

Three E8 Symmetry Forces of Nature Existed Prior to the Big Bang: Two Forces Enabled Transfer of Matter to the New Universe and One Force enabled the Bang Itself

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Abstract: The Standard Model has SU(3) symmetry appearing only once, in the QCD theory of the strong force. A simple argument shows SU(3) symmetry is also the symmetry of life, with its 8-fold representation, and it is also the symmetry of the 8 stable matter particles. It is only logical to also expect 8 forces of nature but there are only five forces at present: it is proposed that 3 new forces were active only in an epoch prior to the big bang when time was not active. One force enabled the big bang itself and two forces enabled matter to pass from the previous universe into the present cosmos without violating flatness. The new theory accounts for 248 particles of a revised Standard Model, in accordance with E8 symmetry.

The author had a stroke in 2002 which left him very right-brained yet greatly improved his “big picture” insight¹. According to his theory of the evolution of the universe, time was inactive for an undetermined interval² before the big bang and for similar epochs before that, and during these periods three new forces of nature became active:

1. A force pulling massive spin 1 right-handed and left-handed gauge boson particles together (SU(2) symmetry particles now, former electroweak and pair-production particles when time was active, both now identical and uncharged with time inactive),
2. A force pulling massive left-handed spin 1 boson (former electroweak particles) and massive spin $1/2$ fermion particles together to form supersymmetric partner pair entities of cosmic scale, and
3. A force pulling massive spin 0 boson (dark energy particles) and massive spin $1/2$ fermion particles together to again form supersymmetric partner pair entities also of cosmic scale (probably 0.1 light year is typical). The latter two forces formed fermibosonic³ entities of cosmic scale which the author calls Briggs fermibosons type A (spin 1 bosons) and type B (spin 0 bosons). The type B fermibosonic force pulled the space-expanding dark energy spin 0 boson particles of the universe into close contact with ordinary matter and the type A force pulled former massive weak-gauge spin 1 boson particles into close contact with ordinary matter (note that all the particles have no electric charge when time is not active and therefore are not influenced by electromagnetic forces). Also, former particle-antiparticle pairs (W⁺, W⁻, and 8 matter particles) cannot annihilate when time is off.

The three new forces mean that there are 8 fundamental forces of nature in all: 5 forces (each with its own gauge boson) were already known. The 5 are: one electromagnetic force, 3 electroweak forces, and one gravitational force (remember that the electromagnetic force has only one photon for both electricity and magnetism as required for the superior life-sustaining dipole radiation of ordinary light). The 8-fold representation is a common indicator of SU(3) symmetry. The strong force, obeying QCD theory, has its own 8-fold representation and is not included in this count. The SU(3) symmetry is also the symmetry of life itself: DNA has A, C, G, and T building blocks for each parent, or 8 in all. This very simple fact is completely ignored by all physicists except the author, yet it is of overwhelming importance! This means that the 3 new forces make this cosmos theory very anthropic. This is enhanced even more when one also considers the 8 basic stable matter particles of nature: the electron, the up quark, the down quark, the neutrino and their antiparticles.

In addition to the 3 new forces of nature and 2 new zero mass entities (not quantum particles) of fermibosonic type which appeared during the time-off epoch, 3 new mass particles and 1 new massless electromagnetic force particle appeared. These latter particles resulted from reversion of the electroweak broken symmetry state back to an unbroken state with new particles appearing in the no-time epoch. One of the new mass particles was an SU(2) symmetry particle of right-handed helicity (arising from pair production in the gamma-ray big bang radiation of the previous universe) and the second new mass particle was an SU(2) symmetry particle of left-handed helicity (arising from the electroweak reversion) which came into close contact with the right-handed pair-production particle under the influence of the first time-

off force. This contact formed an uncharged-particle pair which later annihilated at the instant time came on again, creating the big bang.

The bang produced equal bursts of radiation of as yet undetermined energy everywhere in the reawakened universe. The time-on action occurred instantaneously everywhere and was not limited by light speed (the particles were almost certainly quantum entangled). No matter entered the universe at this time. The fermibosonic entities passed also into the new universe but because they each had no net mass⁴ they caused no change in the cosmological constant. The type A fermibosonic entities of E8 symmetry broke down to $SU(2) \times U(1)$ symmetry very soon after the big bang in the intense heat of the big bang and became sources of positive energy (the bosonic component of the fermibosonic entity was of negative energy) electroweak-force massive bosons (W^+ , W^- , Z_0) and huge black holes, via quasar followed by Seyfert galaxy formation and later in the new universe the type B fermibosonic entities were torn apart by the intense gravitational fields of the already-formed huge black holes and became ordinary matter and dark energy (negative energy) for the reawakened universe, via spiral galaxy formation alone. This latter action is probably still going on today, producing more dark energy and ordinary matter in equal amounts and causing continuing expansion of the universe.

A cyclic universe has already been proposed⁵ in which time is periodically turned off to produce a resetting of entropy to a low value in the universe and also to shrink the universe to an initial size. When time is restored an annihilation process occurs as described above throughout the universe (now reduced in size) which can be identified as the big bang. While time is inactive, no distinction can be made between matter and antimatter particles, resulting in a high degree of symmetry of single-group E8 type⁶. The heavy, now uncharged matter-antimatter gauge boson particles then pull together under the influence of the first new time-off force, so that when time was restored the particles are in close contact and can annihilate. In addition, dark energy is reversed during the time-off epochs, shrinking the universe back to its beginning size. The two fermibosonic entities (type A and type B) each have no mass (due to negative-energy bosonic components) and can pass into the new universe without causing a change in its flatness and can generate new mass via galaxy growth. Thus at the big bang instant and for some time afterward, no mass is transferred to the new universe, no gravitons flow and no gravity waves form. Gravity waves do occur later with the formation of galaxies but these are much milder than one would expect from cosmic inflation, for example.

We have further information concerning the three new forces of nature: there are no more forces than these 3. We know this because 3 means that there are in the cosmos 8 forces in all: one electromagnetic, 3 weak, 1 gravitational and the 3 new forces, or 8 forces in all, excluding the strong force, which has its own 8 – force $SU(3)$ symmetry. The 8 - fold symmetry is that of life itself (4 units of DNA for each parent, or 8 in total). This symmetry is also the symmetry of the 8 stable building-block particles of the universe needed to insure that life forms are not radioactive (electron, up quark, down quark, neutrino, and their 4 antiparticles). Thus the universe contains the forces and the matter needed for life (the matter also has the strong force, mediated by gluons with its separate 8 – fold symmetry). Only the strong force $SU(3)$ symmetry connection is recognized by the physics community at present (QCD theory) – however, nature tells us that the cosmos is more anthropic than this!

The 3 new time-off forces all have gauge bosons. This means that in their unbroken symmetry form they are quantum-mechanical “hidden variables”⁷ (an example is the photon and its vector-potential A , but not the W or Z_0 boson particles of the 3 electro-weak forces) and thus can only be observed quantum mechanically but this may make it possible to confirm their existence despite the time-off requirement.

Our finding that all of the ordinary mass of the present universe entered via spiral galaxies answers the “missing antimatter” problem⁸: since the matter came in at or near the galaxy central black holes, all matter-antimatter annihilation occurred there, at least no farther out in the galaxy than the galaxy bar regions: certainly not further out on the galaxy arms where life exists and the annihilation radiation could be dangerous to it. This is further evidence for the very anthropic cosmos idea! – nature has provided for life most diligently!

To summarize, the 3 new forces of nature (which only act when time is not active) are:

1) An attractive long-range force between new left-handed heavy gauge bosons and new right-handed heavy gauge bosons to form particle-antiparticle pairs (which are of single-particle Majorana type in the absence of time) to draw the particles into contact by the end of the time-off epoch (the particles cannot annihilate while time is off). This causes a big bang annihilation instantly throughout the reduced-size following universe when time turns on again. The radiation is of GeV-scale energy initially but is greatly down-shifted in frequency by the time we experience it.

2) A force between fermionic matter particles and massive negative-energy spin-zero boson particles (former dark energy particles). This produces a massless spin $\frac{1}{2}$, spin 0 supersymmetric fermibosonic stable entity (not particle) of cosmic scale (Briggs fermiboson type B) which is later torn apart in the new universe by already-existing huge black holes, forming spiral galaxies of ordinary matter and massive spin-zero bosons (the latter are a.k.a. dark energy which causes expansion of the universe).

3) A force between massive spin 1 former weak gauge-boson particles (now of negative energy) which forms a massless, stable spin $\frac{1}{2}$, spin 1 supersymmetric, fermibosonic entity (Briggs fermiboson type A) which is disrupted by the initial powerful annihilation radiation of the big bang to form massive positive-energy electroweak bosons and huge black holes. These black holes later use their powerful gravity to tear apart the Briggs fermiboson entities type B as described above.

The Majorana neutrino is a matter particle which is its own antiparticle. Its existence requires another particle⁹ (known as the sterile neutrino). The two new particles replace the neutrino and antineutrino particles of the original stable particle group which leaves the initial stable SU(3) group number unchanged at 8. Thus the sterile neutrino intrinsically has no antiparticle, i.e. it must be a massive gauge boson. This boson can give rise to a new force of nature of intermediate range dependant on the mass of the boson. This new force of nature is active in bringing matter from the previous universe together to form massless entities in the present universe of fermibosonic type known as Briggs fermibosons. These entities are of cosmic dimension (typically 0.1 lightyear) and are broken down by the strong gravitational fields of the huge black holes resulting from earlier type A fermiboson splitting to form ordinary matter and dark energy in the new universe.

It is possible to compute the number of new particles that would appear in the Standard Model if the universe model is as described above. To generate the eight fundamental-particle fermions (particles not new) we need 8 new time-on dark energy gauge bosons and 4 new time-off gauge bosons (for the fermibosonic type B entities) and 4 new time-on gauge bosons (for the fundamental antiparticles) and for the time-off fermibosonic type A entities we need two new force gauge bosons. Thus we need a total of 18 new gauge bosons for the fermibosonic entities. In addition we need 2 new SU(2) particles: one of right-handed and the other of left-handed helicity for the big bang. We also need a right-handed Wo-type particle and a final U(1) particle to form the electroweak symmetry for the new right-handed group. This adds to a total of 22 new particles required. The present Standard Model has 226 particles¹⁰: 22 new particles yields a total of 248, the representation number for E8 symmetry. This remarkable agreement is a very strong indicator that the theory is correct!

The theory of the evolution of the universe based on an initial entity having the exceptional, single member symmetry group E8 can be considered as a “trinity theory of the cosmos”. E8 symmetry of fermibosonic matter is the highest symmetry possible in nature, another member of the trinity (dark energy) has SU(1), the next lower symmetry. This latter symmetry requires that the member have no gauge bosons. This means no photon and no graviton or any other gauge boson. The final member of the trinity is ordinary matter.

Recently, a new method of high-energy particle collision analysis has been developed¹¹. It is found that one graviton is equivalent to 2 gluons. This implies that for the fermiboson type B all the available spin must be taken by the fermion, leaving none for the gauge boson, and this is why the gauge boson must have SU(1) symmetry. We can identify it as dark energy (expansion of space). It is not dark matter which would require a graviton: thus dark matter does not appear in this trinityastic theory of the evolution of the universe. It should be noted that cold, non-reflective ordinary matter is allowed in the theory: only more exotic forms of matter are not allowed. The identification of SU(1) symmetry with dark energy fills a long-

standing gap in The Standard Model: SU(2) and SU(3) appear in the present model but SU(1) does not. Higher symmetry members, such as SU(5) are also not in the model but this is probably because these symmetries would be higher than that of life itself (SU(3)). Theories based on SU(5) have been developed, but all have failed.

The introduction of E8 symmetry brings in a “trinity” like concept to the theory which makes it mysteriously (to most physicists) quite religious. In addition, the theory in this form appears to be without flaws, such as, for example, the missing antimatter problem. Note that E8 symmetry applies to both the type A and B fermibosonic entities. This means that the highest symmetry entity is not single but double (male and female entities perhaps?).

The conventional theory of the evolving universe starts with a very short period of very rapid inflation. No use is made of E8 symmetry and no trinity concept appears. This implies that the conventional theory is very atheistic. The theory in this form also suffers from flaws, such as the missing antimatter problem.

J.R. Oppenheimer may have had a similar insight¹² when he mysteriously named the first test of the atomic bomb “The Trinity Test”. Many of us at Los Alamos at the time wondered why he picked this name.

In conclusion, during the time-off epoch the fourth dimension of time becomes a dimension of inactive life (seeds?) having the highest symmetry (E8) possible. The fermibosonic entities, also of E8 symmetry, form during this epoch. The bosonic components of the fermibosonic entities are of negative energy type: our understanding of this is not clear at present. The following time-on epoch does not immediately see the fermibosonic entities broken down: this action comes at varying later times, a short time for type A entities, a possibly much longer time before the type B entities (involving spiral galaxies) are all broken down.

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