Alternative Charge Carriers and the Higgs Boson

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Abstract

A functional class of particles, the "Alternative Charge Carriers" (ACCs), is recognized as characteristic of the Electroweak domain and the Weak Force Intermediate Vector Bosons (IVBs).

The photon is the massless gauge boson of the electromagnetic force, and its intrinsic entropic motion ("velocity c") creates the metric domain of spacetime; the Higgs boson is the massive gauge particle of the electroweak force, creating the "particle metric" or "zoo" of electroweak spacetime, the "Alternative Charge Carriers" (ACCs) (leptons, mesons, neutrinos), in both virtual and "real" forms. In a universe lacking antimatter - such as ours - ACCs serve to balance charges and preserve charge conservation during particle interactions. ACCs enable the decay of heavy hyperons, quarks, and lepton "families" to our familiar electromagnetic ground state through channels that obey charge conservation, despite the lack of antimatter in our Cosmos. Hence the ACCs are yet another conservation consequence of our "matter-only" Universe. The Higgs boson may be thought of as a gauge particle or "marker" for the convergence of the weak and electromagnetic forces: the specific energy level necessary for the weak force creation of *single members* of the ACC class of particles.

Space is the entropic/energetic conservation domain of massless light (free electromagnetic energy); historic spacetime is the entropic/energetic conservation domain of massive particles (bound electromagnetic energy). While the photon establishes a dimensional "spacetime metric" (in which 300,000 kilometers of distance is metrically equivalent to one second of time), the Higgs boson establishes an electroweak particle metric or "symmetric energy state" at 125 GEV (in which the electric and weak forces are equivalent). Both are symmetry conditions, for at "velocity c" the asymmetric time dimension vanishes, and at 125 GEV the specific identities of the leptons are subsumed into a single generic leptonic identity, and likewise the specific flavors of the quarks vanish into a single generic quark identity. It is these generic identities (symmetric energy states) which the weak force IVBs "sample" to select specific quark/leptonic flavors for the purpose of identity transformations among elementary particles. We may think of the Higgs boson as the gauge boson of the electroweak particle "zoo", or virtual particle "sea", of the Heisenberg/Dirac spacetime "vacuum".

The "Standard Model" of the "Higgs mechanism" of the electroweak force proposes four Higgs particles - one each for the W+, W-, and Z neutral (the "Intermediate Vector Bosons" (IVBs) or field vectors of the weak force), and a fourth scalar boson which gauges the intersection of the weak and electromagnetic forces. This fourth Higgs is the one recently discovered at CERN. (See: "*Most Wanted Particle*" by Jon Butterworth, 2014, The Experiment LLC, pages 96-99 and 237 - 238; see also: "*The Large Hadron Collider*" by Don Lincoln 2014, The Johns Hopkins University press, pages 126 and 133 - 135. The W and Z were also discovered - at CERN - in 1983. The math of this complex theory was worked out by Weinberg, Salam, and Glashow, 1967. Peter Higgs (and others) proposed the "Higgs boson" in 1964, as the source of elementary particle mass.`

In the real world (as opposed to the theoretical/math world), how do we see these theories manifest? Science has long noted that the electromagnetic force with its field vector (the photon of "light") is evidently composed of two parts, one the massless photon, and the other a virtual component consisting of particle-antiparticle pairs (leptons and quarks), which materialize and annihilate one another essentially instantaneously. Ordinarily, as this virtual particle component of electromagnetic energy tries to materialize, it is kept in its virtual state by matter-antimatter symmetry, which causes the annihilation of these virtual particles as soon as they appear. Such particles comprise a "vacuum sea" of virtual particles, coextensive in our universe with spacetime. Given sufficient energy, this "sea" of virtual particles is available for particle interactions, transformations, and even creation/destruction, and the weak force makes use of it via the mediation of the IVBs.

The great mass of the IVBs reproduces the energy density of the early universe when these particle pairs were in abundant supply and essentially identical to each other (because the energy was so extreme). The massive IVBs are thus enabled to "sample" or select particles from that portion of the "sea" which its mass reproduces (and therefore allows it to access). Selected particles are then used to effect elementary particle interactions/transformations. (See: "The "W" IVB and the Weak Force Mechanism"). This mode of action allows the IVBs to exactly reproduce elementary particles from the original "sea" or primordial source, preserving the necessary universal symmetry of elementary particle parameters of mass, spin, charge, etc. Because the mechanism depends on mass to reproduce these primitive conditions, it is unaffected by the entropic expansion of the spatio/temporal universe; hence electrons produced today are (and must be) identical in all respects to those produced eons ago. This universal and necessary symmetry among elementary particles in terms of mass and other physical parameters is the reason why the weak force is so strange, with its massive IVBs: the weak force must be able to reproduce *single* elementary particles (not just particle-antiparticle pairs) - that are absolutely identical in every respect to all others (of its type) that have ever been, or ever will be, produced - past, present, future. This is a tall order, and it is one of the defining parameters, constraints, and symmetries of our "matter only" universe, responsible for the oddities of the weak force and the Higgs boson.

Let's put all this in terms of a familiar analogy: the Higgs mechanism is like a government mint which must stamp out coins in various denominations, but (naturally) of identical value within each denomination. It's easy to understand why all one cent, five cent, and ten cent coins (etc.), must be of equal value within type (contain the same quantity of precious metal), for the sake of the stability of the country's financial system and the public trust. Here, money/precious metal is the analog of energy, the financial system represents conservation law (such as the conservation of energy), and the various coin denominations represent the various elementary particles. The Higgs mechanism represents the government mint, and the W and Z IVBs represent the massive presses stamping out coins - some of positive value (W+), some of negative value (W-), and some of neutral value (Z zero), but all useful and necessary for one or another economic transaction/interaction (because even the Z neutrals have value as Alternative Charge Carriers, which in this case we can understand as uncharged information packets).

This government mint resides in a vast country called the electroweak domain, and the coins it stamps out are the electron, muon, and tau, their corresponding neutrinos, and their antiparticles. This mint also produces mesons of positive, negative, and neutral varieties, in various denominations depending upon their quark content. The mesons are used as ACCs in baryon transformations, because they carry various quark flavors (in addition to electric charge), and the leptons and neutrinos are used as ACCs (of electric and identity charge) in transactions and transformations among and between leptons, mesons, and baryons (see: "The 'W' IVB and the Weak Force Mechanism"). Within type, all these coins must be identical, for obvious financial

and energy conservation reasons. The total collection of coin dies and precious metals available from the mint (the range of its potential particle productions) is a cosmic parameter characterized/determined by a particular Higgs boson of unique mass/energy - in this case, the electroweak Higgs scalar boson. The name of this mint is the "Electroweak Alternative Charge Carrier Mint". It only produces ACCs.

The "heavy hitters" in our electromagnetic domain are baryons (protons and neutrons), as they generally carry much more mass (value) than the leptons. But although the Electroweak Mint (Higgs mechanism) can stamp out mesons with various quark flavor combinations and hence permit the transformation of baryons (as in the decay of a neutron to a proton), the electroweak mint simply does not possess a press (IVB) heavy enough to stamp out (or destroy) baryons themselves. To obtain newly minted baryons we have to visit an entirely different (smaller, hotter, denser) country, the domain of the G.U.T. (Grand Unified Theory). In the country of the GUT the electroweak and strong forces are unified, allowing the minting of *single*, original baryons. (See: "The Origin of Matter and Information").

The GUT mint has a very heavy press (the "X" IVB), which can stamp out (or destroy) baryons themselves. But this country is so far away that we will probably never be able to visit (at least not via CERN and the LHC), although we know it exists because we are up to our ears in baryons (protons and neutrons), and they have to come from somewhere. In the electroweak domain, we can transform baryons but we cannot make or destroy them. Like Frodo's magic ring, baryons can only be destroyed in the furnace where they were created. And there may be yet another country, further away still (smaller, hotter, denser), the "TOE" ("Theory of Everything" or " Planck" domain), with another mint/Higgs mechanism and an ultraheavy press ("Y" IVBs), which stamps out/destroys leptoquarks. But that domain is so close to the "Big Bang" or "Creation Event" that nobody can get anywhere near it. (See: "The Higgs Mechanism and the Weak Force IVBs"; See also: "Table of the Higgs Cascade").

We should note that there is no theory for the GUT that suggests it should include a symmetry-breaking photon/IVB split, as in the electroweak domain. Consequently, the GUT mint may not exist within a large spacetime domain; indeed, in our view, proton decay occurs mainly inside black holes. Likewise, proton creation occurs so early in the development of the universe that there is no appreciable spacetime to speak of, and certainly no freely traveling photons. Leptoquark creation is earlier yet (during the TOE), within an even more opaque and spatially constricted arena.

We, obviously, live in the cold and low-energy electromagnetic domain where only chemical interactions (electron shell interactions) are the rule (on planets like Earth). The nuclear transformations in our Sun are the evidence of the activity of the electroweak IVBs creating leptons, neutrinos, mesons (the ACCs), and photons (in the nucleosynthetic process producing helium from hydrogen). We find our planetary chemical electromagnetic domain (which can only muster up, for example, a coal-burning fire), dependent upon the solar energy of nuclear transformations and the IVBs of the electroweak domain. (These same IVBs are also engaged in "radioactive" nuclear transformations here on Earth.)

While the "mint" analogy may be appropriate in terms of energy vs finances, it does not tell us how the presses (IVBs) actually make particles with mass (although compression is implied). I have assumed that the great mass of the IVBs represents an example of the energy density of the early universe during the time the "leptonic spectrum" was first created. Mass is a necessary feature of the Higgs mechanism because mass (as bound energy) is not susceptible to the entropic enervation of cosmic expansion over the eons - ensuring an accurate reproduction of particles whenever/wherever they may be replicated. Mass also suggests compression, and compression may well have a large part to play in the conversion of freely traveling

electromagnetic waves (photons) into a bound, stationary, or "standing" electromagnetic wave. We know that both massive particles and light are electromagnetic in character and are derived from one another, as matter-antimatter annihilations unambiguously inform us ($e = mcc$, $e = h\nu$, $h\nu = mcc$), as do also the high-energy "atom smashers" or colliders (such as the Large Hadron Collider or LHC) at CERN, etc. The exact means whereby light is converted into particles via the Higgs mechanism and IVBs - now or in the early Universe - is not known, but it must involve (at least) a conversion from two to four dimensions and from intrinsic motion in space (at "c") to intrinsic motion in time with no intrinsic spatial motion; the acquisition of various conserved charges, etc. Possibly a dimensional "knot" is involved. (See: "The Higgs Boson vs the Spacetime Metric".)

As for the mysterious Higgs boson itself, it acts as a boundary marker or "gauge" for the threshold of the electroweak domain, the energy at which the electromagnetic and weak forces join, and *(single)* Alternative Charge Carriers may be produced. At this high energy all the leptonic particles are equivalent, and all the quark flavors are equivalent (but quarks vs leptonic particles are still separate - they will join in the next higher energy level, in the domain of the GUT). The electroweak energy level is the domain in which *(single)* Alternative Charge Carriers may be created, destroyed, and/or transformed - mesons, leptons, and neutrinos. It is these ACCs that allow the transformation of baryons (but not their creation or destruction), and ACCs are typical of the energy level of the electroweak force and its usual activity (of which our Sun is the archetypal example). The electroweak energy level allows (via the mediation of the IVBs and ACCs), the nuclear transformations which characterize the stars, while the chemical (electron shell) energy level characterizes the planetary realm. Life utilizes even weaker, specialized biochemical bonds - such as hydrogen bonds. (See: "The Fractal Organization of Nature".)

The Higgs confers mass upon the weak force IVBs, the "W" and "Z", but exactly how we do not know (we say the IVBs "sample" the mass-energy domain of the Higgs boson). The IVBs then go on to faithfully reproduce *single* examples of the ACCs: massive mesons, quarks, leptons and neutrinos. In this view, the Higgs itself does not confer mass directly upon the elementary particles, as in the standard "ether drag" model, but only indirectly through the IVBs, by an unknown mechanism (a "virtual" ACC somehow becomes "real", via the energetic mediation of a virtual IVB). The mass of an IVB is understood as the energy density of a primordial era, and is not a permanent feature of any particle. Likewise, the Higgs lives only at the intersection of the weak and electromagnetic forces, so it marks and "gauges" the boundary of a symmetric energy state, in which all leptons are equivalent (among themselves), and (likewise) all quarks are equivalent. The IVBs get what mass and particles they require from the symmetric energy state created by the mass-energy of the Higgs.

In the "Standard Model", the Higgs and the photon separate at the threshold of the electroweak state, the Higgs remaining massive and the photon remaining massless ("electroweak symmetry-breaking"). The photon goes on to create universal spacetime, but the Higgs seems to also be a universal (but "virtual") feature of this self-same spacetime. Stars everywhere and everywhen use the same electroweak Higgs and IVBs to produce the same nuclear transformations. Nevertheless, the Higgs presence must be virtual, at least in our current cold, "ground state" universe; the "real" Higgs is available on demand given enough energy - as at the LHC (CERN). Presumably, there is a distinct Higgs-like boson distinguishing or "gauging" the boundary of each confluent energy level (the EW, GUT, and TOE); these several different symmetric energy states is one reason why these Higgs-like bosons are necessary partitions or boundary markers within the mechanism producing *single*, identical, massive, elementary particles.

We live in an era of information-building in the stars (as the electroweak ACCs transform baryons and build

the elements of the periodic table), and life-building on the planets, as the universe awakens to itself, using the information (from the periodic table) passed down from the stars and the electroweak force to our cool electromagnetic/biochemical planetary domain.

Both the "Steady State" and "Big Bang" cosmologies can be simultaneously entertained: the all-symmetric Multiverse is the "Steady State", mighty, eternal, immortal, and fertile, forever "budding off" asymmetric universes similar (?) to our own, ephemeral and of explosive origin, but requiring no net energy to create. Our universe would therefore seem to represent an individual excursion into the creative powers of the information domain - perhaps one of infinitely many. In this case the universe is what we make of it, to do with as we wish and are able - including committing suicide by abusing ourselves and/or our planet. The responsibility is all our own, although Nature will help if we work with her rather than against her.

The Enigma of Mass

Single elementary particles acquire "rest mass" (E = mcc) from the weak force IVBs, by revisiting the original energy density of the era in which they were first created (the Higgs energy density). "Rest mass" immediately acquires a gravitational field (and associated time dimension), which is exactly proportional to its total rest mass (Gm), whatever the source of the mass may be, whether elementary particle mass or "binding energy". "Inertial mass", or "mass due to acceleration" arises from forcing a particle's metric-warping gravitational field through the metric field of spacetime (resistance of one metric field to the intrusion of another metric-warping field). Gravitational "weight" (gm) is due to the reciprocal acceleration process - the metric field of spacetime is accelerating through the warping gravitational field of the stationary particle (f = ma). In this series, all the "m's" are equivalent, and derive from the same "rest mass" source (Einstein's E =mcc). The Equivalence Principle is upheld and explained. Inertial mass of acceleration is not due to "ether drag" by the Higgs field, but to the "ether drag" of a metric-warping gravitational field as it is forced through another metric field (spacetime), which resists the warping influence of the intruder. "g" forces are absent without acceleration, since in that case the fields are not forcing or extending/expanding their "warping" influences into each other. Although gravitational fields are weak, they extend throughout spacetime. Because the local metric field of spacetime is influenced by the total gravitational effect of all stars/galaxies in the cosmos, this mass-generating mechanism bears a distant relationship to "Mach's Principle" of inertial resistance. (See: "The Higgs Boson vs the Spacetime Metric".)

Postscript I:

The huge, anomalous masses of the IVBs and the Higgs boson (80, 90, 125 proton masses) tells us that these particles are not part of our ground-state electromagnetic world, not even part of the domain of our atomic nuclei, at least not in their normal ground state. The IVBs must come from an earlier, much more primitive era, smaller, hotter, and far more energy-dense than our own, only a few micro-moments removed from the "Big Bang", during the time when massless, free waves of electromagnetic energy were somehow being converted to massive, bound particles of electromagnetic energy (leptons, quarks, leptoquarks). How this was done remains a mystery: massless, a-temporal, 2-D photons with intrinsic (entropic) spatial motion "c" were converted to massive, temporal, 4-D particles with no intrinsic spatial motion but with (in compensation) an intrinsic/entropic motion in time. Whatever this conversion mechanism may be, it operated only in the very early universe at very high temperatures and energy densities. However, a remnant of this early conversion force can still be found today, making real transformations and creating/destroying *single* elementary particles (ACCs), via the mediation of the virtual particle "sea" by the electroweak IVBs.

The huge masses of the Higgs and IVBs reprise the energy-density of the early Cosmos, including the

mysterious mass-conferring mechanism. The Higgs "gauges" and recreates the electroweak "symmetric energy state", the energy at which the weak and electromagnetic forces converge. At this energy, all lepton species are merged into a single leptonic "genus", and likewise, the quark species are merged into a single quark "genus". These two "genera" do not mix at this level - they mix only at the next higher level, in the "GUT" or "Grand Unified Theory", where the strong force joins the electroweak force in a three-way convergence. (See: "The Higgs Boson and the Weak Force IVBs). The IVBs are able to make identity transformations among the elementary leptons and quarks because individual species identity is fluid within the generic "symmetric energy state". The (virtual) Higgs establishes a (virtual) particle "zoo" or "sea" (of Alternative Charge Carriers), and the (virtual) IVBs, because of their similar mass-energy (as conferred by the Higgs), are able to access this particle pool and take what they need to effect (real) transformations/interactions. These virtual interactions essentially connect the early with the modern-day universe, ensuring that every electron (for example) created today is identical to those created eons ago in the "Big Bang" - maintaining a necessary and universal symmetry among elementary particles (within type). The same mechanism that made the first electrons makes electrons today.

Postscript II:
The Higgs is like the main building of a government mint, a high-density domain of energetic symmetry where the precious metals are kept: copper, silver, gold (representing the three energetic families of elementary particles), along with the dies for the various elementary particles of the Higgs particle metric or "zoo" (pennies, nickles, dollars - corresponding to neutrinos, leptons, mesons), all of which are available to the IVB presses as required. A heavy IVB accesses a significant part of the Higgs domain (because of their similar masses), specifically that part in which the particle it seeks to replicate was first created. The mint supplies the IVBs with the proper raw material and the correct die for the particle it will stamp out - the same material and die that created the first particle of its type, and that will also create the last. The heavy IVB reproduces the primordial energy density of the universe when the required particle was first created (borrowing from the Higgs energy-density), and finds therein a virtual particle (the "die" from the Higgs "particle metric") of the original type and energy to exactly reproduce the particle in question. By this means (the constant mass or energy-density of the Higgs scalar boson) the universal and necessary symmetry among elementary particles is maintained throughout the eons of the Cosmos.

1) The true function of the Higgs boson is therefore to provide an invariant source of particles of a given type and energy. This is possible because the Higgs is a scalar boson marking or "gauging" the confluence of two natural forces, the electric and weak. This convergence will be at the same energy everywhere in the universe. Furthermore, because the Higgs itself is a particle, or form of bound energy, it is impervious to the entropic expansion of the universe over time. The Higgs simply sets a universal standard to which the IVBs must rise. (The IVBs must have the correct mass-energy to fish in the Higgs particle "sea"). In turn, the IVBs supply universally invariant (single) elementary particles to reactions, transformations, and interactions they mediate. It should be reasonably obvious, from the standpoint of energy and symmetry conservation, why all elementary particles (of a given type) must be identical. Electrons produced today (for example) must be able to seamlessly swap places with those created eons ago during the "Big Bang", or annihilate with an ancient positron (antiparticle) .

2) The true function of the IVBs is to extract *single* particles (the ACCs) from the Higgs energy field and provide them as needed to the reactions/interactions (the daily commerce) of the material content of the Cosmos, not only as it (quickly) cascades from the "Big Bang" to its ground state, but also as it (slowly) seeks to repay the symmetry debt engendered by its matter-only condition ("original sin"): returning, in

obedience to Noether's theorem, asymmetric massive, bound forms (particles) of electromagnetic energy to symmetric massless free forms (light) - the ongoing work of the stars and our life-sustaining Sun. (See: "The 'W' IVBs and the Weak Force Mechanism"; See: "The Higgs Boson and the Weak Force IVBs"; See: "The Solar Archetype"; See: "A Theory of Everything: A General Systems Perspective".)

Postscript III:
Let's take another look at "proton decay". Why is it so much harder for baryons to completely decay than leptons? We find that at the electroweak energy level - energies found in the IVBs of our Sun - baryons may be transformed but not created or destroyed, whereas leptons, mesons, and neutrinos can be both transformed and created/destroyed. So far as we know, since the time of the "Big Bang", no new baryons have ever been created, and likewise, none have ever been destroyed. The problem is one of a lack of suitable Alternative Charge Carriers; baryons carry two conserved charges that leptons lack: 1) color charge, carried by all quarks and gluons; 2) baryon number charge, the analog of lepton number ("identity") charge, the latter carried in "implicit" form by all massive leptons and in explicit form by neutrinos. Neutrinos function as ACCs for the massive leptons with respect to lepton number or identity charge (see: "Lepton Number or Identity Charge".) Both color and baryon number charge are strictly conserved, so both must somehow be canceled, neutralized, or otherwise balanced before a baryon may be created or destroyed.

The color charge of the baryon's strong force, which functions to keep the three quarks of a baryon confined within the tiny region of the atomic nucleus, is carried by a field of 8 "gluons", massless field vectors moving at velocity "c". Each gluon is composed of a color/anticolor charge pair. (There are three color charges ("red, green, blue" - purely names of convenience with no relation at all to color in the sense of a pigment). Quarks also carry color charges, and it is the round-robin exchange of color charges between quarks (via gluons) that permanently confines quarks to the nuclear boundary (unlike photons and electric charges, all gluons and color charges attract each other). The total color field of any atomic nucleus always sums to zero color (or color neutrality - "white"), and this charge must be conserved. There is no ACC available to carry the total color charge of the baron - only an antibaryon can do it - and herein lies the major sticking point for baryon creation/destruction (or "proton decay" as the problem is generally known). (Mesons are always color-neutral, carrying color-anticolor charges of the same color, and hence cannot function as an ACC for the color charge of a 3-quark baryon.)

However, there is an "internal" solution to this color-charge conservation problem, not requiring an anti-baryon, which stems from the origin of the quarks as three-way partitions of a primitive heavy lepton (the "leptoquark"). The total color charge of a baryon must sum to zero ("white") - both because their parent particles (the leptons) began with no color charge at all, and because (in consequence) gluons carry color/anticolor charges in all possible combinations, summing to the original zero ("white") color charge of the parent lepton. This means that if we can compress a baryon sufficiently and symmetrically it will return to its original leptoquark state and the color charge will self-annihilate. (Note that we are once again contemplating compressing matter to some earlier, more primitive, higher energy state.) A leptoquark is a primordial, high energy lepton, the heaviest member of the leptonic spectrum (the spectrum of *true elementary particles* - particles with no internal components and with associated neutrino identity charges). A Leptoquark is split into three parts (quarks) by its own too-great mass and electrical self-repulsion (and the action of the "Y" IVB?). (See also: "The Origin of Matter and Information") . There is no color charge in this (leptoquark) state because the quarks are still nascent or virtual rather than real (they have not yet separated from each other), but there is a lepton number charge, and this can be carried by a neutrino ACC, the very heavy leptoquark neutrino whose presence in the Cosmos today is registered as the mysterious "dark matter".

Hence proton decay is possible if we can sufficiently and symmetrically compress a baryon to its original leptoquark size, at which point a leptoquark antineutrino can cancel its baryon number charge - or it can emit its own leptoquark neutrino as an ACC, accomplishing the same charge/symmetry conservation end. (See: "Table of the Higgs Cascade".)

As we have noted above, compressing a baryon sufficiently and symmetrically to cause its color charge to self-annihilate requires the "X" IVB which does not exist in the electroweak energy domain (nor its "mint"). We must travel to the GUT energy domain to find such a heavy IVB, a special press stamping out shiny new (electrically neutral) leptoquarks in some far-away country. These leptoquarks (analogs of heavy neutrons) achieve electrical neutrality simply because their internal quark composition allows such a configuration. It is these electrically neutral leptoquarks which go on to decay asymmetrically via the weak force "X" IVB, producing the excess of matter-only baryons which comprise our asymmetric matter-only universe. Hence we see the necessity for quarks (to form electrically-neutral leptoquarks which can live long enough to undergo weak force asymmetric decays), and the relationship between the quarks, baryons, and leptons is explained. (The necessity for three energy "families" arises because three families presents the possibility of many more (16) electrically neutral three-quark combinations.) Although obviously necessary, the asymmetric weak force decay of primordial electrically neutral leptoquarks remains a mystery, an unexplained or "given" parameter of our Cosmos, perhaps attributable only to the statistical imperative - or anthropic fiat - of an abundantly fertile Multiverse. With the excess of matter-baryons comes an equal excess of leptoquark antineutrinos, exactly balancing the baryon number of the universe, and accounting for its "dark matter" content.

Because the "X" IVB is so massive, in our present-day universe the only place proton decay can reasonably be expected to occur is in black holes - where, unfortunately, the reaction cannot be observed. In fact, insofar as proton decay is concerned, the main difference between a black hole and an "X" IVB is simply size. Perhaps, at least in a functional sense, a black hole is a gravitational example of a gigantic Higgs boson/IVB combination (a "gravity mint"). This would be just another instance of the gravitational metric of black holes overtaking all functions of the electromagnetic metric. Even photons become massive (since they cannot travel freely), the symmetry condition g = c means that time vanishes (because the clock stops), and all field vectors of the electromagnetic domain are converted into gravitational analogs. (See: "A Description of Gravity"). The "X" IVB is so prohibitively heavy that proton decay would be rare indeed were it not for black holes. Perhaps this is the "real" cosmic function of black holes - destroying baryons and converting them to light.

Heavy baryons ("hyperons") are born in the "Big Bang" via an asymmetric weak force process; decay via ACCs to the nucleons of our ground state; join together gravitationally to form galaxies, stars, and planets, producing in the process (via the strong force) the elements of the periodic table. Baryons chemically create life via their electron shells and the electromagnetic force. Baryons die/decay in black holes, where they are crushed into light, eventually escaping as "Hawking radiation", the final symmetry-conserving interaction required by Noether's Theorem. "Information" is the "golden thread" running through the conservation laws governing the evolutionary unfolding of the single feature giving significance and meaning to our universe, and providing its rationale: self-conscious life.

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