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Abstract

Matching existing data (in this case what is known as "decay models") is a critical part of a new theory's viability. Up until this paper the Extended Rishon Model phase transforms (aka "decay models") for the neutron to proton, electron and neutrino have not properly matched. This paper therefore describes a breakthrough which sucessfully creates a sequence of phase transforms, that, in the process, require the existence of a *family* of Higgs Bosons (known in ERM terminology as ultra-proton and ultra-neutron). Importantly and paradoxically, energy (i.e. phases) are completely conserved during the creation (and destruction) of intermediary particles. Prior logical reasoning and deduction is thus invalidated.

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1 Introduction

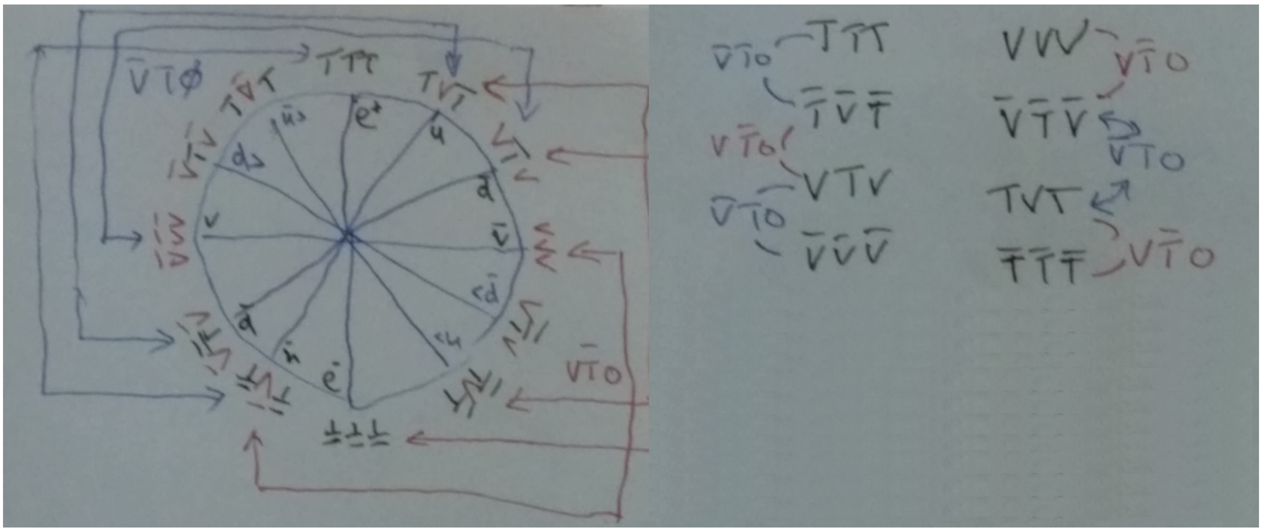

Figure 1: Twelve Rishon positions and VT0 phase transforms

The basis of the Extended Rishon Model is that all particles comprise non-constructively, non-destructively superimposed elliptcally-polarised standing-wave looped photons. That energy conservation is absolute, and consequently phase-shifts can and must take place in perfect energy balance. The apparent paradox that particles can be created out of "thin air" is explained by the fact that the elliptical polarisation axes can and must also balance. Therefore four "particles" - quarks - may pop into existence simultaneously as long as the phases are equal and opposite... more specifically: two pairs of superimposed "particles" happen to have equal and opposite phases.

Additionally, for phase transforms to take place (aka "decay"), the phase transformations must also balance perfectly. We can think of this as being that the energy required to shift two elliptically-polarised photons into two photons with different axes needs to come from somewhere, and it comes from two *other* photons shifting with the *opposite* phase at *exactly* the same time.

Not only that but there is yet another constraint: the magnitude of those paired zero-balance phase-shifts must also be the same order, otherwise there will be an excess of energy. The reason for this becomes apparent as part of the analysis of the neutron to proton (and electron and neutrino) phase-transformation (aka "decay").

2 First phase: Neutron to Higgs0

The transformation from neutron to proton (and electron and neutrino) is extremely involved, and is a multi-stage process. The first part is for a neutron to phase-jump to a much larger radius. Bear in mind that this can only occur if energy (and phase) are completely conserved. The usual quantum "rules" state that we may at least borrow energy for short periods of time, however it is more likely that there are local E.M. field disturbances (fluctuations) of sufficient magnitude *such that* the probability of "jumps" of a certain energy magnitude increase to the point where they actually occur. Unfortunately, though, due to conservation of energy these "jumps" have to extract that energy from somewhere in the local environment, which will want it returned! Thus we have a slightly different perspective that is effectively identical to that of the quantum tunneling and "energy borrowing" effect, but one which is purely based around E.M. fields, and phase and energy conservation.

In the Extended Rishon Model, then, each of the quarks within a neutron undergoes a high-energy phase-shift through the addition to each of four perfectly phase-balanced, energy-balanced additional waves. These balanced shifts are termed "VT*" and they involve the quarks that make up neutral pions. In the case of the up quark, two pions both comprising down and anti-down superimpose (along with the up quark) to create something known as the "ultra-up" quark. It is therefore a five-superposition pattern. In the case of the down quark it is joined by two pions both comprising up and anti-up quarks.

The important thing to note here is that each of the three VT* phase transforms took part simultaneously at the same energy levels: i.e. the magnitudes were all the same. In other words, the neutron's constituent parts all "jumped" from one lower energy level (that of the neutron) to a larger one (that of the ultra-neutron aka "Higgs0").

Conceptually we can think of this as being analogous to electron orbital shell jumping, except that it is quarks that are involved and doing the "jumping" to higher energy states (radii), not electrons. In fact, it is highly likely that spherical harmonics will be part of any Group Theory behind the Extended Rishon Model.

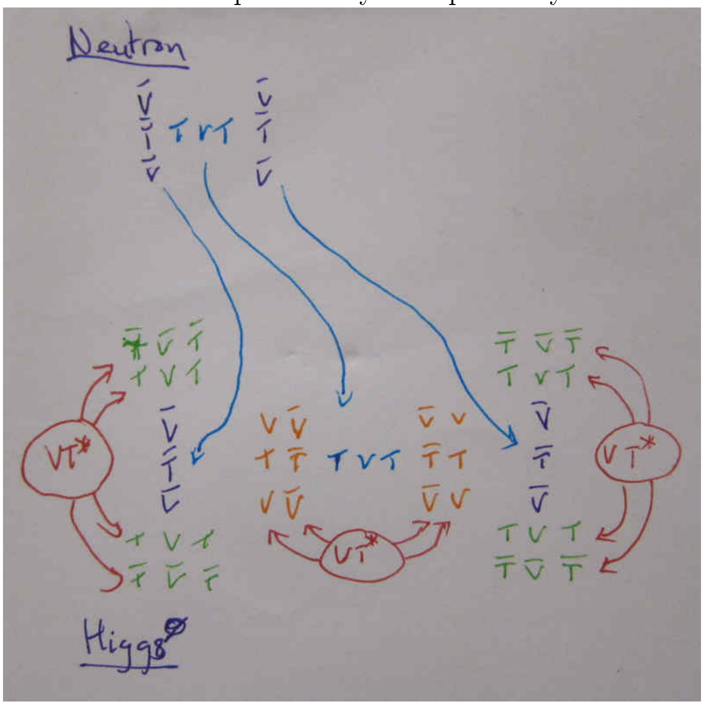

Figure 2: Neutron phase transform, phase one

3 Second phase: Higgs0 to Higgs+ (and electron and neutrino)

The next phase involves the neutral Higgs0 phase-transforming into an electron and neutrino. It has to be pointed out that phase three likely occurs at the same time, but for clarity of the Feynmann-like diagrams it is covered separately.

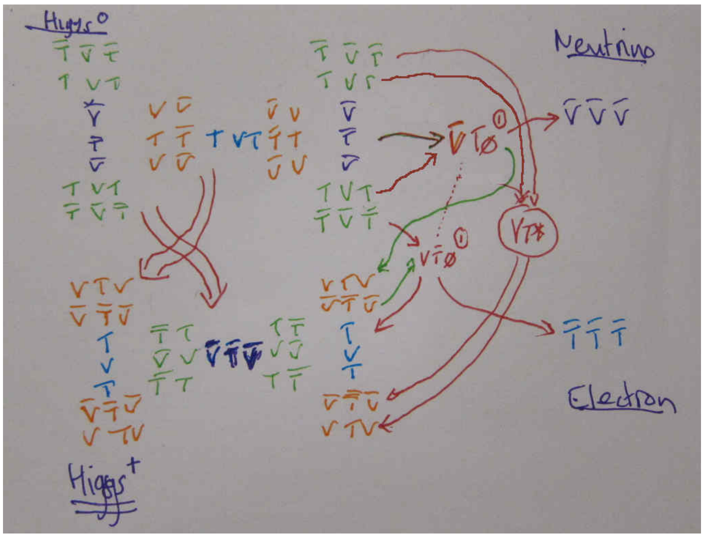

Figure 3: Neutron phase transform, phase two

Firstly we note that given that a proton and a neutron share one up and one down quark, likewise in ultra-proton (Higgs+) and ultra-neutron (Higgs0) they also share an ultra-up and ultra-down quark. Thus two of these are left alone: we therefore need to work out the phase transformations that will turn the ultra-down quark of the Higgs0 into an ultra-up of a Higgs+, all respecting conservation of energy and phase.

We note that the ultra-up comprises five "particles" (superimposed quarks) and that the neutrino gives six; we note also likewise that the ultra-down and electron also comprise six. In doing the analysis this is a good sign that there are twelve "particles" (elliptically polarised photons) in total.

We note that the VT* transformation takes care of turning down and anti-down into up and anti-up. VT* is special in that it may take place independently between only four quarks, where each pair is a quark and matching anti-quark. The sum energy balance of all four particles is zero, and the phase difference required to shift each member of each pair to a different phase is the same no matter what. Thus energy and phase are completely conserved.

The matched VT0 pair are a slightly more complex matter, as we also involve a pair of Feynmann-like time-reversals as well (arrows in greeen instead of red). Basically, VT0 transforms may *only* occur in phase-matched pairs and between pairs of particles (elliptically-polarised photons), thus there must be exactly eight and only eight "particles" (elliptically-polarised photons) involved. From figure 1 we see that an up quark and anti-down quark may be part of a $\overline{V}T0$ phase-transform and that a 30 degree clockwise phase-shift will turn such a pair into a neutrino and a down quark (with the proviso that this **must** take place simultaneously as a 30 degree counter-clockwise phase-shift, aka a $V\overline{T}0$ transform).

It just so happens that such a $V\overline{T}0$ transform may also take place at the same time: again examining figure 1 an up and anti-down quark may phase-shift counter-clockwise by 30 degrees into the electron and up quark, such that we have on one hand the down quark from the ultra-neutron in one part of the Feynmann-like diagram plus the neutrino, and on the other we have the up quark and the electron on the other, giving perfect phase-shifted balance.

Except... there's a twist: two time-reversals are involved (shown in green). VT0 phase-transforms are similar to Feynmann diagrams, where there is an additional "rule" that sometimes it is possible to have three particles in and one out, or one particle in and three out, rather than always two-in and two-out. In this case, the sign of one of the particles whose direction (creation or destruction) has been reversed, the sign must also be reversed as well.

Put another way: look more closely at the $V\overline{T}0$ transform. There is actually only one particle in (the anti-up) and there are three particles out: electron, up quark and anti-down. Whilst $V\overline{T}0$ says that anti-up and *down* may be a matched pair of inputs, in this case the down quark is being *created* so its sign (phase - or more importantly elliptical axis) is offset (by 180 degrees) to make it an anti-down.

Basically this all boils down to cancellation of energy. If the total energy, taking into account the precise phases of all particles (photons) involved in the matched pair of VT0 transforms does not cancel precisely and exactly to zero, there has been a mistake made. In other words not even the energy of the phase transformations is not permitted to balance and sum to zero. *This is an absolutely critical fundamental aspect of the Extended Rishon Model: energy conservation is absolute and inviolate.* It just so happens that particles are elliptically-polarised photons, and as such they can and do phase-cancel (and transform), under certain very specific conditions.

4 Third phase: Higgs+ to proton

The third and final phase likely takes place simultaneously with the second: the extreme radius (high energy state) of the Higgs+ cannot be sustained for long. The constituent parts of the ultra-quarks, being superimposed pions, are happy to phase-cancel, dropping the ultra-quarks from their higher energy state down to the lower, much more stable state (a single elliptically-polarised wave, each as opposed to being five superimposed ones with a much larger radius), the end result being... a proton.

This process is basically the reverse of the first, where a neutron's three quarks jumped to higher energy states with VT* phase-transforms contributing the four extra quarks (in two pion groups each) needed to do so.

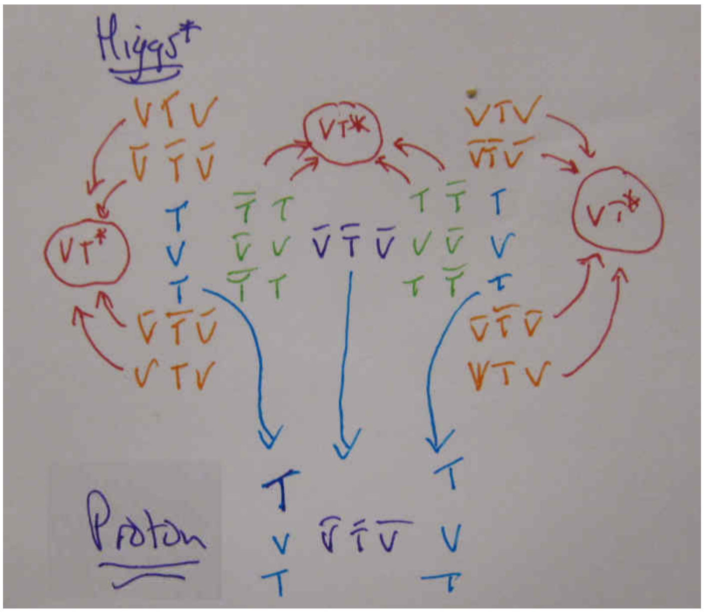

Figure 4: Neutron phase transform (Higgs+ to proton), phase three

5 Discussion

In previous work it was believed that in order to achieve the required energy balance during phase-transforms that a W-Boson must be accompanied by a matching pion (aka gluon). However this simply does not match the known facts. Instead, we note from the phase two diagram that the constituent parts of a W-Boson are *exactly* those of the double (crossed) arrows, in red (i.e. ultra-up and ultra-down quarks).

We also note that each matched pair in any given VT0 (or VT*) phase transform is separated by exactly (180-30) degrees: the phase difference between up and anti-down is exactly 150 degrees; the phase difference between the electron and up quark, also exactly 150 (180-30) degrees. It is not a coincidence that matched VT0 phase-transforms may only occur by shifting one pair of elliptically-polarised photons by 30 degrees (each) whilst the other shifts 30 degrees in the equal and opposite direction.

Lastly we note that the neutrino and electron are at completely different energy levels from the ultra-quarks from which they were "spawned". This has yet to be explained, where the jump that the proton and neutron undergo by contrast feels perfectly natural as the radii (energy levels) of all constituents prior and post jump were all at the same level. This is not the case for the spawned electron and neutrino, and as of yet there is no explanation or basis in the Extended Rishon Model for how these two particles may drop from such high energy levels to lower ones, and still respect conservation of energy at the same time.

References

[1] Luke Kenneth Casson Leighton, *An introduction to the Extended Rishon Model*, vixra:1403.0016, 03 March 2014, http://vixra.org/abs/1403.0016.