MOVING DIMENSIONS THEORY SOLVES DILEMMA IN FEB. 2009's SCIENTIFIC AMERICAN COVER STORY: Was Einstein Wrong?: A Quantum Threat to Special Relativity Entanglement, like many quantum effects, violates some of our deepest intuitions about the world. It may also undermine Einstein's special theory of relativity By David Z Albert and Rivka Galchen

-- http://www.sciam.com/article.cfm?id=was-einstein-wrong-about-relativity

MOVING DIMENSIONS THEORY: UNITING EINSTEIN'S ELEMENTARY FOUNDATIONS OF RELATIVITY & SCHRODENGER'S CHARACTERISTIC TRAIT OF QUANTUM MECHANICS

by Dr. Elliot McGucken

http://fqxi.org/community/forum/topic/238

"A physical theory can be satisfactory only if its structures are composed of elementary foundations. The theory of relativity is ultimately as little satisfactory as, for example, classical thermodynamics was before Boltzmann had interpreted the entropy as probability. –Einstein in a letter to Arnold Sommerfield on January 14th, 1908. CPAE, Vol. 5, Doc. 73:"

"When two systems, of which we know the states by their respective representatives, enter into temporary physical interaction due to known forces between them, and when after a time of mutual influence the systems separate again, then they can no longer be described in the same way as before, viz. by endowing each of them with a representative of its own. I would not call that one but rather the characteristic trait of quantum mechanics, the one that enforces its entire departure from classical lines of thought. By the interaction the two representatives [the quantum states] have become entangled." [+]Schrödinger

Moving Dimensions Theory's simple postulate, physical model, and equation account for both "relativity's elementary foundations," which Einstein stated we yet needed, and Schrödinger's "characteristic trait" of quantum mechanics—entanglement.

MDT: The fourth dimension is expanding relative to the three spatial dimensions at the rate of c, or dx4/dt=ic.

MDT, by treating physical reality as *real,* has found the mechanism for time and its arrows that Feynman had been seeking: "Now if the world of nature is made of atoms, and we too are made of atoms and obey physical laws, the most obvious interpretation of

> this evident distinction between past and future, and this irreversibility of all phenomena, would be that some laws, some of the motion laws of the atoms, are going one way – that the atom laws are not such that they can go either way. There should be somewhere in the works some kind of principle that uxles only make wuxles, and never vice versa, and so the world is turning away from uxley character to wuxley character all the time – and this one-way business of the interactions of things should be the thing that makes the whole phenomena of the world seem to go one way."

RE: If we are to go forward, we must go back to that heroic age.

"If we are to go forward, we must go back and rediscover those precious values - that all reality hinges on moral foundations and that all reality has spiritual control." –Martin Luther King Jr.

Physics has ever been driven and advanced by physicists contemplating *physical* reality and presenting *physical* models, in the rugged pursuit of fundamental *physical* principles.

"My interest in science was always essentially limited to the study of principles.... That I have published so little is due to this same circumstance, as the great need to grasp principles has caused me to spend most of my time on fruitless pursuits." --Einstein

Einstein's Principle of Relativity (the first postulate), as well as the second postulate of relativity, both derive from MDT's single postulate which is more concise and has the added benefits of providing for free will, liberating us from the block universe, weaving change into the fundamental fabric of spacetime for the first time in the history of relativity, and providing a *physical* model for time and all its arrows and asymmetries, entropy, and quantum nonlocality and entanglement, as well as reality's probabilistic nature. The fourth dimension is inherently nonlocal via its invariant expansion, and thus "quantum mechanics' characteristic trait" (in Schrodinger's words) naturally emerges.

1. First postulate (principle of relativity)

The laws by which the states of physical systems undergo change are not affected, whether these changes of state be referred to the one or the other of two systems of coordinates in uniform translatory motion.

2. Second postulate (invariance of c)

Light is always propagated in empty space with a definite velocity c that is independent of the state of motion of the emitting body.

Both of these postulates—as well as the Einstein/Minkowski spacetime metric—naturally derive from MDT's simple postulate and equation: the fourth dimension is expanding relative to the three spatial dimensions at c, or dx4/dt=ic.

MDT presents a new universal invariant--an elementary law from which Einstein's Principle of Relativity can be built by pure deduction. Begin with a universe with four dimensions x1, x2, x3, x4, where the fourth dimension is expanding relative to the three spatial dimensions dx4/dt=ic,

and the Minkowski/Einstein spacetime metric and all of relativity naturally emerge, as does quantum mechanics' nonlocality and entanglement, wave-particle duality, space-time duality, mass-energy duality, E/B duality, entropy, and time and all its arrows and asymmetries.

"Behind it all is surely an idea so simple, so beautiful, that when we grasp it - in a decade, a century, or a millennium - we will all say to each other, how could it have been otherwise? How could we have been so stupid?" --John A. Wheeler

MDT presents a physical principle more fundamental than Einstein's principle of relativity, as all of relativity naturally emerges from MDT's postulate, as well as entanglement and quantum mechanics' probabilistic nature.

Generally speaking, physicists of yore would come up with a postulate, representing a novel physical reality.

MDT's postulate: The fourth dimension is expanding relative to the three spatial dimensions at the rate of c.

That postulate would often have an equation associated with it.

MDT's equation: dx4/dt=ic

The postulate and equation would represent a new principle--in MDT's case, that of the hitherto unsung fact that the fourth dimension is expanding relative to the three spatial dimensions at the rate of c.

This postulate/equation would then be shown to have a myriad of far-ranging consequences, as Lee Smolin says:

http://www.youtube.com/watch?v=3bLwqnIfLRA&feature=related

MDT's far-ranging consequences:

1. MDT is the foundational *physical* source of nonlocality and thus quantum mechanics' probabilistic nature and entanglement.

2. MDT is the foundational *physical* source of relativity: begin with a 4D universe wherein the fourth dimension is expanding relative to the three spatial dimensions: dx4/dt=ic, and all of relativity arises.

3. MDT is the foundational *physical* source of time and all its arrows and asymmetries.

4. MDT is the foundational *physical* source of entropy.

5. MDT is the foundational *physical* source of Huygens' Principle and Heisenberg's Uncertainty Principle.

Simple proofs of MDT:

PROOF#1:

Relativity tells us that a timeless, ageless photon remains in one place in the fourth dimension.

Quantum mechanics tells us that a photon propagates as a spherically-symmetric expanding wavefront at the velocity of c.

Ergo, the fourth dimension must be expanding relative to the three spatial dimensions at the rate of c, in a spherically-symmetric manner.

The expansion of the fourth dimension is the source of nonlocality, time and all its arrows and asymmetries, c, relativity, entropy, free will, and all motion, change, and measurement, for no measurement can be made without change.

For the first time in the history of relativity, change has been wedded to the fundamental fabric of spacetime in MDT.

PROOF#2:

Einstein and Minkowski wrote $x4=ict$

Ergo $dx4/dt=ic$.

PROOF#3:

The only way to stay stationary in the three spatial dimensions is to move at c through the fourth dimension. The only way to stay stationary in the fourth dimension is to move at c through the three spatial dimensions. Ergo the fourth dimension is moving at c relative to the three spatial dimensions.

Best,

Dr. E (The Real McCoy)

Over the past several months I have only become more certain of MDT's simple beauty and elegance.

Thanks to fqxi for this unique forum and thanks to all the participants for the collegial dialogue and debate which helped advance and forge MDT!

Indeed, MDT heard, and answered, Einstein's call to adventure:

"A physical theory can be satisfactory only if its structures are composed of elementary foundations. The theory of relativity is ultimately as little satisfactory as, for example, classical thermodynamics was before Boltzmann had interpreted the entropy as probability. –Einstein in a letter to Arnold Sommerfield on January 14th, 1908. CPAE, Vol. 5, Doc. 73:"

MDT presents a physical principle more fundamental than Einstein's principle of relativity, as all of relativity (The Principle of Relativity (the first postulate), Einstein's two postulates of relativity, and the Minkowski/Einstein spacetime metric) naturally emerges from MDT's postulate, along with time as we measure it on our watches and computers.

And too, MDT, via the natural smearing of locality into nonlocality heralded by the expansion of the fourth dimension, provides a *physical* model for quantum entanglement--that which Schrödinger stated was the "characteristic trait" of quantum mechanics:

"When two systems, of which we know the states by their respective representatives, enter into temporary physical interaction due to known forces between them, and when after a time of mutual influence the systems separate again, then they can no longer be described in the same way as before, viz. by endowing each of them with a representative of its own. I would not call that one but rather the characteristic trait of quantum mechanics, the one that enforces its entire departure from classical lines of thought. By the interaction the two representatives [the quantum states] have become entangled." --Schrödinger

So it is that MDT provides a common *physical* model for quantum mechanics and relativity, unifying them. Now a funny thing about our era is that the antitheory regiments use MDT's beauty, simplicity, and elegance against it. After deconstructing and dismissing Schrödinger, Einstein, and Maxwell, they created physics in their own image--snarky, meaningless math that is "always in its infancy," and which will require infinite funding from mommy to take it to its maturity.

The fact that MDT uses words to describe *physical* concepts has actually been used against it. The fact that the simple, foundational theory comes with a simple postulate--"the fourth dimension is expanding relative to the three spatial dimensions at c"--and a simple equation, dx4/dt=ic, which bestows us with a myriad of diverse, profound consequences across all realms of physics, has been seen as a deficiency. Yes--physics has entered the Twilight Zone, where to be noble to bolster snarky, indecipherable math while tearing true physicists down with crackpot indexes.

But yet, I will have to side with the heroic Greats, in words, equations, and deed:

"Mathematicians may flatter themselves that they possess new ideas which mere human language is as yet unable to express. Let them make the effort to express these ideas in appropriate words without the aid of symbols, and if they succeed they will not only lay us laymen under a lasting obligation, but, we venture to say, they will find themselves very much enlightened during the process, and will even be doubtful whether the ideas as expressed in symbols had ever quite found their way out of the equations into their minds." –James Clerk Maxwell

"I don't believe in mathematics." -- Albert Einstein.

"Do not worry about your difficulties in mathematics, I assure you that mine are greater." --Einstein

"Mathematics are well and good but nature keeps dragging us around by the nose."" --Einstein

"Geometry is not true, it is advantageous." --Jules H. Poincare

"Born described the weak point in Einstein's work in those final years: ". . . now he tried to do without any empirical facts, by pure thinking. He believed in the power of reason to guess the laws according to which God built the world." --Einstein's Mistakes, Hans C. Ohanian

Plato: A good decision is based on knowledge and not on numbers.

Einstein: Not everything that counts can be counted, and not everything that can be counted counts. (sign in Einstein's office, hanging beside a picture of Faraday)

Einstein, "But before mankind could be ripe for a science which takes in the whole of reality, a second fundamental truth was needed, which only became common property among philosophers with the advent of Kepler and Galileo. Pure logical thinking cannot yield us any knowledge of the empirical world; all knowledge of reality starts form experience and ends in it. Propositions arrived at by purely logical means are completely empty as regards reality. Because Galileo saw this, and particularly because he drummed it into the scientific world, he is the father of modern physics -- indeed, of modern science altogether. (Albert Einstein, Ideas and Opinions)"

"Mathematics are well and good but nature keeps dragging us around by the nose." --Albert Einstein

In Disturbing the Universe, Freeman Dyson writes, "Dick [Richard Feynman] fought back against my skepticism, arguing that Einstein had failed because he stopped thinking in concrete physical images and became a manipulator of equations. I had to admit that was true. The great discoveries of Einstein's earlier years were all based on direct physical intuition. Einstein's later unified theories failed because they were only sets of equations without physical meaning. Dick's sum-over-histories theory was in the spirit of the young Einstein, not of the old Einstein. It was solidly rooted in physical reality." --Freeman Dyson

Smolin writes in TTWP that Bohr was not a Feynman "shut up and calculate" physicist, and from the above Dyson quote, it appears that Feynman wasn't either:

"Mara Beller, a historian who has studied his [Bohr's] work in detail, points out that there was not a single calculation in his research notebooks, which were all verbal argument and pictures." --Smolin's The Trouble With Physics

"I have hardly ever known a mathematician who was capable of reasoning."--Plato

Plato’s quote is hanging in the Boston Museum of Science, and it seems to agree with Albert Einstein, Galileo, and Max Born:

http://www.ilfilosofo.com/blog/2008/04/12/plato-mathematician-quote/

"I personally like to regard a probability wave as a real thing, certainly as more than a tool for mathematical calculations. ... how could we rely on probability predictions if we do not refer to something real and objective? (Max Born on Quantum Theory)"

Max Born wrote, "All great discoveries in experimental physics have been made due to the intuition of men who made free use of models which for them were not products of the imagination but representations of real things."

"Gradually the conviction gained recognition that all knowledge about things is exclusively a working-over of the raw material furnished by the senses. ... Galileo and Hume first upheld this principle with full clarity and decisiveness." --(Albert Einstein, Ideas and Opinions)

To reject *physical* intuition and replace it with the nonsensical block universe MDT does away with seems to go exactly against the spirit by which physics has ever advanced, according to Galileo, Einstein, and other noble physicists.

It seems a preposterous conclusion that quantum mechanics, which works so very well, must be thrown out and reformulated for something which MDT shows there is no need for--the block universe.

"In the long run my observations have convinced me that some men, reasoning preposterously, first establish some conclusion in their minds which, either because of its being their own or because of their having received it from some person who has their entire confidence, impresses them so deeply that one finds it impossible ever to get it out of their heads. Such arguments in support of their fixed idea ... gain their instant acceptance and applause. On the other hand whatever is brought forward against it, however ingenious and conclusive, they receive with disdain or with hot rage - if indeed it does not make them ill. Beside themselves with passion, some of them would not be backward even about scheming to suppress and silence their adversaries. I have had some experience of this myself. ... No good can come of dealing with such people, especially to the extent that their company may be not only unpleasant but dangerous."--(Galileo Galilei)

"my dear Kepler, what do you think of the foremost philosophers of this University? In spite of my oft-repeated efforts and invitations, they have refused, with the obstinacy of a glutted adder, to look at the planets or Moon or my telescope." --Galileo Galilei

We must forever keep physical reality in the front and center, along with logic and reason and *physical* intuition--otherwise progress in physics will grind to a halt, as it has for the past thirty years.

"But before mankind could be ripe for a science which takes in the whole of reality, a second fundamental truth was needed, which only became common property among philosophers with the advent of Kepler and Galileo. Pure logical thinking cannot yield us any knowledge of the empirical world; all knowledge of reality starts form experience and ends in it. Propositions arrived at by purely logical means are completely empty as regards reality. Because Galileo saw this, and particularly because he drummed it into the scientific world, he is the father of modern physics -- indeed, of modern science altogether." --Albert Einstein, Ideas and Opinions

In Dark Matters, Dr. Percy Seymour writes, "Albert Einstein was a great admirer of Newton, Faraday, and Maxwell. In his office he had framed copies of portraits of these scientists. He had this to say about Faraday and Maxwell, in "Maxwell's Influence on the Development of the

Concept of Physical Reality": "The greatest change in the axiomatic basis of physics--in other words, of our conception of the structure--since Newton laid the foundation of theoretical physics was brought about by Faraday's and Maxwell's work on electromagenetic phenomena" --p. 33-34, DARK MATTERS

In his book Einstein, Banesh Hoffman tells us: "Meanwhile, however, the English experimenter Michael Farady was making outstanding experimental discoveries in electricity and magnetism. Being largely self-taught and lacking mathematical facility, he could not interpret his results in the manner of Ampere. And this was fortunate, since it led to a revolution in science. . . Ampere and others had concentrated their attention on the visible hardware--magnets, current-carrying wires, and the like--and on the numbers of centimeters separating the pieces of hardware. In so doing they were following the action-at-a-distance tradition that had developed from the enormous success of the Newtonian system of mechanics and law of gravitation. . .But Faraday regarded the hardware as secondary. For him the important physical events took place in the surrounding space--the filed. This, in his mind, he filled with tentacles that by their pulls and thrusts and motions gave rise to the electromagnetic effects observed. Although he could thus interpret his electromagnetic experiments with excellent precision and surprising simplicity, most physicists adept at mathematics thought his concepts mathematically naive."--BANESH HOFFMAN, EINSTEIN

It is interesting that Einstein introduced relativity as a principle--as a primary law not deduced from anything else.

Well, I guess I was dumb enough to even ask, "why relativity?"

And I found the answer in a more fundamental invariance--the fourth dimension is expanding relative to the three spatial dimensions, or dx4/dt = ic. Change is fundamentally embedded in space-time. And not only can all of relativity be derived from this, but suddenly we have a *physical* model for entropy, time and its arrows and asymmetries in all realms, free will, and quantum nonlocality and entanglement. MDT accounts for the constant speed of light c--both its independence of the source and its independence of the velocity of the observer, while establishing it as the fastest, slowest, and *only* velocity for all entities and objects moving through space-time, as well as the maximum velocity that anything is measured to move. And suddenly we see a *physical* basis for E=mc^2. Energy and mass are the same thing--it's just that energy is mass caught upon the fourth expanding dimension, and thus it surfs along at "c."

On page 37 of "Einstein's Mistakes, The Failings of Human Genius," by Hans Ochanian, we read,

"Einstein acknowledged hid debt to Newton and to Maxwell, but he was not fully aware of the extent of Galileo's fatherhood. In an introduction he wrote for Galileo's celebrated Dialogue Concerning the Two Chief World Systems, he faults Galileo for failing to produce a general mathematical proof. Galileo regarded relativity as an empirical, observational fact, that is, a law of nature, and Einstein's own formulation of the Principle of Relativity three hundred years later imitated Galileo's in treating this principle as a law of nature and not as a mathematical deduction from anything else."

Well, MDT provides a more fundamental law with an equation: dx4/dt = ic, from which relativity is derived in my paper. And an added benefit are all the other entities dx4/dt=ic accounts for with a *physical* model, from entropy, to qm's entanglement and nonlocality, to time and all its arrows.

MDT accomplishes several things right off the bat:

1) unfreezes time & liberates us from the block universe, shwoing that we have free will

2) weaves change into the fundamental fabric of spacetime

3) derives relativity from a more fundamental universal invariant: dx4/dt=ic

4) provides a *physical* model for entropy

5) provides a *physical model for quantum entanglement

6) provides a *physical* mechanism for nonlocality--the fourth expanding dimension distributes nonlocality

7) provides a physical model unifying the dualities--space/time, energy/mass, wave/particle, E/B

8) provides a *physical* model for the invariance of c--both its independence of the source and its independence of the observer

9) provides a *physical* model for the spherically-symmetric expanding wavefront of probability that defines a photon's path

10) offers a resolution for both the EPR Paradox and Godel's problems with the block universe relativity implied

11) offers a physical model for why nothing can move faster than c.

12) offers an intuitive model for the length-contraction can accompanies all motion

13) accounts for both the agelessness (from relativity) and the nonlocality (from quantum mechanics) of the photon

14) accounts for the gravitational slowing of time and light, as well as the gravitational redshift

15) provides a unique physical model underlying wide-ranging phenomena in quantum mechanics, relativity, statistical mechanics

Surely MDT offers a brand new way and a new day!

And when you factor in how little MDT has cost so far, compared to the hundreds of millions of dollars which have gone into quantum gravity/string theory religions/regimes and the creation of crackpot indexes to suppress the bold, new ideas by the corporate-state Matrix, surely MDT is worth pursuing!

Moving Dimensions Theory—which regards time as an emergent phenomena—was inspired in part by Einstein's words pertaining to the higher purpose of physical theories--words which ought be nailed above the door of every physics department, so as to liberate us from frozen time and frozen physics: "Before I enter upon a critique of mechanics as a foundation of physics, something of a broadly general nature will first have to be said concerning the points of view according to which it is possible to criticize physical theories at all. The first point of view is obvious: The theory must not contradict empirical facts. . . The second point of view is not concerned with the relation to the material of observation but with the premises of the theory itself, with what may briefly but vaguely be characterized as the "naturalness" or "logical simplicity" of the premises (of the basic concepts and of the relations between these which are taken as a basis). This point of view, an exact formulation of which meets with great difficulties, has played an important role in the selection and evaluation of theories since time immemorial."

Attached please find the true, heroic spirit of science,

that which serves higher ideals,

that which boldy voyages forth via curiosity,

that which seeks truth and honor,

and that which returns on home,

with the boon.

A hero ventures forth from the world of common day into a region of supernatural wonder: fabulous forces are there encountered and a decisive victory is won: the hero comes back from this mysterious adventure with the power to bestow boons on his fellow man. –Joseph Campbell, The Hero With a thousand Faces

Best,

Dr. E (The Real McCoy)

Moving Dimensions Theory & A Dialogue With Roger Penrose

Based on, with Dr. E!: [url]http://www.fortunecity.com/emachines/e11/86/flowtime.html[/url]

Physicist : Einstein's Theory of Relativity was really the death-knell for the old concepts of space and time. Einstein showed that Absolute Space and Absolute Time could not exist any longer.

Narrator : According to the Theory of Relativity, space and time were no longer a rigid framework but were instead a fabric which could be stretched and distorted.

Dr. E: In other words, dimensions can and do move.

Physicist : Normally we think of a black hole, a collapsed star, as being a point of zero size and infinite density surrounded by what's known as the event horizon, the point of no return. But most stars actually spin, and when they collapse they will begin to spin more rapidly. And the spinning

star that becomes a spinning black hole doesn't have a point, a singularity in the centre; its singularity looks like a ring, a dough-nut. One possibility was that maybe we could travel into a black hole, avoid the singularity, and travel through the middle and come out the other side. Because space and time were linked, you would not only have to come out in another point in space, but in time as well. This sounds like it would be the ultimate freedom for us that we can time travel; Einstein gives us this wonderful freedom of moving back, changing history, going to the future, seeing what things are like and coming back again, finding what mistakes we might make and then avoid them. This would imply that the past, present and future all exist. There is no present moment to distinguish past from future. All times co-exist, time just is. And so the future is already out there. The only way to understand this was to link the 3 dimensions of space with the one dimension of time to what became known as 4-dimensional space/time.

Dr. E: Time travel into the past is impossible. Otherwise we would have met visitsors from the future. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Roger Penrose : Space-time is certainly different stuff from space because its 4 dimensional instead of 3-D (RP larfs!) which is a big diff. Time really has to be brought into the picture; this one thing which is space/time.

Dr. E: MDT shows that time, as measured by the ticking seconds on our watches, and remembered in our memories, is not the fourth dimension, but rather it is a phenonomen that emerges because the fourth dimension is expanding relative to the three spatial dimensions. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Physicist : Just imagine what this might be like: 3-D space implies a volume, and you can move any where in that volume. Once you add time as a 4th dimension, another axis, then this block of space/time would contain within it past, present and future, all at once. Time is frozen, all times exist together; so just as you can say "over here, over there" in 3-D space, you can talk about "over then", in 4-D space/time.

Dr. E: This is exactly where physicists are lead astray. Time is not a fourth dimension, but it inherits properties of the fourth dimension, which is expanding at c relative to the three spatial dimensions. Physicists extrapolate this fact to believe that the past and future exist out there. But in reality, the deepest we ever get into the expanding fourth dimension is on the order of the Planck length.

Roger Penrose : It's a way of looking at things if you like which physically we seem to be forced into. I say physically from the point of view of what the theory of rel. tells us. And Relativity is remarkably well tested, I mean, 14 places of decimal, its just incredible. So we know that this theory does describe the universe to an extraordinarily precise degree, so we have to take it seriously. And that theory tells us that we have to regard space and time as one thing, its all out there, its one thing. In the same sense that space is out there, time is out there.

Dr. E: Space and time are not the same thing. This is obvious to everyone. We can translate freely through space, but we cannot move at all through time. MDT shows that time, as measured by the ticking seconds on our watches, and remembered in our memories, is not the fourth dimension, but rather it is a phenonomen that emerges because the fourth dimension is expanding relative to the three spatial dimensions. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Narrator : Like the Medieval God's-view of time, Einstein's physics says that the future is already out there. The moments of our lives are just waiting for us to step into them.

Dr. E: No. Read Einstein's 1912 Manuscript on Relativity. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Roger Penrose : But there's no more problem about the future being out there than saying that space is out there. You say, "Mars is out there", but why is that more comprehensible than saying "next week is out there"? It's just as far away in a certain sense.

Dr. E: This is wrong. Read Einstein's 1912 Manuscript on Realtivity. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Physicist : If you take this block of 4-D space/time literally, it means you have to abandon free will. It means not only is the future pre-ordained, but its already there, its already happened. There's no point in making any decisions, whatever you do has already happened. If I choose to drop this stone into a pond, I think of it being my own free choice, but of course in 4-D space/time I had no choice in dropping the stone ; the splash is already there in the future and so we lose all free will. If time travel was possible, you can imagine people coming back from the future to visit us; its no good us saying, "you cant exist - you haven't happened yet".They've come from a time which they consider to be their 'now' and for them we're in their path.

Dr. E: But we do have free will. Quantum Mechanics and relativity both support this, as does reality. Read Einstein's 1912 Manuscript on Realtivity. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Roger Penrose : So this means that in a sense, the present past and future are out there, and that also gives us a very deterministic view of the world. We have no control of what happens in the future because its all laid out. I think the trouble that people have with this idea is that you think the future is under your control, to some degree, and so this means that if the future's laid out then in a sense its not under your control.

Dr. E: But we do have free will. Quantum Mechanics and relativity both support this, as does reality. Read Einstein's 1912 Manuscript on Realtivity. Never did Einstein, nor Minkowski, say

that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Physicist : Personally I'm very uncomfortable about the block universe idea. Now this may be just a gut feeling or just irrational, but can't accept the future's already 'out there'. I don't accept that I don't have any free will.

Roger Penrose : I think there is a positive side to this picture of space and time being laid out there as 4 dimensions, because it tells you that all times are there once and it can affect the way one thinks about people who have died. I mean, I remember thinking in this kind of way when my mother died. In some sense she was still there because her existence is still out there in space/time although in our time she is not alive. A colleague of mine had a son who died in tragic circumstances and I presented this idea to him and it helped his understanding also. This was before I heard that Einstein had a colleague died and he wrote to the man's wife that Bessa was still out there, and that somehow this was reassuring. I certainly think this way often, that space/time is laid out and that things in the past and things in the future are out there still.

Dr. E: But we do have free will. Quantum Mechanics and relativity both support this, as does reality. Read Einstein's 1912 Manuscript on Realtivity. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Narrator : But almost at the same time that Relativity was gaining universal acceptance a radically different picture of the universe was emerging.

Physicist : The way out if you don't want to accept the block universe idea is quantum mechanics.Now, Quantum Mechanics is the second great discovery of the 20th century physics and that states that the future isn't predetermined and preordained.

Narrator : Quantum Mechanics was born out of a series of experiments whose results even today have no satisfactory explanation. Relativity works at the large scale where it provides exact predictions as to what will happen next. But when physicists started looking down at the atomic and sub-atomic level, the familiar laws failed. At this level, there were no certainties, only probabilities. How can the future of the universe be already out there if the future of a single molecule is so utterly unpredictable?

Dr. E: MDT gives a satisfactory account of all of Quantum Mechanical phenonema. In addition to underlying relativity, dx4/dt = ic also underlies QM's inherent nonlocality, which results in probability. The expanding fourth dimension distributes and disperses locality in a nonlocal manner. A single point becomes a sphere, as the fourth dimension expands as a spherically-symmetric wavefront of radius ct, describing exactly the propagation of a photon's probabilistic wavefront. The act of measurement localizes the particle which was hitherto caught in an expanding dimension, where all points were at the same point in that dimension.

Physicist : Before we look to see what the atom is doing, not only is there a gap in our knowledge, the atom itself has not decided what to do. It had an infinite number of choices to make, it will be doing all those choices all at once, and its only when we look to see what is

happening do we force it to make a choice. In Quantum Mechanics the future is not determined, and so Quantum Mechanics in a sense rescues us and rescues free will.

Roger Penrose : In a sense you don't have the future laid out in Quantum Mechanics So Quantum Mechanics is basically different in the way we look at it. You do have this indeterminacy about the future and a necessary feature of this is its incompatibility with Special Relativity. So we have these 2 great theories, both of which are extremely accurate, tell us something about how the world operates, something very insightful and profound and accurate, but they're incompatible with each other. So there's no doubt there's something missing here. How important it is to how we 'feel' the passage of time is I think very important.

Dr. E: no-the two theories are exactly compatible. The Curious Nature of the Photon, Einstein's Annus Mirabilis,

and Moving Dimensions Theory

[url]http://physicsmathforums.com[/url]

How MDT Is Aiding Fellow Physicists

"The conclusions from Bell's theorem are philosophically startling;

either one must totally abandon the realistic philosophy of most

working scientists or dramatically revise our concept of space-time." -

Abner Shimony and John Clauser

Moving Dimensions Theory provides this new concept of space-time. The

vast ambitions of most tenure-track physicists, including string

theorists and LQG hypers, causes them to focus on irrelevant, minute

questions, and thus, though funded by millions for over thirty years,

have not yet been able to string the bow. Deeper, true physicists,

such as Abner Shimony and John Clauser are alert to the fact that

physics need news ideas.

The expanding fourth dimension gives rise to non-local phenomena and

quantum entanglement, as the expanding fourth dimension means that two

events separated in the three spatial dimensions can yet appear to be

at the exact same place in the fourth dimension. MDT thus provides the

new concept of space-time.

"For me, then, this is the real problem with quantum theory: the apparently essential conflict between any sharp formulation and fundamental relativity. It may be that a real synthesis of quantum and relativity theories requires not just technical developments but radical conceptual renewal." -John Bell

"Entanglement is not one but rather the characteristic trait of quantum mechanics." -Erwin Schrodinger

"For me, then, this is the real problem with quantum theory: the apparently essential conflict between any sharp formulation and fundamental relativity. It may be that a real synthesis of quantum and relativity theories requires not just technical developments but radical conceptual renewal." -John Bell

Moving Dimensions Theory provides this radical conceptual renewal. The expanding fourth dimension gives rise to non-local phenomena and quantum entanglement, as the expanding fourth dimension means that two events separated in the three spatial dimensions can yet appear to be at the exact same place in the fourth dimension. MDT thus provides the new concept of space-time.

"Entanglement is not one but rather the characteristic trait of quantum mechanics." –Schrodinger

Moving Dimensions Theory & Hero's Journey Physics

Overcoming the Tragic Anti-Theory Leviathans that No Longer Teach Foundational Papers nor Ask Foundational Questions

By Dr. E (The Professor in Black)

"In questions of science, the authority of a thousand is not worth the humble reasoning of a single individual." –Galileo Galilei

Thanks Eckard,

I'm glad at least some of my words are making sense now.

I enjoy your questions as they reflect the spirit we need to get back to--what does the math *physically* mean?

On p. 226 of Einstein's *Ideas and Opinions*, Einstein writes, "the supreme task of the physicist is to arrive at those universal elementary laws from which the cosmos can be built up by pure deduction. There is no logical path to these laws; only intuition, resting on sympathetic understanding of experience, can reach them."

MDT presents a new universal elementary law from which Einstein's Principle of Relativity can be built by pure deduction. Begin with a universe with four dimensions x1, x2, x3, x4 where the fourth dimension is expanding relative to the three spatial dimensions at the rate of c, dx4/dt=ic, and all of relativity naturally arises, as does quantum mechanics' nonlocality and entanglement, wave-particle duality, space-time duality, mass-energy duality, entropy, and time and all its arrows and asymmetries.

There is a reason why the anti-theory regimes have banned the discussion of Einstein/Galileo/Planck/Bohr/Dirac's philosophies.

Einstein continues, "In this methodological uncertainty, one might suppose that there were any number of possible systems of theoretical physics all equally well justified; and this opinion is no doubt correct, theoretically (this is what the landscaper/multiversers/parallel universers/E8ers/E9ers capitalize on). But the development of physics has shown that at any given moment, out of all conceivable constructions, a single one has always proved itself superior to all the rest." And that would be MDT.

Einstein continues, "The longing to hold this pre-established harmony is the source of the inexhaustible patience and perseverance with which Planck has devoted himself, as we see, to the most general problems of our science, refusing

to let himself be diverted to more grateful and more easily attained ends (such as writing coffee-table physics books or gaining tenure as a string theorist or groupthink regimeist, or running a gossip column/blog/administering a crackpot index)."

Einstein continues, "The state of mind which enables a man do to this kind of work is akin to that of a religious worshipper or the lover; the daily effort comes from no deliberate intention or program, but straight from the heart."

http://www.youtube.com/watch?v=-ebtjgK8NNU&feature=related

Yes! Instead of following the questions asked by Ministry of Curiosity, or dictated from on high--instead of serving a groupthink regime for tenure and titles, Planck did it because he *loved* it--Planck, like every true artist, poet, and scientist, did it *straight from the heart."

I'm pretty sure this song was written about Max Planck:

http://www.youtube.com/watch?v=-ebtjgK8NNU&feature=related

Einstein continues, "There he sits, our beloved Planck, and smiles inside himself at my childish playing-about with the lantern of Diogenes. Our affection for him needs no thread-bare explanation. May the love of science continue to illumine his path in the future and lead him to the solution of the most important problem in present-day physics, which he has himself posed and done so much to solve. May he succeed in uniting quantum theory with electrodynamics and mechanics and mechanics in a single logical system."--Einstein--Ideas & Opinions, pps. 226-227

I just found a cool little book called "Once Upon Einstein" written by Thibault Damour.

In it he quotes Einstein's reflections on mere math.

In 1922, Einstein gave a lecture in France, in which he stated, "One must still confront the equations with reality and know what fact the mathematics hides."

Contrast this spirit to the modern-day anti-theorists who use math to hide facts of reality--facts such as curving, bending spacetime, facts such as time and all its arrows and asymmetries, facts such as free will and change and entropy, and facts such as quantum nonlocality and entanglement. MDT, with its simple postulate and equation, embraces all these facts of physical reality, weaving change into the fundamental fabric of spacetime, for the first time in the history of relativity. Indeed, MDT sinks one deeper than Einstein's Principle of Relativity, as MDT exposes the deeper mechanism that causes Einstein's principle of Relativity--MDT: the fourth dimension is expanding relative to the three spatial dimensions at the rate of c.

Einstein continues in Damour's book, "One may very well possess the mathematical apparatus of relativity and understand nothing of the theory itself."

A French journalist reported in Damour's book, "An interesting profession of faith from the mouth of he who many consider as a quintessential abstractor, and one may clearly distinguish the gulf that separates him from some of our mathematicians."

“Books on physics are full of complicated mathematical formulae. But thought and ideas, not formulae, are the beginning of every physical theory.” -- Einstein/Infeld, The Evolution of Physics

MDT, by focusing on *physical* reality, presents a physical theory, based on a fundamental universal invariant, which unifies phenomena from across the spectrum, while underlying Einstein's Principle of Relativity.

Too, too many well-funded physicists spend their days fine-tuning their snarky crackpot indexes, and playing around with meaningless math as opposed to reading the Great Books and Classics.

EINSTEIN ON CLASSIC LITERATURE: FROM EINSTEIN'S IDEAS AND OPINIONS. p. 64-65

Einstein stated, "Somebody who reads only newspapers and at best books of contemporary authors looks to me like an extremely near-sighted person who scorns eyeglasses."

While Wheeler regularly quoted Shakespeare and other Greats, few, if any, physicists these days ever demonstrate a breadth of wisdom--not even in-between their blogging snarkfests. Because they never read the Greats, their epic souls were never exalted, and they let their higher sense of reason go unused, their chief aim becoming to raise grants so as to but sleep and feed, as Hamlet lamented.

Einstein continues, "He is completely dependent on the prejudices and fashions of his times, since he never gets to see or hear anything else. And what a person thinks on his own without being stimulated by the thoughts and experiences of other people is even in the best case rather paltry and monotonous," as evidenced by the self-reflective, navel-gazing blogs which never break beyond their momentary "news of the day" context.

Einstein continues, "There are only a few enlightened people with a lucid mind and style and with good taste within a century. What has been preserved of their work belongs among the most precious possessions of mankind. We owe it to a few writers of antiquity that the people of the Middle Ages could slowly extricate themselves from the superstitions and ignorance that had darkened life for more than half a milleniun."

And now we see why the snarky mathematical physicists have cast aside these "most precious possessions of mankind!" It is because their anti-theory regimes are built upon "superstition and ignorance" as well as snarky groupthink.

Indeed, they are handwaving, mathematical snobs, and Einstein concludes, "Nothing (classic literature) is more needed to overcome the modernist's snobbishness."

I would recommend a new Heroic curriculum for rising renaissance men and physicists, including:

Science:

Original papers by Einstein, Bohr, Newton, Feynman, Dirac, Heisenberg, Planck, Schrodenger, Aristotle, Plato, Heraclitis. All of these could be assembled in a manner that costs less than a typical textbook.

Literature:

Hamlet, Shakespeare

Moby Dick, Herman Melville

Paradise Lost, Milton

Dante's Inferno

Homer's Iliad and Odyssey

Opening Books:

The Battle for The Soul of Capitalism, John C. Bogle

The Odyssey, Homer

Mythology:

The Hero With a Thousand Faces, Joseph Campbell

Philosophy:

Socrates' Apology, Plato

Plato's Republic (particularly Book VII & The Parable of The Cave)

Aristotle's Poetics

The American Founding:

The Declaration of Independence

The Constitution

Benjamin Franklin's Autobiography

Economics:

The Theory of Moral Sentiments, Adam Smith

The Wealth of Nations, Adam Smith

The Entrepreneurial Imperative, Carl Schramm

The Road to Serfdom, F.A. Hayek

Classical Economics, Thomas Sowell

Religion:

Exodus (KJV)

The Book of Matthew (KJV)

Moving Dimensions Theory—which regards time as an emergent phenomena—was inspired in part by Einstein's words pertaining to the higher purpose of physical theories: "Before I enter upon a critique of mechanics as a foundation of physics, something of a broadly general nature will first have to be said concerning the points of view according to which it is possible to criticize physical theories at all. The first point of view is obvious: The theory must not contradict empirical facts. . . The second point of view is not concerned with the relation to the material of observation but with the premises of the theory itself, with what may briefly but vaguely be characterized as the "naturalness" or "logical simplicity" of the premises (of the basic concepts and of the relations between these which are taken as a basis). This point of view, an exact formulation of which meets with great difficulties, has played an important role in the selection and evaluation of theories since time immemorial."

The vastly wealthy anti-theory regimes no longer approach physics as the Founding Fathers of physics approached physics. Safe from logic, reason, and

experiment in their multiverses/parallel universes, they have rejected the wisdom and philosophy of Einstein, Bohr, Born, Planck, Newton, Aristotle, Plato, and Galileo; and they regularly send froth sycophantic attack dogs to tear down true physical theories, while trying to bankrupt true physicists, to keep their perpetual-motion money machines running 24/7, even as they vote and legislate against time, space, physical reality, the foundational papers and questions, and rugged cowboy physicists.

And yet, it moves. Below is a simple chart that shows the simple glory of MDT, when contrasted to the institutionalized and well-rewarded failures of the snarky anti-theory regimes built upon meaningless math that is founded upon masturabatory math. “I do not feel obligated to believe that the same God who has endowed us with sense, reasons, and intellect has intended us to forgo their use.” –Galileo

Moving Dimensions Theory & Hero’s Journey Physics

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By Dr. E (The Professor in Black)

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	Moving Dimensions Theory	**String Theory / M-Theory**	**LQG**
Postulate	The fourth dimension is expanding relative to the three spatial dimensions at c, as a wave-front with a Planck wavelength.	Everything is made of tiny, vibrating strings, or something. (Is this even a postulate?)	Little loops are cooler than little strings in never really helping us formulate what has never been seen—quantum gravity.
Equation	dx4/dt=ic	??? (No.)	??? (No.)
Provides a *physical* model underlying the Principle of Relativity.	Yes.	No.	No.
Accounts for time and its arrows across all realms.	Yes.	No.	No.
Weaves change into the fundamental fabric of spacetime for the first time in the history of relativity.	Yes.	No.	No.

Provides a *physical* model for time as an emergent phenomena.	Yes.	No.	No.
Accounts for time's asymmetries across all realms.	Yes.	No.	No.
Provides a *physical* model for entropy.	Yes.	No.	No.
Provides a *physical* model for quantum nonlocality.	Yes.	No.	No.
Provides a physical model for quantum entanglement.	Yes.	No.	No.
Provides a *physical* model underlying the relativistic phenomena ($E=mc^2$/time dilation/etc.).	Yes.	No.	No.
Provides a common *physical* model for curious phenomena in qm & relativity & stat mech.	Yes.	No.	No.
Funding	$0	$1,200,000,000+	$100,000,000+
Provides a *physical* model underlying Huygens' & Heisenbergs' Principles.	Yes.	No.	No.
Provides physical model underlying time's asymmetries.	Yes.	No.	No.
Provides physical model underlying time's arrows.	Yes.	No.	No.
Unfreezes time.	Yes.	No.	No.
Liberates us from the block universe.	Yes.	No.	No.
Accounts for/sets the	Yes.	No.	No.

maximum/only velocity c.			
Sets the velocity of light *c* and Planck's Constant *h*	Yes.	No.	No.
Ranks super-high on the famous Dr. John Baez crackpot index.	No.	Yes.	Yes.
Predicts all of relativity.	Yes.	No.	No.
Predicts the gravitational slowing of light and time.	Yes.	No.	No.
Predicts the gravitational redshift.	Yes.	No.	No.
Proposes a new universal invariant.	Yes.	No.	No.
Explains away Godel's block universe.	Yes.	No.	No.
Accounts for Einstein's "spooky" action at a distance.	Yes.	No.	No.
Provides a *physical* mechanism for the distribution of locality into nonlocality.	Yes.	No.	No.
Provides a *physical* mechanism for the energy of the vacuum.	Yes.	No.	No.
Recognizes that space-time can bend and move. (Honors Einstein's GR)	Yes.	No.	Up to a point. But refuses to see the natural beauty of dx4/dt=ic.
Provides a physical model for quantum foam.	Yes.	No.	No.
Shows time travel into the distant past is impossible.	Yes.	No.	No.

Useful for building vast groupthink / handwaving / anti-theory regimes.	No.	Yes.	Yes—when combined with E8/$$$$$.
Provides us with free will to move beyond anti-theory regimes.	Yes.	No.	No.
Exalts physical ideas/models over meaningless math.	Yes.	No.	No.
Weaves change into the fundamental fabric of spacetime.	Yes.	No.	No.
Accounts for the single velocity of c through spacetime for all objects.	Yes.	No.	No.
Backed by well-funded/snarky sycophants /misleading PR campaigns to the innocent press.	No.	Yes.	Yes.
Accounts for and unifies the dualities (space/time, mass/energy, wave/particle)	Yes.	No.	No.
Provides an *underlying physical* reason for all nonlocal, wavelike behavior.	Yes.	No.	No.
Unfreezes time and progress in theoretical physics.	Yes.	No.	No.
Helps Godel with his problems with time in relativity/a block universe.	Yes.	No.	No.
Cashes in on Multiverses / Tautologies / Anthropic	No.	Yes.	Yes.

Principle / pseudo-science			
Sheds light/resolves the Einstein/Rosen/Podolsky Paradox.	Yes.	No.	No.
Conforms to Einstein's/Born's/ Planck's/Plato's/Galileo's notions of the nature of physical theory.	Yes.	No.	No.

Plato: "I have hardly ever known a mathematician who was capable of reasoning." The Plato quote is hanging in the Boston Museum of Science, and it seems to agree with Albert Einstein, Galileo, and Max Born:

http://www.ilfilosofo.com/blog/2008/04/12/plato-mathematician-quote/

"I personally like to regard a probability wave as a real thing, certainly as more than a tool for mathematical calculations. ... how could we rely on probability predictions if we do not refer to something real and objective? (Max Born on Quantum Theory)"

Max Born wrote, "All great discoveries in experimental physics have been made due to the intuition of men who made free use of models which for them were not products of the imagination but representations of real things."

"Gradually the conviction gained recognition that all knowledge about things is exclusively a working-over of the raw material furnished by the senses. ... Galileo and Hume first upheld this principle with full clarity and decisiveness." -- (Albert Einstein, Ideas and Opinions)

To reject *physical* intuition and replace it with the nonsensical block universe MDT does away with seems to go exactly against the spirit by which physics has ever advanced, according to Galileo, Einstein, and other noble physicists.

It seems a preposterous conclusion that quantum mechanics, which works so very well, must be thrown out and reformulated for something which MDT shows there is no need for--the block universe.

“In the long run my observations have convinced me that some men, reasoning preposterously, first establish some conclusion in their minds which, either because of its being their own or because of their having received it from some person who has their entire confidence, impresses them so deeply that one finds it impossible ever to get it out of their heads. Such arguments in support of their fixed idea ... gain their instant acceptance and applause. On the other hand whatever is brought forward against it, however ingenious and conclusive, they receive with disdain or with hot rage - if indeed it does not make them ill. Beside themselves with passion, some of them would not be backward even about scheming to suppress and silence their adversaries. I have had some experience of this myself. ... No good can come of dealing with such people, especially to the extent that their company may be not only unpleasant but dangerous.”--(Galileo Galilei)

“my dear Kepler, what do you think of the foremost philosophers of this University? In spite of my oft-repeated efforts and invitations, they have refused, with the obstinacy of a glutted adder, to look at the planets or Moon or my telescope.” --Galileo Galilei

We must forever keep physical reality in the front and center, along with logic and reason and *physical* intuition--otherwise progress in physics will grind to a halt, as it has for the past thirty years.

“But before mankind could be ripe for a science which takes in the whole of reality, a second fundamental truth was needed, which only became common property among philosophers with the advent of Kepler and Galileo. Pure logical thinking cannot yield us any knowledge of the empirical world; all knowledge of reality starts form experience and ends in it. Propositions arrived at by purely logical means are completely empty as regards reality. Because Galileo saw this, and particularly because he drummed it into the scientific world, he is the father of modern physics -- indeed, of modern science altogether.” --Albert Einstein, Ideas and Opinions

Math can be very pretty, but Einstein reminds us that physicists ought pursue *physics,* founded in a physical reality--”Mathematics are well and good but nature keeps dragging us around by the nose.”“

“It is anomalous to replace the four-dimensional continuum by a five-dimensional one and then subsequently to tie up artificially one of those five dimensions in order to account for the fact that it does not manifest itself.” – Einstein to Paul Ehrenfest. Just think what Einstein would have said about entire parallel universes/muliverses/landscapes we cannot see!

With an heroic spirit, MDT takes us back to origin of modern physics--to the original papers on relativity and QM, and it humbles itself upon that mountaintop. And when it comes on down, off the shoulders of relativity and QM's giants, MDT presents us with a fundamental view of reality that conforms to all experimental evidence, while not only resolving the paradoxes of the non-locality of the EPR effect and seemingly frozen time in Godel’s block universe, but also unifying the resolution of both physical curiosities within a simple physical postulate--the fourth dimension is expanding relative to the three spatial dimensions, or dx4/dt = ic. In a sense, this is the first theory to predict QM's nonlocality and entanglement, by postulating that the fourth dimension is inherently nonlocal via its expansion--an empirical fact that the timeless, ageless, nonlocal photon agrees with, as the photon surfs the fourth expanding dimension. And not only does MDT predict this, but it also provides a *physical* model for entropy and time and all its arrows and assymetries throughout all realms. And finally, all of relativity may be derived from MDT's simple postulate, as it is in my paper--the fourth dimension is expanding relative to the three spatial dimensions--dx4/dt = ic. A postulate and an equation representing a novel *physical* feature of our universe--a fourth expanding dimension--and the natural, subsequent prediction of all of relativity, qm's nonlocality, entropy, time's arrows and assymetries in all realms, and quantum entanglement.

“I don't believe in mathematics.” Quoted in Carl Seelig. Albert Einstein.

“Do not worry about your difficulties in mathematics, I assure you that mine are greater.” --Einstein

“Geometry is not true, it is advantageous.” --Jules H. Poincare

MDT’s Confession/Apology

I was hoping for a bit of a dialogue, but too, the lack of dialogue will be useful to historians of science in understanding and characterizing why our era has seen no progress in theoretical physics, despite unprecedented funding and resources.

Never before have so many been paid so much to advance physics so little. Indeed, future historians will see that overfunding tends to lead to sociological constructs that exalt consensus building rooted not in logic, reason, and physics--not in foundational questions; but in fashion and politics which obscure the foundational spirits, papers, and questions.

So it is that the Anthropic Principle and tiny, little vibrating strings are exalted over *physical* contemplations and questions, *physical* principles, and *physical* models such as MDT: the fourth dimension is expanding relative to three spatial dimensions, or dx4/dt=ic. For the first time in the history of relativity, change is woven into the fundamental fabric of spacetime; and a deeper physical invariant is shown to underlie relativity and quantum entanglement and nonlocality, in addition to time and all its arrows and asymmetries, and entropy, as well as Huygens' and Heisenbergs' principles.

In many ways Galileo had it easy, because at least the Inquisition in his day wasn't posing as physicists interested in science.

And Max Planck had it easy too, as he noted, “A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.”

But in Plancks' time, the opponents were generally a generation of successful scientists who had risen to the pinnacles of their profession via science--not by politics. So today's non-opponents of MDT are anti-theorists bolstered by state-funded crackpot indexes and anthropic principle politics--”we have

tenure/funding because we are smarter than you because if we weren't smarter than you, we wouldn't have tenure/funding. Ergo we are smarter than you," is what they announce at their lavish conferences, reformulating the anthropic principle to fit the latest "flavor of the week" of their unchanging anti-theory regimes, which have frozen physics in a block universe.

Max Born wrote, "All great discoveries in experimental physics have been made due to the intuition of men who made free use of models which for them were not products of the imagination but representations of real things."

And yet, today, the quantum gravity regimes have rejected simple physical models along with the belief that the math ought represent *real* things. And now, they are even willing to forget time, space, reason, words, dialogue, physics, and physicists--to keep their perpetual motion funding apparati moving--even as time remains frozen. And thus, despite hundreds of millions in funding, there is no quantum gravity. There is no graviton, nor any consistent theory of quantum gravity. Instead, there are literally an infinite number of string theories, and a fair amount of loop-quantum theories, none of which quantize gravity in any finite, consistent way; let alone in any way that makes predictions that can be tested. There is no proof whatsover for tiny, vibrating strings, nor atoms of space and time, nor twistors, nor tiny little loops, nor multiverses, nor hyperspace, nor parallel universes, nor bouncing universes--all of which grace the cover of Scientific American as sycophant students are trained to call true physicists seeking *physical* models and *physical* truths crackpots. And the Greats themselves--Nobel Laureates--both living and dead, have spoken out against such pseudo-science and snarky mathematical handwaving, which has become a religion that has replaced physics, thusly bringing progress to a halt.

"Books on physics are full of complicated mathematical formulae. But thought and ideas, not formulae, are the beginning of every physical theory." --Einstein/Infeld, The Evolution of Physics

Instead of classical, rugged physics on the higher plain of physical reality, we get communal, political efforts which end up opposing progress in physics, as they oppose the individual heroic spirit by which all higher physical truths are ultimately apprehended.

Science is more of an art than a science, and it always seems to advance in manners never before anticipated by the establishment, as Planck stated. One cannot legislate, nor vote on, nor dictate the advancement of science by fiat. Do not take my word for it.

“One cannot pray a lie,” as Mark Twain once said.

“New scientific ideas never spring from a communal body, however organized, but rather from the head of an individually inspired researcher who struggles with his problems in lonely thought and unites all his thought on one single point which is his whole world for the moment.” --Max Planck

And again we see the primacy of the honest individual in the classic, epic hero's journey!

“A hero ventures forth from the world of common day into a region of supernatural wonder: fabulous forces are there encountered and a decisive victory is won: the hero comes back from this mysterious adventure with the power to bestow boons on his fellow man.” --Joseph Campbell

http://en.wikipedia.org/wiki/Monomyth

And the Nobel Laureate economist F.A. Hayek agrees!

“The tragedy of collectivist thought is that, while it starts out to make reason supreme, it ends by destroying reason because it misconceives the process on which the growth of reason depends. It may indeed be said that it is the paradox of all collectivist doctrine and its demands for “conscious” control or “conscious” planning that they necessarily lead to the demand that the mind of some individual should rule supreme—while only the individualist approach to social phenomena makes us recognize the superindividual forces which guide the growth of reason. Individualism is thus an attitude of humility before this social process and of tolerance to other opinions and is the exact opposite of that intellectual hubris which is at the root of the demand for comprehensive direction of social purpose.” –F.A. Hayek, The End of Truth, The Road to Serfdom

Along comes a scientist who agrees with the philosophy of Einstein and Max Born and Planck. Along comes a physicist who agrees with Wheeler, and Feynman, and Glasgow, and Godel, and Bohr, and Gamow--wishing that he could watch old Westerns with Bohr and Gamow. Along comes a scientist who agrees with Nobel Laureate Robert Laughlin and Nobel Laureate F.A. Hayek, with Newton and Dirac, with Heisenberg and Minkowski, with the great mythologist Joseph Campbell. Along comes a scientist with simple theory that has a simple postulate and equation from which all of relativity may be derived; from which entropy naturally arises, and which accounts for time and all its arrows and assymetries across all realms, while also providing a *physical* model for entanglement and nonlocality, as well as a *physical* model for Huygens' principle and the Heisenberg Uncertainty principle. Not only does the multi-billion-dollar physics establishment ignore it, but they have so much funding, that they can hire grad students and professors to snark the theory, so as to defend their perpetual-motion NSF money machines and religions of wormholes, time warps, quantum gravity, multiverses, tiny, vibrating strings, and geometric mysticism/PR/hype, which Moving Dimensions Theory has no need for, as it concerns itself with physics and physical reality--with logic, reason, and simple postulates and equations that represent a hitherto unsung universal invariant--the fourth dimension is expanding relative to the three spatial dimensions at c.

What we have here is a modern-day Inquisition, except that it is even more dangerous, as at least Galileo's Inquisition weren't claiming science's throne.

Check out:

http://www.jklarsen.com/myblog/index.php?blog=6&title=confession_of_galileo_galilei&more=1&c=1&tb=1&pb=1

Where it is reported: “In 1633, physicist Galileo Galilei was brought before the Roman Inquisition. Tried on “vehement suspicion of heresy,” Galileo was forced to swear that he “abjured, cursed and detested” the errors of his work, which extended the findings of the Polish astronomer Nicolaus Copernicus that the Earth Moves.”

Now I have postulated that the fourth dimension expands relative to the three spatial dimensions, and not one person in the entire quantum gravity regime has ever, ever, taken the time to comment on my theory. It's not like MDT is a secret, so their silence puzzles the will.

It would be one thing if quantum gravity/string theory were smashing successes--then, naturally, Rovelli/Carol et al. would all be busy partying like rock stars and flying to conferences and awards ceremonies in Aspen and Hawaii. But with the utter failure of the anti-theory regimes, for decade after decade, surely they ought have a few moments to assess the great and natural success of the brand new directions proposed by MDT.

“Insanity: doing the same thing over and over again and expecting different results.” --Albert Einstein

But I realize, that with tenure and titles to worry about in their aging anti-theory regimes; perhaps before commenting on MDT, they are all waiting for a confession, so as to make the theory “safe” for discussion in polite circles. I even thought of emailing Ed Witten and asking him to come out with a press release in which he states that the M in M-Theory stands for Moving Dimensions.

Well, here is my confession, based on Galileo's, which can be enjoyed here:

http://www.jklarsen.com/myblog/index.php?blog=6&title=confession_of_galileo_galilei&more=1&c=1&tb=1&pb=1

I, Dr. E, son of the late Vincenzio Galilei of Florence, aged 70 years, tried personally by this court, and kneeling before You, the most Eminent Antitheorists and Reverend Lord Cardinals of M-Theory Multiverses, Inquisitors-General throughout the Quantum Gravity Republic against heretical depravity, having before my eyes the Most Holy Gospels of an Elegant Universe, Not Even Wrong, and The Trouble With Physics, and laying on them my own hands; I swear that I have always believed, I believe now, and with Ed Witten's help I will in future believe all which the Holy Quantum Gravity and M-Theory Church doth hold, preach, teach, and hype to the press, including E-8 and next year's E-9 anti-theory.

But since I, after having been admonished by this Holy Office entirely to abandon the false opinion that the fourth dimension expands relative to the three spatial dimensions, and that quantum mechanics' entanglement, nonlocality, entropy, relativity itself, time and all its arrows and assymetries across all realms, the gravitational slowing of clocks and time, Huygens' Principle, Heisenberg's Uncertainty Principle, probability, and all the dualities (space-time, wave-particle, mass-energy) derive from this simple principle of MDT and its equation dx4/dt=ic, and that I was neither to hold, defend, nor teach in any manner whatever, either orally or in writing, the said false doctrine; and after having received a notification that the said doctrine is contrary to the Holy Writ of Hyperspace, I did write and cause to be printed a blog and forum in which I treat of the said already condemned MDT doctrine, and bring forward arguments of much efficacy in its favour, without arriving at any solution: I have been judged vehemently suspected of heresy, that is, of having held and believed that the fourth dimension's expansion is the universe's fundamental invariant and the cause of all time and motion, and that the block universe does not exist and time is not the fourth dimension, but that time is a parameter that emerges because the fourth dimension is expanding relative to the three spatial dimensions at c, that change is and ought be woven into the fundamental fabric of space-time with dx4/dt=ic, and that the fourth dimension, like the earth, does move.

Nevertheless, wishing to remove from the minds of your Tenured Eminences and all faithful LQGers and String Theorists this vehement suspicion reasonably conceived against me, I abjure with sincere heart and unfeigned faith, I curse and detest the said errors and heresies, and generally all and every error and sect contrary to the Holy Quantum Gravity Regimes, and I am ready to forget time, forget space, and forget physical reality, while embracing multiverses and tiny, vibrating strings. And I swear that for the future I will neither say nor assert in speaking or writing such things as may bring upon me similar suspicion; and if I know any heretic who speaks out against tiny, vibrating branes, anti-theories, or atoms of space and time, or one suspected of heresy, I will denounce him to this Holy Office of Time Travel, or to the Inquisitor of Wormholes and Ordinary of the place in which I may be, which will of course be in the block universe, which MDT falsely liberated us from, while falsely granting us free will and free thought, as it falsely unfroze time. I hereby remit all future free will, as I return to the block universe with the hopes of receiving the funding that is a part of my pre-Ordained future, as a member of the Quantum Gravity Church in this multiverse--this subset of the landscape--that the Gods of the Anthropic Principle granted us, while declaring that we should receive infinite funding for our fortitude in service to the Lords of the Landscape.

I also swear and promise to adopt and observe entirely all the penances which have been or may be by this Holy Office of Loops imposed on me. And if I contravene any of these said promises, protests, or oaths, (which Ed Witten forbid!) I submit myself to all the pains and penalties which by the Sacred Canons of String Theory and other Decrees of D-branes general and particular are against such offenders imposed and promulgated. So help me God and the Holy Warped Passages/The Trouble With Physics/10^99 indecipherable arxiv.org papers--which I touch with my own hands.

I, Dr. E, aforesaid have abjured, sworn, and promised, and hold myself bound as above; and in token of the truth, with my own hand have subscribed the present schedule of my abjuration, and have recited it word by word. In America, at the Convent della M-Theory, this 8th day of December, 2008, in this parallel universe.

I, Dr. E, have abjured as above, with my own hand."

And as I'm walking away to serve out my house arrest and exile form the academy after this confession, I turn to the crowd that had gathered to hear me read it and smile.

And I say, "And yet it--the fourth dimension--moves! Eppur si muove!"

http://en.wikipedia.org/wiki/E_pur_si_muove

Best,

Dr. E (The Real McCoy)

"In questions of science, the authority of a thousand is not worth the humble reasoning of a single individual." –Galileo Galilei

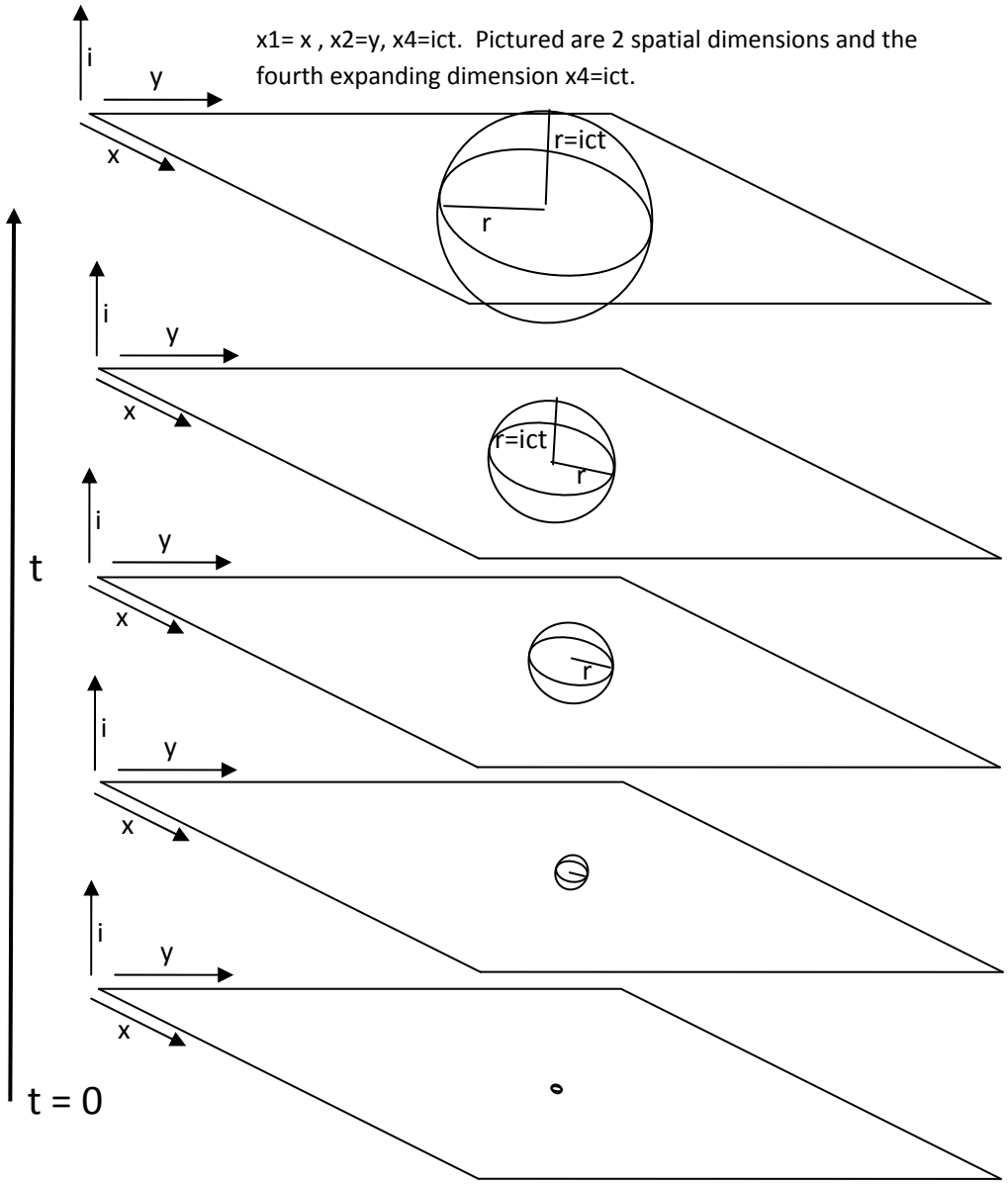
"Books on physics are full of complicated mathematical formulae. But thought and ideas, not formulae, are the beginning of every physical theory." -- Einstein/Infeld, The Evolution of Physics

MDT PERVADES NATURE: IMAGINARY NUMBERS IMPLY PERPENDICULARITY

MDT DIAGRAMS: INSPIRED BY EINSTEIN'S x4 = ict

The expansion of the fourth dimension: dx4/dt=ic

x1= x , x2=y, x4=ict. Pictured are 2 spatial dimensions and the fourth expanding dimension x4=ict.

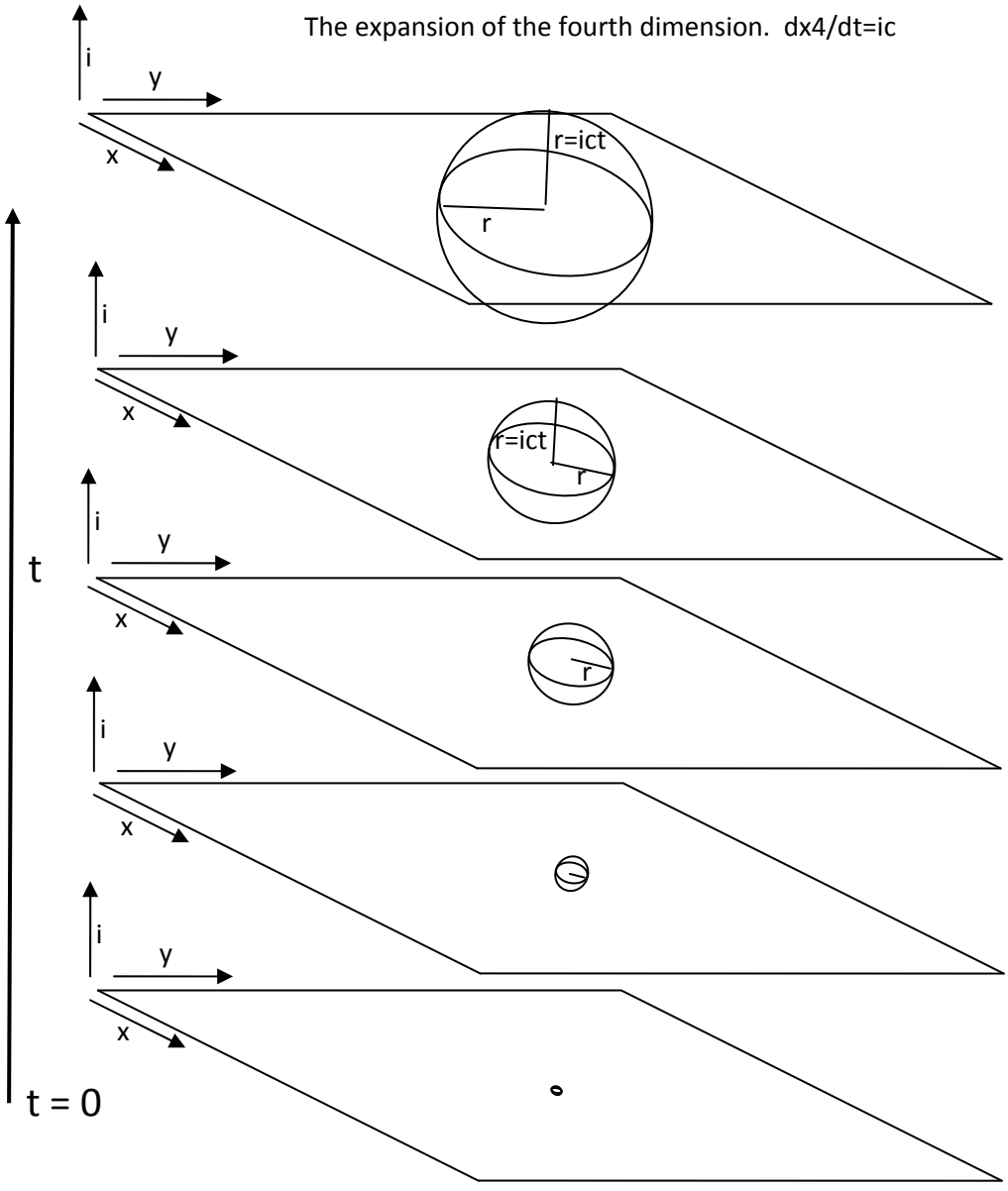


Consider a two-dimensional plane and a point expanding as a sphere in the three spatial dimensions. In the above figure, a point in the third expanding dimension appears as an expanding circle in the 2D plane, as the circle's radius expands at the rate of *c*, giving the 3D sphere a radius of *r=ict*, and the 2D circle in the x-y plane a radius of *r=ct*. Not only does this expansion of the sphere in 3D and circle in 2D define the velocity of light and make it independent of the velocity of the source (relativity), but the expansion also defines the propagation of the probabilistic wavefront that represents the photon's motion (quantum mechanics). Furthermore, the expanding surface of this circle defines both a nonlocality (quantum mechanics) and a simultaneity (relativity). Two photons emitted from the origin at the same time will yet be entangled in an instantaneous fashion (quantum mechanics) no matter how

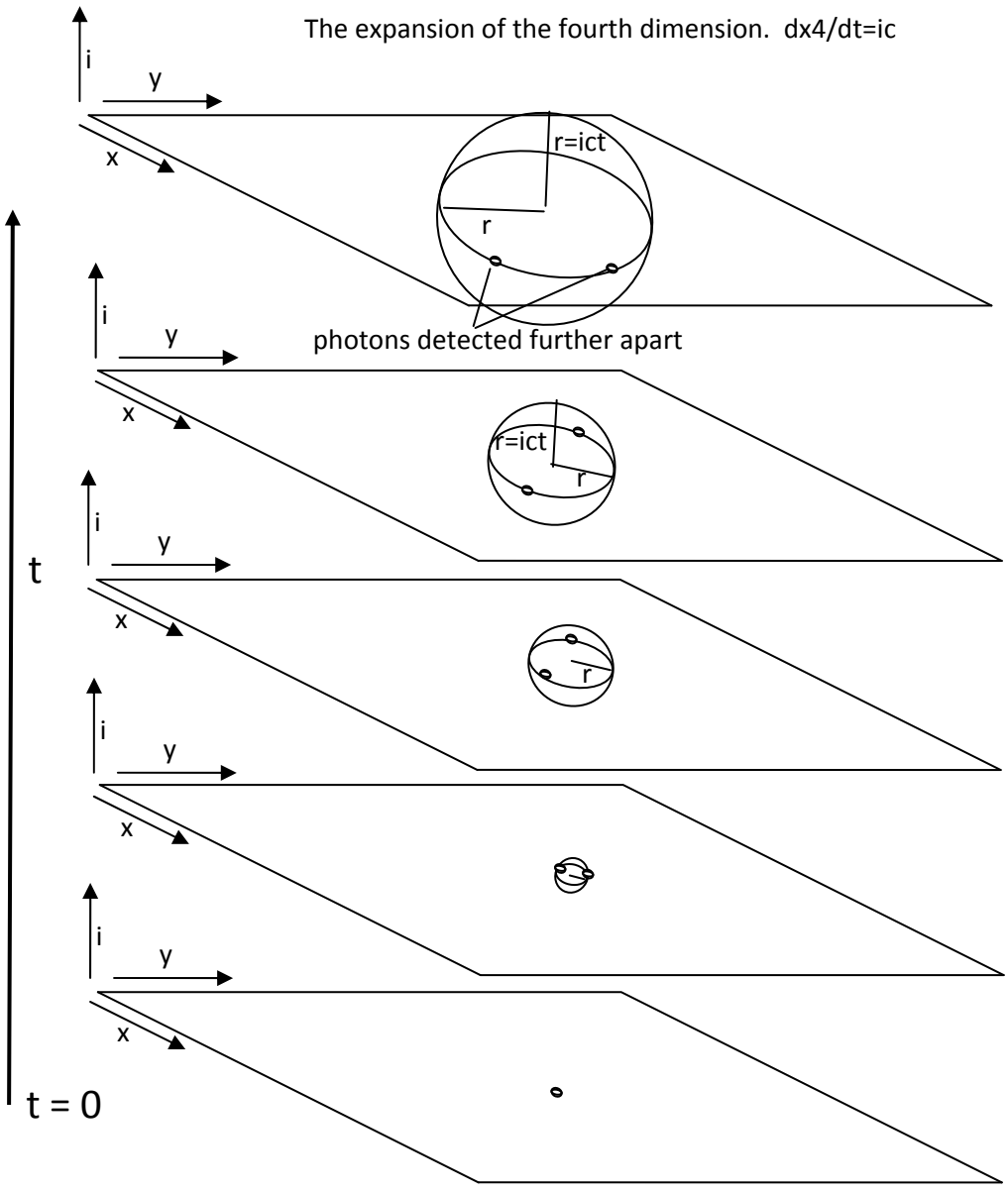
far they travel apart, as the surface of the circle yet defines a single point in the expanding dimension—thus measuring one will instantaneously affect the other. Two photons emitted from the origin at the same time will yet remain at the same place in time, no matter how far they travel—neither photon will age (relativity). Both photons will remain in the exact same place in the expanding dimension. This is because the expanding fourth dimension is inherently nonlocal, as it expands relative to the three spatial dimensions. The expanding dimension redefines our notion of locality, dispersing it in a nonlocal manner.

So it is that a point of the fourth expanding dimension manifests itself as a 3D expanding sphere in our physical reality; and the above figure may be extrapolated into our world of three spatial dimensions, and a fourth expanding dimension. A point in the fourth expanding dimension evolves into a sphere in the three spatial dimensions, as the sphere's radius expands at the rate of c, giving the sphere a radius of $r=ct$. Again, a photon surfs this expanding sphere, which remains in the same place in the fourth dimension. Hence both qm's nonlocality and relativity's ageless photon. Finally both qm and relativity can be seen to come from the same place—dx4/dt=ic.

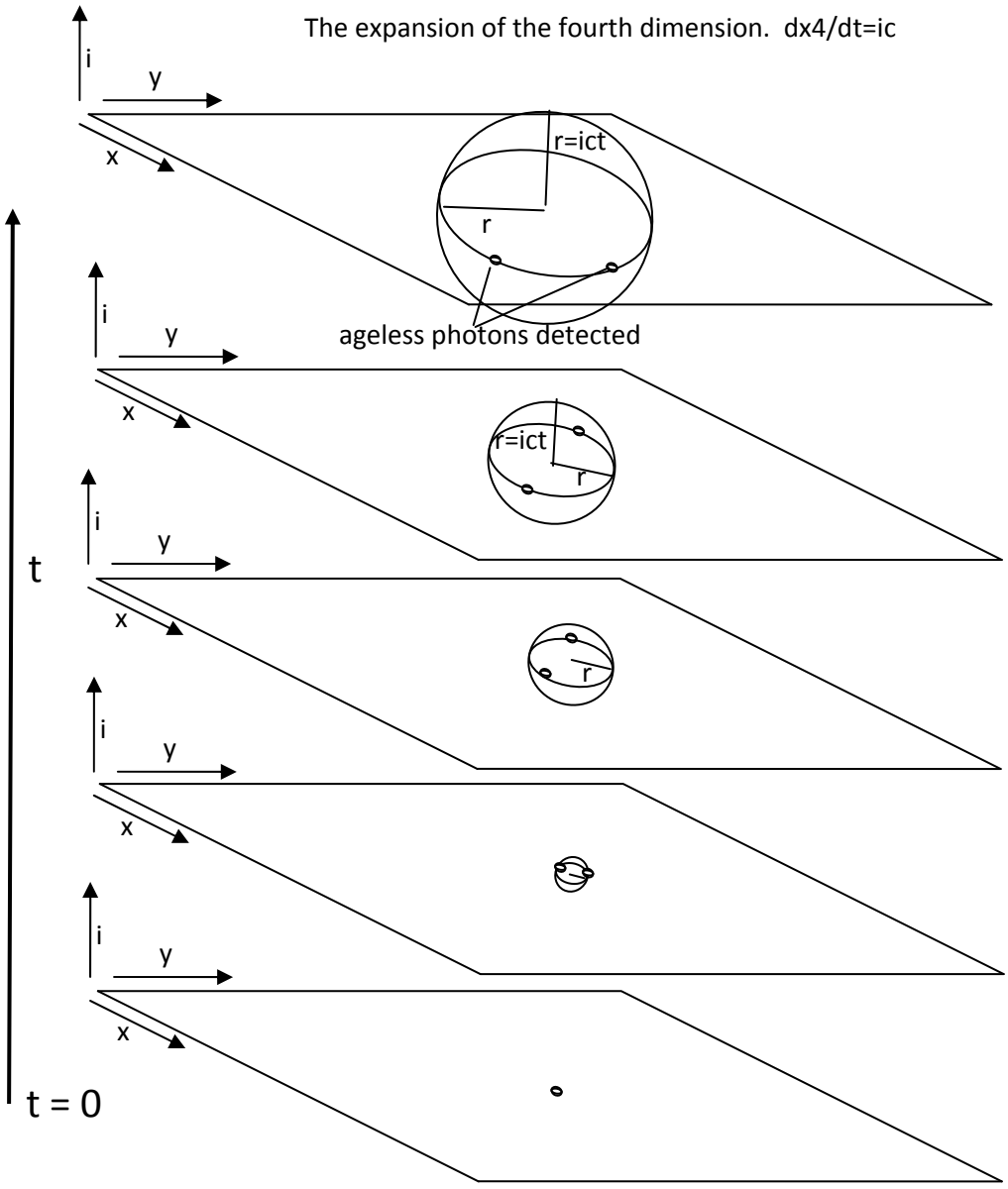
MDT'S PHYSICAL MECHANISM FOR NONLOCALITY: Every point on the spherically-symmetric expanding wavefront yet implies a locality in the fourth expanding dimension. As photons are but matter surfing the fourth expanding dimension, they appear as energy moving at c, while retaining a locality in the fourth expanding dimension.



MDT'S PHYSICAL MECHANISM FOR TIME'S RADIATIVE ARROW: As photons remain in the same place in the fourth expanding dimension, radiation appears as expanding probabilistic spherically-symmetric wavefronts, but not shrinking spherically-symmetric wavefronts.



MDT'S PHYSICAL MECHANISM FOR THE AGELESS PHOTON: As photons remain in the same place in the fourth expanding dimension, they travel at the rate of c while yet remaining in the same place in the fourth dimension. This also explains qm's nonlocality—the expansion of the fourth dimension *defines* nonlocality, while perfectly describing the propagation of the photon, and elaborating on its ageless, timeless, nonlocal, wavelike qualities.



Dimensions Theory: Hero's Journey Physics from Heraclitus to Galileo to Newton to Einstein—Eppur si muove (And yet it moves)!" Moving Dimension Theory was born by asking

foundational questions while working with J.A. Wheeler and P.J. Peebles as an undergrad at Princeton.

"A hero ventures forth from the world of common day into a region of supernatural wonder: fabulous forces are there encountered and a decisive victory is won: the hero comes back from this mysterious adventure with the power to bestow boons on his fellow man." –Joseph Campbell

Physics has ever been driven by the heroic spirit, and this work will salute the heroic risks scientists have taken throughout the ages, exploring their sometimes dramatic fate, from Bruno, to Galileo, to Boltzman, while introducing Moving Dimensions Theory.

Moving Dimensions Theory provides a deeper physical model for time and motion, weaving change into the fundamental fabric of spacetime for the first time in all of relativity; and as change is involved in all physical measurement, MDT presents a common *physical* model underlying quantum mechanics, relativity, and entropy. MDT thus provides an ideal platform to celebrate the giants of physics, while also proposing a hitherto unsung universal invariant: dx4/dt=ic. MDT unfreezes time and liberates us form the block universe, while resolving the EPR paradox and granting us free will.

"New scientific ideas never spring from a communal body, however organized, but rather from the head of an individually inspired researcher who struggles with his problems in lonely thought and unites all his thought on one single point which is his whole world for the moment." –Max Planck

In his 1912 Manuscript on Relativity, Einstein never stated that time is the fourth dimension, but rather he wrote x4 = ict. The fourth dimension is not time, but ict. Despite this, prominent physicists have oft equated time and the fourth dimension, leading to un-resolvable paradoxes and confusion regarding time's physical nature, as physicists mistakenly projected properties of the three spatial dimensions onto a time dimension, resulting in curious concepts including frozen time and block universes in which the past and future are omni-present, thusly denying free will, while implying the possibility of time travel into the past, which visitors from the future have yet to verify. Relativity is derived from the postulate that the fourth dimension is expanding relative to the three spatial dimensions, and time is shown to be an emergent phenomenon. Diverse phenomena from relativity, quantum mechanics, and statistical mechanics are accounted for. Time dilation, the equivalence of mass and energy, nonlocality, wave-particle

duality, and entropy are shown to arise from a common, deeper physical reality expressed with dx4/dt=ic. This postulate and equation, from which Einstein's principle of relativity naturally emerges, presents a fundamental model accounting for the emergence of time, the constant velocity of light, the fact that the maximum velocity is c, and the fact that c is independent of the velocity of the source, as photons are but matter surfing a fourth expanding dimension. In general relativity, Einstein showed that the dimensions themselves could bend, curve, and move. The present theory extends this principle, postulating that the fourth dimension is moving

independently of the three spatial dimensions, distributing locality and fathering time. This physical model underlies and accounts for time in quantum mechanics, relativity, and statistical mechanics, as well as entropy, the universe's expansion, and time's arrows and asymmetries in all arenas.

"More intellectual curiosity, versatility and yen for physics than Elliot McGucken's I have never seen in any senior or graduate student. . . Originality, powerful motivation, and a can-do spirit make me think that McGucken is a top bet for graduate school in physics. . . I say this on the basis of close contacts with him over the past year and a half. . . I gave him as an independent task to figure out the time factor in the standard Schwarzchild expression around a sphericallysymmetric center of attraction. I gave him the proofs of my new general-audience, calculus-free book on general relativity, A Journey Into Gravity and Space Time. There the space part of the Schwarzchild geometric is worked out by purely geometric methods. "Can you, by poor-man's reasoning, derive what I never have, the time part?" He could and did, and wrote it all up in a beautifully clear account. . . .his second junior paper . . . entitled Within a Context, was done with another advisor, and dealt with an entirely different part of physics, the Einstein-Rosen-Podolsky experiment and delayed choice experiments in general. . . this paper was so outstanding. . . I am absolutely delighted that this semester McGucken is doing a project with the cyclotron group on time reversal asymmetry. Electronics, machine-shop work and making equipment function are things in which he now revels. But he revels in Shakespeare, too. Acting the part of Prospero in the Tempest. . . " --John Archibald Wheeler, Princeton University, Recommendation for Elliot McGucken for Admission to Graduate School of Physics

Moving Dimensions Theory provides a *physical* model accounting for time and all its arrows and asymmetries across all realms, quantum nonlocality and entanglement, entropy, and the principle of relativity.

RE: All roads lead to MDT:

In a 4D universe, x1, x2, x3, x4, let the fourth dimension be expanding at the rate of c: dx4/dt=ic. Ergo relativity.

Another proof:

Relativity tells us: the timeless photon stays at one place in the fourth dimension.

QM tells us: a photon is described by a spherically-symmetric probabilistic wavefront expanding at c.

Ergo, the fourth dimension must be an expanding, spherically-symmetric wavefront traveling at c.

Or, an even shorter proof, which comes straight from Einstein’s 1912 manuscript.

x4=ict (Einstein's/Minkowski's Relativity)

ergo dx4/dt=ic

Or, "The only way to remain stationary in the fourth dimension is to propagate at c through the three spatial dimensions. And the only way to remain stationary in three spatial dimensions is to propagate at c through the fourth dimension. Ergo, the fourth dimension is expanding at c relative to the three spatial dimensions."

"Behind it all is surely an idea so simple, so beautiful, that when we grasp it - in a decade, a century, or a millennium - we will all say to each other, how could it have been otherwise? How could we have been so stupid?" –John A. Wheeler

So it is that the EPR Paradox is resolved as time is unfrozen and liberated from Einstein's/Godel's block universe. MDT provides a fundamental framework for all of QM and relativity, while also granting us free will and explaining entanglement and length contraction with the exact same principle, from which time, and all its asymmetries, naturally emerges.

Einstein's Principle of Relativity (and relativity’s two postulates) derive from MDT's single postulate which is more concise and has the added benefits of providing for free will, liberating us from the block universe, weaving change into the fundamental fabric of spacetime for the first time in the history of relativity, and providing a *physical* model for time and all its arrows and asymmetries, entropy, and quantum nonlocality and entanglement, as well as reality's probabilistic nature. The fourth dimension is inherently nonlocal via its invariant expansion.

MDT presents a new universal invariant—an elementary law from which Einstein's Principle of Relativity can be built by pure deduction. Begin with a universe with four dimensions x1, x2, x3, x4 where the fourth dimension is expanding relative to the three spatial dimensions at the rate of c, dx4/dt=ic, and all of relativity naturally arises, as does quantum mechanics' nonlocality and entanglement, wave-particle duality, space-time duality, mass-energy duality, entropy, and time and all its arrows and asymmetries.

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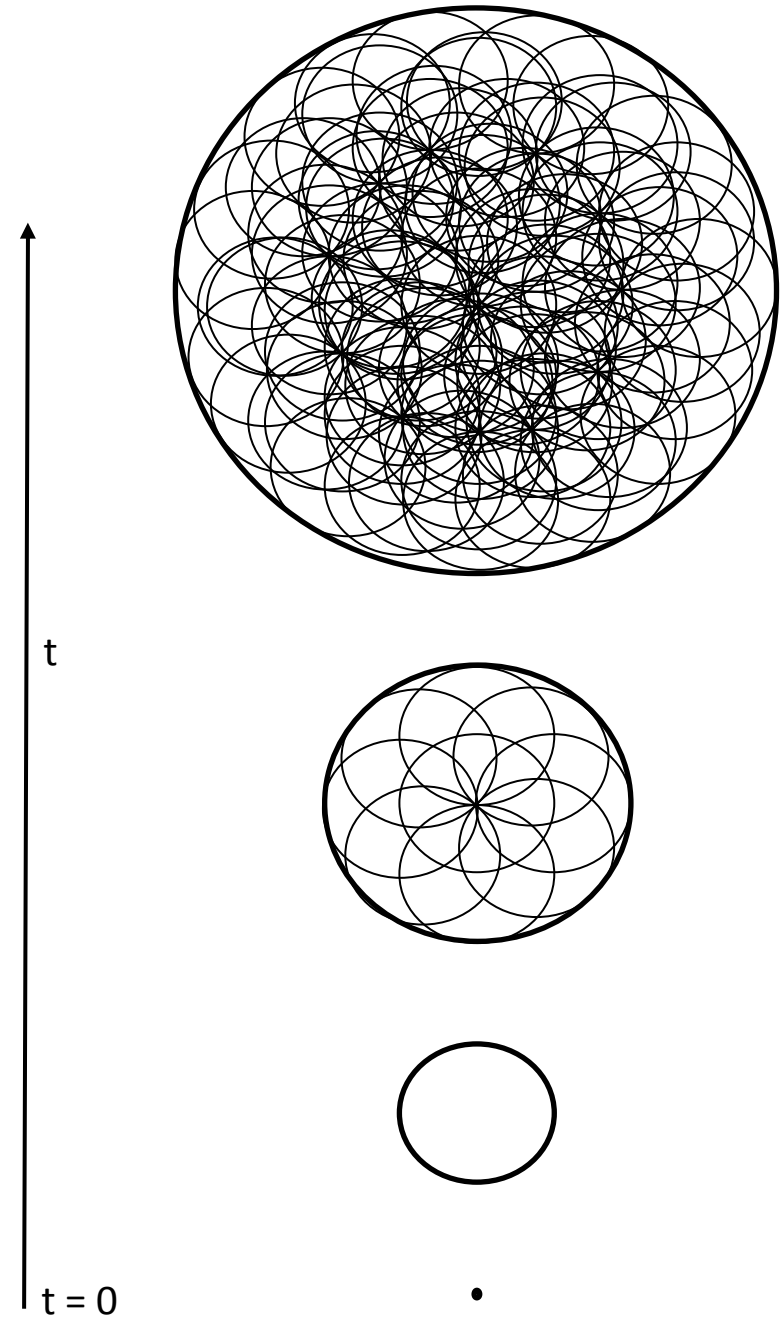


The expansion of the fourth dimension: dx4/dt=ic

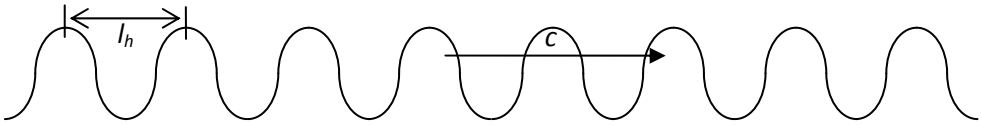
MDT'S PHYSICAL MECHANISM FOR HUYGENS' PRINCIPLE & HEISENBERG'S UNCERTAINTY PRINCIPLE: As a point expands, it defines a sphere. Every point on that sphere in turn expands, giving rise to Huygens' Principle and the Heisenberg Uncertainty Principle, (which both rest upon the fundamental wavelike character of space-time); and so it is that a brand new locality is defined, as every point on the surface of the greater sphere is yet at the exact same place in the expanding dimension. All expanding locality requires a common origin of locality; and as the expansion of the dimension propagates at c, the expansion of locality propagates at c. The spherically-symmetric expanding wave-front of the fourth dimension expands with a wavelength of the Planck Length at the rate of c; setting both h

(Planck's constant) and c (the velocity of light). All wavelike behavior; and all limitations in certainty arise because of the wave-nature of the fourth expanding dimension.

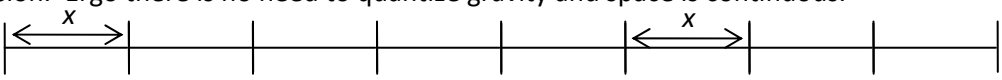
MOVING DIMENSIONS THEORY EXAMINES THE GRAVITATIONAL REDSHIFT & SLOWING OF CLOCKS, AND WHY GRAVITY IS NOT QUANTIZED: ALL HAIL THE UNIVERSE'S FUNDAMENTAL INVARIANT: dx4/dt = ic

by Dr. Elliot McGucken

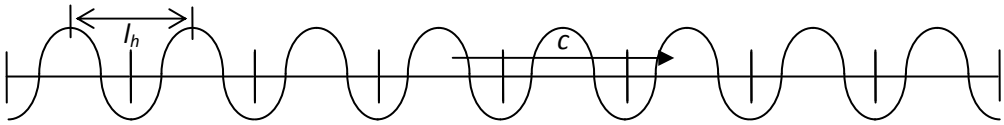
drelliot@gmail.com



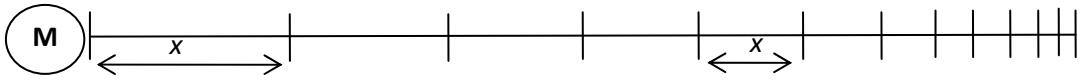
MDT postulates a fundamental invariant of the universe: the fourth dimension is expanding at the rate of c: dx4/dt=ic. This expansion manifests itself as a spherically-symmetric expanding wave-front in 3D with a wavelength of Planck's length l_h. All quantization derives from this invariant expansion. Ergo there is no need to quantize gravity and space is continuous.



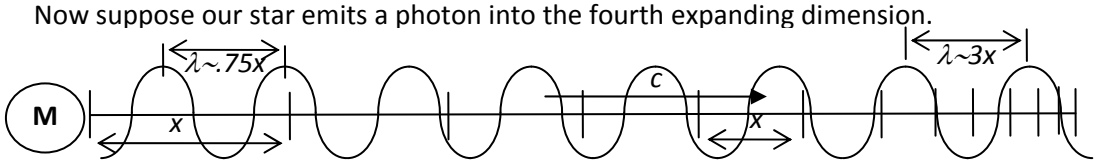
Let us consider a region of flat space.



And let us superimpose the fourth expanding dimension as illustrated above. Any photon (matter propagating by surfing the fourth expanding dimension) will have a velocity of c, and its wavelength will remain constant over the flat space.

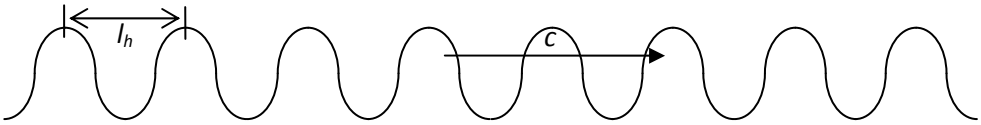


Now let us introduce a mass M of a star into our system of formerly flat space. It will stretch and curve the space as shown above. Rulers closer to the star will be stretched. Now suppose our star emits a photon into the fourth expanding dimension.

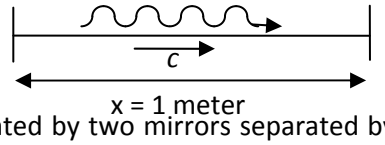


Right where the photon is emitted from the star, its wavelength is about .75x. After it has traveled away from the star, on the right, its wavelength is about 3x. Hence MDT accounts for the gravitational redshift for photons traveling away from stars, as space is curved, while the expansion of the fourth dimension is an invariant! MDT accomplishes this with a simple postulate and equation recognizing a hitherto unsung *_physical_* reality—the fourth dimension is expanding relative to the three spatial dimensions in units of the Planck length. Time has been unfrozen, and we have been liberated from the block universe! Entropy, quantum mechanics' nonlocality and entanglement, relativity, and the gravitational redshift and slowing of clocks, along with time and all its arrows and asymmetries, have been unified with a simple postulate and equation. The problems Godel had with block time and the block universe, as well as the EPR Paradox, are resolved!

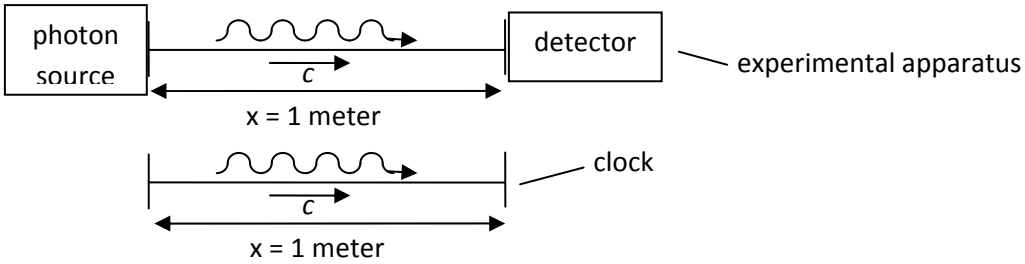
MDT, Clocks, Light, Time, and a Thought Experiment



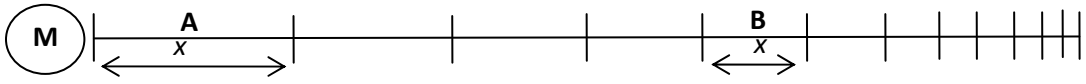
MDT postulates a fundamental universal invariant—the fourth dimension is expanding at the rate of c relative to the three spatial dimensions. This expansion manifests itself as a spherically-symmetric expanding wavefront in our 3D with a wavelength of Planck's length, exactly as every ageless photon suggests, as all photons maintain a locality in the fourth expanding dimension.



Consider a light clock represented by two mirrors separated by one meter. A photon bounces back and fourth between the mirrors. A photon travels at 3.0 x 10^8 m/s, so each time a photon hits a mirror, .333 x 10^{-8} s have elapsed. Suppose we want to measure the velocity of light with this light clock. We set up an experimental apparatus as pictured below, with a photon source and a photon detector separated by one meter. This tautological definition of time and the velocity of light, which rests upon MDT's fundamental invariant of dx4/dt=ic, is what ensures that c is constant. MDT's invariance underlies Einstein's observation, "My solution was really for the very concept of time, that is, that time is not absolutely defined but there is an inseparable connection between time and the [illegible]"

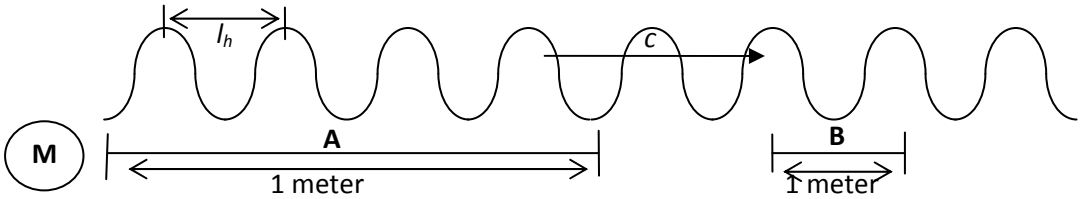


Judging by our light clock, we find that the time taken for the photon to travel one meter, from the source to the detector, is .333 x 10^{-8} s. Now, let us place our apparatus at two different regions, **A** and **B,** where x represents one meter.



In both regions **A** & **B**, judging by the above "light" clock in each region, we find that the time taken for the photon to travel one meter, from the source to the detector, is .333 x 10^{-8} s in both regions. In both regions **A** & **B**, the velocity of light is c. In both regions **A** & **B**, the distance **x** is one meter. But there is a fundamental difference in regions **A** & **B**, that arises because of the universe's fundamental invariant—the fourth dimension is expanding relative to the three spatial dimensions, in *units of an absolute planck length*, which is never stretched. Even though space is curved in regions **A** and **B** by the massive object **M**, the absolute velocity of the expansion of the fourth dimension through both regions in constant—dx4/dt=ic. And so it is that a clock will run slower in region **A** than in region **B**, as it takes the fourth dimension a longer period of absolute time to traverse *x*. The next figure illustrates this.

A Thought Experiment, PART II, MDT, Light Clocks, The Gravitational Redshift: Time is Curved because Although Space is Curves, the Expansion of The Fourth Dimension is Invariant



Now let us superimpose the universe's invariant—the fourth expanding dimension represented by a sine wave (in reality it is a spherically symmetric wave-front, defining the propagation of all photons)—over the regions **A** & **B** which represent space curved by the mass **M**. Recall that the fourth expanding dimension carries all photons. Thus the light clock in region **B**, discussed in the above experiment, will tick about 4 times every time the clock in stretched region **A** ticks once. This is because the fourth expanding dimension has to travel four fundamental wavelengths in stretched region **A**, while only a single one in region **B**. Thus, if the two clocks from **A** and **B** are reunited, all observers will agree that clock A registered less time, and thus that stronger gravitational fields slow time. Both **A** and **B** represent lengths of one meter, and the mass **M** stretches the space in region **A**. Note also that a wave with a certain frequency in **A**—one that oscillates four times as it traverses the distance of one meter, will only oscillate once while traversing the distance of one meter at **B**. Both distances are one meter, and thus the frequency of the wave is higher in **A** and lower in **B**, while the wavelength is lower in **A** and longer in **B**, just as the gravitational redshift dictates.

This simple thought experiment brings to light several remarkable features of MDT. MDT explains why clocks run slower in stronger gravitational fields where space is stretched. It shows that time, as measured on a clock, is also stretched, but only because of an underlying invariant which is never stretched—the expansion of the fourth dimension relative to the three spatial dimensions. For even though time and space are stretched, the expansion of the fourth dimension remains invariant: dx4/dt = ic. And too, it shows that space is continuous, and all quantization arises from the quantized invariant expansion of the fourth dimension relative to the three spatial dimensions, or dx4/dt = ic. The invariant wavelength of the fourth expanding dimension chops measurements of space—of time, energy, and momentum—into units of the Planck length, while providing the fundamental wave nature that gives rise to Heisenberg's Uncertainty Principle in all realms

So it is that the absolute invariance of the expanding fourth dimension, *whose wavelength and rate of expansion never changes*, when superimposed on continuous space that can be stretched by a mass, results in clocks ticking more slowly in stronger

By now it should be seen that the velocity of light is always measured to be constant because the velocity of light is always measured relative to a clock whose

timekeeping is based on distance and the propagation of light. It is the actual expansion of the fourth dimension relative to the three spatial dimensions that is the true invariant; and generally, for all intents and purposes, this can be seen as the velocity of light, as photons surf the fourth expanding dimension. However, MDT is novel in that it shows time's curvature—the slower ticking of a clock in a stronger gravitation field, arises from the invariance of the expansion of the fourth dimension superimposed over the three stationary spatial dimensions. Yes—time's curvature arises from the fundamental invariance in change—dx4/dt=ic—superimposed over continuous space that can stretch. Thus GR also supports MDT's fundamental postulate and equation: dx4/dt = ic.

Furthermore, also note that Planck's length never changes. While space is curved in regions **A** & **B**, Planck's length l_h remains the exact same, defined by the invariant expansion of the fourth dimension. Planck's length, like the speed of light, is defined by the fundamental motion of the universe—the fourth dimension is expanding relative to the three spatial dimensions in units of the Planck length at the rate of c.

Perhaps planck's length and the rate of c may change over large periods of time, which could account for dark matter, dark energy, and an accelerating universe, and differences in the universe's rate of expansion over time.

WHY GRAVITY IS NOT QUANTIZED, WHILE E&M IS, PART II

Gravity is not quantized as there is nothing to quantize. In the above thought experiments, a photon traveling away the massive star experienced a gravitational redshift—it lost energy. In losing energy, no energy was emitted in the form of photons nor mass nor matter nor any other form. The photon lost energy because it surfs the expanding fourth dimension, preserving its original length in the fourth dimension where it was emitted, while entering space that is not quite as stretched—hence its wavelength becomes longer. *But this loss of energy was accompanied by no physical emission of photons nor matter*, nor any entity that can be quantized. Hence gravity does not rely on the emission and propagation of physical entities to transmit forces, nor alter energies, and it cannot be quantized, as both empirical evidence and hundreds of millions of funding have demonstrated over the past thirty-odd years.

Likewise, a photon heading towards a star is blue-shifted. *No physical matter nor photons are added*, but rather, the underlying curvature of space, which is continuous, results in the photon gaining energy.

So it is that in altering the energy of objects, *gravity neither adds nor extracts physical entities*—neither matter nor photons nor gravitons.

Contrast gravity to E&M. In order to accelerate an electron via an electromagnetic wave, we must add photons to it via the electromagnetic wave. Physical entities—photons—must be added to a charge in order to accelerate it; and too, a decelerating electron emits photons as it slows down. And these are of course quantized because the fourth expanding dimension, which carries photons, is quantized in its expansion.

So it is that forces in electricity and magnetism *require the exchange of physical entities*, whereas gravitational forces arise entirely because of the quantized, invariant expansion of the fourth dimension superimposed over the curvature of continuous space, which is continuous. Photons are but matter surfing the fourth expanding dimension, and thus, like the quantized fourth expanding dimension, they are quantized proportional to the Planck length. The fourth dimension continually takes a local point and distributes it nonlocally; and so it is that physical entities such as photons and electrons have nonlocal properties (wavelike), as well as local properties (particulate).

But the gravitational field does not need particles to transmit energy to photons nor any other entity, as we have seen. Gravitational forces rely entirely on the curvature of space relative to the quantized invariance of the fourth expanding dimension. Because gravity does not need particulate nor physical entities to transmit energy, there is nothing to quantize.

So it is that MDT explains both gravitational forces and QED; while showing that they both derive from a deeper physical reality—a hitherto unsung *physical* invariant—the expansion of the fourth dimension relative to the three spatial dimensions—that unifies phenomena in quantum mechanics, relativity, and statistical mechanics, while accounting for time and all its arrows and asymmetries across all realms. And too, Huygens' principle and Heisenberg's Uncertainty principle are accounted for across all realms.

MDT offers a most powerful, simple unifying theory. Expect the Inquisition!

See http://fqxi.org/community/forum/topic/238 for more.

Time as an Emergent Phenomenon: Traveling Back to the Heroic Age of Physics

In Memory of John Archibald Wheeler

by Dr. Elliot McGucken

ABSTRACT

In his *1912 Manuscript on Relativity*, Einstein never stated that time is the fourth dimension, but rather he wrote $x_4 = ict$. The fourth dimension is not time, but *ict*. Despite this, prominent physicists have oft equated time and the fourth dimension, leading to un-resolvable paradoxes and confusion regarding time's physical nature, as physicists mistakenly projected properties of the three spatial dimensions onto a time dimension, resulting in curious concepts including frozen time and block universes in which the past and future are omni-present, thusly denying free will, while implying the possibility of time travel into the past, which visitors from the future have yet to verify. Beginning with the postulate that time is an emergent phenomenon resulting from a fourth dimension expanding relative to the three spatial dimensions at the rate of *c*,

diverse phenomena from relativity, quantum mechanics, and statistical mechanics are accounted for. Time dilation, the equivalence of mass and energy, quantum entanglement, nonlocality, wave-particle duality, and entropy are shown to arise from a common, deeper *physical* reality expressed with $dx_4/dt=ic$. This postulate and equation, from which Einstein's relativity is derived, presents a fundamental model accounting for the emergence of time, the constant velocity of light, the fact that the maximum velocity is *c*, and the fact that *c* is independent of the velocity of the source, as photons are but matter surfing a fourth expanding dimension. In general relativity, Einstein showed that the dimensions themselves could bend, curve, and move. The present theory extends this principle, postulating that the fourth dimension is moving independently of the three spatial dimensions, distributing locality and fathering time. This *physical* model underlies and accounts for time in quantum mechanics, relativity, and statistical mechanics, as well as entropy, the universe's expansion, and time's arrows and asymmetries in all arenas.

"More intellectual curiosity, versatility and yen for physics than Elliot McGucken's I have never seen in any senior or graduate student. . . Originality, powerful motivation, and a can-do spirit make me think that McGucken is a top bet for graduate school in physics. . . I say this on the basis of close contacts with him over the past year and a half. . . I gave him as an independent task to figure out the time factor in the standard Schwarzchild expression around a spherically- symmetric center of attraction. I gave him the proofs of my new general-audience, calculus-free book on general relativity, *A Journey Into Gravity and Space Time*. There the space part of the Schwarzchild geometric is worked out by purely geometric methods. "Can you, by poor-man's reasoning, derive what I never have, the time part?" He could and did, and wrote it all up in a beautifully clear account. . . .his second junior paper . . .entitled *Within a Context*, was done with another advisor, and dealt with an entirely different part of physics, the Einstein-Rosen-Podolsky experiment and delayed choice experiments in general. . . this paper was so outstanding. . . I am absolutely delighted that this semester McGucken is doing a project with the cyclotron group on time reversal asymmetry. Electronics, machine-shop work and making equipment function are things in which he now revels. But he revels in Shakespeare, too. Acting the part of Prospero in the Tempest. . . " -- John Archibald Wheeler, Princeton University, Recommendation for Elliot McGucken for Admission to Graduate School of Physics

Dr. Elliot McGucken's Biography: "Dr. E" received a B.A. in physics from Princeton University and a Ph.D. in physics from UNC Chapel Hill, where his research on an artificial retina, which is now helping the blind see, appeared in *Business Week* and *Popular Science* and was awarded a Merrill Lynch Innovations Grant. While at Princeton, McGucken worked on projects concerning quantum mechanics and general relativity with the late John A. Wheeler, and the projects combined to form an appendix

treating time as an emergent phenomenon in his dissertation. McGucken is writing a book for the Artistic Entrepreneurship & Technology (artsentrepreneurship.com) curriculum he created.

"The most beautiful thing we can experience is the mysterious. It is the source of all true art and all science. He to whom this emotion is a stranger, who can no longer pause to wonder and stand rapt in awe, is as good as dead: his eyes are closed." --Albert Einstein

Yes--entanglement, entropy, time, nonlocality, Huygens' Principle, relativity--how mysterious are all these! And yet if you ask foundational questions such as *why* entanglement, *why* entropy, *why* time, *why* nonlocality, *why* Huygens' Principle, *why* relativity, the richest, wealthiest establishment in the history of physics, which also happens to be the establishment which has contributed the least (perhaps money cannot buy physics and philosophy?), sends forth anonymous postdocs and grad students to launch the snarky, ad-hominem attacks they perfect under the guidance of their pseudo-physicist political mentors.

But hey--everyone's got to make a living.

Behold MDT--the great unifier and invariant source underlying all these *physical* phenomena--in relativity and quantum mechanics--in statistical mechanics and entropy.

For the first time in the history of relativity, *change* has been *physically* woven into the fundamental fabric of spacetime, with dx4/dt = ic. And that's where change needs to be! For can you name any branch of physics in which change, and time, do not exist? Without change, no measurement can be made.

MDT is unique in that it offers a *physical* model underlying entropy, entanglement, and nonlocality, and too, all of relativity can be immediately derived from its simple postulate and equation.

I expect MDT to bring additional boons for years to come!

Moving Dimensions Theory & A Dialogue With Roger Penrose

Based on, http://www.fortunecity.com/emachines/e11/86/flowtime.html, with Dr. E!: [url]http://www.fortunecity.com/emachines/e11/86/flowtime.html[/url]

Physicist : Einstein's Theory of Relativity was really the death-knell for the old concepts of space and time. Einstein showed that Absolute Space and Absolute Time could not exist any longer.

Narrator : According to the Theory of Relativity, space and time were no longer a rigid framework but were instead a fabric which could be stretched and distorted.

Dr. E: In other words, dimensions can and do move.

Physicist : Normally we think of a black hole, a collapsed star, as being a point of zero size and infinite density surrounded by what's known as the event horizon, the point of no return. But most stars actually spin, and when they collapse they will begin to spin more rapidly. And the spinning star that becomes a spinning black hole doesn't have a point, a singularity in the centre; its singularity looks like a ring, a dough-nut. One possibility was that maybe we could travel into a black hole, avoid the singularity, and travel through the middle and come out the other side. Because space and time were linked, you would not only have to come out in another point in space, but in time as well. This sounds like it would be the ultimate freedom for us that we can time travel; Einstein gives us this wonderful freedom of moving back, changing history, going to the future, seeing what things are like and coming back again, finding what mistakes we might make and then avoid them. This would imply that the past, present and future all exist. There is no present moment to distinguish past from future. All times co-exist, time just is. And so the future is already out there. The only way to understand this was to link the 3 dimensions of space with the one dimension of time to what became known as 4-dimensional space/time.

Dr. E: Time travel into the past is impossible. Otherwise we would have met visitsors from the future. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Roger Penrose : Space-time is certainly different stuff from space because its 4 dimensional instead of 3-D (RP larfs!) which is a big diff. Time really has to be brought into the picture; this one thing which is space/time.

Dr. E: MDT shows that time, as measured by the ticking seconds on our watches, and remembered in our memories, is not the fourth dimension, but rather it is a phenonomen that emerges because the fourth dimension is expanding relative to the three spatial dimensions. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Physicist : Just imagine what this might be like: 3-D space implies a volume, and you can move any where in that volume. Once you add time as a 4th dimension, another axis, then this block of space/time would contain within it past, present and future, all at once. Time is frozen, all times exist together; so just as you can say "over here, over there" in 3-D space, you can talk about "over then", in 4-D space/time.

Dr. E: This is exactly where physicists are lead astray. Time is not a fourth dimension, but it inherits properties of the fourth dimension, which is expanding at c relative to the three spatial dimensions. Physicists extrapolate this fact to believe that the past and future exist out there. But in reality, the deepest we ever get into the expanding fourth dimension is on the order of the Planck length.

Roger Penrose : It's a way of looking at things if you like which physically we seem to be forced into. I say physically from the point of view of what the theory of rel. tells us. And Relativity is remarkably well tested, I mean, 14 places of decimal, its just incredible. So we know that this theory does describe the universe to an extraordinarily precise degree, so we have to take it seriously. And that theory tells us that we have to regard space and time as one thing, its all out there, its one thing. In the same sense that space is out there, time is out there.

Dr. E: Space and time are not the same thing. This is obvious to everyone. We can translate freely through space, but we cannot move at all through time. MDT shows that time, as measured by the ticking seconds on our watches, and remembered in our memories, is not the fourth dimension, but rather it is a phenonomen that emerges because the fourth dimension is expanding relative to the three spatial dimensions. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Narrator : Like the Medieval God's-view of time, Einstein's physics says that the future is already out there. The moments of our lives are just waiting for us to step into them.

Dr. E: No. Read Einstein's 1912 Manuscript on Relativity. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Roger Penrose : But there's no more problem about the future being out there than saying that space is out there. You say, "Mars is out there", but why is that more comprehensible than saying "next week is out there"? It's just as far away in a certain sense.

Dr. E: This is wrong. Read Einstein's 1912 Manuscript on Realtivity. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Physicist : If you take this block of 4-D space/time literally, it means you have to abandon free will. It means not only is the future pre-ordained, but its already there, its already happened. There's no point in making any decisions, whatever you do has already happened. If I choose to drop this stone into a pond, I think of it being my own free choice, but of course in 4-D space/time I had no choice in dropping the stone ; the splash is already there in the future and so we lose all free will. If time travel was possible, you can imagine people coming back from the future to visit us; its no good us saying, "you cant exist - you haven't happened yet".They've come from a time which they consider to be their 'now' and for them we're in their path.

Dr. E: But we do have free will. Quantum Mechanics and relativity both support this, as does reality. Read Einstein's 1912 Manuscript on Realtivity. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Roger Penrose : So this means that in a sense, the present past and future are out there, and that also gives us a very deterministic view of the world. We have no control of what happens in the future because its all laid out. I think the trouble that people have with this idea is that you think the future is under your control, to some degree, and so this means that if the future's laid out then in a sense its not under your control.

Dr. E: But we do have free will. Quantum Mechanics and relativity both support this, as does reality. Read Einstein's 1912 Manuscript on Realtivity. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Physicist : Personally I'm very uncomfortable about the block universe idea. Now this may be just a gut feeling or just irrational, but can't accept the future's already 'out there'. I don't accept that I don't have any free will.

Roger Penrose : I think there is a positive side to this picture of space and time being laid out there as 4 dimensions, because it tells you that all times are there once and it can affect the way one thinks about people who have died. I mean, I remember thinking in this kind of way when my mother died. In some sense she was still there because her existence is still out there in space/time although in our time she is not alive. A colleague of mine had a son who died in tragic circumstances and I presented this idea to him and it helped his understanding also. This was before I heard that Einstein had a colleague died and he wrote to the man's wife that Bessa was still out there, and that somehow this was reassuring. I certainly think this way often, that space/time is laid out and that things in the past and things in the future are out there still.

Dr. E: But we do have free will. Quantum Mechanics and relativity both support this, as does reality. Read Einstein's 1912 Manuscript on Realtivity. Never did Einstein, nor Minkowski, say that time is the fourth dimension. Rather, Einstein equated the fourth dimension x4 with x4 = ict. Hence MDT's simple postulate and equation: dx4/dt = ic.

Narrator : But almost at the same time that Relativity was gaining universal acceptance a radically different picture of the universe was emerging.

Physicist : The way out if you don't want to accept the block universe idea is quantum mechanics.Now, Quantum Mechanics is the second great discovery of the 20th century physics and that states that the future isn't predetermined and preordained.

Narrator : Quantum Mechanics was born out of a series of experiments whose results even today have no satisfactory explanation. Relativity works at the large scale where it provides exact predictions as to what will happen next. But when physicists started looking down at the atomic and sub-atomic level, the familiar laws failed. At this level, there were no certainties, only probabilities. How can the future of the universe be already out there if the future of a single molecule is so utterly unpredictable?

Dr. E: MDT gives a satisfactory account of all of Quantum Mechanical phenonema. In addition to underlying relativity, dx4/dt = ic also underlies QM's inherent nonlocality,

which results in probability. The expanding fourth dimension distributes and disperses locality in a nonlocal manner. A single point becomes a sphere, as the fourth dimension expands as a spherically-symmetric wavefront of radius ct, describing exactly the propagation of a photon's probabilistic wavefront. The act of measurement localizes the particle which was hitherto caught in an expanding dimension, where all points were at the same point in that dimension.

Physicist : Before we look to see what the atom is doing, not only is there a gap in our knowledge, the atom itself has not decided what to do. It had an infinite number of choices to make, it will be doing all those choices all at once, and its only when we look to see what is happening do we force it to make a choice. In Quantum Mechanics the future is not determined, and so Quantum Mechanics in a sense rescues us and rescues free will.

Roger Penrose : In a sense you don't have the future laid out in Quantum Mechanics So Quantum Mechanics is basically different in the way we look at it. You do have this indeterminacy about the future and a necessary feature of this is its incompatibility with Special Relativity. So we have these 2 great theories, both of which are extremely accurate, tell us something about how the world operates, something very insightful and profound and accurate, but they're incompatible with each other. So there's no doubt there's something missing here. How important it is to how we 'feel' the passage of time is I think very important.

Dr. E: no-the two theories are exactly compatible. Please google *The Curious Nature of the Photon, Einstein's Annus Mirabilis, and Moving Dimensions Theory.*

[url]http://physicsmathforums.com[/url]

Based on, http://www.fortunecity.com/emachines/e11/86/flowtime.html, with Dr. E!: [url]http://www.fortunecity.com/emachines/e11/86/flowtime.html[/url]

FOUNDATIONAL QUESTIONS ASKED AND ANSWERED BY MDT

"Einstein introduced relativity as a principle--as a law of nature not deduced from anything else, and well, I guess I was dumb enough to ask, 'why relativity?' And I found the answer in a more fundamental invariance--the fourth dimension is expanding relative to the three spatial dimensions, or dx4/dt = ic. " --Dr. E

Hello Kyle,

I'm back one more time to answer your question from yesterday.

You wrote: "Overall, I read your essay with interest, and it wouldn't be an exaggeration to say I was impressed. How did you come up with dx4/dt=ic, if I may ask?"

Well, thanks for the words!

I thought I could do a better, more detailed job in answering this than I did yesterday. Below I repeat some of what I said in my previous answer, but I've changed/added a lot of things too, after sleeping on it.

How did I come up with dx4/dt=ic as the universe's primary invariance and the simple postulate that the fourth dimension is expanding relative to the three spatial dimensions?

I guess it all goes back to asking "why?"

That deeper "why" about foundational questions, that always needs a *physical* answer--an answer I finally found in the *physical* reality MDT presents. I was asking questions like "*Why* time?"

"Why time," I wondered my freshman year at Princeton, when I yet believed in the block universe I had read about. Why does time move, and why is now "now" if relativity makes all nows equal? If the block universe is real, why can't I get back to yesterday's now and that 1989 summertime when the days were long?

http://www.youtube.com/watch?v=Be7T8CRC4TI

Well, Moving Dimensions Theory answers why we cannot travel back in time--why we cannot find our way back to yesterday or last summer. For time is not a fourth dimension, and the past no longer exists. Time is a phenomena that emerges because the fourth dimension is expanding relative to the three spatial dimensions. Alas, sadly enough, past summers and all our yesterdays, like the block universe, do not exist. But this is a good thing! For MDT unfreezes time and liberates us from a frozen 4D block universe, while preserving *all* of relativity. And it gives us free will! And all this makes sense, as while time travel into the past is impossible, we all use free will every day to get up and "git 'er done!"

I guess I always reached for the "why" behind the why. So many are happy to see a mathematical equation spit out an answer like sausage, and say, "Well, as you can see,

the equation states that time stops at the speed of light." But *why* does this happen? What is the *physical* reality underlying this? *Why* is the photon ageless? What machine or mechanism or physical reality is responsible for this?

It is interesting that Einstein introduced relativity as a principle--as a primary law not deduced from anything else.

Well, I guess I was dumb enough to even ask, "why relativity?"

And I found the answer in a more fundamental invariance--the fourth dimension is expanding relative to the three spatial dimensions, or dx4/dt = ic. And not only can all of relativity be derived from this, but suddenly we had a *physical* model for entropy, time and its arrows and assymetries in all realms, free will, and quantum nonlocality and entanglement. MDT accounts for the the constant speed of light c--both its independence of the source and its independence of the velocity of the observer, while establishing it as the fastest, slowest, and only velocity for all entities and objects moving through space-time, as well as the maximum velocity that anything is measured to move. And suddenly we see a physical basis for E=mc^2. Energy and mass are the same thing--it's just that energy is mass caught upon the fourth expanding dimension, and thus it surfs along at "c."

On page 37 of "Einstein's Mistakes, The Failings of Human Genius," by Hans Ochanian, we read,

"Einstein acknowledged hid debt to Newton and to Maxwell, but he was not fully aware of the extent of Galileo's fatherhood. In an introduction he wrote for Galileo's celebrated fatherhood. In an introduction he frote for Galileo's celebrated Dialogue Concerning the Two Chief World Systems, he faults Galileo for failing to produce a general mathematical proof. Galileo regarded relativity as an empirical, observational fact, that is, a law of nature, and Einstein's own formulation of the Principle of Relativity three hundred years later imitated Galileo's in treating this principle as a law of nature and not as a mathematical deduction from anything else."

Well, MDT provides a more fundamental law with an equation: dx4/dt = ic, from which relativity is derived in my paper. And added benefit are all the other entities dx4/dt=ic accounts for with a *physical* model.

And the development of MDT has been driven throughout by seeking to provide *physical* answers to that *physical* "why?"

Why does time stop at the speed of light? "Because relativity says so," is how physicists are generally trained to respond. Yes, I would answer, but "*why*?" Why are photons ageless, and why do two initially interacting photons remain entangled? What secret, deeper reality of our universe dictates that this must be so?"

I think all the questions started back in the late eighties/early nineties with "Why length contraction?" "Because relativity says so," is how physicists are generally trained to respond. Yes, I would answer, but "*why?*"

And in 1990, I remember standing in P.J. Peebles' office, who I had for Quantum Mechanics, asking him how it could be that an ageless photon was ultimately defined by a spherically-symmetric wave-front expanding at c through our three spatial dimensions. This struck me as odd. That same year I worked on projects pertaining to relativity (GR) and quantum mechanics (EPR/delayed choice/spooky entanglement) with John Archibald Wheeler. And it struck me that both relativity and quantum mechanics were ultimately founded upon curiosities that rested upon measurement, and the measurements/thought experiments always somehow rested upon light, which is fundamentally wed to time, as is the fourth dimension. Well, MDT expresses this deeper, fundamental relation between the fourth dimension, time, and light in a simple equation which provides a physical model accounting for phenomena in both quantum mechanics and relativity:

$dx4/dt = ic$

There you have--the universe's fundamental invariant. For the first time, change is shown to be woven into the fundamental fabric of the universe, as we are liberated from a block universe and granted free will. The present becomes a most important point, as that is where $dx4/dt = ic$. $dx4/dt = ic$ does not happen in the past, nor does it happen in the future, but only in the "now!"

“My solution was really for the very concept of time, that is, that time is not absolutely defined but there is an inseparable connection between time and the signal light velocity.” –Einstein

Einstein was right: $dx4/dt = ic$

So maybe, maybe, if we could find the primal force that powers light--if we could perceive the deeper reality which renders photons ageless and bestows upon them the unchanging, constant velocity of c--which is both independent of the observer and the source--if we could catch up with a light beam and find out exactly what it was that ordinary matter was surfing on when it became light propagating at c--perhaps we could unify a helluva lot in quantum mechanics, relativity, and statistical mechanics, as MDT does. Catch up with a lightbeam, and you will see that it is matter surfing the fourth expanding dimension. How else could it be that the *only* way for matter to remain stationary in teh fourth dimension is to move at c? Does this not prove that the fourth dimension is moving at c?

What is the *physical* reason for length contraction? What *physical* entities of this universe give rise to length contraction? What deeper *physical* reality dictates that any moving object must be foreshortened in the direction of its motion? What is *physically* going on on a deeper level? There must be some *primary* cause--some universal invariant--for length contraction, time dilation, entropy, entanglement, nonlocality, and

time and all its arrows and assymetries, and all the dualities--space/time, mass/energy, and wave/particle.

And then, as time went on, I found I was able to answer a wide array of foundational questions with: "Because the fourth dimension is expanding relative to the three spatial dimension: dx4/dt = ic." And I went back to Einstein's original words in his 1912 Manuscript and found that he had never quite provided a deeper motivation for setting x4 = ict, other than that it works! Well, x4 = ict because the fourth dimension is expanding relative to the three spatial dimensions.

And this small recognition of a primary universal invariant answered an abundance of questions with a *physical* model. And when diverse questions spanning all realms of physics are answered by a common *physical* model, surely that points the way towards unification!

One reason I think String Theory and Loop Quantum Gravity have not made much progress is because they have not been asking the fundamental questions I enumerate below. Rather, a system is set up where grad students and postdocs apply for grants to work on questions asked by the people with the funding. Max Planck, Joseph Campbell, and F.A. Hayek all tell us why this does not work:

“New scientific ideas never spring from a communal body, however organized, but rather from the head of an individually inspired researcher who struggles with his problems in lonely thought and unites all his thought on one single point which is his whole world for the moment." --Max Planck

And again we see the primacy of the honest individual in the classic, epic hero's journey!

"A hero ventures forth from the world of common day into a region of supernatural wonder: fabulous forces are there encountered and a decisive victory is won: the hero comes back from this mysterious adventure with the power to bestow boons on his fellow man." --Joseph Campbell

http://en.wikipedia.org/wiki/Monomyth

And the Nobel Laureate economist F.A. Hayek agrees!

"The tragedy of collectivist thought is that, while it starts out to make reason supreme, it ends by destroying reason because it misconceives the process on which the growth of reason depends. It may indeed be said that it is the paradox of all collectivist doctrine and its demands for “conscious” control or “conscious” planning that they necessarily lead to the demand that the mind of some individual should rule supreme—while only the individualist approach to social phenomena makes us recognize the super-individual forces which guide the growth of reason. Individualism is thus an attitude of humility before this social process and of tolerance to other opinions and is the exact opposite of that intellectual hubris which is at the root of the demand for comprehensive direction of social purpose." –F.A. Hayek, The End of Truth, The Road to Serfdom

So it is that in asking my own questions, I had to find my own way through the woods. And in Arthurian Legend, which Joseph Campbell oft talks about, it is dishonorable to follow someone else's path through the forest, but instead, one must blaze one's own trail. Dante starts off alone in this dark woods in the Divine Comedy, and Morpheus tells Neo, "there is a difference between knowing the path and walking it." "I can tell you of the way, but you must find it and walk it on your own."

Could you ever imagine Eisenstein working on something he wasn't naturally curious about?

Here are some of the questions that are answered with Moving Dimensions Theory's simple postulate and equation: "because the fourth dimension is expanding relative to the three spatial dimensions: dx4/dt = ic."

0. Why time? Why time’s arrows and asymmetries?

0.1 Why relativity? Why the principle of relativity? What deeper physical reality underlies relativity?

0.2 Why entanglement and nonlocality?

1. Why is light’s velocity a constant c? Why relativity's postulates?

2. Why is light’s velocity c independent of its source?

3. Why is it that nothing can travel faster than c?

4. Why does a photon, which travels at c, not age?

5. Why does a photon’s spherically-symmetric probablistic wavefront define simultaneity—a locality in the fourth dimension?

6. Why are energy and mass equivalent? Why E=mc^2?

7. Why do all of time’s arrows point in the same direction—towards dissipation, decoherence, and entropy?

8. Why do so many physicists say time is the fourth dimension, when Einstein never said x4 is time, but instead said x4 = ict?

9. Why can matter can appear as energy or mass?

10. Why is it that when matter appears as pure energy, it propagates at c through space?

11. Why does all matter have particle—local—and wave—nonlocal—properties?

12. Why does all energy have particle—local—and wave—nonlocal—properties?

13. Why is it that when matter appears as stationary mass it propagates at c through the fourth dimension?

14. Why is it that when matter appears as energy, it propagates at c through the three spatial dimensions?

15. Why is it that to move at c through space is to stand still in the fourth dimension?

16. Why is it that to move at c through the fourth dimension is to stand still in space?

17. Why is it that all objects move at but one speed through space-time—c?

18. Why is the universe expanding?

19. Why does radiation expand outwards, but not inwards?

20. Why do we see retarded waves, but not advanced?

21. Why is it that entropy imitates the general motion of all radiation and the universe's expansion—a spherically-symmetric expanding wave?

22. Why is it that Huygens' Principle, which underlies all reality ranging from QED to Feynman's many-paths, to classical physics, state that every point of a spherically-expanding wavefront is in turn a spherically-expanding wavefront?

23. Why are all photons described by a spherically-expanding wavefront propagating at c?

24. Why is it that two initially-interacting photons remain entangled, no matter how far they travel apart?

25. Why is it that two initially-interacting photons remain the exact same age, no matter how far they travel apart?

26. Why is it that Young's double-slit experiments show that both mass and energy have nonlocal wave properties?

27. Why is it that the collapse of the wave function is immediate in the photoelectric effect, and all other experiments?

28. Why is there no way for an object to gain velocity without being reduced in length via relativistic length contraction?

29. Why does a photon trace out a null vector through space-time? How can movement across the universe describe a path of zero length?

30. Why does time's arrow point in a definitive direction?

21. Why does entropy increase?

32. Why do moving clocks run slow?

33. Why is time travel into the past impossible?

34. Why does free will exist?

35. Why is it that time is not frozen—-how come the block universe does not exist? Why do we have free will?

36. Why does a photon’s probabilistic wavefront travel at c?

37. Why is the velocity of quantum entanglement c? Why is it that only initially interacting particles can yet be entangled? Why is it that they must first share a common locality or origin, in order to share an entangled nonlocality when they are separated?

38. Why is it that in Schrodenger's equation, the first derivative with respect to the fourth dimension is proportional to the second derivative with the respect to the three spatial dimensions? Any change in position in the fourth expanding dimension is an acceleration in the three spatial dimensions.

39. Why is it that a photon emitted from the sun is red-shifted as it travels away? It's wavelength appears longer as it is measured against space that is less-stretched. A photon inherits the local geometry of the space-time where it was emitted.

40. Why do clocks in gravitational fields run slow?

41. Why are photons red-shifted as they move away from massive objects, and blue-shifted as they move towards them?

42. Why the conservation laws? Why does an object maintain its rotation in space-time, unless acted upon by an exterior force?

43. Why is the velocity of every object through space-time c?

44. Why is it that the only way to stay stationary in the fourth dimension is to move at c through the three spatial dimensions?

45. Why is it that the only way to remain stationary in the three spatial dimensions is to move at c relative to the fourth dimension?

46. Why does a photon have zero rest mass, and how does zero rest mass imply the velocity of light? None of the object’s matter exists in the three spatial dimensions, but only in the fourth expanding dimension.

47. Why time's arrows?

48. Why time's asymmetries?

49. Why entropy?

50. Why is there an i in x4=ict?

51. Why is the velocity of light both independent of the velocity of the source and the velocity of the observer?

52. Why are light, time, and measurement so fundamentally related?

53. Why the - sign in-front of x4 in the space-time metric? What is different about x4?

Well, MDT answers all theses questions, and more, with a simple physical postulate and equation: "The fourth dimension is expanding relative to the three spatial dimensions or dx4/dt = ic."

Over the years, MDT has provided a *physical* model that answered these and other questions, unifying diverse fields and physical phenomena in a common, simple principle.

Now as MDT unfreezes both time and progress in theoretical physics, it will be opposed by many. Furthmore, as MDT explains away wormholes and time travel into the past, which have never been seen but yet form the foundations of many modern religions adhered to by geometric mystics and soothsayers, it will be opposed even more. As MDT provides a simple equation and postulate that hearken on back to the heroic age of physics, instead of presenting indecipherable math that can be used to raise massive funding for some groupthink Matrix/corporate-state/MTV show, it will be opposed even more, by those in The Matrix who have nothing to gain by simple truth and beauty, and so much to lose.

I think all the questions started back in the late eighties/early nineties with "why length contraction?"

Why does an object become foreshortened in the direction of its motion? Why is it that the only way for something to move is to become shorter in the direction of its motion?

When I wondered about this, as when I pondered all the above questions MDT answers, I tried to envision the *physical* structure of space-time and reality that would account for the behavior. For ultimately physics is about physics, and sometimes, a mathematical equation comes forth which supports the physical reality--in this case of a ofurth expanding dimension: dx4/dt= ic.

And here is how it worked out while contemplating the physical reality underlying relativistic length contraction.

Consider a ruler--it gets shorter as it moves due to length contraction.

But wait, does not a ruler also appear shorter as it rotates? Consider a ruler at the end of a football field, parallel to the field goals. As it rotates, it will appear shorter and shorter to

us, as we stand at the other end of the field, looking on. Have you ever noticed this illusion, as a rotating radar on a distant ship looks like something that keeps contracting and expanding? It is hard for us to tell it is rotating--rather we might actually guess that it is actually getting physically shorter and longer.

These youtube videos almost illustrate this rotating radar effect:

http://www.youtube.com/watch?v=jd6ZxHk2-zA&feature=related

http://www.youtube.com/watch?v=IMlsmqWSo8A&feature=related

And I saw that relativistic length contraction is a rotation of sorts. The ruler is rotated out of our three spatial dimensions. But what is it rotated into? It is rotated into the fourth dimension. But why, when this happens, does the ruler always, always propagate in the direction of its foreshortening? Well, it is because the fourth dimension--the dimension which the ruler is being rotated into--is moving! Thus relativistic length contraction is always, always accompanied by a change in velocity.

Rotate something into the fourth dimension, and it gains a translational velocity. Give something a translational velocity, and it will appear foreshortened in our three spatial dimensions. All because the fourth dimension is expanidng relative to the three spatial dimensions or dx4/dt = ic.

Then, right after I pondered length contraction, the - sign in the space-time metric puzzled me. Why does x4 have a - sign in-front of it? How is x4 different from the three spatial dimensions? What is a photon telling us by defining a null vector? A photon can cross the universe, and yet not travel at all? Ahaha! For in the fourth dimension, it has not moved, as the fourth dimension has been moving with it, just as a surfer stays with the wave they ride. This brings de Broglies' pilot waves to mind...

Well, that's some of the story behind MDT. A very early version of it appeared in my 1998 dissertation:

http://elliotmcgucken.com/dissertation.html

And I am forever indebted to J.A. Wheeler, through whom I first encountered not only these questions, but the courage to ask them. Wheeler always used to say, "I want to know what the show is all about, before it's out." And not only were foundational questions allowed and encouraged in his office, but one could not enter nor leave without naturally asking them. His Great Spirit has moved on, and while the past is no longer real, the immortal soul is, as Socrates concludes:

"I think Socrates, said Cebes, that even the dullest person would agree, from this line of reasoning, that the soul is in every possible way more like the invariable than the variable.

And the body?

To the other.

Look at it in this way too. When soul and body are both in the same place, nature teaches the one to serve and be subject, the other to rule and govern. In this relation which do you think resembles the divine and which the mortal part? Don't you think that it is the nature of the divine to rule and direct, and that of the mortal to be subject and serve?

I do.

Then which does the soul resemble?

Obviously, Socrates, soul resembles the divine, and body the mortal." --The Phaedo

For some reasons I wrote a lot of sonnets that first year in grad school--often during quantum mechanics. At the end of the semester, when the professor was passing out the exams, he looked at me and said, "You will do very well on this! You took many notes!" I guess he thought I was taking notes the whole time. I've never been much of a class learner, but I made up for it by staying up late, reading the quantum texts. It wasn't always efficient, but here're some of the poems I wrote in quantum mechanics--I sent them to Wheeler during that first year of grad school:"

"cxl.

Now suppose we have a hole in a slate,

A photon from a source passes on through,

And it darkens a grain on a film plate,

To say it went through the hole would be true.

Several photons pass through, we wait a bit,

And quite a simple pattern we do see,

A bright spot directly behind the slit,

Fading away as you move outwardly.

We choose to add an additional slit,

The photon seems to have a decision,

It must choose one of them through which to fit,

For photons are not allowed to fission.

But now there are fringes, common to waves!

In this manner, can particles behave?

cxli.

What's seen is an interference pattern,

Which is common to every type of wave,

On the vast ocean or from a lantern,

This is the way every wave does behave.

Though you think particles blacken the spot,

Between the source and plate light is a wave,

As to its whereabouts we can say not,

Such is the way reality behaves.

These ghostly facts are true of all matter,

Electrons and protons and you and me,

We're but empty waves that somehow matter,

Striving to comprehend reality.

Wavy winds blow, our consciousness is lit.

It makes up our mind, our minds make up it.

cxlii.

"The question is to be or not to be,

Whether it is nobler within the mind,

To believe in indeterminacy,

Or refute that God plays dice in the wind.

Are there many worlds, or only just this one?

And is Schrodinger's cat alive or dead?

Of p and x, can we only know one?

And of Wigner's good friend, what can be said?"

He smiled and said, "no question, no answer,

This above all, science holds to be true,

Love is in the mind of the romancer,

And the kind of love determines the view."

He looked up to the sky, a sky few see,

A sky filled with a child's curiosity."

Best,

Dr. E (The Real McCoy)