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THE INFINITE WEAKNESS OF THE THEORY OF WEAK INTERACTIONS

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Abstract: I will begin by critiquing the Wikipedia pages on weak interaction, then move to some textbooks. I will show that the entire theory is a castle in the air. I will then replace the theory with my own theory: a strictly mechanical theory with no virtual particles or fields, no unassigned fields or terms, no borrowing of energy from the vacuum, and no mystifying math.

The theories of weak and electroweak interaction have rarely been seriously critiqued. Both theories are very young, being about forty years old, but one would have liked to see a more rigorous analysis of both. Theories at this level are highly insulated, since those considered qualified to have an opinion include only a handful of top theorists. These top theorists define mainstream theory, they often work together, they are very authoritative, and—beyond a few meaningless bets—they rarely disagree publicly. If they argue about anything, it is only priority. For this reason, the method of modern physics is nearly monolithic, from the maths used and the assumptions made, to the role of science and the interpretation of history. Top physicists disagree about very little, and about almost nothing of fundamental importance.

We saw this clearly in the quick acceptance and immediate dogmatizing of electroweak theory at the end of the 20th century. True, there was a period of indecision in the early 60's, while the theorists sorted through new information from accelerators, but once the math was completed there was almost no opposition to the theory. In one way, this was not surprising, in that only a handful of people had the math and experimental knowledge to analyze the theory. But in another way it is shocking, since, as I will show, the theory is extremely speculative, it often or always uses the math as a cover for opacity, and in several places it diverges into outright irrationality and magic.

Only in the 20^{th} century were scientists finally able to achieve a complexity in math and terminology to allow them to avoid any and all critique and debate. Scientists have always attempted this, but in the past intelligent generalists always found a way in. Berkeley and Swift acted as gadflies to Newton, for instance. In fact, Newton met formidable critique from his own English colleagues (and Leibniz, of course), and the fight was both fierce and public. Until recently, this was the healthy norm. Popper was still pestering Einstein in the 1940's. But now, the very exclusive club at the top of physics has shielded itself from external debate and critique, and this has allowed rot to set in. The pond has become too small, and too little fresh water flows in and out. Physicists have become warped by their own mathematical models, as well as by the perceived successes of their immediate predecessors, and they have quite literally left the path of reason.

As evidence for all this, let us start at Wikipedia. I like to critique Wikipedia pages for several reasons. One, all scientific topics are written by the universities and other institutions, and policed by them, so these pages are the perfect place to go to find the current fortified dogma. Two, Wikipedia is extremely influential. It is the most widely read of all the propagandized media sources that sell the current science product, dwarfing the numbers of *Scientific American* or *Physical Review Letters* or *Physics Today* or *ArXiv*. This is where the modern person goes for a quick education in the "hard" sciences. Three, despite the warnings on other pages—to tread with academic caution—the science pages really are representative of the standard model: they are well edited, extensive, and heavily policed, so you can be pretty sure you are getting the story right from the horse's mouth. You may not get the whole story, but the story you get will be a professional gloss, fact-checked, sourced, and buffed to shine, likely with a sprinkling of diagrams and macromedia presentations.

The first thing we learn about the weak interaction from Wiki is that it is mediated by W and Z bosons. So we take that link to discover that bosons are mediating particles with huge masses, "heavier than entire atoms of iron." The W boson is the mediator in beta decay, and its entire job is in facilitating the reversal of a quark. This reversal is called a flavor change, because the quark goes from being a down quark to being an up quark.

$d \rightarrow u + W^-$

But why would we need a boson the size of an iron atom to flip a quark over? I don't think anyone has ever bothered to ask that question. The mass of a quark is said to be about 4MeV; and of a W boson, about 80GeV. So the mediating particle outweighs the mediated particle by 20,000 to 1. That is like using an atomic bomb to flip your mattress. A tad more force than the job calls for. We will call that red flag number 1.

The W then decays into an electron and an antineutrino.

$W^- \rightarrow e + v$

I keep looking at that decay and saying to myself, "AND!" Since the neutrino is said to weigh nothing and the electron weighs .5MeV, we have a slight imbalance here. That decay is not intended to be an equation, but still. We have a huge amount of energy coming from nowhere and then disappearing into nothing. We will call that red flag number 2.

Then we get a section on "predicting the W and Z." Glashow, Weinberg, and Salam "predicted" them using an SU(2) gauge theory, but the bosons in a gauge theory must be massless. We must assume that the masses of the W and Z were "predicted" in some other way, then, since the gauge theory predicted zero masses. Wiki does not address this problem, but maybe we can clear it up later when we study the texts. Wiki only tells us that the symmetry of the gauge theory must be broken, to give the bosons mass, and that the Higgs mechanism does this job. So we take that link.

What we find is that the Higgs mechanism is a form of spontaneous symmetry breaking. What is spontaneous symmetry breaking? It is symmetry that is broken spontaneously. Something that happens spontaneously requires no mechanism, so the Higgs mechanism is a mechanism with no mechanism. In other words, the SU(2) problem is solved by calling it a symmetry, breaking it without a mechanism, and then calling that breaking a Higgs mechanism. That is red flag number four.

Wiki tells us that "the evidence for the Higgs mechanism is overwhelming," but this evidence turns out to be evidence that particles near the predicted W and Z masses exist. So, we are to understand that because big particles exist for very short times, this means the SU(2) gauge theory can't be correct in predicting zero masses. And this means that the gauge symmetry must be broken, which means that the theory must be correct.

That is so circular it is dizzying. All the fake Higgs mechanism does is allow you to break something you wanted to break, without having to give a mechanical reason for the breaking. It allows you to fudge your math while giving a fancy name to the fudging. But if your gauge theory requires you bypass it with a symmetry breaking, it could and probably does mean that your gauge theory isn't any good to start with. Normally, if you develop equations that yield false predictions—like these zero boson masses—you must ditch the math. You don't get to nail some jerry-rigged *post hoc* correction to it, in the form of a non-mechanical "field mechanism."

There can be no evidence for the Higgs mechanism, since, as I just showed, the Higgs mechanism is not a mechanism. It is a spontaneous symmetry breaking, and you cannot have evidence for something that is spontaneous. All you do is say, "It happened, I had a theory for it, therefore I must be right." It is strictly equivalent to saying, "I predict the Sun will rise tomorrow [after seeing the Sun rise everyday of your life], and I hypothesize that the reason it will rise is that it is filled with helium." When it rises, you jump up with joy and claim that the evidence for your theory is overwhelming, since the Sun came up just as you predicted. Don't you see that what these "physicists" have done is develop a math that doesn't work, then said, "I predict that this math is broken and needs a fix. The fix is a spontaneously broken symmetry. Aha, here is a spontaneously broken symmetry that allows me to fix my math to any degree I want. So I must be right!"

Unfortunately, Mr. Higgs also predicted another particle, the Higgs boson. Glashow, Weinberg, and Salam probably would have preferred he hadn't done that, since it requires another round of fudging, but these guys are good at making lemonade. They know that the odds are good that another big super-meson will be found, given enough energy in the accelerator, so they just bide their time. When a big particle is found, they can claim it. This time they are careful not to be too precise in their mass prediction, so that they can claim over a wide range of masses. Another benefit is that these particle accelerators employ a lot of physicists. So if the search is spun out another decade or two, so much the better.

Currently, this page at Wiki has a "General Discussion" section that I predict will soon be deleted. It will be deleted because it leaves some dirty laundry out in the open. I have already alerted you to huge piles of dirty laundry, but that was the sort of dirty laundry the standard *likes*, because it causes confusion. The sort of dirty laundry the standard model does *not* like is information that allows a reader to see through the confusion, and this General Discussion section contains some of that information. Here is the laundry that will be deleted first:

Higgs' original article presenting the model was rejected by *Physical Review Letters* when first submitted, apparently because it did not predict any new detectable effects. So he added a sentence at the end, mentioning that it implies the existence of one or more new, massive scalar bosons, which do not form complete representations of the symmetry. These are the Higgs bosons.

The Higgs mechanism was incorporated into modern particle physics by Steven Weinberg and is an essential part of the Standard Model.

This is dirty laundry that really stinks, because it allows us to see how science really works. Higgs predicted nothing, but then, to save the publication, added a slapdash prediction of particles “which did not form complete representations of the symmetry.” This means that the particles were not a necessary outcome of the math. They were just a trial balloon, a piece of fluff up for the taking, a bit of bait on a hook. Weinberg saw the value of that bait, and swallowed it down. We will call that red flag number five.

Some will say that the Higgs mechanism does provide a mechanism once joined to the gauged theory, since a broken symmetry that is gauged means that the vacuum is charged. Charge is a mechanism. But this is another fudge because 1) charge is not mechanical in QED. Even before we got to the Higgs field, charge was mediated by virtual photons. Virtual photons are non-mechanical. In fact, they are mystical. They mediate forces spontaneously, with no energy transfer, and so are a mathematical and physical cheat. 2) You cannot assign charge to the vacuum, since that is assigning characteristics to the void. One of the first postulates of physics is that you cannot assign extension, force, motion, or acceleration to nothing. For charge to be mechanical, it would have to have extension or motion. All virtual particles and fields are brazen cheats. Higgs’ field, like Dirac’s field, is a bald mathematical cheat. The only way to hope to hide this is to cover it with thick blankets of advanced math. That is what the Abelian, non-Abelian, and Affine models do. They misdirect you into mathematical symbolisms as fast as possible, to divert you from the realization that all this math is based on big cheats at the axiomatic level. Red flag number six.

So let us return to the W and Z page, on our way back to the Weak Force page. In a section on “discovery,” we discover this:

The huge Gargamelle bubble chamber photographed the tracks of a few electrons suddenly starting to move, seemingly of their own accord. This is interpreted as a neutrino interacting with the electron by the exchange of an unseen Z boson. The neutrino is otherwise undetectable, so the only observable effect is the momentum imparted to the electron by the interaction.

That is supposed to be a discovery of proof of weak interaction? That looks to me like a discovery of “a few electrons suddenly starting to move.” Why should we interpret it their way rather than any other way? No neutrino or Z is detected, as they admit, so this is hypothetical in the extreme. Is this what the other page meant by “overwhelming evidence” for the Higgs mechanism? Red flag number seven.

Well, no, we get some other evidence. We are told that the W and Z bosons were detected in 1983 by Carlo Rubbia. Problem is, this experiment only detected a particle, it did not tell us that it was a boson or that it was taking part in any weak mediation. Since I have shown that large mesons can be predicted by other simpler methods (stacked spins), this particle detection is not proof of weak interaction or of the Higgs mechanism. It is only indication of a large particle or two. Red flag number eight.

To understand why the weak interaction was initially proposed, we have to go back to 1957, the year that Yang and Lee were proven correct in their belief that beta decay violated parity. A parity violation means that beta decay works only on left-handed particles or right handed anti-particles. A theory was needed to explain why this was true. After a decade of fumbling, Glashow, Weinberg, and Salam provided the theory, using a whole mess of sloppy renormalized math to provide us with both a parity loss and a charge conjugation loss. I have already shown big red flags with their axioms, including giving charge to the vacuum and breaking parity “spontaneously” with no mechanism, but there are many others. Just as an example, we get this from the Wiki page:

However, at low energies, one of the Higgs fields acquires a vacuum expectation value and the gauge symmetry is spontaneously broken down to the symmetry of electromagnetism. This symmetry breaking would produce three massless Goldstone bosons but they are "eaten" by three of the photon-like fields through the Higgs mechanism, giving them mass. These three fields become the W^-, W^+, and Z bosons of the weak interaction, while the fourth gauge field which remains massless is the photon of electromagnetism.

Does anyone really think that sounds like physics? A field "eats" a massless particle, thereby giving it mass?

Let us go to the texts to see if we can get clarification on any of this. Let us first look at Steven Weinberg's *The Quantum Theory of Fields,* a very famous book that is often used as a textbook in graduate courses. Weinberg devotes most of the first 18 chapters to pseudo-mathematical formalisms, but in section 19.2, ironically titled *Degenerate Vacua*, we finally get some theory. Weinberg says,

We do not have to look far for examples of spontaneous symmetry breaking. Consider a chair. The equations governing the atoms of the chair are rotationally symmetric, but a solution of these equations, the actual chair, has a definite orientation in space.

That quote will serve as a perfect introduction to the nowhere land that is modern particle physics. Weinberg, a Nobel Prize Winner, doesn't even understand what a conservation or symmetry law is. Classically, it was thought that parity was conserved because spin is an energy state. To conserve energy, you must have an equal number of left and right spins. As a matter of angular momentum, every left spin cancels a right spin of the same size, and sums to zero. If they were created from nothing, as in a Big Bang, they must sum to nothing, so we assume an equal number of left and right spins, at the quantum level. We also expect interactions to conserve parity, in that we expect that anything we can do left to right, we should also be able to do right to left. Unless we discover a mechanical reason that CCW is not just as good as CW in some experiment, we assume that they are equivalent.

Now, we *have* discovered that parity is not conserved in some quantum interactions, because some things like beta decay are preferential to one spin over another. We assume there is a reason for this. The electroweak theory supplies a mystical and non-mechanical reason for it and I will offer a simple mechanical reason for it below, but we know that parity is not conserved.

However, this has absolutely nothing to do with chairs, and the fact that Weinberg would say such a thing is frightening. Weinberg implies that because we have a chair facing west, and not one facing east, we have a parity imbalance: that one chair has literally lopsided the entire universe. This requires a quantum explanation, and that explanation is a spontaneously broken symmetry.

The gods of physics would let Weinberg's three sentences stand as a refutation of the entire book, but my readers will not, so I will slog on. Weinberg continues,

A spontaneously broken symmetry in field theory is always associated with a degeneracy of vacuum states.

What is a degeneracy of vacuum states?

For the vacuum the expectation value of [a set of scalar fields] must be at a minimum of the vacuum energy…. We are not yet ready to conclude that in such cases the symmetry is broken, because we have not yet ruled out the possibility that the true vacuum is a linear superposition of vacuum states in which [the summed scalar fields] has various expectation values, which would respect the assumed symmetry.

So, a degeneracy of vacuum states is the fall of these expectation values into a non-zero minimum, this minimum corresponding to a state of broken symmetry.

To pull that apart and put it into standard English, Weinberg is assuming what he is trying to prove. Rather than assume that the vacuum is a nothing, with only one possible state—zero—and with no expectation values above zero (which is of course the logical assumption), Weinberg assumes that the vacuum can have a range of non-zero states, giving both it and his fields a non-zero energy. Weinberg then plays with this possible range of energies, assigning a possible quantum effective action to the field and then looking at various ways it might create parity or subvert parity.

Since any expectation value above zero for the vacuum is just daydreaming, Weinberg is free to choose either parity or non-parity. Due to Yang and Lee's finding, he chooses non-parity, which implies that his non-zero vacuum degenerates to the minimum.

He then applies this to the chair!

Spontaneous symmetry breaking actually occurs only for idealized systems that are infinitely large.

So a chair is an idealized system that is infinitely large!

The appearance of broken symmetry for a chair arises because it has a macroscopic moment of inertia *I*, so that its ground state is part of a tower of rotationally excited states whose energies are separated by only tiny amounts, of order h^2/I. This gives the state vector of the chair an exquisite sensitivity to external perturbations; even very weak external fields will shift the energy by much more than the energy difference of these rotational level. In consequence, any rotationally asymmetrical external field will cause the ground state or any other state of the chair with definite angular momentum numbers rapidly to develop components with other angular momentum quantum numbers. The states of the chair that are relatively stable with respect to small external perturbations are not those with definite angular momentum quantum numbers, but rather those with a definite orientation, in which the rotational symmetry of the underlying theory is broken.

And you thought my papers were hard to read. The reason this is so hard to make sense of is that Weinberg is not really talking about symmetry here. He is talking about something called decoherence, and you have to know that to make any sense out of this paragraph. He is trying to explain to himself why the chair is not a probability or an expectation value: why its wave function has collapsed into a definite state. Quantum math works by proposing a range of states, this range determined by the uncertainty principle. This is what Weinberg did with the vacuum: he assigned it a range of states and then pushed that range based on the non-parity knowledge of Yang and Lee. This is how quantum physicists work. But the chair is not a range of states, it is a state. To degenerate or collapse into this ground state, or decohere from the probability cloud into the definite chair we see and experience, the chair has to interact with its surroundings. The chair is most stable when the surroundings are stable (having "a definite orientation"); so the chair aligns itself to this definite orientation. In doing so, it breaks the underlying symmetry. Or this is Weinberg's argument.

This paragraph is interesting from a theoretical standpoint because it means that Weinberg believes that the chair is not just probabilistic as a matter of definite position; he believes it is probabilistic in spin orientation. He even talks about the macroscopic moment of inertia. This is doubly and triply weird, because the chair has no macroscopic angular motion. The chair may be facing east or west, but there is no indication it is spinning, either clockwise or counter. Even if it were, there is no physical reason to believe that a chair spinning clockwise should have a preponderance of quanta in it spinning clockwise. I don't believe QED has ever shown that it is impossible to propose a macro-object spinning CW, with all constituent quanta spinning CCW. But clearly Weinberg is making this assumption.

Regardless, his whole discussion is just more proof that Weinberg doesn't understand parity conservation or symmetry to begin with. Spin parity was never thought to apply to macro-objects, by anyone with any sense. A chair facing or spinning in one direction is not a fundamental energy state of the universe, and the Big Bang doesn't care if you have five chairs spinning left and four spinning right. The Big Bang didn't create chairs directly out of the void, so we don't have to conserve chairs.

Quantum physicists have been monumentally confused by their maths. That is why Weinberg's book begins with 18 chapters of math. The math is primary, and then the theory is cobbled together around the math. But you can't do theory this way, because you end up building grand edifices on infantile assumptions. We have seen that Weinberg builds his math and theory on the assumption that the vacuum has a possible range of non-zero states. That is like building a theory of entomology on the assumption that bugs have a range of transfinite IQ's. No matter how much fancy math you bring to the problem, you will still look confused.

For instance, electroweak theory, like all quantum theory, is built on gauge fields. These gauge fields have built-in symmetries that have nothing to do with the various conservation laws. What physicists tried to do was to choose gauge fields that matched the symmetries they had found or hoped to find in their physical fields. QED began with the simplest field U(1), but the strong force and weak force had more symmetries and therefore required SU(2) and SU(3). Because these gauge fields were mathematical fields and not physical fields, and *because they contained symmetries of their own,* physicists soon got tangled up in the gauge fields. Later experiments would show that the symmetries in the math didn't match the symmetries in nature, and the gauge field would have to be broken somehow, either by adding ghost fields or by subtracting symmetries by "breaking" them.

Any normal person who found that his mathematical field didn't fit nature would get rid of the field altogether, choosing a math that was more transparent and less intrusive. But modern physicists are not normal people. They are very attached to their maths. So instead of ditching the entire set of gauge theories, they have preferred to paste them up and patch them and drill them full of holes. They push them and renormalize them and fluff them with make-believe fields and particles. Just as matter of mediating particles, quantum theory now has 12 gauge bosons, only three of which are known to exist, and only 1 of which has been well-linked to the theory. The eight gluons are completely theoretical, and only fill slots in the gauge theory. The three weak bosons apparently exist, but no experiment has tied them to beta decay, as I showed above. The photon is the only boson known to exist as a mediating particle, and it was known long before gauge theory entered the picture.

Amazingly, quantum theory has managed to get even this 1 boson wrong, since the boson of quantum theory is not a real photon: it is a *virtual* photon! QED couldn't conserve energy with a real photon, so the virtual photon mediates charge without any transfer of energy. The virtual photon creates a zero-energy field and a zero-energy mediation: the photon does not bump the electron, it just whispers a message in its ear.

So, from a theoretical standpoint, the gauge groups are not the solution, they are part of the problem. We should be fitting the math to the particles, not the particles to the math. Quantum physicists claim over and over that their field is mainly experimental, but any cursory study of the history of the field shows this is not true. Quantum physics has always been primarily mathematical. A large part of 20th century experiment was the search for particles to fill out the gauge groups, and the search continues.

Weinberg's book proves this beyond any doubt. 99% of the book is couched in what I call *leading* math. The math has a mind of its own. It is not a tool, but a vehicle. You climb in and it takes you where *it* wants to go.

You have to search hard for any connection to reality in Weinberg's book. In very few places does he step out of the math. Just as a knight never leaves the castle without his armor and a hooker never leaves the house without her lipstick, the physicist never leaves the house without his math. Weinberg is behind high walls of math on almost every page, and we see why in the rare instances he steps out. He steps out and begins conserving chairs.

To show an example of this, let us stay in chapter 19 and look at Goldstone bosons. Weinberg admits that Goldstone bosons "were first encountered in specific models by Goldstone and Nambu." Notice they were not first encountered in experiments. No, they were encountered in the math. As a "proof" of their existence, Weinberg offers us a first equation in which action is invariant under a continuous symmetry, and in which a set of Hermitian scalar fields are subjected to infinitesimal transformations. This equation also includes *it*, a finite real matrix. To solve, he also needs the spacetime volume and the effective potential.

You will see below that I am able to analyze beta decay from nothing but a bald interaction. I don't even have to be told all the particles present: I can deduce the others. Almost no math is involved. But quantum physicists never look at a problem without first loading it down with all the math they know. The first thing they do is write everything as integrals and/or partial derivatives, whether they need to or not. Then they bury their particles under matrices and action and Lagrangians and Hamiltonians and Hermitian operators and so on, as many as they can apply. Only then do they begin calculating.

All this is risible, since you can't prove a particle with math. You can only prove a particle by studying nature. Weinberg is forced to admit this when, in chapter 21, he begins by "eliminating Goldstone bosons." Yes, the particle he uses so much math to prove (twice) in chapter 19 has zero mass, and that doesn't work as the mediator of the weak force. It doesn't exist. He needs to go from zero mass to 80 GeV, and only a broken symmetry can achieve that sort of weight gain. So he proves a particle twice in one chapter and disproves it two chapters later.

Before we leave this text, let us ask if we find a prediction of the mass of the W particle. We do, in equation 21.3.36: $W = ev/2\sin\theta$, where e is the electron field, v is the vacuum expectation value, and the angle is the electroweak mixing angle. Weinberg develops v right out of the Fermi coupling constant, so that it has a value here of 247 GeV.

$v \approx 1/\sqrt{G_F}$

The angle was taken from elastic scattering experiments between muon neutrinos and electrons, which gave a value for θ of about 28^o.

All of this is of great interest, because 1) there is no muon neutrino in beta decay, so the scattering angle of electrons and muon neutrinos don't tell us anything about the scattering angles of protons and electrons, or electrons and electron antineutrinos. The electron antineutrino is about 80 times smaller than a muon neutrino, so it is hard to see how the scattering angles could be equivalent. It appears this angle was chosen after the fact, to match the data. Weinberg even admits it, since the angle wasn't known until 1994. The W was discovered in 1983, remember. 2) Fermi gave the coupling value to the fermions, but Weinberg gives the derived value to the vacuum expectation. This means that the W particle comes right out of the vacuum, and the only reason it doesn't have the full value of 247 GeV is that angle and its relation to the electron. We were initially shocked to find 80 GeV coming from nowhere, but we actually have 247 GeV coming from nowhere. Yes, Weinberg has magically called forth 247 GeV from the void, to explain one neutron decay, and no one has blinked an eye. He gives it back 10^{-25} seconds later, so it is considered a borrowing, not a theft. But 247 GeV is not a little bump in the void; it is an absolute Everest.

One other thing to get in here, since it is very important. The symmetry breaking is local, not global. What does that mean? It means that Weinberg wanted to keep his magic as localized as possible. A global symmetry breaking might have unforeseen side-effects, warping the gauge theory in unwonted ways. But a local symmetry breaking affects only the vacuum at a single "point." The symmetry is broken only within that hole that the W particle pops out of and back into. If we fill the hole back in fast enough, and divert the audience's gaze with the right patter, we won't have to admit that any rules were broken or that any symmetries really fell. We can solve the problem at hand, keep the math we want to keep, and hide the spilled milk in a 10^{-25}s rabbit hole.

Why did physics embrace this magic? Because Weinberg's math is renormalizable (where Fermi's was not) and because Weinberg's math breaks the necessary symmetries. But since renormalization is hocus pocus, and since I will show below that the symmetries can be broken without invoking the vacuum, we have embraced this conjuring for no good reason, and to the eternal shame of the history of physics.

Let us now look at another text, Bryon Roe's *Particle Physics at the New Millennium.* Roe is a bit more transparent than Weinberg. He gives away the farm a little more often. As we study this text, let us try to find an answer to this question: "Why is the weak force considered a force, one of the four fundamental forces of nature?" Wiki downgraded it to an "interaction" in the title of the page, but then re-boosted it to its original pre-eminence in the paragraph below the title. From what we have seen up to now, the weak interaction appears to be nothing more than a set of similar decays, linked by their parity breaking and by their use of big particles. Is this a fundamental force of nature?

Roe, like Weinberg, loses his balance most when talking about symmetry breaking. Roe doesn't devolve into quite the strangeness of Weinberg: he illustrates the theory with wine glasses instead of chairs:

Imagine a dinner at a round table where the wine glasses are centered between pairs of diners. This is a symmetric situation and one doesn't know whether to use the right or the left glass. However, as soon as one person at the table makes a choice, the symmetry is broken and glass for each person to use is determined. It is no longer right-left symmetric. Even though a Lagrangian has a particular symmetry, a ground state may have a lesser symmetry.[1]

Still, very strange. We could start by referring Roe to Emily Post, where rules of wine glasses may be found. Beyond that, this example, like Weinberg's chair example, has nothing to do with symmetry. There is nothing here that could be an analogue to a quantum mechanical ground state, even supposing that quantum mechanics were correct. Roe implies that the *choice* determines the ground state and the symmetry breaking, but there is no existential or mathematical difference between reality before the choice and after the choice. Before the choice, the entire table and everything on it was already in a sort of ground state, since it was not a probability, an expectation, or a wave function. For one thing, prior choices had been made to bring it to this point. For another, the set before the choice was just as determined as the set after the choice, and just as real. De-coherence did not happen with the choice. It either happened long before or it was happening all along. For another, there was no symmetry that the universe would care about to begin with. As with entropy, the universe doesn't keep track of things like this: there is no conservation of wine glasses any more than there is a conservation of chairs. Position is not conserved, nor is direction. Parity is a conservation of spin, not of position or direction. Roe might as well claim that declination is conserved, or lean, or comfort, or wakefulness, or hand position. Should we monitor chin angles at this table as well, and sum them relative to the Big Bang?

Directly after this Roe shows us some very short math for our Goldstone boson getting "eaten up by the gauge field" and thereby becoming massive. Remember above where I ridiculed the idea of a field giving mass to a massless theoretical particle, by eating it? Well, here is the math:[2]

$$L = D_\beta{}^*\varphi\ {}^*D_\beta\,\varphi - \mu^2\varphi^*\varphi - \lambda(\varphi^*\varphi)^2 - (1/4)F_{\beta\nu}F^{\beta\nu}$$

where $F_{\beta\nu} = \partial_\nu A_\beta - \partial_\beta A_\nu$; $D_\beta = \partial_\beta - igA_\beta$; and $A_\beta \rightarrow A_\beta + (1/g)\partial_\beta\alpha(x)$

Let $\varphi_1 \equiv \varphi_1' + \Box 0|\varphi_1|0\Box \equiv \varphi_1' + v; v = \sqrt{\mu^2/\lambda})$ and substitute:

New terms involving A are

$$(1/2)g^2v^2A^\nu A_\nu - gvA_\nu\partial^\nu\varphi_2$$

"The first term is a mass term for A_ν. The field has acquired mass!" says Roe.

But Roe's math suddenly stops. He chooses a gauge so that $\varphi_2 = 0$, which deletes the last term above. But then he switches to a verbal description:

One started with a massive scalar field (one state), a massless Goldstone boson (one state) and a massless vector boson (two polarization states). After the transform there is a massive vector meson A^μ, with three states of polarization and a massive scalar boson, which has one state. Thus, the Goldstone boson has been eaten up by the gauge field, which has become massive.

You don't see this very often. These mathematicians revert to verbal description only in the most dire cases. They much prefer to hide behind the math. But here the math is missing. Do you see an A^μ in that derivation? I don't. Roe has simply *stated* that the mass of the field is given to the bosons, with no math or theory to show it. He has elided from A_ν to A^μ with no strings between them, hoping, I suppose, that no one would notice.

Seeing this, we must ask if Weinberg does the same sort of eliding. Let us return to his book. The math is in section 21.3, the crucial point being equation 21.3.27. This is where he simply inserts his positive vacuum expectation value, by asserting that $\mu^2 < 0$, and finding the positive vacuum value at the stationary point of the Lagrangian. Roe never told us that $\mu^2 < 0$, but of course this means that μ is imaginary. This makes the stationary point of the Lagrangian undefined, and means that the expectation values of the vacuum are also basically imaginary. Being undefined and unreal, any steps Weinberg takes after this are unbound by his math. He can do anything he wants to. He therefore juggles the "equalities" a bit more until he can get his vacuum value to slide into his boson mass. He does this very ham handedly, since his huge Lagrangian quickly simplifies to $W = vg/2$, where v is the vacuum expectation value. Remember that g in weak theory is very close to 1, being .65, so that the boson mass is very nearly equal to v. $W \approx v$. [Does no one else find it a bit curious that these huge Lagrangians end up being equivalent to $W = vg/2$, with g being nearly 1?]

So, yes, Weinberg does play us some tricks here, though he hides his tricks a bit better than Roe. Roe gives up on the math and just assigns his field mass to his bosons. Weinberg skips the field mass and gives his vacuum energy right to his boson, with no intermediate steps except going imaginary. Weinberg tries to imply that his gauged math is giving him the positive expectation value, but it isn't. Rather, he has cleverly found a weak point in his math where he can choose whatever value he needs for his vacuum input, and then transfers that energy right into his bosons.

I am about ready to move on to my own theory, so let us finish by answering our initial query: what is the force of the weak force? In section 7.2, Roe tells us that "The energies involved in beta decay are a few MeV, much smaller than the 80 GeV of the W intermediate boson." But by this he only means that the electrons emitted have kinetic energies in that range. This means that, as a matter of *energy*, the W doesn't really involve itself in the decay. Just from looking at the energy involved, no one would have thought it required the mediation of such a big particle. So again, why did Weinberg think it necessary to borrow 247 GeV from the vacuum to explain this interaction? Couldn't he have borrowed a far smaller amount?

The answer to this is that by 1968, most of the smaller mesons had already been discovered. It therefore would have been foolhardy to predict a weak boson with a weight capable of being discovered in the accelerators of the time. The particles that existed had *already* been discovered, and the only hope was to predict a heavy particle just beyond the current limits. This is why the W had to be so heavy. It was a brilliant bet, and it paid off.

It will be answered that the prediction was very accurate, but I have shown, using Weinberg's own book, that it wasn't as accurate as is claimed. Weinberg et al. bet large, with the mixing angle as a spread, then matched the mixing angle to the experiment, after the fact.

Wiki tells us the force of the weak interaction is 10^{-11} less than the E/M force. But what exactly is interacting with that strength? We can find out from this equation, which relates once again Fermi's old coupling constant G_F with the new weak coupling constant g.

$4\sqrt{2}G_F = g^2/W^2$

$G_F = 1.166 \times 10^{-5}\text{GeV}^{-2}$

$g = .65$

In this simple equation, we see once again that Weinberg is not really doing what he says he is doing. He claims to be doing a lot of fancy gauge math, but what he is really doing is changing the coupling constant an amount that will give him the particle he wants to predict. Like this: "I want to predict a particle of about 80 GeV, so that it will be discovered within five years. To do that, all I have to do is change the value of Fermi's coupling constant. I will do that with a lot of gauge math and symmetry breaking, to hide my tracks, but in the end it will just mean a couple of numbers and a couple of squared terms. The broken symmetry I can just sweep into the vacuum."

And we have another bold move in making the new coupling constant dimensionless, so that it is more difficult to compare to the old coupling constant and the coupling constant of electric charge. Charge has dimensions of Coulombs or eV's, but g has no dimensions. Fermi's constant was already a minor dodge, since it was written in GeV^{-2}, as you see. But the new weak coupling constant is a much fuller dodge. It prevents the asking and the answering of questions like I am asking.

Again, what is the strength of the weak force? To know this, we must first ask, what is the strength of the E/M force? Physics has also hidden that number in a constant, the so-called fine-structure constant, $\alpha = .0073$. Obviously, that is not a force, since force is measured in Newtons. A dimensionless constant is not a force. In comparing the fine structure constant and the weak coupling constant, we do not find a difference of 10^{-11}. So we keep looking.

Remember that I showed in my paper on the Coulomb equation that this equation is still used to find the force between the proton and electron. It turns out that this force is used to this day in quantum mechanics: 8.2×10^{-8} N. The weak force is 10^{-11} weaker than that, or about 10^{-18} N. Using the current Bohr radius gives us Joules instead of Newtons: 1.5×10^{-8} J. Then 1eV = 1.6×10^{-19} J, so 1GeV = 1.6×10^{-10} J. So we have 97 GeV as the strength of the weak force.

That ties into our equations above, because if we unwind Fermi's constant, we get

$G_F = 1.166 \times 10^{-5}\text{GeV}^{-2}$

$1/\sqrt{G_F} = 293$ GeV

So the weak force is actually determined by the inverse of the square root of Fermi's old constant, and it is 3×10^{-11} weaker than E/M.

Of course, Weinberg knew this going in. It is no accident that Fermi's coupling energy is about what Weinberg ended up borrowing from the vacuum. Fermi's energy was 293 and Weinberg borrowed 247 from the vacuum.

As a force, the weak force during beta decay is about 10^{-18} N. That is very substantial, no matter how you look at it, but is it a fundamental force of nature? No. A fundamental force of nature should be fundamental, and the weak force is not fundamental. As I will show, it is just a set of collisions with similar outcomes. Other decays, like kaon decays, are not decays either and they are not reactions to fundamental fields. Like beta decay, they are collisions that happen in a similar charge field, lacking parity for the same reason and seeming to include neutrinos for the same reason, and so on.

The weak force was oversold for the same reason QCD and quarks were oversold and for the same reason string theory is now oversold: PR. Physics has become a constant noisy vulgar bid for the Nobel Prize, and every new idea from the top of any subfield in physics is now accompanied by its own advertising campaign. The links to the media we see now were built in the 1960's, and they have been perfected since then. We don't have just a few press releases, we have a broad propaganda campaign filtered through a thousand media sources online and off. The science journals, online encyclopedias, and mainstream media updates lead this blitz, with daily announcements read straight to the public. This is followed by a barrage of books and PDF's, and the seeding of a thousand forums. Physicists like Weinberg set themselves apart not only for their bold use and misuse of the new maths, but for their bold use of the media. Like Hawking and Feynman, Weinberg has been a master of the bet, the intimidation, and the pose. He has cowed thousands of students, impressed ten of thousands of fellow mathematicians with his chutzpah, and stayed one step ahead of the particle accelerators. This is what it is to be a modern physicist.

Now I will show the simple mechanical explanation of parity loss in beta decay, kaon decay, and so on, with no use of the vacuum. In my earlier paper on QCD, I ended by showing that beta decay is not decay at all. It is a collision. In the most common form, it is the collision of a positron and a neutron, yielding a proton and an electron. In my analysis there is no mediating particle and no neutrino. No mediating particle is necessary, since the positron acts upon the neutron directly, by bumping it. This is another reason the weak force is not a fundamental force: the primary force is not mediated by a field. It takes place in a charge field, yes, but the charge field does not mediate the force of collision. The charge field only mediates the after-effects, and thereby the parity loss.

In this way: both the positron and the neutron have stacked spins. The neutron has four stacked spins and the positron has two. The collision reverses the outer spins of both particles. This z-spin reversal turns the neutron into a proton, and the positron into an electron. In that other paper, I showed 16 of the 32 spin states of the baryon, proving that a simple z-spin reversal could change a neutron into a proton. What is more, I showed that this reversal would allow the charge field of the baryon to escape, changing the neutral neutron into a proton emitting the charge field. Furthermore, I showed that both electrons and positrons are also emitting the charge field, although in smaller amounts than the baryons. All charged particles are emitting the field, and the charge field is always repulsive, in the first instance.

I also fine-tuned the so-called charge conjugation between particles and anti-particles. The standard model has difficulty explaining the mechanical difference between charge difference and particle/anti-particle difference, but I explain it very simply as the spin of the emitted field. In Dirac's equation, for instance, "the wave function has four components corresponding to the degrees of freedom of spin up, spin down and particle, anti-particle."[3] That's all fine and good, but neither Dirac nor anyone else has assigned the particle/anti-particle difference to a physical characteristic or parameter.

I do. All non-neutral particles and anti-particles emit a charge field of photons, but the photons are also spinning. This gives the charge a charge. Anti-particles emit their photons with reverse spin, or upside-down, so that although the photons and anti-photons do not cancel each other's linear momenta, they do cancel each other's angular momenta.

Both the appearance of a neutrino field and the appearance of a loss of parity are caused by the same thing: the charge field in which beta decay takes place is not a symmetrical field. All experiments have taken place on the Earth, and on the Earth the charge field is predominantly emitted by particles, not anti-particles. So no matter what the direction of the magnetic field is, the summed charge field present will be a photon field, not an anti-photon field. In other words, if particles emit right photons and anti-particles emit left photons, the charge field on the Earth will always sum to a right photon field. You can already see how this must skew beta decay.

Such a field will not prevent any sort of collision or decay, it will only prevent parity, if parity is defined as the expectation of a mirror image particle flight. So it is not the interaction or the force or the particles involved or the math that lacks parity. It is the charge field that lacks parity. And the charge field does not lack parity for any fundamental or universal reason. It lacks parity for a local reason: the local emission field on the Earth is emitted mainly by particles, not anti-particles. The local charge field is a right photon field, so it lacks local symmetry.

This will be true no matter what your decay rates are or what your experimental particles are, since the charge field is ubiquitous. You cannot block it out of your experiment.

As I showed in the other paper, this also explains the appearance of neutrinos. The neutrino field was first "seen" as an unexplained flux in the charge field, but I show that the flux is caused by the amount of left photons present, not by neutrinos. In other words, if your "decay" is causing your summed charge field to change strength locally, this can easily be misread as the presence of a new particle field. But it is *correctly* read as a change in the amount of left photons present. If you have positrons changing into electrons, you will have an immediate boost in the angular momentum of your right photon field, since fewer left photons will be canceling right photons. If you have electrons changing into positrons, you will have the reverse effect. And of course the same applies to the protons and anti-protons. The neutrino field is just a flux in the summed angular momentum of the charge field. This flux is carried by the photons, which is why the neutrino field has the same characteristics as the photon field: near-zero mass and speed of c.

The standard model could not show any of this, because for it the photon has no spin or angular momentum. It also has no real presence in the field, being only virtual. Since I allow the photon a non-zero mass and a non-zero diameter, I can give it spin and thereby explain many mysteries of particle interaction.

Also notice that my theory mirrors the standard model in important ways. The standard model would have the neutron turn into a proton by a quark reversal: the down quark becomes an up quark, as I showed way above. In my theory the outer spin reverses to achieve the same thing. The three quarks become x, y and z spins, of different energies and mass equivalences. This then explains why we cannot have quarks by themselves: spins cannot exist alone. You cannot separate a spin from the thing that is spinning.

Not only does this explain parity loss and the apparent neutrino field in several decays, this explains the strange qualities of the magnetic field. The electric field is carried by the linear momenta of the real photons, but the magnetic field is carried by the angular momenta. This clears up a very big problem in QED as well as in astronomy, since it explains how the E/M field can exist with a weak or nearly non-existent magnetic component. The strength of the magnetic field is determined by the summed angular strength of the charge field, and if the field were to be created by nearly equal number of left photons and right photons, it would not be able to carry a magnetic potential. In other words, it would have a full electrical strength and a near-zero magnetic strength. This explains the solar wind exclusion of Venus and Mars, as I show in a recent paper, and it explains certain cases of magnetic loss in quantum interactions as well.

CP parity is also explained in a simple mechanical way by my theory. It was at first thought that weak interactions obeyed a combined charge conjugation/spin parity, meaning that if you mirrored everything twice, once with spin and then once by replacing particles with anti-particles, you could conserve all symmetries. But this turned out to be false as well. CP parity is "almost" conserved. Electroweak theory claims to include this fact by hitting it with a lot of complex math and sloppy axioms, but I can explain it in a straightforward way. CP parity is "almost" conserved, and the amount of "almost" turns out to be an amount equal to the proposed neutrino field. CP parity is almost conserved, because, beyond the direction of motion after collision, particles and anti-particles *almost* act the same in the field. As I have shown, the only difference is that the charge emitted by the anti-particles is upside down relative to the particles. Since the entire reaction takes place in a right field of photons, anti-particles will subtract a small amount from the total angular momentum of the charge field. This small amount is the amount of CP parity failure.

I have claimed that I could predict the W particle without electroweak theory, but in my meson paper I only derive the Z particle. So I will take a moment here to derive the W, to show how easy it is to do. Using my meson equation, we can find the size of any meson. Like other large "mesons", the W is a baryon with several unstable spins forced on top of the stable z-spin. So we start with the primary equation: $[1 + (8 \times 16 \times 32 \times 64 \times 128 \times 256)/2^{14}] = 524{,}000$. We then divide by 9 to achieve a multiple of the electron, and then multiply by .511, which gives us about 30 GeV. This was the same method for the Z. But I found that the Z was three particles huddling, and the W is four. In my meson paper, I found that mesons would tend to huddle in groups of three or four: three when the charge or magnetic field was most planar, and four when the charge or magnetic field was least planar. In each case the mesons huddle in response to the charge wind. The W requires only one extra calculation, due to a "pionic" loss of inner spin levels due to a cross field. The W has several levels of stacked spins to achieve its size, and the outer two levels have been crushed in the y direction, like the pion. As with the pion (and several other mesons), we use this simple transform, which expresses the loss: (7.222/9). Since two levels are affected, we double the transform. This takes us down to 19.2 GeV for the single particle. Four particles give us 77 GeV. As with the Z, we find muons and taus in the decay, so it is likely that muons and taus huddle with the larger particles in some fashion. We are about 3.5 GeV short of the experimental number for the W of 80.4 GeV, so I propose two taus to make up the difference. The muons would then be created by the pionic decay of the larger particles.

Since I have shown that a simple meson equation can predict levels based on nothing but stacked spins, and since these spins can easily produce very large, very unstable particles of the required sizes, it is not necessary to believe that the W and Z are borrowed from the vacuum in some mysterious process, in order to break a manufactured mathematical symmetry. As you can see, my meson equation can be used to predict other even larger particles at higher energies, and these larger particles are related to smaller ones by factors of two, in the first instance.

Before I conclude, I must point out one other important thing. I showed that the standard model believes the weak force is 10^{-11} times weaker than E/M (although it likes to hide the real numbers deep under dimensionless "coupling constants"). But it turns out they are fatally and fantastically wrong in this as well. I have recently shown at http://milesmathis.com/quantumg.html that the force between the proton and electron is not 8.2×10^{-8} N, but around 8×10^{-27} N, which is obviously not a fractional correction. Unknown to QED, gravity exists at the quantum level, at a size 10^{22} above their estimates, and this has skewed all the field equations by huge margins. I will not bother to restate my arguments and equations here, but this means that the force available in beta decay is around 10^{9} greater than the fundamental charge. We have already seen that the real-life energy encountered in beta decay is about 50,000 times less than this, on the order of 5 MeV. But if Fermi was correct, the maximum potential energy in this collision is around 250 GeV. This would make controlled beta decay and similar processes extremely efficient sources of energy.

Contemporary physicists have tried to convince us that Fermi's energy goes back into the vacuum with the W particle, but it doesn't. The vacuum is not a sponge. Just as electricity can be harnessed, these electrons fleeing the neutron collision can be harnessed as well.

In the past few decades we have heard an ever-increasing rumor of "zero-point" energy. Unfortunately, no one knows where this energy comes from. Most stories I have heard give the energy to the vacuum, but, just as I don't allow my niece to assign her lost toys to gnomes, I don't allow anyone to assign anything to the vacuum. But in dismissing zero-point energy, I do not dismiss huge pools of untapped energy at the quantum level. I only point out that these pools of energy are not hidden in the vacuum, they are hidden behind decades of bad math and poorly defined fields. And they may be hidden there on purpose.

Conclusion: From all this, we can see that the effort to conserve symmetry and express lack of parity in weak interactions was misplaced to begin with. We don't have to conserve parity or symmetry, since the experimental set-up doesn't contain it to begin with. Since we don't have to conserve it, we don't have to express conservation or non-conservation in the equations. Yes, the equations will show non-conservation after we run them, but they don't have to contain the symmetries *before* we run them. We don't need to choose fancy maths that have the symmetries built into them, since the numbers need to be free to express themselves without prior finessing. Beyond that, I have shown that these gauge fields are worse than a nuisance. Because they have built-in symmetries, the mathematicians begin to pay more attention to the symmetries in the math than the symmetries or lack of symmetries in nature. These new maths are intrusive and presumptuous. More than that, they are misleading. More than that, they are false. The facts at hand should set the gauges, not the choice of matrices. The problems we encounter should tell us how many dimensions or symmetries or rows or columns we need, not the math. We should control the math, not the reverse.

As disastrous as the choice of math has been, the choice to borrow from the vacuum was even more disastrous. I have shown that it wasn't necessary to begin with, since there was no symmetry that needed to be broken, spontaneously or no. But the very fact that physicists would even think to get involved in such manipulations is a permanent black-eye for the field of physics. Future centuries will be appalled, since, while past scientists may have been able to plead ignorance, we cannot. Modern scientists have spent many off-hours claiming to be superior to religion and magic, as we see now with Richard Dawkins and as we saw with Richard Feynman and his cargo cult lectures. But borrowing from the vacuum is sub-magical and sub-religious, since it isn't even done with a bow to the unknown. It is nothing less than a towering intellectual fraud, a hubristic hypocrisy of cosmic proportions, performed in full view, with a thumbs up from the Nobel Committee. It would be impossible to criticize theories like this too harshly, since they are both the cause and the effect of a century-long global and local corruption of academia and all things rational. Nor is it just the Diracs and Higgs and Feynmans and Gell-Manns and Weinbergs that are guilty of this fraud, since the entire field, the entire intellectual community, has crumbled at their feet, offering supplication and reward.

Well, not me. I want as much separation from this corruption as possible, which is why I purposely write these papers in the tone of an agon. Being alone in my musings does not frighten me nearly as much as being feted by committees for institutional fraud.

[1]Roe, Bryon P., *Particle Physics at the New Millennium*, section 11.3

[2]Ibid, section 11.4

[3]Ibid, section 7.1
