

Title –

## Equation Describing the Universe

Author –

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Abstract –

Originally, I planned to call this article  $H_u = BEc^{e^\infty}$ , or  $1 = 1^\infty$ . But my computer won't let me save that name – so I've changed the title to "Equation Describing the Universe". This equation looks like the one physicists are hoping will be printed on T-shirts in the middle of this century as a description of the Universe. Normally, I'd leave development of this equation in the capable hands of Isaac Newton or Albert Einstein. They aren't here right now ... and it'll be quite a while before they return. However, they instructed me to send you this message on their behalf.

H is for the Hamiltonian, representing the total energy of a quantum mechanical system. The subscript u stands for "universe" and  $H_u$  means the universe operates quantum mechanically (quantum effects operate macroscopically as well as microscopically, and this unification is symbolized by the first 1). BEc is for Bose-Einstein condensate, a finite form of matter that is the first known example of quantum effects becoming apparent on a macroscopic scale (represented by the second 1). Borrowing a couple of lines from the more complete explanation in the Content – "The infinite cosmos could possess this absence of distance in space and time, via the electronic mechanism of binary digits. To distinguish this definition from "the universe going on and on forever", we can call it "electronic infinity or  $e^\infty$ " (not  $E_8$ ). When the macroscopic quantum effects of the BEc are magnified by  $e^\infty$ , those effects are instantly translated into all space-time operating quantum mechanically. In other words, you can multiply a BEc (the second 1) an infinite number of times – but no matter how many (or how few) times you do it, you'll always end up with 1 (the macroscopic universe's time and space operating quantum mechanically). Consequent to this operation is the inevitable quantum entanglement of everything (matter, energy, forces); making all space and all time a unification.

Content –

"The universe IS something" ("Astronomy" magazine – March 2013, p.66) is interesting. This letter and its reply continue on from Bob Berman's article "Infinite Universe" ("Astronomy" – Nov. 2012) which says, "The evidence keeps flooding in. It now truly appears that the universe is infinite" and "Many separate areas of investigation – like baryon acoustic oscillations (sound waves propagating through the denser early universe), the way type 1a supernovae compare with redshift, the Hubble constant, studies of cosmic large-scale structure, and the flat topology of space – all point the same way." Support for the article - (after examining recent measurements by the Wilkinson Microwave

Anisotropy Probe, NASA declared "We now know that the universe is flat with only a 0.4% margin of error." - [http://map.gsfc.nasa.gov/universe/uni\\_shape.html](http://map.gsfc.nasa.gov/universe/uni_shape.html); and according to "The Early Universe and the Cosmic Microwave Background: Theory and Observations" by Norma G. Sánchez, Yuri N. Parijskij [published by Springer, 31/12/2003], the shape of the Universe found to best fit observational data is the infinite flat model).

Thinking about a finite cosmos makes my head hurt (if the cosmos is finite, what exists outside it? If there's something, that something must be part of the universe. If there's absolutely nothing, how can that be? Nothing doesn't exist.) But I can't really picture an infinite cosmos that never ends. A new definition of infinity is needed. The inverse-square law states that the force between two particles becomes infinite if the distance of separation between them goes to zero. Remembering that gravitation (associated with particles) partly depends on the distance between their centres, the distance of separation only goes to zero when those centres occupy the same space-time coordinates (not merely when the particles' or objects' sides are touching i.e. infinity equals the total elimination of distance). The infinite cosmos could possess this absence of distance in space and time, via the electronic mechanism of binary digits. To distinguish this definition from "the universe going on and on forever", we can call it "electronic infinity or  $e\infty$ ".

1's and 0's would make the bosons of gravity and electromagnetism which would interact in Wave Packets to produce matter. All matter in the universe then has the potential to behave like a Bose-Einstein condensate (a state of matter composed of bosons cooled close to absolute zero in which atoms fall or condense into the lowest accessible quantum state, at which point quantum effects become apparent on a macroscopic scale). The bosons composing gravity and EM can all have the same properties e.g. position, velocity, magnetism and spin (force-carrying particles, or bosons, defy Pauli's exclusion principle). The matter we know obeys Pauli's exclusion principle. So how is it different from a Bose-Einstein condensate. To exhibit Bose-Einstein condensation, the fermions (particles of matter) must "pair up" (not in the normal manner of sharing electrons) to form compound particles that are bosons. This "pairing-up" may be achieved by using e-infinity to delete distance. This leads to a photon (such as from the Sun) experiencing the whole universe – including BECs, gravitons, and other photons - in its existence.

It's impossible to point to the 4th dimension of time, so this cannot be physical. Since the union of space-time is well established in modern science, we can assume the 4th dimension is actually measurement of the motions of the particles occurring in the 3 dimensions of length, width, and height. The basic standard of time in the universe is the measurement of the motions of photons - specifically, of the speed of light. This is comparable to the 1960's adoption on Earth of the measurement of time as the vibration rate of cesium atoms. At lightspeed, time = 0 (it is stopped). Below 300,000 km/sec, acceleration or

gravitation causes time dilation (slowing of time as the speed of light is approached). If time's 0, space is also 0 because space and time coexist as space-time whose warping (gravity) is necessarily 0 too. Spacetime/gravity form matter/mass, so the latter pair can't exist at lightspeed and photons are massless (even when not at rest).

Suppose Albert Einstein was correct when he said gravitation plays a role in the constitution of elementary particles (in "Do Gravitational Fields Play An Essential Part In The Structure of the Elementary Particles?" – a 1919 submission to the Prussian Academy of Sciences). And suppose he was also correct when he said gravitation is the warping of space-time. Then it is logical that 1) gravitation would play a role in constitution of elementary particles and also in the constitution of the nuclear forces, and 2) the warping of space-time that produces gravity means space-time itself plays a role in the constitution of elementary particles and the nuclear forces. Gravity, being united with EM and the nuclear forces, is therefore the ultimate physical source of all repelling and attracting. Mass increase at increasing accelerations is inevitable because the object is encountering more spacetime and gravity (the producers of mass; which also confer mass's equivalent [energy] on cosmic rays that travel far enough through space, turning them into ultra-high-energy cosmic rays). But mass increase cannot become infinitely large since space-time, gravity and mass don't exist at lightspeed. The object is converted into energy which means mass and energy must be equivalent and Energy must equal Mass related to the Speed of Light ( $E=mc^2$ , in the words of Albert Einstein).

Since there is zero, or no, spacetime at light speed; infinity exists in that state - all distances are totally eliminated and a photon experiences the whole universe – as well as all time – in its existence). "Physics of the Impossible" by Michio Kaku (Penguin Books 2008, p.227) says, "... whenever we naively try to marry these two theories (general relativity and quantum theory), the resulting theory makes no sense: it yields a series of infinite answers that are meaningless." We see that infinite answers are supposed to be arrived at because light is important in Relativity and "infinity (in the sense of total elimination of distance) exists at light speed". Infinity and infinite answers are not barriers to uniting general relativity and quantum theory. When we realize that  $c=\infty$  (infinity exists at light speed), those infinite answers can yield not nonsense but real meaning.

With all distances deleted and a photon experiencing the entire universe in its existence (including gravity and the nuclear forces – carried by the gravitons, gluons,  $W^+$ ,  $W^-$  and  $Z^0$  particles), the cosmos has become finite (even subatomic or quantum sized). The "pairing up" of particles by e-infinity i.e. by the electronic binary digits of 1 and 0 permits matter we know to defy the exclusion principle and act as though it was buried at the centre of a planet. No gravity-EM interactions in wave packets occur at the planet's centre; meaning there is no mass\* and, agreeing with conclusions from Isaac Newton's theories, (hypothetical) objects weigh nothing. Also, "pairing up" of particles by e-infinity

means quantum effects become apparent on a large macroscopic scale. This permits a “distant” event to instantly affect another (exemplified by the quantum entanglement of particles separated by light years), or permits effects to influence seemingly separate causes (exemplified by the retrocausality or backward causality promoted by Yakir Aharonov and others). This means quantum processes wouldn't be confined to tiny subatomic scales but would also occur on the largest cosmic scales.

\* According to the Lagrangian – the L of a dynamical system which summarizes the dynamics of the system – fermions should be massless, and the common view is that it's the Higgs field/boson coupled to them that gives them their masses. There are several explanations for the creation of mass – Einstein's gravitational / electromagnetic interaction being used here.

Why do fermions obey the exclusion principle if e-infinity (binary digits) pairs them up to exhibit Bose–Einstein condensation and quantum effects becoming apparent on a macroscopic scale? It must be because of temperature. The slightest interaction with the outside world can be enough to warm fragile BECs (they're normally very near absolute zero or -273.15 degrees C), forming a normal gas. Remembering that our world's average temperature is almost 290 degrees C above that, it's no surprise that the vibration from the heat splits the paired particles apart and causes them to obey the exclusion principle. Since this article refers to the 1's and 0's of base 2 mathematics (the binary system), physical explanation (heat splitting particles apart) isn't enough and a mathematical explanation (at least in a limited context) is desirable.

Let's borrow a few ideas from string theory's ideas of everything being ultimately composed of tiny, one-dimensional strings that vibrate as clockwise, standing, and counterclockwise currents in a four-dimensional looped superstring. We can visualize tiny, one dimensional binary digits of 1 and 0 (base 2 mathematics) forming currents in a Mobius loop – or in 2 Mobius loops, clockwise currents in one loop combining with counterclockwise currents in the other to form a standing current. Combination of the 2 loops' currents requires connection of the two as a four-dimensional Klein bottle. This connection can be made with the infinitely-long irrational and transcendental numbers. Such an infinite connection translates - via bosons being ultimately composed of 1's and 0's depicting pi, e,  $\sqrt{2}$  etc.; and fermions being given mass by bosons interacting in matter particles' “wave packets” – into an infinite number of Figure-8 Klein bottles.\*\* Slight imperfections in the way the Mobius loops fit together determine the precise nature of the binary-digit currents (the producers of gravitational waves, electromagnetic waves, the nuclear strong force and the nuclear weak force) and thus of exact mass, charge, quantum spin, and adherence to Pauli's exclusion. Referring to a Bose-Einstein condensate, the slightest change in the binary-digit flow (Mobius loop orientation) would alter the way gravitation and electromagnetism interact, and the BEC could become a gas.

\*\* Each one is a “subuniverse” composing the physically infinite and eternal space-time of the universe (our own subuniverse is 13.7 billion years old). We don’t have to worry about accelerating cosmic expansion – the result of more space, forces, energy and matter being continually produced by binary digits - leaving our galaxy alone in space. As “dark energy” causes known galaxies to depart from view, more energy and matter can replace them (since the universe obeys fractal geometry, gravity is the source of repelling and attracting not only on a quantum scale but on a cosmic scale, too i.e. it accounts for dark energy – it accounts for dark matter and Kepler’s laws of planetary motion, too [but that’s a long explanation best left in <http://vixra.org/abs/1303.0218>]). The Law of Conservation says neither matter nor energy can be created or destroyed (though the quantity of each can change), so a better phrase might be “binary digits recycle spacetime” (when matter changes into energy or energy becomes matter, we commonly say matter or energy has been created). As well, other expanding subuniverses can collide with ours and their galaxies enter our space to keep our galaxy company.