

The biggest mistake in Science: Space and Time do not fuse into SpaceTime continuum.

SpaceTime is not a four dimensional continuum; and this blunder makes a scientific revolution inevitable and a paradigm shift in science imminent.

INDORE, MADHYA PRADESH, INDIA, July 21, 2023 /EINPresswire.com/ -- Einstein and Minkowski

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Biology is based on Chemistry, which in turn is based on Physics. Space and Time underlies Physics and Cosmology, and are the most fundamental concepts imaginable in entire Science.”

Subhajit Waugh.

merged the three dimensions of space and one dimension of time into a single four-dimensional manifold called SpaceTime. This leads to a block universe view in which there is no distinction between the past, the present and the future, and all three of them simultaneously coexist. This view is in stark contrast to our everyday experience, as well as with an astonishing number of observations in the whole of science. In fact, an entire book has been written to highlight this glaring mistake [The arrow of time: the quest to solve science’s greatest mystery]. The four-dimensional SpaceTime continuum view has been challenged by Mr. Subhajit Waugh from RRCAT,

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SpaceTime is the arena in which everything happens, and it is also the fabric which makes the universe. A proper understanding of SpaceTime concept is crucial not just for Physics and Cosmology, but for entire Science. Different flavors of SpaceTime are described by different metrics like the ‘Minkowski SpaceTime metric (MST metric)’, the ‘Friedmann–Lemaître–Robertson–Walker metric (FLRW metric)’, the ‘Schwarzschild metric’ etc. A good starting point to understand what SpaceTime really is would be the flat SpaceTime metric (MST metric). The MST metric: $ds^2 = (i.c.dt)^2 + dx^2 + dy^2 + dz^2 = (i.c.dt)^2 + dr^2$ (which explains all of special relativity, including time dilation, length contraction, and relative simultaneity) is not a statement for 4D SpaceTime continuum. That mistake occurred due to our incomplete knowledge about the true nature of imaginary numbers ([#Link1](#)). An imaginary sign lies hidden within the MST metric, which discriminates the space dimensions from time dimension and turns the metric (+,+,+,-) instead of (+,+,+,+). Einstein’s mistake was to treat time and space exactly equally (which certainly is not the case). Unlike real numbers, imaginary number (i) cannot be used as an independent axis (this is explained in detail in the paper whose link is provided below). An independent axis means an additional dimension. Imaginary number is required only for inaccessible dimension, and does not create an additional dimension.

Imaginary number is required only by a trapped creature (i.e. required by a flatlander).

Another major reason behind the incorrect mathematical interpretation of the spacetime equations (e.g. Minkowski and FLRW metrics) has been the incorrect interpretation of the relative simultaneity implied by these metrics. The concept of the block universe (introduced by Minkowski) is due to faulty understanding of relative simultaneity. Scientists have mistakenly used the analogy of a loaf of (4D) bread that can be sliced at different angles. The logic is that when observers are in motion, then the spacetime loaf would be cut at an angle, which means that the "now" of one observer would be significantly different from that of another. Each observer will have their own plane of simultaneity. Observers moving at different relative velocities have different planes of simultaneity. This loaf of bread analogy leads to the Rietdijk–Putnam paradox (Andromeda paradox), which does not support/vindicate the viewpoint, but only expose it as ridiculous. A much more appropriate analogy would be the printer cartridge analogy. Although the cartridge can only move back and forth on a 1D metal rod, it can still print any slanted line (at any angle of inclination) on 2D paper because the paper moves. The same is true if the 2D paper is held still and the metal rod moves up (or down) while the cartridge moves sideways.

MST metric is confirmed to be true in countless experiments, but is actually a mathematical statement for a (dynamic) 3D hypersurface, moving with a velocity c in the 4th dimension in an embedding 4D hyperspace. This is easy to prove. One can take any observer, located anywhere in 3D space, and moving with any possible velocity. Relative to itself, the observer does not move through space ($dr=0$). Hence (putting $dr=0$), the above MST metric becomes: $ds/dt = i.c$. Therefore, every arbitrary frame of reference reaches the same conclusion. The presence of i clearly shows that everyone is moving with the velocity of light (c) in a direction perpendicular to all three x, y and z axis (which is an impossible direction for every observer trapped inside 3D space hypersurface. Why impossible direction? Well, let that observer just try to point their finger towards the future or towards the past. That direction is perpendicular to every direction they can point). The lack of understanding about $i=\sqrt{-1}$ had led scientists to conclude that the velocity is imaginary (and hence discouraged from digging deeper). They simply concluded that our spacetime is very peculiar (hyperbolic), without questioning why this peculiarity arises after all.

[Digressing slightly from the central topic of SpaceTime, it may be noted that the MST metric can perfectly describe a small section of an expanding (hyper) balloon universe, where c is the radial increment/expansion velocity of our universe (as dictated by MST metric, or even the FLRW metric). The temporal part of both MST and FLRW metric are identical. Unbelievably, scientists have been completely ignoring what the temporal parts of SpaceTime metrics are telling. Using this balloon model, and taking the age of our universe equal to the currently accepted value of 13.8 billion years, the calculated Hubble constant value (71.002 km/s/Mpc) matches very well with accepted values (69.8 km/s/Mpc and 74 km/s/Mpc determined by two separate methods). Since the crucial SpaceTime equation and Hubble's law both tells the same story, it should give us great confidence that our universe is an expanding (hyper) balloon ([#Link2](#)). Since our

universe is expanding at a constant rate rather than accelerating (as currently believed), we do not need dark energy, since we do not have to account for acceleration. This model of universe is superior to the presently accepted 'Standard Model of Cosmology (SMC)'. A Nature Astronomy (2020) paper had claimed with 99% confidence level that our universe is closed. Another paper claims betting odds of 2000 \square 1 against an open, flat and infinite universe, thus mortally wounding the SMC. And more importantly, this model unifies General Relativity and Quantum Mechanics, the two bitterly conflicting pillars of modern Physics ([#Link3](#).)]

An immediate consequence of making the above correction (4D spacetime continuum versus dynamic 3D hypersheet) is that one dimension got freed up (which we were reserving unnecessarily). That is because if we ignore the motion of the hypersheet, then, what Einstein had assumed as a 4D structure, turns out to be a 3D one (inside a 4D embedding hyperspace). Kaluza's miracle of obtaining Maxwell's equation in addition to Einstein's field equations seemed to exact a heavy price: a fifth dimension was required as an embedding space. Actually, four dimensions are sufficient, and we get electromagnetic phenomena as a bonus. In fact, the implications of freeing up a dimension is much more profound, and solves the requirement of a fifth dimension popping up everywhere in physics, but stringent limit on the number of dimensions set at four from experiments and observations simply do not allow that.

MST metric shows that relativity is all about being trapped inside the wall of the expanding (hyper) balloon, but being free to move along the wall. The question is "What is this 3D hypersurface wall of the balloon universe made of?" The answer is: It is made of (scalar) fields, and particles, which are mere resonances/excitations in that field. That is just the core statement of stunningly accurate Quantum Field Theory (QFT) which forms the foundation of Standard Model of Particle Physics. Thus, one gets a glimpse of the unity between relativity and Quantum Mechanics. Since every star and planets and even humans are ultimately made up of particles (which are mere excitations/resonances in the 3D fields), therefore, every bit of matter is eternally trapped in the 3D hypersheet, and is getting dragged with it as the (hyper) balloon universe expands. The radius of the universe is an impossible direction for humans (which does not even exist for trapped beings like us). The radial increase of the universe appears as passage of time for us.

GRAVITY AND DARK MATTER: General Relativity remains our best theory of gravity. However the greatest cosmological challenges today like dark matter, black hole singularity (leading to 'information loss' paradox) etc. are mere relics of our misunderstanding of General Relativity (GR). The Schwarzschild metric (which is an exact solution to the Einstein field equations that describes the gravitational field outside a spherical mass), is also a dynamic 3D hypersurface (moving with a velocity c in the fourth dimension), just like the Minkowski SpaceTime metric. The Flamm paraboloid is an accurate mathematical representation of the Schwarzschild metric (contrary to popular belief) if the dynamic nature is considered. Hence, the rubber membrane/sheet model (which is used to teach General Relativity in schools and colleges) should be taken literally rather than as an analogy. The dynamic nature of the 3D field-particle hypersurface causes the flow of time (which appears to vary with the strength of the gravity field

due to varying slopes of the Flamm paraboloid at different distances from the massive object). A hint of the (opposing) effects of this slope on spatial stretching scale and gravitational time dilation lies hidden in plain sight in the Schwarzschild metric. The scale factors in the temporal and radial part of the metric are negative inverse of each other. This sort of negative inverse relation is seen in the slopes (m_1 and m_2) of two perpendicular lines ($m_1 \cdot m_2 = -1$), which suggests the resolution of the slope into cos and sine components. Picturing gravity as stretching of 3D hypersurface rather than warping of 4D spacetime provides a key to unlocking the still mysterious aspects of gravity. A better understanding of gravity has immense impact on the subjects of dark matter, cosmic filament structure, and cosmic evolution. The wall of the balloon universe behaves just like a rubber membrane. The difference is that it is a 3D hypersheet rather than a 2D rubber sheet. Massive objects like stars and planets are embedded like thin coins inside this wall itself (when viewed from the 4th dimension), and produces stretching of this wall along the 4th dimension. This stretching is seen by trapped creatures like us as warping of 4D SpaceTime fabric itself, and gives rise to gravity as General Relativity (GR) insist. Since the 3D hypersheet is a single continuous sheet, and since all massive objects nearby stretch this sheet in a single direction, therefore the collective stretching gets enormously amplified. The resultant increased stretching bends light rays enormously (through gravitational lensing) and gives false impression of huge amounts of Dark Matter halo. This magically solves all dark matter related issues. Black hole singularity is just the insider viewpoint of a trapped creature. Right at the center of the naked singularity, time passes at the same rate as in deep space, far away from any gravitational sources.

WHAT IS TIME? Contrary to popular belief, time itself is not the fourth dimension, but emerges due to motion along fourth space dimension. This is self-evident since time does not possess the unit of distance (meter or yard or mile) which would have given it the status of a true (space or spatial) dimension. At its heart, the concept of 'time duration' is shockingly simple. It is the childishly simple formula which is taught in elementary schools worldwide:

[Distance (covered) = Velocity X Time. Therefore, Time = Distance/Velocity.]

Mr. Waugh's theory has sparked intense debate in scientific community, and differs from previous theories of time. Historically, Newton's view of time was that time is universal, and is same everywhere. It ticks at a constant rate, and time passes equally and precisely the same for everybody. However, Einstein showed that time is flexible, and time and space inevitably mix together, which can be beautifully summarized in a single equation known as Minkowski SpaceTime Equation (MSTE), also known as the MST metric. Einstein's and Newton's views are inherited by the two pillars of modern physics (General Relativity and Quantum Mechanics), and the mismatch has caused the apparently insolvable crisis called 'problem of time'. But it is only 'seemingly impossible' problem, and both 'absolute universal time' and 'relative time' can co-exist peacefully. (See References below).

The mystery of time is shrouded by two (least understood) concepts: imaginary number, and higher dimension. Imaginary number is needed only for an inaccessible higher dimension. The presence of imaginary sign (i) clearly shows that the 3D space (which can accommodate up to three mutually perpendicular axes x , y and z) is actually a 3D hypersheet embedded in a 4th

dimension which is inaccessible to humans.

To understand the awesome power of time, one need to understand the divine power that comes with a higher dimension. Since humans cannot fully visualize four dimensions, an analogy must be used. One may imagine the surface of a flat table (representing two dimensions) on which an intelligent ant is crawling outside a circle drawn on the table. Inside the circle is a tiny dot. There is absolutely no way for the ant to reach the dot without crossing the circle. But a (divine) human can touch the dot from above the table without ever touching the circle. In a similar way, a divine being having access to the fourth dimension can remove a person's heart or liver without ever cutting the skin. That is exactly why time flows even in the deepest core of our planet (without bothering how to penetrate thousands of miles of solid rocks surrounding the earth's core). Time flow also controls the radioactive decay rate deep inside an atom. This is not magic, but similar to having access to every point on the table top from above.

The ant is only aware of two mutually perpendicular x and y axes. The z axis which is so obvious to humans does not even make sense to that ant. For representing any distance (d), or velocity (v) along the z-axis, the ant has to use imaginary numbers (i) without really bothering to examine what the imaginary sign (i) actually represent.

About Mr. Subhajit Waugh

Mr. Subhajit Waugh is a Scientific Officer at RRCAT, Department of Atomic Energy, Government of India. He obtained his Master's degree in Physics from the National Institute of Technology, Rourkela, in 2003, where he was the topper of his batch. In 1996, he was awarded the prestigious NCERT National Talent Scholarship. Mr. Waugh appeals all his dear viewers to watch and SHARE this (non-scientific) video of his created United Nations Anthem (UN Anthem).

<https://www.youtube.com/watch?v=YgUchABJ0EQ>

Further References:

Is everything we know about the shape and size of our universe, and how it works, wrong?

<https://doi.org/10.5281/zenodo.7343171>

Quantum Mechanics and General Relativity are fully compatible, and have a common origin: the expanding (hyper) balloon universe.

<https://doi.org/10.5281/zenodo.6811311>

Shape and size of our universe: challenging the Standard Model of Cosmology

<https://doi.org/10.5281/zenodo.7619290>

#physics #science #space #astronomy #universe #nature #sciencefact #sciencenerd
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#quantummechanics #generalrelativity

[Mr. Waugh dedicates this to his mother (late) Mrs. Basanti Waugh, his father (Shri Lalji Vittal Waugh), and his 'Jathamosai' (uncle).]

subhajit waugh

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