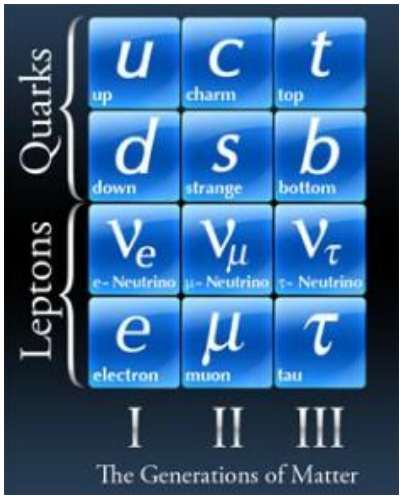
It is hoped that some of these problems will be solved after the Large Hadron Collider (LHC) near Geneva, Switzerland is restarted. This is scheduled in later 2009. The machine has already had a short first run in 2008 but it was shut down due to technical difficulties. The LHC has been dubbed "the Big Bang machine" and when it slowly reaches its maximum power it will become the most powerful particle collider in the world.

http://lhc-machine-outreach.web.cern.ch/lhc-machine-outreach/

The Search for the TOE

The deficiencies in the Standard Model point to the need to find an even grander theory. It is sometimes called the "theory of everything" (TOE) but such a name is a misnomer since no theory could literally be about "everything." It is also called the "unified field theory" in that it will unify the interactions of all of the major force fields with their associated mater particles. Physicist Lee Smolin in his book, "*The Trouble With Physics: The Rise of String Theory, the Fall of a Science and What Comes Next?"* outlines what he

expects such a theory should be able to do. In the first chapter he claims the much sought after TOE must have solutions for five major unsolved problems in physics. [3]



Smolin's first problem, which I just previewed, is the problem of quantum gravity. It must succeed in including gravity into the micro-realm picture. However it is possible to have a stand alone theory of quantum gravity that isn't a TOE; the theory called loop quantum gravity is an example. The difference is that the TOE must reach further and solve several other problems. Superstring theory is positioned as a TOE contender.

The second problem for the TOE is how can we make sense out of the mysteries of quantum mechanics? It's a very unique theory that includes many bizarre things that we don't experience in our everyday world. In 1900 physicist Max Planck discovered that energy is not infinitely divisible. It only comes in lumps and there is a smallest possible amount that can be detected and/or exchanged called the quantum. This was the initial discovery that others built on to develop the new science. In quantum mechanics probability and uncertainty replace the roles that causality and certainty plays in the older or classical theories.

Strangely particles in quantum mechanics can also behave as waves. This is called a quantum or conjugate duality and there are others. What we detect depends directly on the structure of experiments or detection systems. We can't detect something that is a particle and wave at the same time yet at different times these things display either nature. It is as if what we detect depends on the type of "looking glass" we use.

There is also the position/momentum duality and it is considered a core mystery. If we want to know the position and velocity of a macro-realm object, let's say an automobile, it isn't a problem. However if we want to know the *precise* position of a subatomic particle we can't at the same time know its velocity and vice versa. This isn't a limitation of our detection technology but is rather a physical limitation. The value of the restriction was firstly worked out by the theoretical physicist Werner Heisenberg. It is now called the *Heisenberg Uncertainty Principle* and it puts it all into a precise mathematical formula. It is as if quantum particles don't have *precise* positions and momentum at the same time. There is also an energy/time duality where trying to measure either one on a subatomic particle also limits the accuracy of its partnered or conjugate variable.

To add to the confusion we also know that some particles can apparently interact instantly even when separated by great distances i.e. quantum entanglement. This appears to violate Special Relativity that dictates that information cannot be transmitted faster than the speed of light. There are also other particles that appear to tunnel through seemingly "impossible" energy barriers i.e. quantum tunneling. This is somewhat akin to you or me walking through a solid wall.

Still quantum mechanics is an incredibly successful science. Without it we wouldn't understand things like nuclear fusion & fission, lasers, microwaves, radioactivity, electronics and much more. You might wonder how such probabilistic things can be accurate. The answer is when you make statistical predictions based on large populations of things, such as subatomic particles, the outcomes become predictable. The result was that the quantum mechanical equations made possible the development of most of the modern world's technologies, including computers. The reality is it works; but it is difficult or perhaps impossible to understand on the bedrock level.

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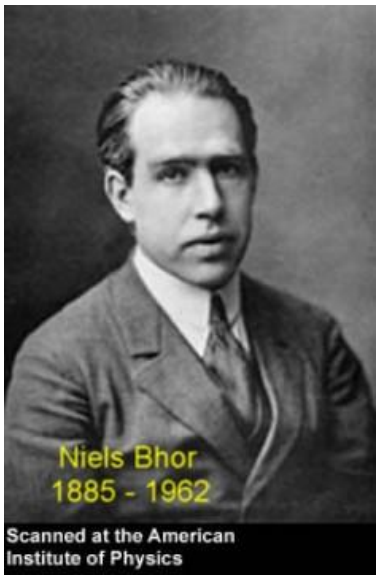
[3] Smolin, Lee. *"The Trouble With Physics: the Rise of String Theory, the Fall of a Science and What Comes Next?"* Houghton Mifflin Co., New York, 2006. pp. 3 – 17 [Return to 3]

Some physicists think there is something missing in the micro-realm picture; which is to say quantum mechanics is an incomplete theory. They believe that when the missing link or theory is discovered the fog will lift and things will make sense. This position was championed by Albert Einstein. Other physicists insist quantum mechanics is a complete theory. They claim nature in the micro-realm only seems bizarre when we attempt to impress our everyday reality on it. Niels Bhor, one of the founders of quantum mechanics, held this position. The controversy ensued almost at the inception of the theory. Einstein and Bhor had several friendly debates at intervals beginning in 1927 up and into 1935. It appears subsequent experiments has decided the issue in Bhor's favor but the question persists: how can we make sense out of quantum mechanics? Smolin claims either one must make sense of it as it is or develop a new theory that does.



The third problem relates to the discovery of a suspected unifying common link among the Standard Model particles. There has been a theoretical attempt at increasing the unity among particle classes. The idea is there is an underlying symmetry among fermions and bosons. Common coins, for example, have a heads & a tails sides. Each is a different side of the same coin and hence shares its symmetry. A theory called super-symmetry assumes each fermion has a related boson and vice-versa. The theory introduces a hidden partner particle for each known particle. This theoretically doubles the number of Standard Model particles but these hidden partners have yet to be detected. In any case super-symmetry did remove some mathematical difficulties caused by infinite values popping up in equations but it isn't known whether the theory describes a route that nature actually took.

Early string theory was developed as an attempt to explain the strong nuclear force. This didn't work out and was superseded by a new "colors-like" theory of the strong force, now called quantum chromo-dynamics. String theorists latched onto super-symmetry and used the extra particles to develop a theory of quantum gravity. This is why string theory is now known as "superstring" theory. However the search for Smolin's common link goes even deeper for an even more far reaching unity. Perhaps there is an undetected common particle that interacts and creates Standard Model particles. Many theorists still think the "strings" in superstring theory might be the key to this mystery. The main idea is that particles rather than being point-like things are the result of vibrating strings. The vibrations are like music but make up the different particles depending on how they vibrate. It's disappointing that after over 20 years of additional theoretical modeling superstring theory is still not much closer to solving this and many other problems. The challenge stands: we must determine whether there is a unifying fundamental entity that manifests the Standard Model particles.

The fourth problem could be called the problem of the constants. The speed of light is the most commonly known constant but there are some 20 constants that are used in the Standard Model. These are the values of forces and masses that largely govern particle interactions. This isn't simply a side issue. If the constants didn't have the values they do (or very, very close to them) it could have jeopardized the early formation of atoms and molecules. Larger things, like galaxies, also require the gravitational constant to be as it is or these things could not have formed.

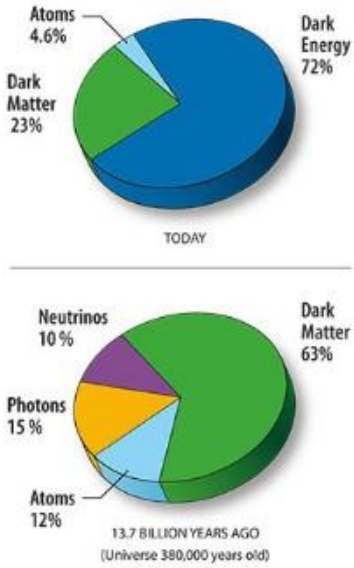
It's easy to see how the constants issue is directly related to the appearance and evolution of life. It requires large numbers of atoms and molecules to form into stars and planets (with special qualities) in order to create a stable base for life to evolve. The key need for specific life supporting values of constants is expressed as the "*Anthropic Principle."* Some physicists such as Leonard Susskind think it is explanatory like the Principle of Relativity. Others such as Lee Smolin claim it is merely descriptive and hardly even sound science. The debate continues. The interpretations include both weak and strong versions of the

principle. The weak version claims that if the constants are inline then advanced life has a *probability* to arise. The strong version insists given the right values, such life *must* arise.

It is clear the apparent design around us largely stems from the fine-tuned values of the constants. It all looks very much like a put-up-job that religious people interpret as the special creation of a god or gods. Scientists seek for natural explanations and have used the Anthropic Principle in link with the multiverse idea. It basically says we live in a universe that is part of a collective of others, hence a "multiverse." All of the member universes aren't assumed to have constants that support or allow for the appearance and the evolution of life. Only a small set of universes would have advanced life due to the luck of the draw termed "anthropic selection." This places the appearance of advanced life into the realm of a multiverse form of probability and waters down the apparent fine-tuning of the constants. The design of complex life therefore appears to be less of a deliberate manipulation and more like a chance event.

In any case, the key question remains: how are constants determined by nature? So far their values are measured in experiments; then physicists "pencil" these values into their equations. It's a little bit like fixing holes in a damn by simply measuring them and making up plugs or patches that fit. If the damn shifts and new cracks appear around the patches you simply add more filling. Ideally we should be able to derive these values directly from first principles. The need to measure and input their values means something very key is missing in our theories. Any successful TOE should eliminate the need to fill in holes in the damn of particle physics.

Smolin's fifth problem is really a grouping of two cosmological mysteries. It is: what is the nature of the mysterious dark mater and dark energy? There must be some missing mass that isn't apparent in the visible stars within galaxies that is causing outer galactic stars to move faster than can be accounted for. It also causes galaxies and clusters of galaxies to stay bonded together. This has been dubbed "dark mater." Whatever it is, it's probably something outside the Standard Model and yet dominates the gravity producing elements in our universe. Dark energy is also invisible. Beginning about five billion years ago something has been causing the expansion of the universe to accelerate and we also don't know what it is. It turns out that dark energy is currently the dominant energy and dark mater is the second on the list of what composes of our universe. NASA's WMAP scientists claim that today: dark energy makes up 72% of the universe, dark mater about 23% and common or baryonic mater only about 4.6%. This embarrassing breakdown implies we don't really understand the makeup of 95% of our universe. [4] The TOE will have to determine what these dark entities are.



Keep in mind there are also other problems or mysteries of equal importance to Smolin's five that the TOE must solve but I will not go into these here. The previously mentioned superstring theory and the theory of loop quantum gravity have at least partial answers to one or more of the five major problems. I've written much on the search for the TOE and developed a TOE contender called "vibe theory." It is the only theory I know of that can solve all of the above and many other key problems. I will not give a complete account of vibe theory in this essay but I will hit on some of its general elements.

Is it All Physical?

Even when the TOE is finally determined at least one general question will remain: can we explain everything by the dance of micro-realm particles? In other words is everything in the universe "physical" as

[4] http://map.gsfc.nasa.gov/ [Return to 4]

understood by Standard Model particles? I initially thought that natural law was information that somehow controlled the action of known particles. If so, it would be non-physical. I have since explained natural law by a theory of the universe's initial conditions. It is part of "vibe theory." It claims there are three fundamental sub-quantum strings called preons that have force qualities. They interact and makeup space/time, matter and the major forces. Hence an ethereally acting natural law isn't required.

I also once thought that time was non-physical but several theories create a physical picture of how space and time are interconnected. Vibe theory explains that "space/time" consists of a lattice of interlocked units. This is similar to the view used in Loop Quantum Gravity that depicts loops of space/time; both theories create a discrete space/time. However vibe theory differs in that each unit of space/time is a composite, consisting of three interlocked preons/strings. You can think of these units as the "atoms of space/time" since atoms are also composites but of course they aren't literally atoms. At the genesis of our universe there was a massive influx of the units of space/time. It created the lattice but the "Big Vibe" caused some units of space/time to pop. This allowed some preons to free flow and mix through out the space/time lattice. Some of these freed preons interacted and created mater (fermions) and the forces (bosons). The theory goes on to explain how even today preon interactions create local paces that we think of as "time." This adds to and dovetails with what Einstein showed. He claimed time isn't universally the same as it locally flexes depending on the strength of gravity and/or on the velocity of moving things. Your watch or clock is merely a scale device that indicates the pace of events in your immediate locality. Moreover the varying paces occur within "space/time" and this connection negates any strictly stand alone concept of time within our universe

However, there is a theoretical caveat in the discussion of time that stems from pre-universe scenarios related to scientific genesis theories. In these theories time in some sense is depicted as pre-existing our space/time continuum. To understand this we have to start with a short discussion on scientific theories of the genesis or beginning of our universe. There is a lot of evidence that points to the conclusion that our universe had a beginning. In the 1930's Edwin Hubble's telescopic observations proved the universe was expanding. After the early cosmologist Georges Lemaitre learned of it he took it to its logical conclusion. He realized the early universe was much smaller and claimed it must have started as a primeval "atom" that exploded. This was soon dubbed "the Big Bang" ironically as an off-the-cuff slight by physicist Fred Hoyle. He championed the then opposing "Steady State" theory. It stated the universe was infinite i.e. it didn't have a beginning and was always in a steady state in terms of its content. One problem is he and his associates had to hypothesize the constant creation of tiny amounts of hydrogen to keep up the same material content or density in an expanding universe. The accumulating evidence has been convincingly in Lemaitre's favor while none of Hoyle's steady state predictions have been verified.

Was There a Beginning?

One line of evidence that supports a beginning lies in the abundance of light elements such as hydrogen, helium & lithium in our universe. Their detected quantities essentially agree with that predicted in models of early nucleosynthesis that deal with the details of when atomic nuclei initially formed. The first two fit very firmly in the predictions but more recently there have been some questions raised about lithium. It appears there is too much of one of its forms and not enough of another. [5] In any case hydrogen is the most abundant element and the early models indicate it and most of the helium and lithium had to have been created in the early universe before stars formed. Hydrogen is the only light element that isn't produced in stars and it is the primary stellar fuel. This means it had to have pre-existed the first stars. This alone implies our universe had a beginning.

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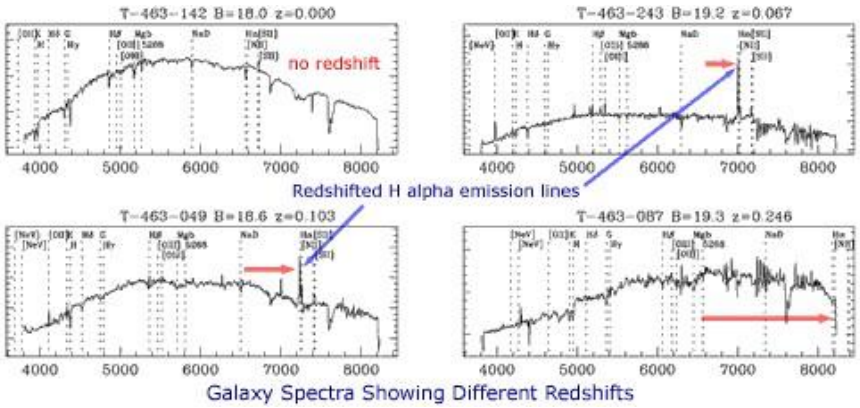
[5] 13 More Things: *The Lithium Problem*, New Scientist, 02 Sept. 2009 #2742, http://www.newscientist.com/article/mg20327246.700-13-more-things-the-lithium-problem.html [Return to 5]

There have also been fruitful detections of light or photons. We have even detected the first free flowing photons in what is called the cosmic microwave background (CMB) via NASA's WMAP satellite and other experiments. These photons took their first flight when they decoupled from the other swirling particles in the primal cloud. We also observe the most energetic galaxies called quasars but their light reaches us from great distances. In astronomy observations of the light emitted by distant objects is connected to past times. When we see the sun shining, its light took about 8 minutes to reach our eyes. This means the picture we see of the sun is 8 minutes old. In the case of quasars we look to spectral studies of light to determine their distance. Isaac Newton discovered when light is passed through a prism it breaks out into different bands of colored light. The light from heated elements creates unique spectral signatures and we have cataloged them from experiments on Earth. The good news is we can use the data to tell the composition of distant stars. There are hot elements that not only emit light but also absorb some specific wave-lengths. The colored bands of their spectrums are thereby also marked by dark absorption lines.

There isn't any such thing as an absolutely stationary star or galaxy as everything moves relative to other things. There are some galaxies that are moving towards each other but most are in clusters that are moving apart due to universal expansion. The constant expansion causes the light emitted from a source; let's say a star, to stretch. This means the wave-length of light increases or shifts towards the red end of the spectrum of light. The great thing is the stretching also causes the dark lines in spectral signatures to shift towards the red-end. The further away a receding source is, the faster it is moving and the greater is the red shift. [6] These light signatures tell us that quasars are billions of light years away from us. It means quasar galaxies are relics of a very different past. It points to different earlier conditions and also to a genesis.

Here are some sample galaxy spectra i.e. light emitted by distant galaxies illustrating different redshifts or stretching of specific wavelengths of light.



http://outreach.atnf.csiro.au/education/senior/astrophysics/spectra_astro_types.html

Notice the red arrows. The larger ones illustrate greater red shifting and are therefore further away from us.

All of the scientific genesis theories speak of a beginning although in some cases it's claimed to be the start of another cycle. In each case a pre-universe state of some sort is implied. Vibe theory's units of space/time after all must have come from somewhere. There are also other and more commonly known genesis theories. The inflationary big bang theory is currently most popular but there is also the cyclical universe theory and the pre-big bang scenario. We can't really prove all the specifics of these theories but we might succeed in testing some of their differing predictions of early universe conditions. Perhaps further studies of the previously mentioned cosmic microwave background may provide more data on early conditions.

[6] Some nearby galaxies are moving towards us and create the opposite effect. The spectral lines are blue shifted i.e. the lines are shifted towards the blue end of the spectrum. [Return to 6]

WMAP scientists peg this radiation to have started about 380,000 years after the genesis. They calculate our universe began about 13.7 billion years ago so these photons are the oldest things we have ever detected. [7]

There is also the possibility of studying a neutrino background radiation since neutrinos are also predicted to have been abundant in the early universe. This would be challenging since they are very difficult to detect. It is said that neutrinos can even zip through a block of solid lead several miles long and interact with very few particles. This is due to the fact that they not only move at close to the speed of light but only interact with gravity and the weak nuclear force. Millions of these particles, most originate in our sun, are harmlessly passing through your body even as you read this. These are difficult entities to spy on but we've managed to do so in specialized underground experiments.

Another promising source might come from the study of gravitational waves. Since scientific genesis theories make specific predictions about the energy and propagation of early gravitational waves it could prove to be decisive. Gravity interacts with everything and so gravitational waves cannot be blocked by dust or other kinds of mater. This means they could be a rich mine of new information. There are several gravitational wave detector experiments underway and others are planned but unfortunately they haven't yet been detected. It would be cool if they succeed since some of these waves could stem from the earliest times.

The Problem of Mind

Perhaps there still are things which are non-physical, but it may depend on answers to other questions. What is life? How did it begin? What are: consciousness, personality, awareness, thought, intuition and emotion? You might think some of this is in the realm of psychology and not physics but the two fields must overlap. Here is what I mean. If our universe started from a Big Bang or Big Vibe etc. then everything that is here must in theory be traceable back to the genesis. We know that mater is made of atoms and molecules and these consist of Standard Model particles and these are in principle traceable to the beginning. Yet thoughts, for example, also exist but what do they consist of? We can say it is all brain function but here we encounter many blanks or areas of missing information. It is often assumed a human being is merely *"a ghost in the machine"* and once the body dies our minds simply cease. This is the medical/scientific perspective but we still don't have a complete model of how the brain works. We know the brain is composed of billions of cells that include chemical and electrical activity. We have also identified parts and areas that specialize in functions. If scientists could demonstrate how the brain creates consciousness etc. it would certainly strengthen the argument.

There are analogies from how some of our technology works to brain functioning. We know for example moving pictures on television result from photon emissions from cells in the screen. A television is a complex light machine but it takes a human mind to decipher and interpret the light as a moving picture. We also understand how computers work in processing data and it is widely thought to be similar to brain function. These technologies are driven by electricity and electrons also move around the billions of brain cells via nerve pathways.

We commonly use electromagnetic waves within the "radio wave" frequencies to can carry information such as what we transmit and receive in radio and television receptors. These kinds of electromagnetic waves are modulated so the information e.g. sound, music, pictures etc. change the shape of the carrier wave. The carrier waves have large wave lengths and can't travel and carry information between the cells inside our brains. Notice the image. The wavelengths of radio waves are the largest.

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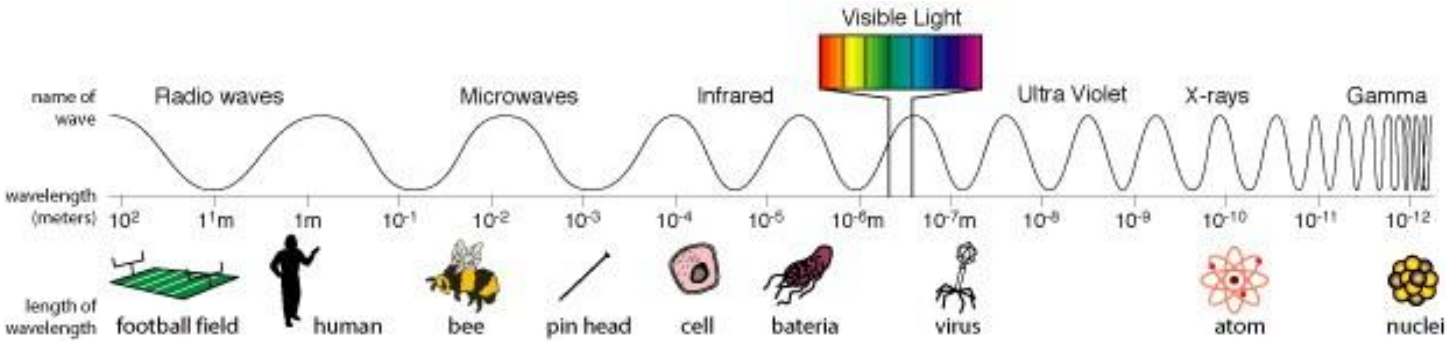
[7] http://map.gsfc.nasa.gov/ [Return to 7]



The Electromagnetic Spectrum
Image: Courtesy of NASA

http://science.hq.nasa.gov/kids/imagers/ems/waves3.html

Brains cannot and do not generate the shorter wavelength x- or gamma rays since these are too energetic and incidentally can destroy brain tissue. It's also difficult to imagine how electrons, which do reside in brains and are responsible for its moving electrical currents, could be interacting and creating thoughts, emotions, intuitions, consciousness and personality. Yet the "I AM's" that are you and I exist. Maybe our brains use some currently unknown wave/particles that are outside the Standard Model. These would have to be low energy and/or weakly interactive and have a short wavelength. There is also the older religious argument of "ensoulment." The idea is some completely non-physical entity such as a soul or spirit in humans interacts with the mater of our brains. Some are strong in faith but we're still short in evidence. No one knows for sure.

Perhaps some things currently on the fringes of science may turn out to be true, such as: ESP, telepathy, out-of-body-experiences and related things? Maybe all ghost sightings, for another example, are not simply hallucinations or illusions? People have claimed to see things such as ghostly ships with crews and other scenes with marching soldiers etc. If these people are all hallucinating then why do they see the same things? People who suffer from hallucinations such as some in psychiatric hospitals do not all have the same visions. However, people have not only seen the same ghosts but at different times and sometimes in different locations. It has also been determined that everyone who makes such claims isn't mentally ill, on drugs or in collusion. Maybe there are holographic-like copies of former things made up of unknown particles that occasionally and temporarily appear in the environment. If so, people at least at times are really seeing something.

What if telepathy in some individuals really occurs? People report they have occasionally had an inner hearing-like experience of the thoughts of others. If it is so, it would mean that some unknown radiation of the sort I speculated about is emitted by brains/minds and some others are at times receiving and deciphering it. It may also mean our minds; thoughts etc. actually consist of these unknown particle/waves. In any case very few particle physicists, if any, think the current Standard Model particle list is complete. If such things exist outside of brains, maybe we really do survive the death of the body. However, we also can't claim to know all the answers especially about any so-called life-after-death schemes. Among the problems are the teachings of different mystics and/or founders of religions about after-life scenarios contradict. It means they aren't all reading off the same page and at least some of their non-provable revelations can't be true.

We can all still believe whatever we like but beliefs lead to conclusions that aren't proven. To believe something is a creative act. One must fill in the blanks between things known and unknown but this doesn't make it objectively true. I believe things too but I view it as a working model, that's subject to change due to new information and/or perspectives. As evidence compiles, the case becomes sounder and things eventually become provable. There comes a point when there isn't a need for "belief" since one simply

"knows." So many balls, for example, have been dropped that we don't have to believe things fall at a known rate of acceleration independent of their mass. Of course there are different bars of proof such as "beyond a reasonable doubt" or based on "the preponderance of the evidence." In science both, yes even the later, are acceptable. Scientists also continue to search for better cases since all of the data is rarely available and prevailing theories are thought of as the best current approximations. How great is that!

I think reason and observation should usually lead our searches but there are times to pay attention to intuition and emotion. Intuitions alone can produce a "feeling" of what is true but this alone doesn't "prove" it. However these can create leads or directions for further study. Care is required since if intuition suggests something that goes against established facts then it can't be completely right. On the-other-hand one shouldn't always out-of-hand simply accept commonly held assumptions. The "mystic within me" intuits more answers can be found. However the "scientist within me" always wants to criticize conclusions and raise the bar of physical explanations as high as it can go. The mystic and the scientist within can at times conflict. However there are times when both co-operate. When intuition assists reason/observation it can lead to breakthroughs! James Clerk Maxwell (known for his 19th century mathematical formulation of the electromagnetic force) and Albert Einstein (known for his 20th century Special and General Theories of Relativity) are examples of theorists who were greatly assisted by their intuition. I think listening to it makes the exploration of *"all that is"* (ATI) far more exciting!

I will advance this discussion in a future article; stay tuned to my website! I started this essay on November 14, 2008. It has been edited and added to many times since. Ken Koskinen

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