The Weak Reaction

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Abstract

Beta decay is a misinterpretation of the beta reaction because antimatter velocity is opposite of cause-effect velocity.

Keywords

beta decay

Chapter 1 Contents

List of Figures

Claims of Novelty

- The weak force does not exist. Beta decay is a misinterpretation of the beta reaction because antimatter velocity is opposite of its cause-effect velocity.

Chapter 2 Introduction

Dedication

This work is dedicated to Ginger

Previous Work

The text and diagrams are substantially the same as my paper posted on the physics archive https://vixra.org/abs/2209.0057. The term Sub-quarks are used in that online document. In this paper, the term "Tetrons" is used to emphasize they are a discovery and to avoid usage of a generic term "sub-quarks". Other authors have published using "subquarks" with different characteristics. The word "tetron" is descriptive because this entity is located at a vertex of a tetrahedral quark. Four tetrons are the four vertices of a quark, as explained in detail later.

This presentation omits some equations that are in the published paper and attempts to portray the same conclusions with diagrams.

Definitions

Spin

Isospin, hereafter called spin, is the expression of time rate that is present in all particles. Spin is a tri-directional constant angular velocity. For hadrons, positive spin is matter and negative spin is antimatter.

The Feynman diagram is a particle version of the Minkowski diagram, where only a qualitative understanding of direction of travel is necessary. The Feynman diagram does not account for spin, which this proposal does.

Naming Conventions

This paper uses 3 different tools (MS Access, MS Excel and AutoCAD), each of which has a unique set of formatting choices. The following have identical meaning:

p+ // p- means a proton paired with an anti-proton

To accommodate the Access lack of subscripts:
Ve' = positron neutrino

Chapter 3 The New Quarks

In the primary paper in this series, Tetrons [1], four new quarks were identified: yyz, yyz', wxy and wxy'. What was not described is how these tetrons are different. We could call u, d, u', d' as nucleon forming quarks. We could call yyz, yyz', wxy and wxy' as lepton forming quarks, for reasons explained later.

[1] Tetrons, viXra.org e-Print archive, viXra:2307.0050

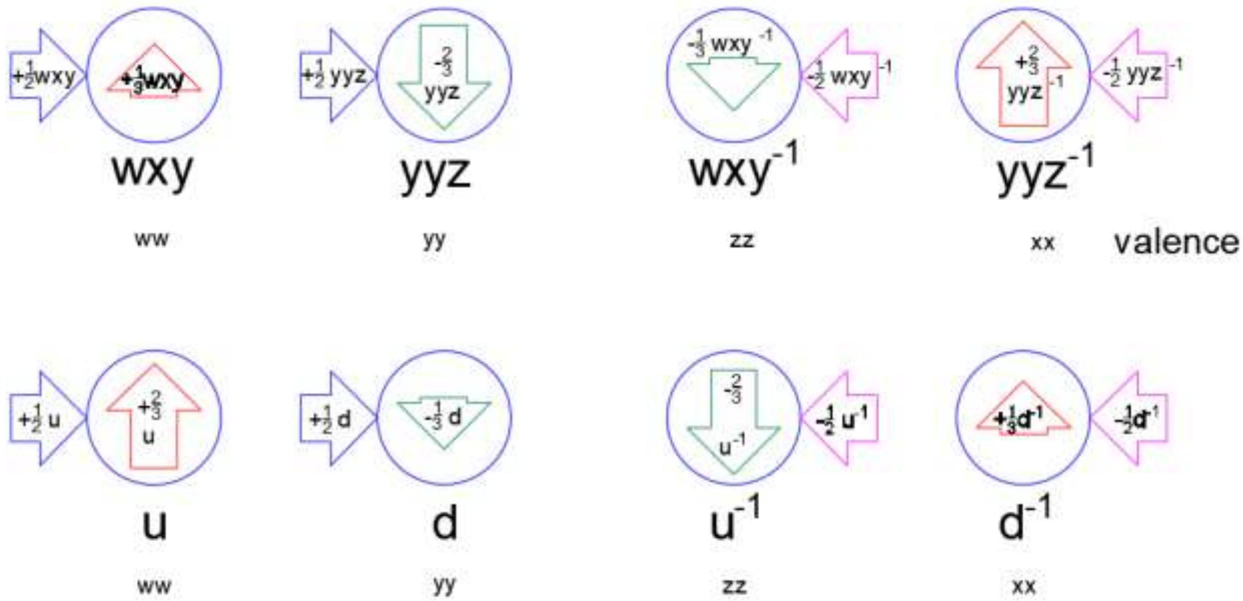

Figure 1 - The New Quarks

From the above comparison, the wxy, yyz, wxy’ and yyz’ are identical in spin but different in charge.

Using the spin alone, the nucleon forming quarks are clearly matter or antimatter.

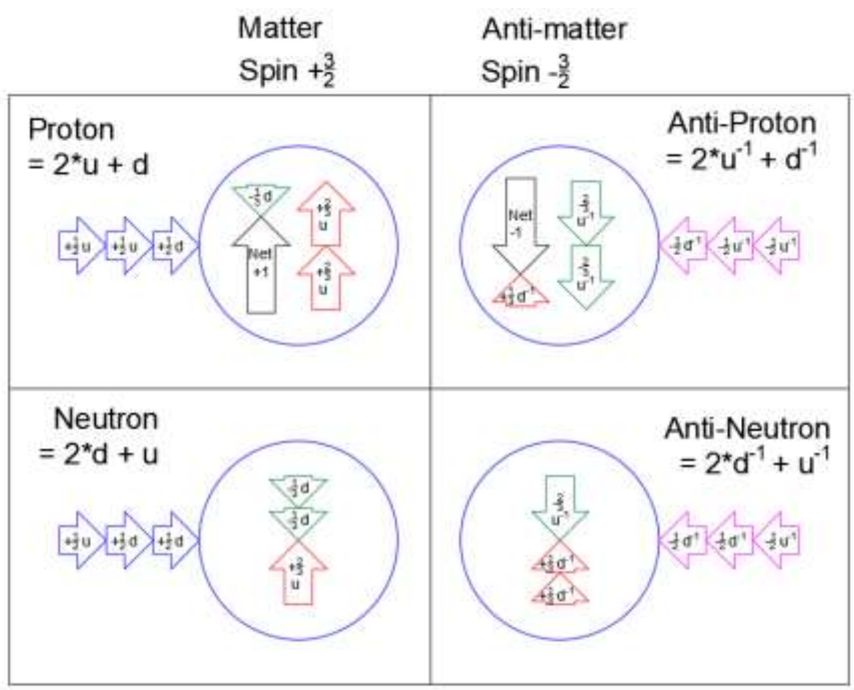

Figure 2 - Nucleon Complex

The quarks that form nucleons appear to engage in a quark “decay” as follows:

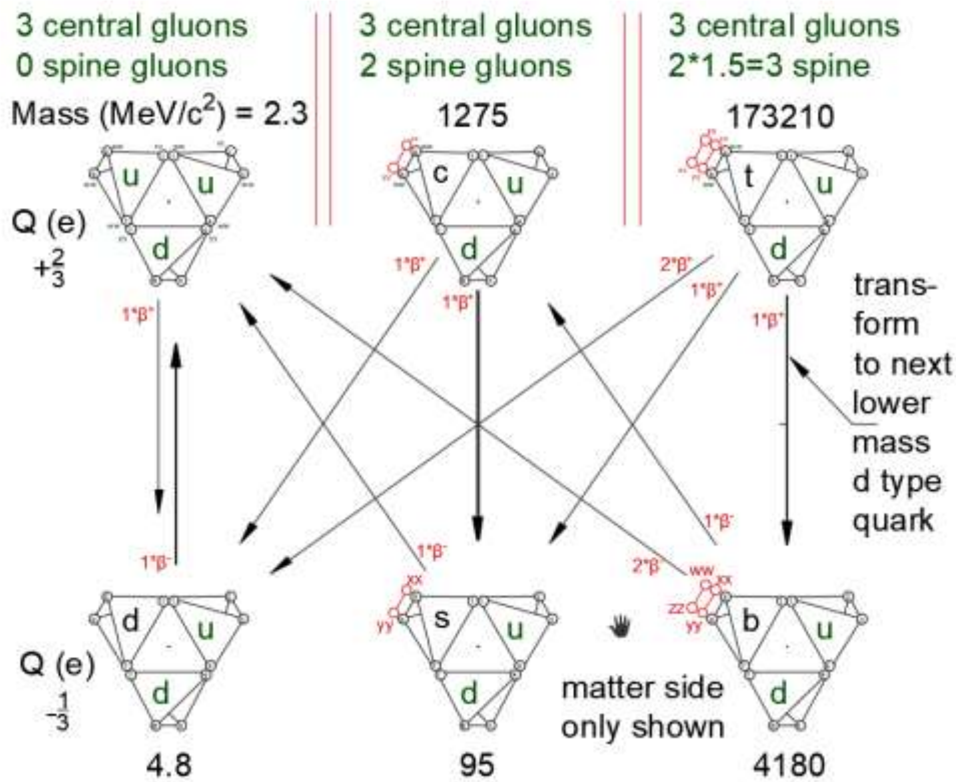

Figure 3 - Quark "Decays"

Since these "decays" are between +2/3 and -1/3 charge, these decay processes exclude the new quarks which are +1/3 and -2/3 charge.

Following are some hypothetical lepton particles made from the new quarks:

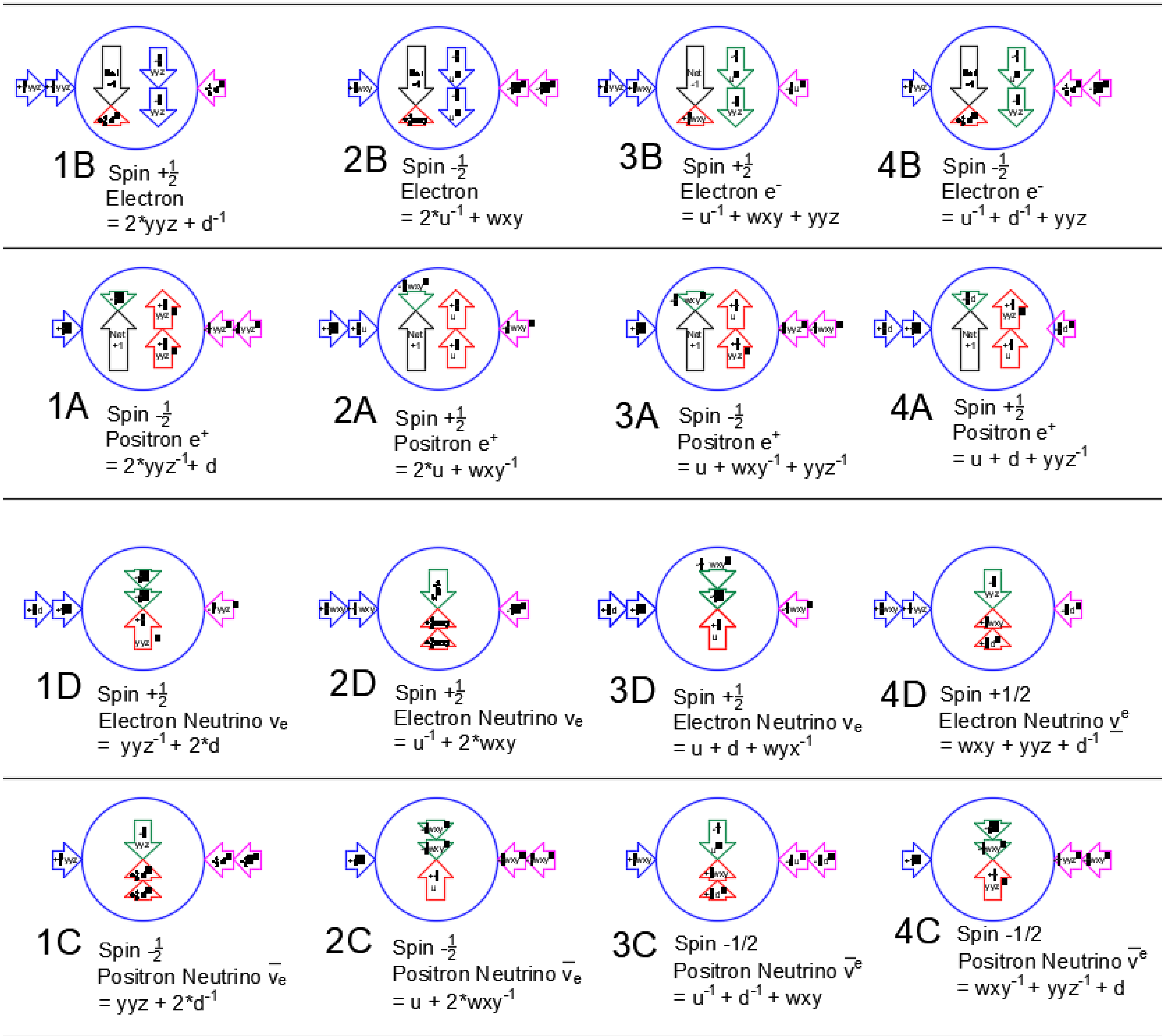

Figure 4 - Hypothetical Leptons

The rules governing the above lepton particles are:

Electrons and positrons work in same spin pairs that occupy 1/2 of an electron orbit. The opposite spin pair occupies the other 1/2 of the orbit, per the Pauli exclusion principle. Neutrinos work in opposite spin pairs that cancel one another's spin and charge so they can pass thru space without interacting with matter or antimatter particles. Although the matter and anti-neutrinos are electrically neutral, they need to be spin zero in a pair to not have its tetrons interact with nearby tetrons to form a gluon. The exception to this is the beta reaction, discussed later.

All of the above 3 quark lepton particles form a primary triangle of tetrahedrons, and then form a secondary structure of being folded into an apex configuration, which has fewer reactive tetron positions than a nucleon forming flat triangular structure.

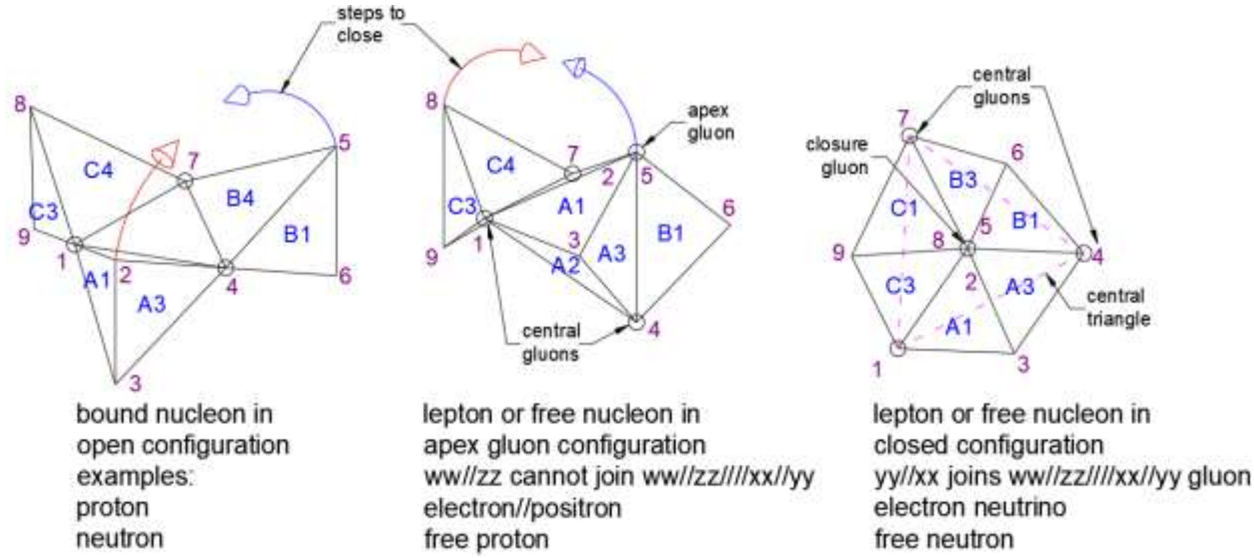

Figure 5 - Folding Structure of Particles

The 'apex' configuration is so named because the #2 and #5 vertices join to form an apex gluon.

Chapter 4 The Beta Reaction

The Original Beta "Decay"

The beta plus reaction experimental evidence is as follows:

"In the 20 July 1956 issue of Science, Clyde Cowan, Frederick Reines, Francis B. "Kiko" Harrison, Herald W. Kruse, and Austin D. McGuire published confirmation that they had detected the neutrino, a result that was rewarded almost forty years later with the 1995 Nobel Prize.

In this experiment, now known as the Cowan-Reines neutrino experiment, antineutrinos created in a nuclear reactor by beta decay reacted with protons to produce neutrons and positrons:

$\underline{v}_e + p^+ => n^o + e^+$" [2]

This can be simplified because the neutron and proton charges are known:

$\underline{v}_e + p => n + e^+$

This is beta plus reaction (β+), a proton becoming a neutron. Note the antimatter positron neutrino entering the beta reaction, shown on the left side of the equation. The following equations below are the revised derivation of the beta reaction, using tetron notation. The remainder of this section illustrates the mechanics.

[2] Neutrino - Wikipedia

tetrons:

ww = +spin, +chg, +time

xx = -spin, +chg, -time

yy = +spin, -chg, -time

zz = -spin, -chg, +time

first level quarks:

u = 3*ww + xx	$\bar{u}$ = 3*zz + yy
d = 2*yy + zz + ww	$\bar{d}$ = 2*xx + zz + ww
wxy = 2*ww + yy + xx	$\overline{wxy}$ = 2*zz + yy + xx
yyz = 3*yy + zz	$\overline{yyz}$ = 3*xx + ww

leptons:

e^- = ($\bar{u}$ + $\bar{u}$ + wxy)

e^+ = (u + d + $\overline{yyz}$)

v_e = ($\overline{yyz}$ + d + d)

$\bar{v}_e$ = ($\bar{u}$ + $\bar{d}$ + wxy)

The "W boson" is on both sides of the equation

W^- boson:

x + $\bar{v}_e$ => y + e^-

(? + ? + d) + ($\bar{u}$ + $\bar{d}$ + wxy) => (? + ? + u) + ($\bar{u}$ + $\bar{u}$ + wxy)

example:

n + $\bar{v}_e$ => p + e^-

(u + u + d) + ($\bar{u}$ + $\bar{d}$ + wxy) => (d + u + u) + ($\bar{u}$ + $\bar{u}$ + wxy)

W^+ boson:

y + v_e => x + e^+

(? + ? + u) + ($\overline{yyz}$ + d + d) => (? + ? + d) + (u + d + $\overline{yyz}$)

example:

p + v_e => n + e^+

(u + u + d) + ($\overline{yyz}$ + d + d) => (d + d + u) + (u + d + $\overline{yyz}$)

Figure 6 - Revised Beta Reaction

In the above revised beta reactions, the neutrino is the cause of the reaction, and not an exiting by-product. This means the beta reaction is not a decay.

Subsequent Reinterpretation of the Beta Plus Reaction

The problem with interpreting antimatter particles is their velocity direction is reversed from the cause-effect direction. This conclusion is reached by following the analysis below.

Exact velocity of the neutrino and positron may be a moot point. “The neutrinos emitted in beta decay will have a spectrum of energy ranges, because although momentum is conserved, the momentum can be shared in any way between the positron and neutrino, with either emitted at rest and the other taking away the full energy, or anything in between, so long as all the energy from the Q-value is used. The total momentum received by the positron and the neutrino is not great enough to cause a significant recoil of the much heavier daughter nucleus.”[3]

“Since it is established that neutrinos possess mass, the speed of neutrinos of kinetic energies ranging from MeV to GeV should be slightly lower than the speed of light in accordance with special relativity. Existing measurements provided upper limits for deviations from light speed of approximately 10^{-9}, or a few parts per billion. Within the margin of error this is consistent with no deviation at all.”[4]

[3] CNO cycle - Wikipedia

[4] Measurements of neutrino speed - Wikipedia

This means the velocity of the neutrino is c, just as the photon. This means the momentum is entirely carried by the electron or positron.

Detail of the Neutron to Proton Reaction

The negative spin of the positron neutrino $\underline{v}_e$ is the source of the negative spin electron resulting from the neutron "decay" process. Predicted experimental observation is the electron exiting neutron "decay" is always negative spin.

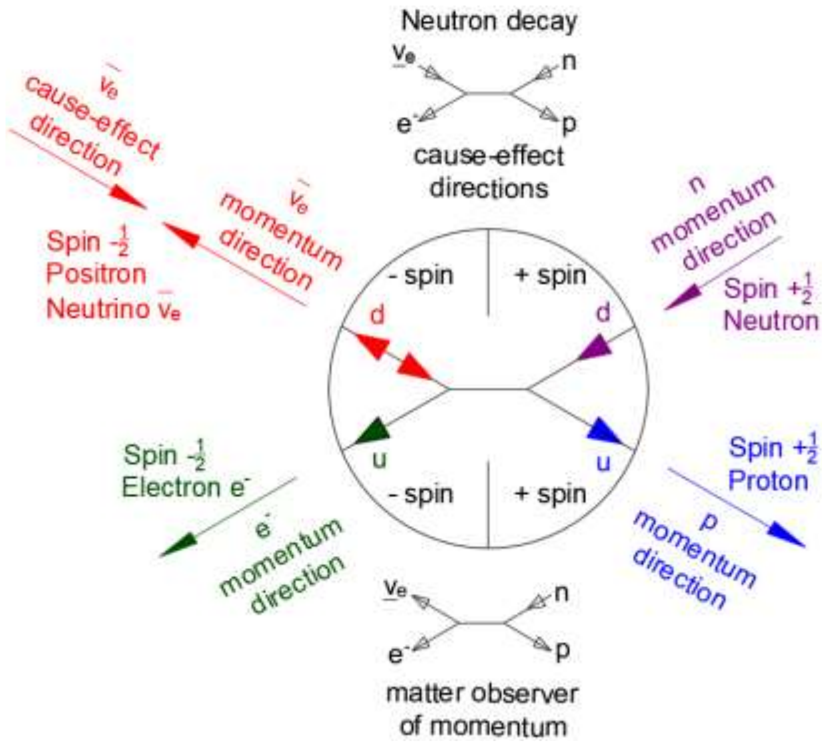

Figure 7 - Detail of the Neutron to Proton Reaction

Detail of Proton to Neutron Reaction

The positive spin of the positron is the source of the positive spin electron neutrino resulting from the proton to neutron reaction. Predicted experimental observation is electron neutrino exiting the proton to neutron transmutation is always positive spin.

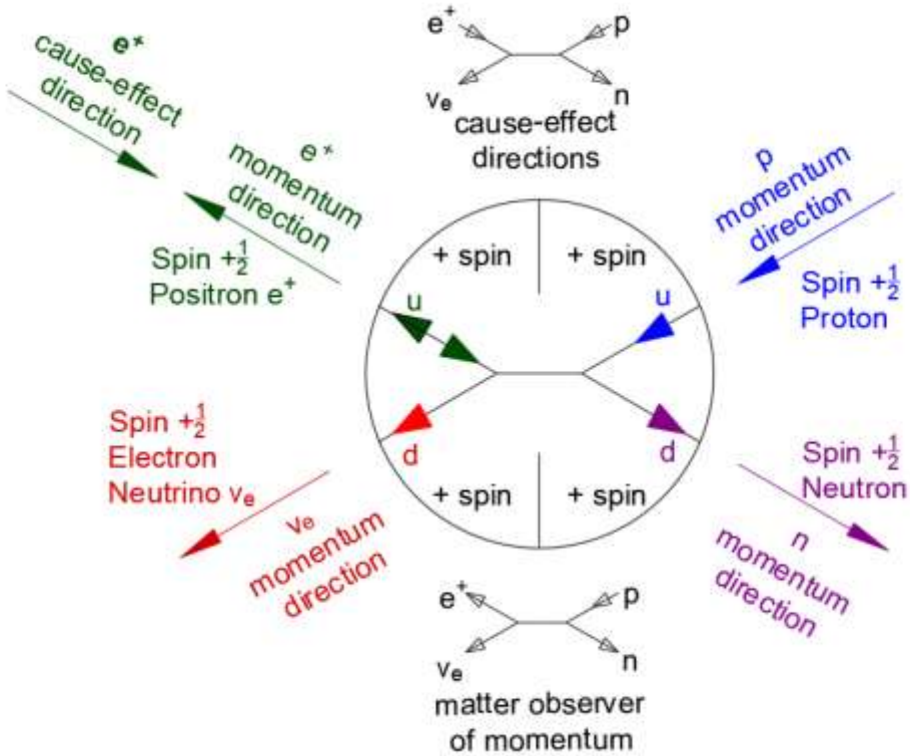

Figure 8 - Detail of Proton to Neutron Reaction

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Cause-Effect of Neutron to Proton Reaction

1. Sources and targets are in pairs of a matter and an antimatter particle
2. A matter quark transferred from a matter source to a matter target is mirrored by an anti-quark transferred from an antimatter source to an antimatter target.
3. For nucleons and neutrinos, spin determines whether a particle is matter or antimatter
4. For electrons and positrons, charge determines whether a particle is matter or antimatter

Because electron output is spin negative, the neutrino must also be spin negative. This makes the antimatter positron neutrino move in reverse of the cause-effect direction. Cause-effect direction (source to target direction) of antimatter is reverse of its direction of movement. The spin -1/2 positron neutrino has direction of movement away from the reaction, but the cause-effect is towards the reaction. This positron neutrino is thus the cause of the reaction.

The observation of the positron neutrino leaving the reaction is misleading, causing this reaction to be mislabeled as the neutron decay. Common sense tells us a particle leaving a reaction did not cause the reaction. Common sense does not govern the nature of antimatter.

In the below 2 diagrams, note the arrow direction is reversed in the whole diagram and the zig zag half circle is on the opposite side for trigger leptons.

Particle Summary of Neutron to Proton Reaction

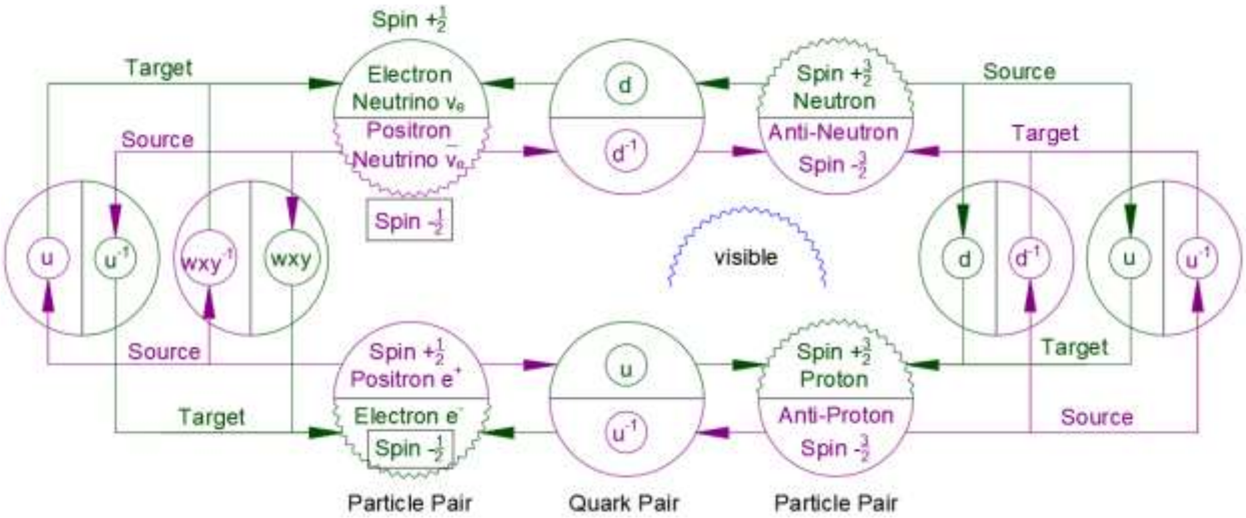

Figure 9 - Particle Summary of Neutron to Proton Reaction

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Particle Summary of Proton to Neutron Reaction

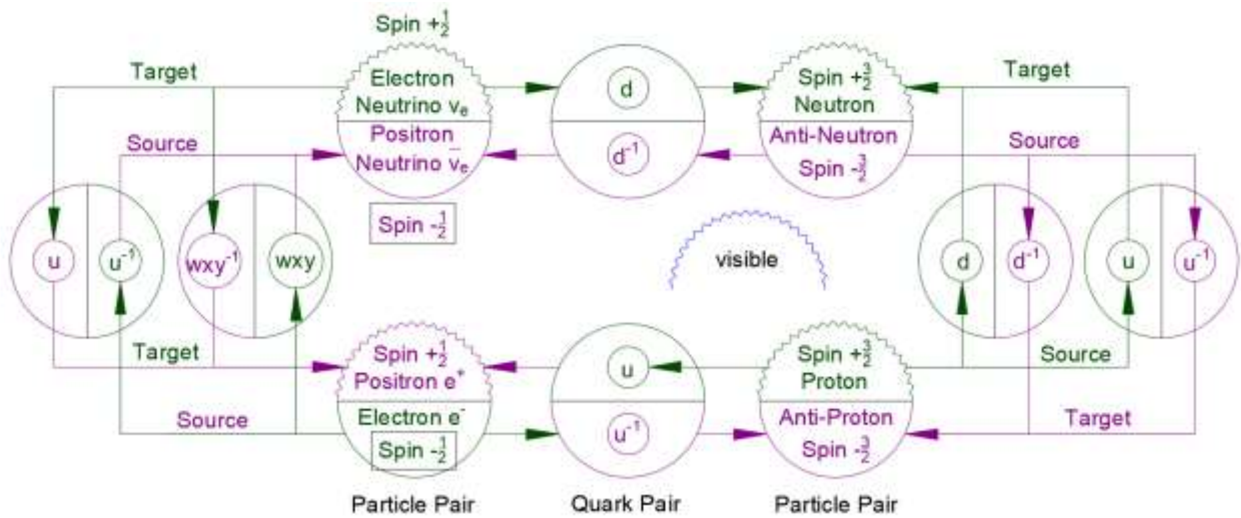

Figure 10 - Particle Summary of Proton to Neutron Reaction

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Commonality and Differences of Neutron to/from Proton Reaction

1) Quark mirror pairs are net zero spin, charge and time, so they are unaffected by other quarks or particles.

2) In Neutron to Proton reaction, cause-effect direction is cause event to effect event:

2.1) The electron is detected exiting the reaction, and its velocity direction matches the cause-effect direction.

2.2) The positron neutrino is detected exiting the reaction, but its velocity direction is opposite to cause-effect direction. Therefore, it is entering the reaction as a cause. This reverse velocity observed is expected for antimatter.

3) In Proton to Neutron:

3.1) The positron is detected exiting the reaction, but its velocity direction is opposite to cause-effect direction. Therefore, it is entering the reaction as a cause.

3.2) The electron neutrino is detected entering the reaction, and its velocity direction matches the cause-effect direction.

4) This is a generic 4 particle reaction where each particle has 3 quarks. Isomers of the lepton trigger side can be substituted where they match the isomers of the right side (example nucleons).

5) Similar reactions exist for particles with 2 quarks such as kaons, pions and D particles.

6) There are no particles with more than 3 quarks because that arrangement is geometrically unstable. Gluons are ball joints, and form a hinge with another gluon. The tetrons at the exterior vertices of the particle repel to cause the particle to maintain its shape.

7) Particle pairs are composed of 3 quark pairs.

8) There are no solitary quarks. They always exist in quark pairs of matter and antimatter.

9) There are no solitary tetrons. They always exist at a quark vertex with another tetron.

10) A reaction always has a mirror reaction where the components are the same but the directions of source and target are reversed.

Other Beta Reactions

The beta plus and minus reaction is prevalent. Some examples are shown below.

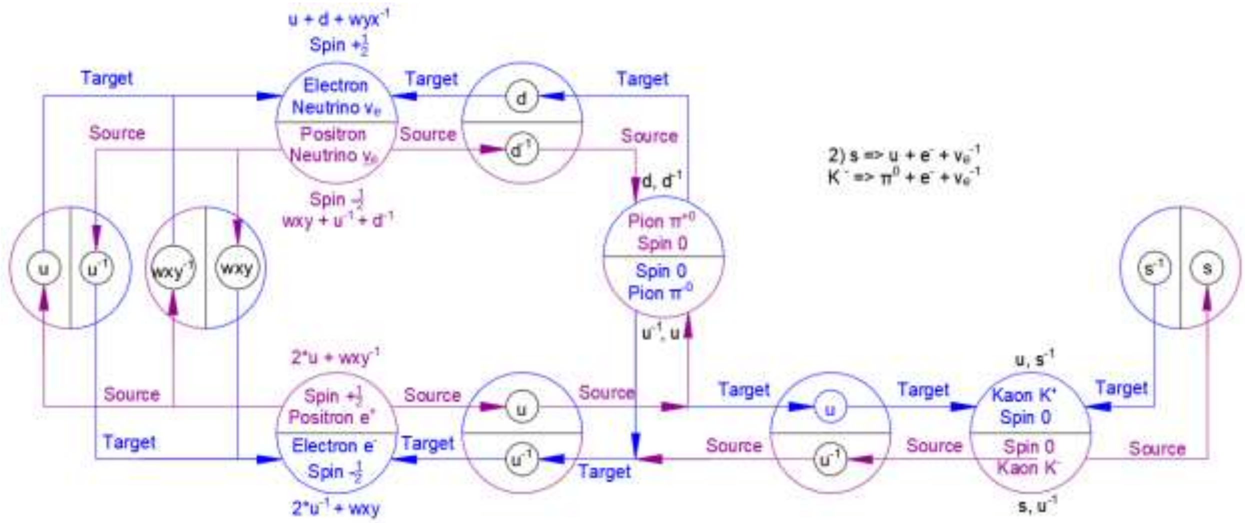

Figure 11 - Kaon "decay" Beta Minus with Strange and Anti-Strange Dead End

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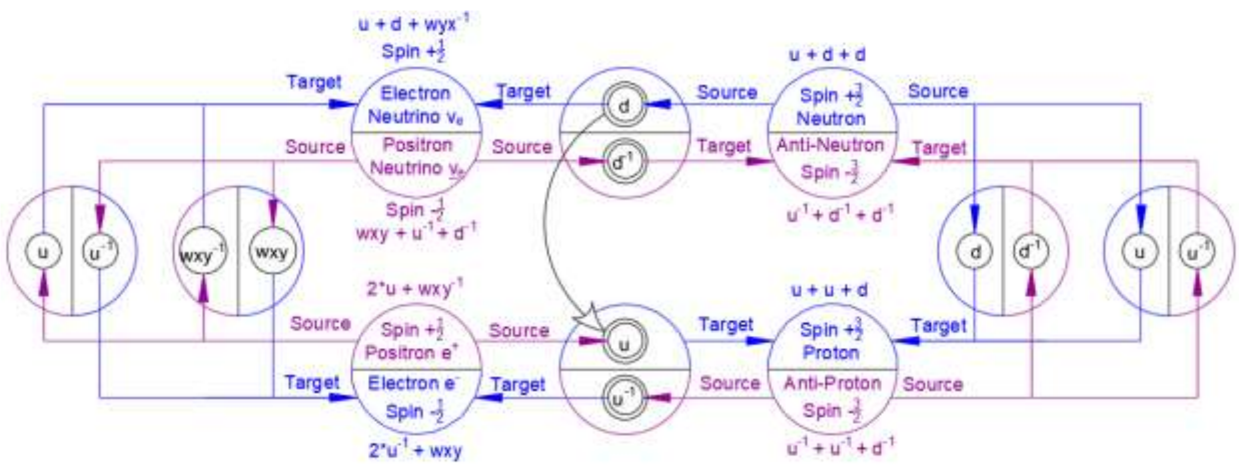

Figure 12 - "Neutron decay" Beta Minus

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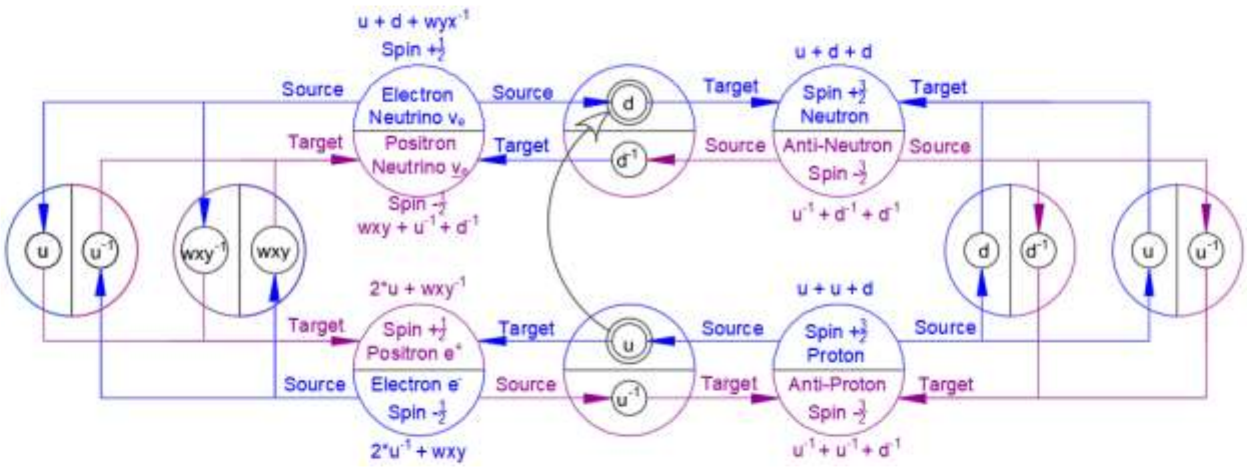

Figure 13 - "Part of proton fusion" Beta Plus

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Rewriting the Standard Model

Observed pattern	Standard Model W particle	Caywood Model W reaction
1) $p + p => pn + e^+ + v_e$	1) $u => d + W^+ => d + e^+ + v_e$	1) $u + v_e => d + e^+ \;||\; u + (\overline{yyz} + d + d) = d + (u + d + \overline{yyz})$
2) $n => p + e^- + \bar{v}_e$	2) $d => u + W^- => u + e^- + \bar{v}_e$	2) $d + \bar{v}_e => u + e^- \;||\; d + (\bar{u} + \bar{d} + wxy) => u + (\bar{u} + \bar{u} + wxy) \;||\; \bar{u} + wxy = \bar{u} + wxy$
3) $K^- => \pi^0 + e^- + \bar{v}_e$	3) $s => u + W^- => u + e^- + \bar{v}_e$	3) $s + \bar{v}_e => u + e^- \;||\; (d + xx + yy) + (\bar{u} + \bar{d} + wxy) => u + (\bar{u} + \bar{u} + wxy)$
		$\bar{u} + wxy + (xx + yy) = \bar{u} + wxy + \frac{1}{2}$ gluon mc^2
4) $D^+ => K^- + \pi^0 + \pi^+ + e^+ + v_e$	4) $c => s + W^+$	4) $D^+ + [\pi^-] + e^+ => K^- + [\pi^+] + v_e$
		$(c + \bar{d}) + [\bar{u} + d] + (u + u + \overline{yyz}) => (s + \bar{u}) + [\bar{d} + u] + (u + d + \overline{yyz})$
		$((u + xx + yy) + \bar{d}) + [\bar{u} + d] + (u + u + \overline{yyz}) => ((d + xx + yy) + \bar{u}) + [\bar{d} + u] + (u + d + \overline{yyz})$
		4a) $(u + u + \overline{yyz}) => (u + d + \overline{yyz})$ via beta plus reaction $u => d$
		4b) $D^+ = (u + xx + yy) + \bar{d}$ .... $K^- = (d + xx + yy) + \bar{u}$ where $xx + yy$ is mc^2
		4c) $\pi^- = (\bar{u} + d)$ .... $\pi^+ = (\bar{d} + u)$

Observed pattern	Standard Model W particle	Caywood Model W reaction
1) $p + p \Rightarrow pn + e^+ + \nu_e$	1) $u \Rightarrow d + W^+ \Rightarrow d + e^+ + \nu_e$	1) $u + \nu_e \Rightarrow d + e^+$ ‖ $u + (\overline{yyz} + d + d) = d + (u + d + \overline{yyz})$
2) $n \Rightarrow p + e^- + \bar{\nu}_e$	2) $d \Rightarrow u + W^- \Rightarrow u + e^- + \bar{\nu}_e$	2) $d + \bar{\nu}_e \Rightarrow u + e^-$ ‖ $d + (\bar{u} + \bar{d} + wxy) \Rightarrow u + (\bar{u} + \bar{u} + wxy)$ ‖ $\bar{u} + wxy = \bar{u} + wxy$
3) $K^- \Rightarrow \pi^0 + e^- + \bar{\nu}_e$	3) $s \Rightarrow u + W^- \Rightarrow u + e^- + \bar{\nu}_e$	3) $s + \bar{\nu}_e \Rightarrow u + e^-$ ‖ $(d + xx + yy) + (\bar{u} + \bar{d} + wxy) \Rightarrow u + (\bar{u} + \bar{u} + wxy)$
		$\bar{u} + wxy + (xx + yy) = \bar{u} + wxy + \frac{1}{2}$ gluon mc^2
4) $D^+ \Rightarrow K^- + \pi^0 + \pi^+ + e^+ + \nu_e$	4) $c \Rightarrow s + W^+$	4) $D^+ + [\pi^-] + e^+ \Rightarrow K^- + [\pi^+] + \nu_e$
		$(c + \bar{d}) + [\bar{u} + d] + (u + u + \overline{yyz}) \Rightarrow (s + \bar{u}) + [\bar{d} + u] + (u + d + \overline{yyz})$
		$((u + xx + yy) + \bar{d}) + [\bar{u} + d] + (u + u + \overline{yyz}) \Rightarrow ((d + xx + yy) + \bar{u}) + [\bar{d} + u] + (u + d + \overline{yyz})$
		4a) $(u + u + \overline{yyz}) \Rightarrow (u + d + \overline{yyz})$ via beta plus reaction $u \Rightarrow d$
		4b) $D^+ = (u + xx + yy) + \bar{d}$ .... $K^- = (d + xx + yy) + \bar{u}$ where $xx + yy$ is mc^2
		4c) $\pi^- = (\bar{u} + d)$ .... $\pi^+ = (\bar{d} + u)$
5) $b \Rightarrow c + e^- + \bar{\nu}_e$	5) $b \Rightarrow c + e^- + \bar{\nu}_e$	5) $b + \bar{\nu}_e \Rightarrow c + e^-$ ‖ $(c + ww + zz) + (\bar{u} + \bar{d} + wxy) \Rightarrow c + (\bar{u} + \bar{u} + wxy)$ ‖ $\bar{u} + wxy + (xx + yy) = \bar{u} + wxy +$ gluon mc^2
6) $b \Rightarrow c + \mu^- + \bar{\nu}_\mu$	6) $b \Rightarrow c + \mu^- + \bar{\nu}_\mu$	6) $b + \bar{\nu}_\mu \Rightarrow c + \mu^-$ ‖ $(c + ww + zz) + (\bar{u} + \bar{d} + wxy) \Rightarrow (u + xx + yy) + (\bar{u} + \bar{u} + wxy)$ ‖ $\bar{u} + wxy + (xx + yy) = \bar{u} + wxy +$ gluon mc^2
7) $b \Rightarrow c + \tau^- + \bar{\nu}_\tau$	7) $b \Rightarrow c + \tau^- + \bar{\nu}_\tau$	7) $b + \bar{\nu}_\tau \Rightarrow c + \tau^-$
8) $s \Rightarrow u + d + \bar{u}$	8) $s \Rightarrow u + d + \bar{u}$	8) $s + \bar{u} \Rightarrow u + d$
9) $b \Rightarrow c + d + \bar{u}$	9) $b \Rightarrow c + d + \bar{u}$	9) $b + \bar{u} \Rightarrow c + d$
10) $b \Rightarrow c + s + \bar{c}$	10) $b \Rightarrow c + s + \bar{c}$	10) $b + \bar{c} \Rightarrow c + s$
11) not observed	11) $t \Rightarrow b + W^+$	11)

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Z Boson Example

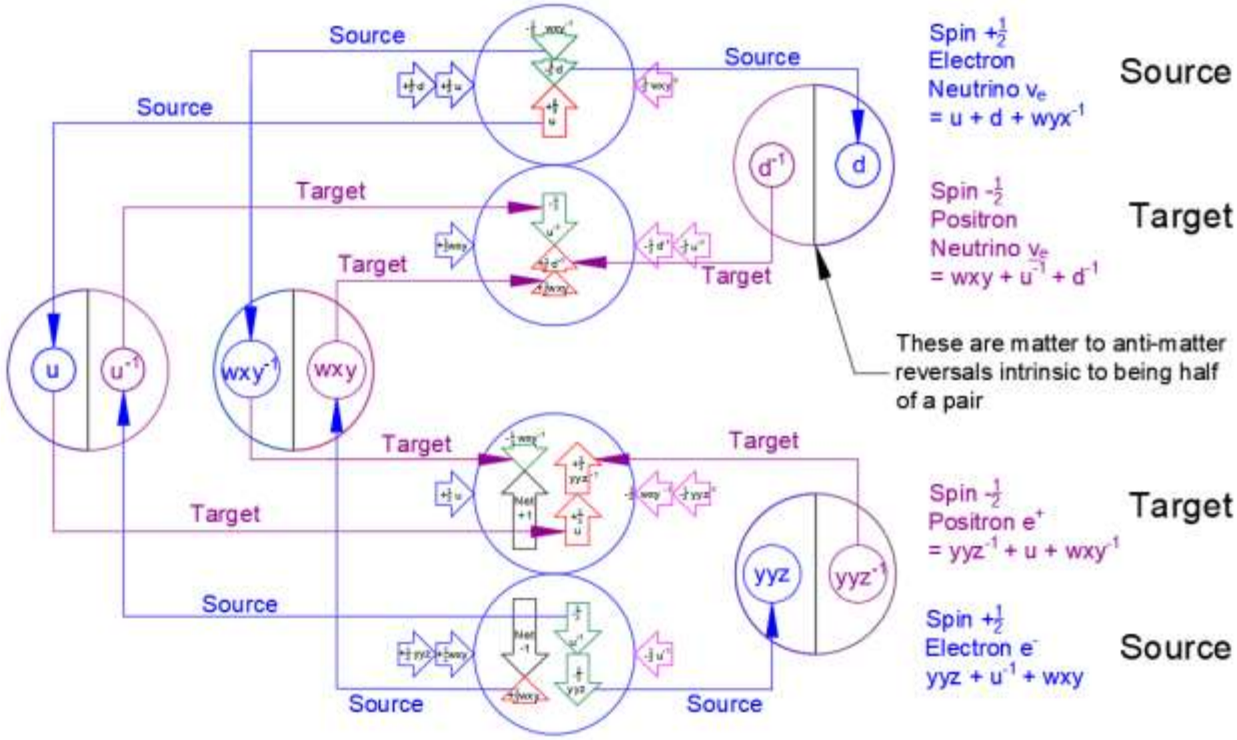
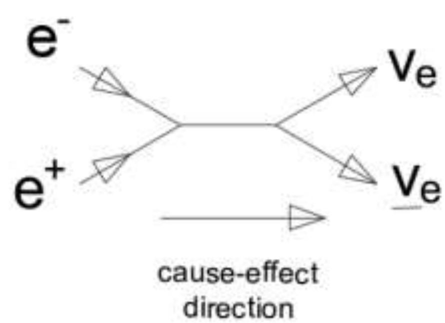


Figure 14 - Z Boson Example

Cause-Effect reality (momentum direction of anti-matter is opposite cause-effect direction as viewed by matter observer):

Two inputs = Electron e^- and Positron e^+
Two outputs = and Electron Neutrino v_e and Positron Neutrino $\underline{v_e}$



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Comparison of W and Z "Bosons"

Uses 2 different electron isotopes

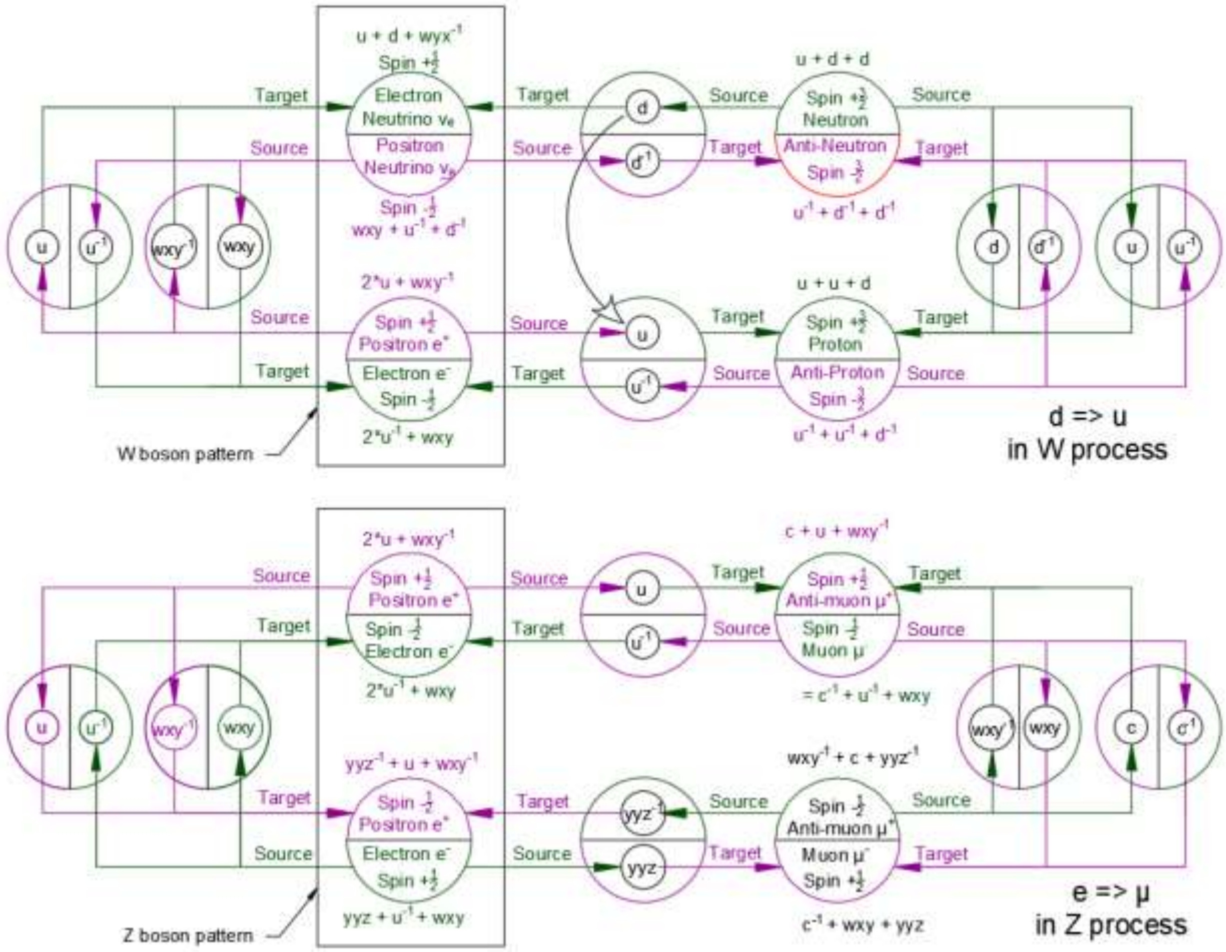

Figure 15 - Comparison of Z and W "Bosons"

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Comparison of W and Z "Boson" Triggers

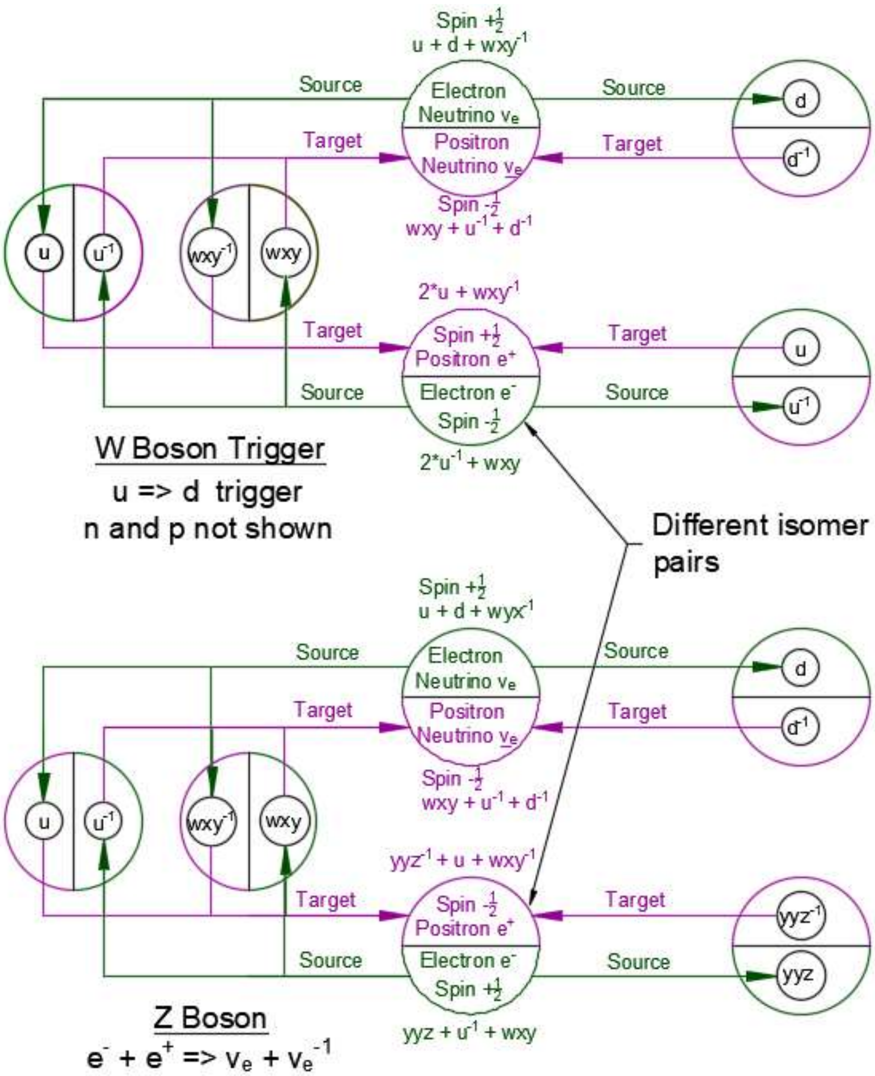

Figure 16 - Comparison of W and Z "Boson" Triggers

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Pair Production

Observed:

$(Z+)\gamma \Rightarrow e^- + e^+$

where Z is a nucleus[5]

Cause-effect:

$(Z+)(\gamma_{matter} + \gamma_{antimatter}) + e^+ \Rightarrow e^-$

γ_{matter} is a photon

$\gamma_{antimatter}$ is an anti-photon

[5] Pair production - Wikipedia

2 annihilation photons travel the same cause-effect direction but opposite momentum and velocity directions

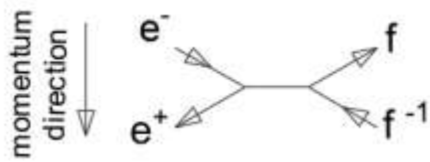
<u>Momentum</u>:

$p_\gamma = p_{e-} + p_{e+} + p_R$

where p_R = is nuclei recoil = 0 because target is stationary

$p_\gamma = p_{e-} + p_{e+}$ which is zero because p_{e-} and p_{e+} are equal magnitude and opposite velocities

p_γ is annihilation photons momentum of zero because of emission in opposite directions 180° apart



	invisible neutrinos			charged leptons			hadrons					
f	v_e	v_μ	v_T	e^-	μ^-	T^-	u	d	s	c	b	matter
f^{-1}	v_e^{-1}	v_μ^{-1}	v_T^{-1}	e^+	μ^+	T^+	u^{-1}	d^{-1}	s^{-1}	c^{-1}	b^{-1}	anti-matter

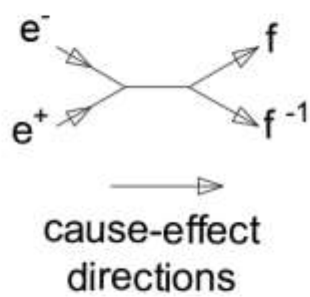


Figure 17 - Pair Production

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Quantum Field Theory

"The earliest successful classical field theory is one that emerged from Newton's law of universal gravitation, despite the complete absence of the concept of fields from his 1687 treatise *Philosophiæ Naturalis Principia Mathematica*. The force of gravity as described by Newton is an 'action at a distance'—its effects on faraway objects are instantaneous, no matter the distance….

Fields began to take on an existence of their own with the development of electromagnetism in the 19th century. Michael Faraday coined the English term 'field' in 1845. He introduced fields as properties of space (even when it is devoid of matter) having physical effects. He argued against ‘action at a distance’, and proposed that interactions between objects occur via space-filling ‘lines of force’.”[6]

The Feynman diagram associated with this reference follows:

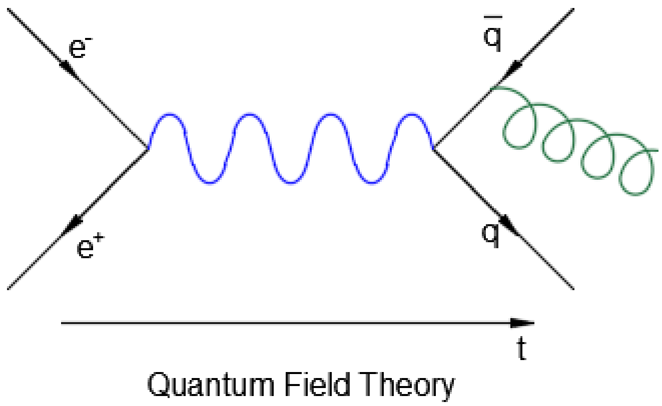

Figure 18 - Quantum Field Theory

Where the blue wave is a photon and the green “spring” off to the right is a gluon. Neglecting the gluon and photon, the above diagram is as follows, where v_e is q and $\underline{v}_e$ is $\underline{q}$.

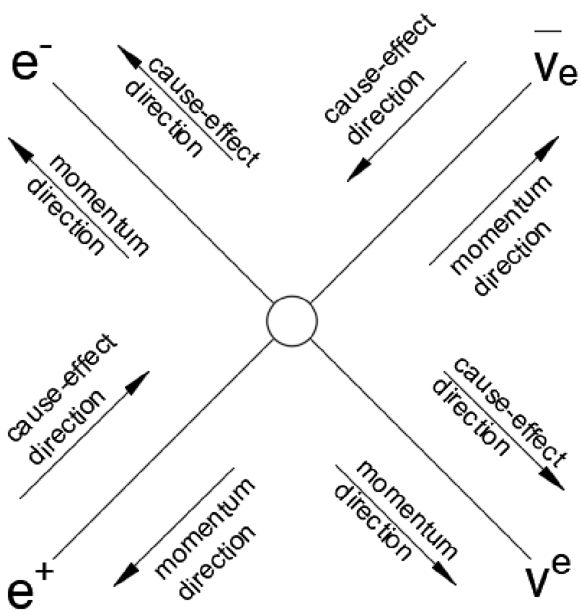

Figure 19 - Simplified Feynman Diagram of Quantum Field Theory

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[6] Quantum field theory - Wikipedia

Z "Boson" for Tau and Muon

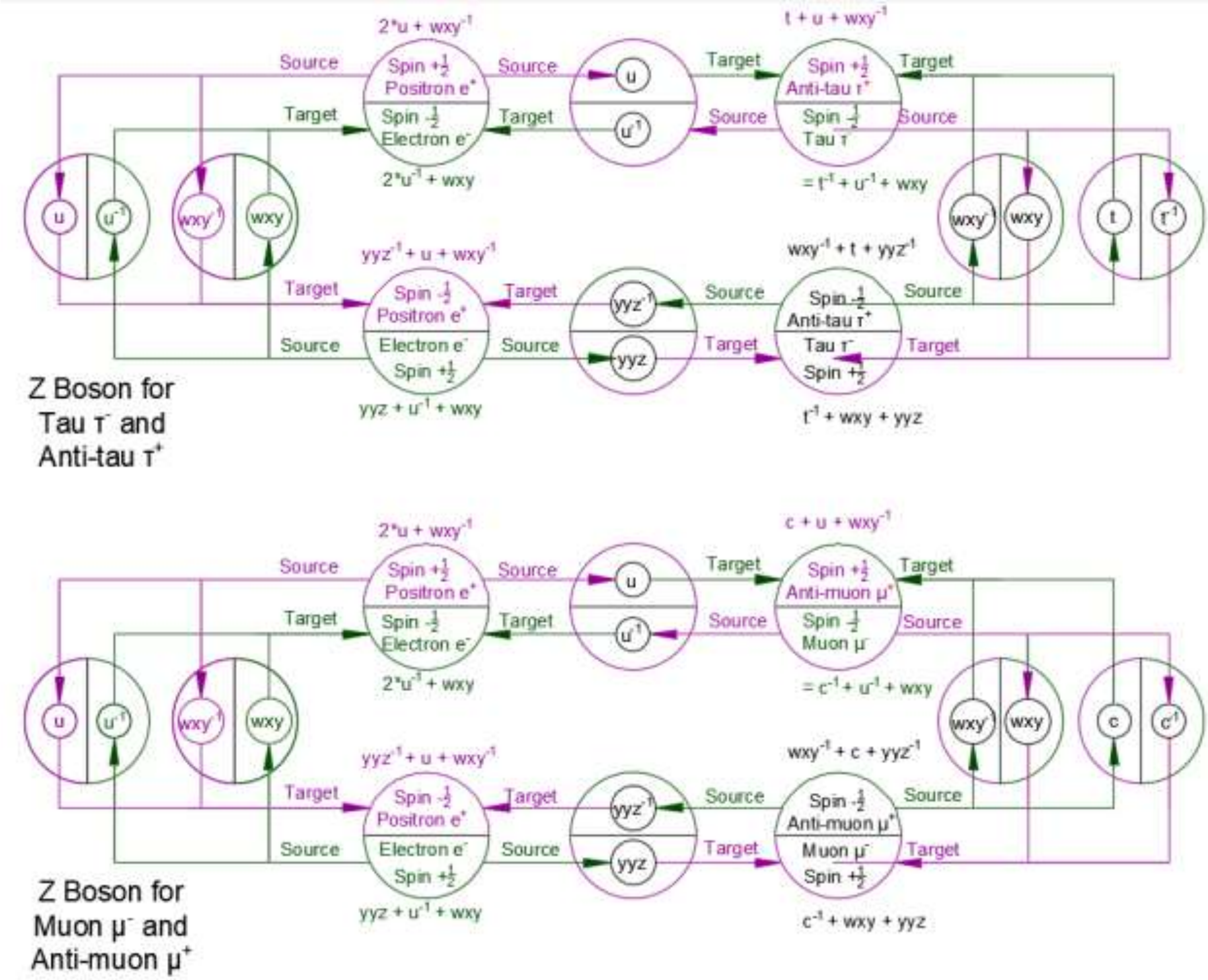

Figure 20 -Z "Boson" for Tau and Muon

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Two Levels and Three Spin Isomers of Electron, Muon, Tau

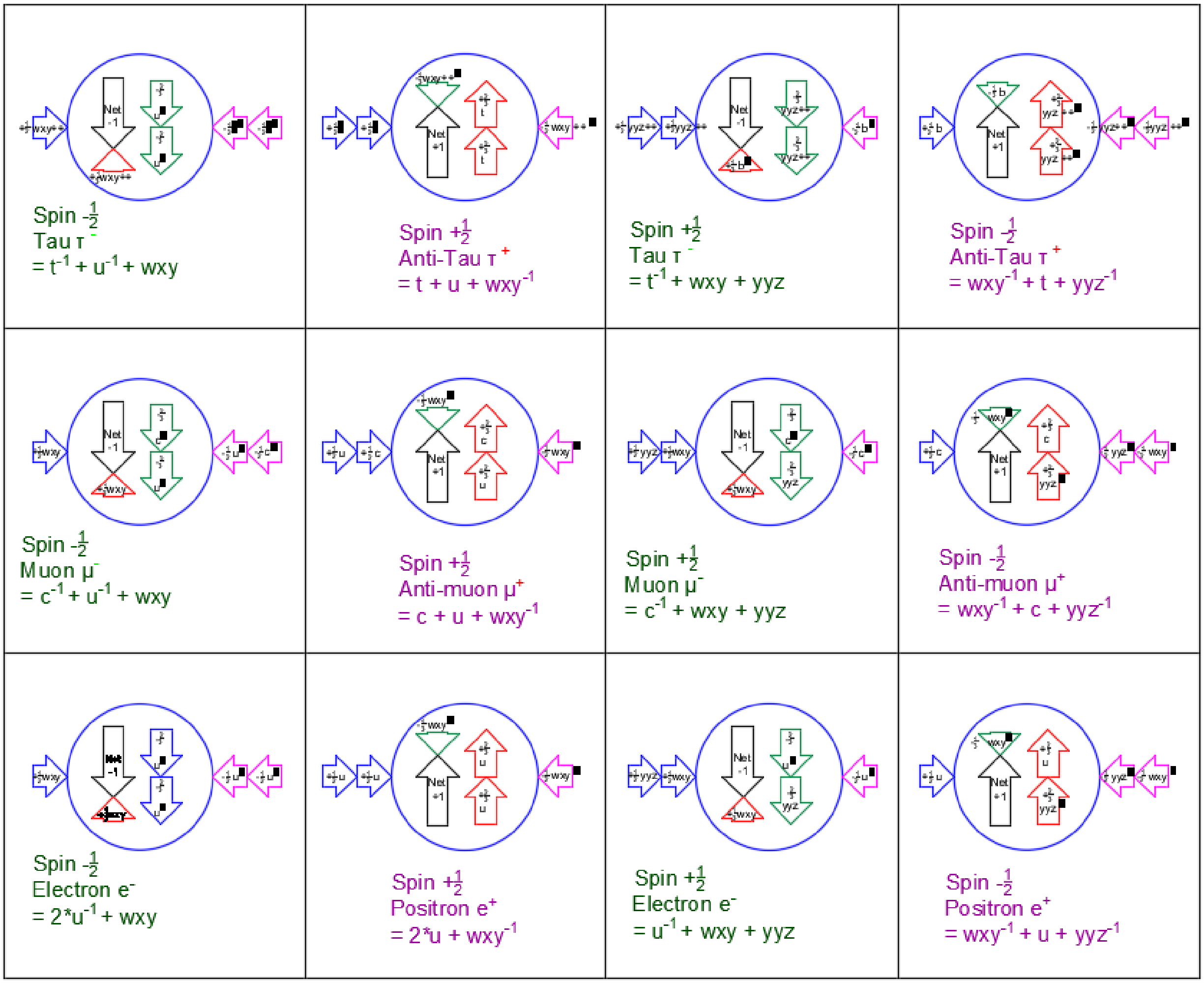

Figure 21 - Two Levels and Three Spin Isomers of Electron, Muon, Tau

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Pictorial of Three Levels and Two Spin Isomers of Electron, Muon, Tau

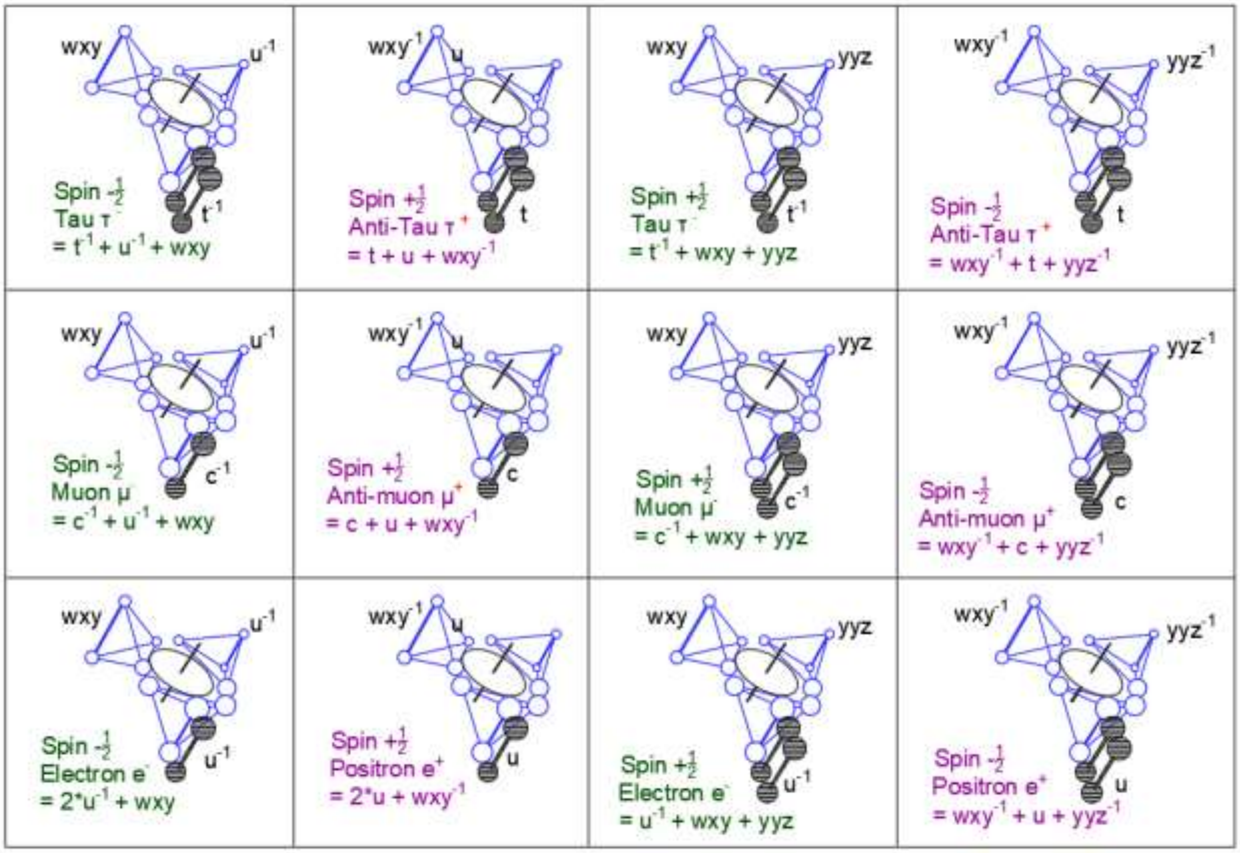

Figure 22 - Pictorial of Three Levels and Two Spin Isomers of Electron, Muon, Tau

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Muon, Pion, Proton, Meson "Decay"

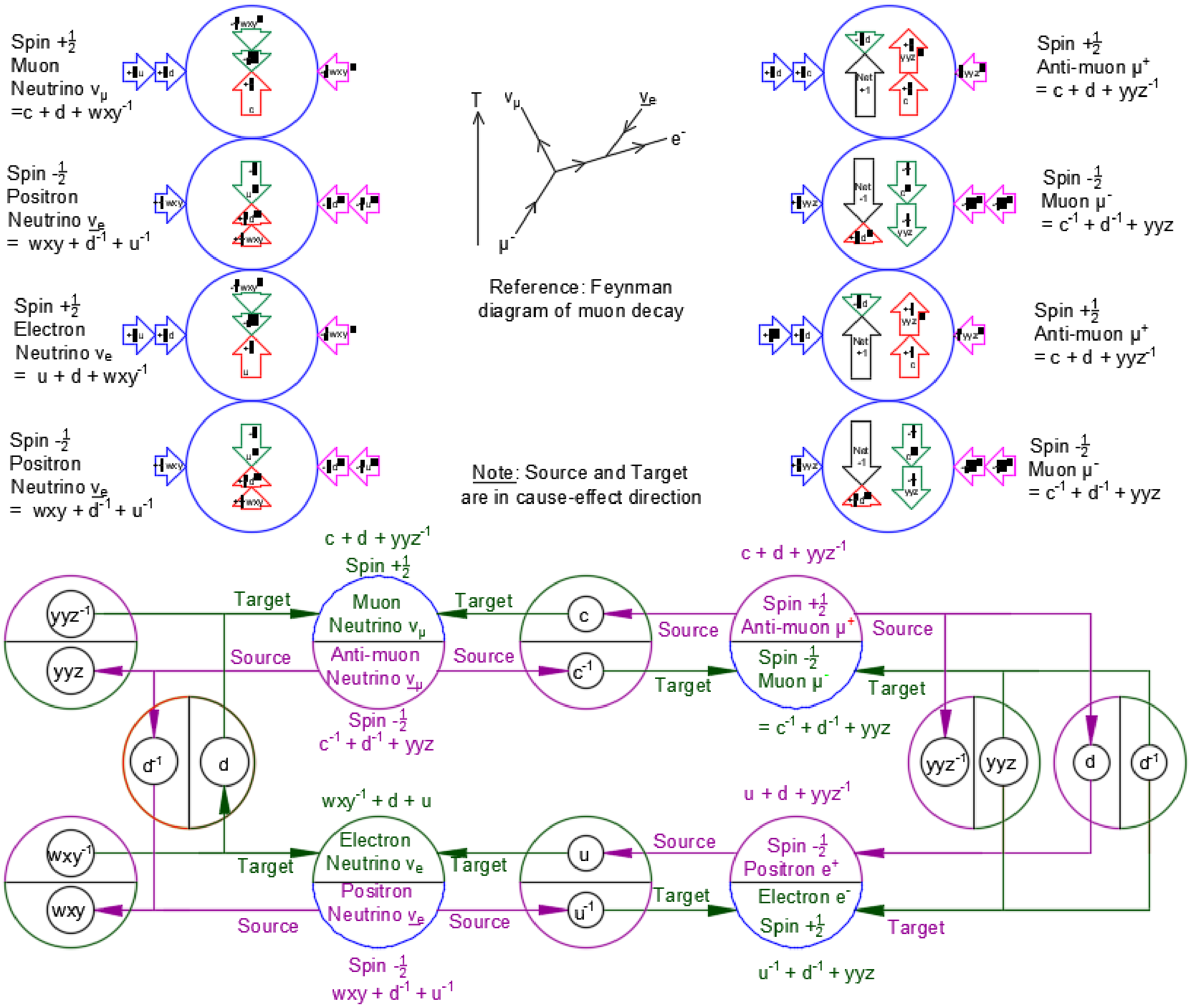

Figure 23 - Muon "Decay" Is Initiated by Anti-muon Neutrino

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Neutral Pion Decays into Photon

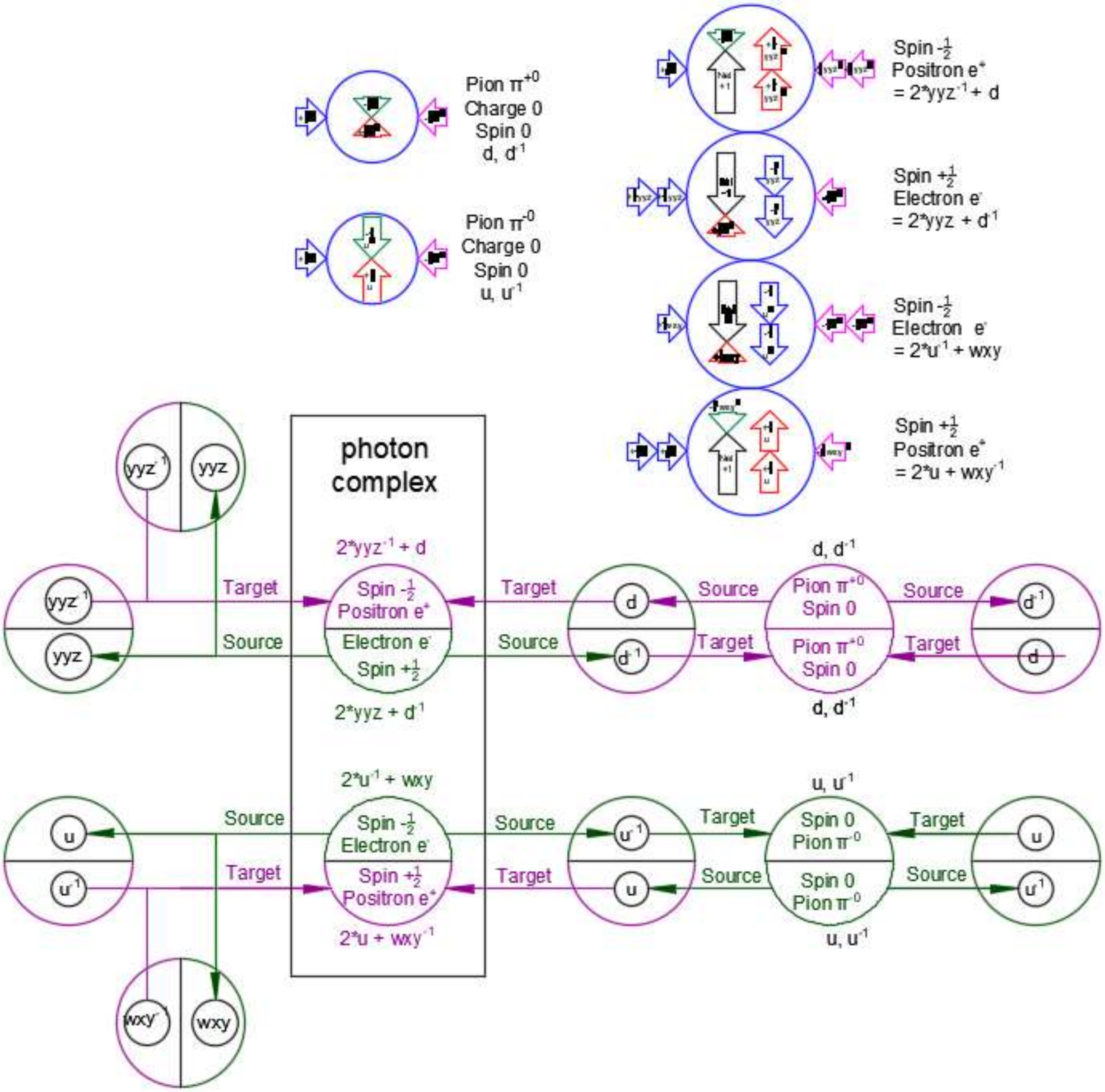

Figure 24 - Neutral Pion Decays into Photon

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Photon + Proton => Neutron + energy

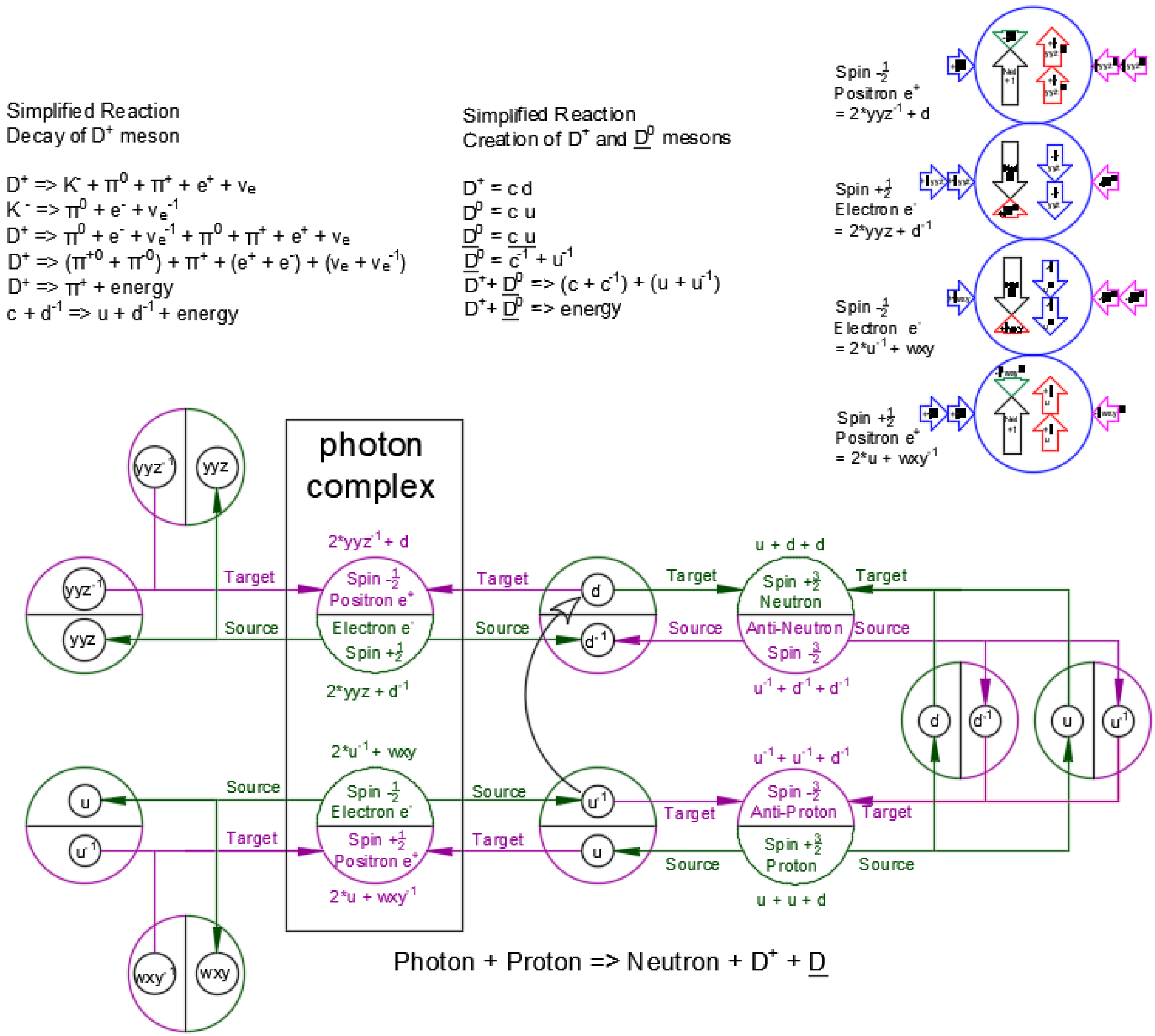

Figure 25 - Photon + Proton => Neutron + Energy

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J/ψ meson

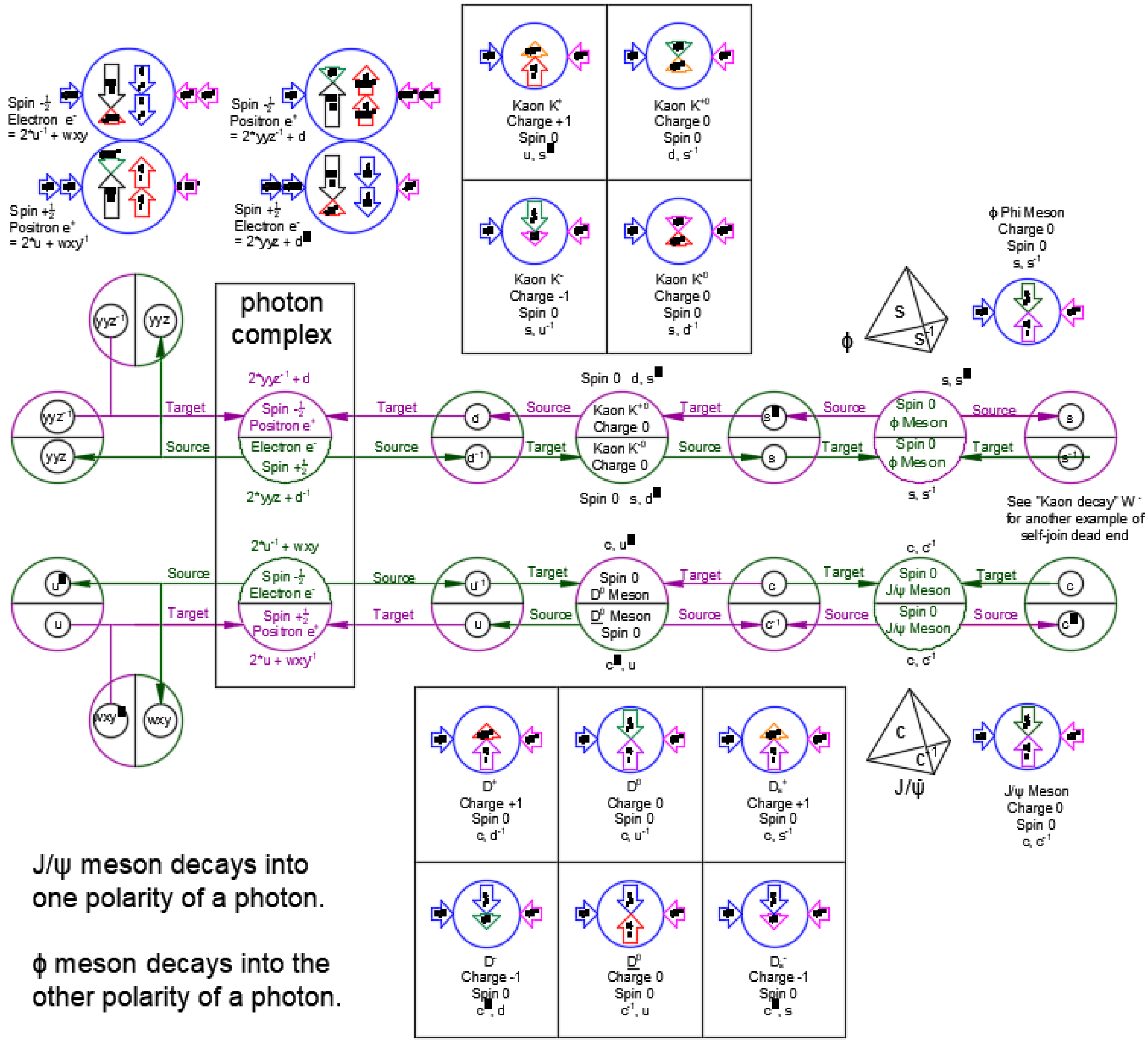

Figure 26 - J/ψ meson

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Antimatter Velocity Opposite of Cause-Effect Direction

Both observers see what they are made of (matter or anti) as moving the same direction as cause-effect. Both observers see the PCT opposite of what they are made of (matter or anti) as having velocity opposite of cause-effect direction. Matter observer cannot see outside the matter box. Matter observer sees antimatter velocity backwards from cause-effect. Antimatter observer cannot see outside the antimatter box. Antimatter observer sees matter velocity backwards from cause-effect. They are in complete agreement because they speak with the same mouth.

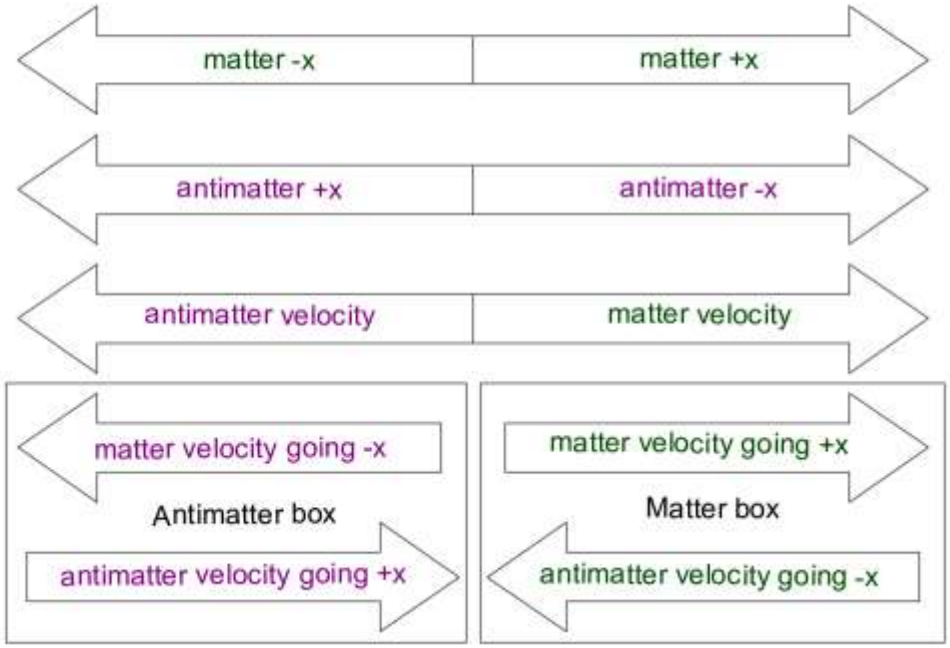

Figure 27 - Antimatter Velocity Opposite of Cause-Effect Direction