The Weak Reaction Mechanics

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Abstract

The weak reaction mechanics is initiated by either an incoming electron neutrino//positron neutrino or electron // positron, and results in a proton changing to a neutron or vice versa. The insight from the Two-Slit experiment is required to give the correct state diagram with both matter and antimatter interacting.

Keywords

beta decay, beta reaction

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 preceding work this paper is built on is The Weak Reaction, viXra.org e-Print archive, viXra:2307.0076

and Sub-quarks, Anti-matter and Red Shift, viXra.org e-Print archive, viXra:2209.0057

Naming Conventions

This paper uses different tools (MS Access, MS Excel), each of which has a unique set of formatting choices. For example, antimatter can be represented as V_e’, where V_e’ = positron neutrino

Review of Weak Reaction Equations

In the primary paper in this series, Tetrons [1], four new quarks were identified: yyz, yyz’, wxy and wxy’. In the Weak Reaction paper previously referred to, the weak reaction is summarized in equation form below:

tetrons:

ww = +spin, +chg, +time

xx = -spin, +chg, -time

yy = +spin, -chg, -time

zz = -spin, -chg, +time

first level quarks:

u = 3*ww + xx

d = 2*yy + zz + ww

wxy = 2*ww + yy + xx

yyz = 3*yy + zz

$\overline{u}$ = 3*zz + yy

$\overline{d}$ = 2*xx + zz + ww

$\overline{wxy}$ = 2*zz + yy + xx

$\overline{yyz}$ = 3*xx + ww

leptons:

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

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

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

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

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

W^- boson:

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

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

example:

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

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

The Weak Reaction Diagram

Beta minus reaction:

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

$n + v_e' => p + e^-$
in the figure below the $n + v_e'$ are shown on the right side as a cause
and the p + e- are on the left side as a resultant

Beta plus reaction:
$p + v_e => n + e^+$
in the figure below p + e- is shown on the left side as a cause
and the $n + v_e'$ are on the left side as a resultant

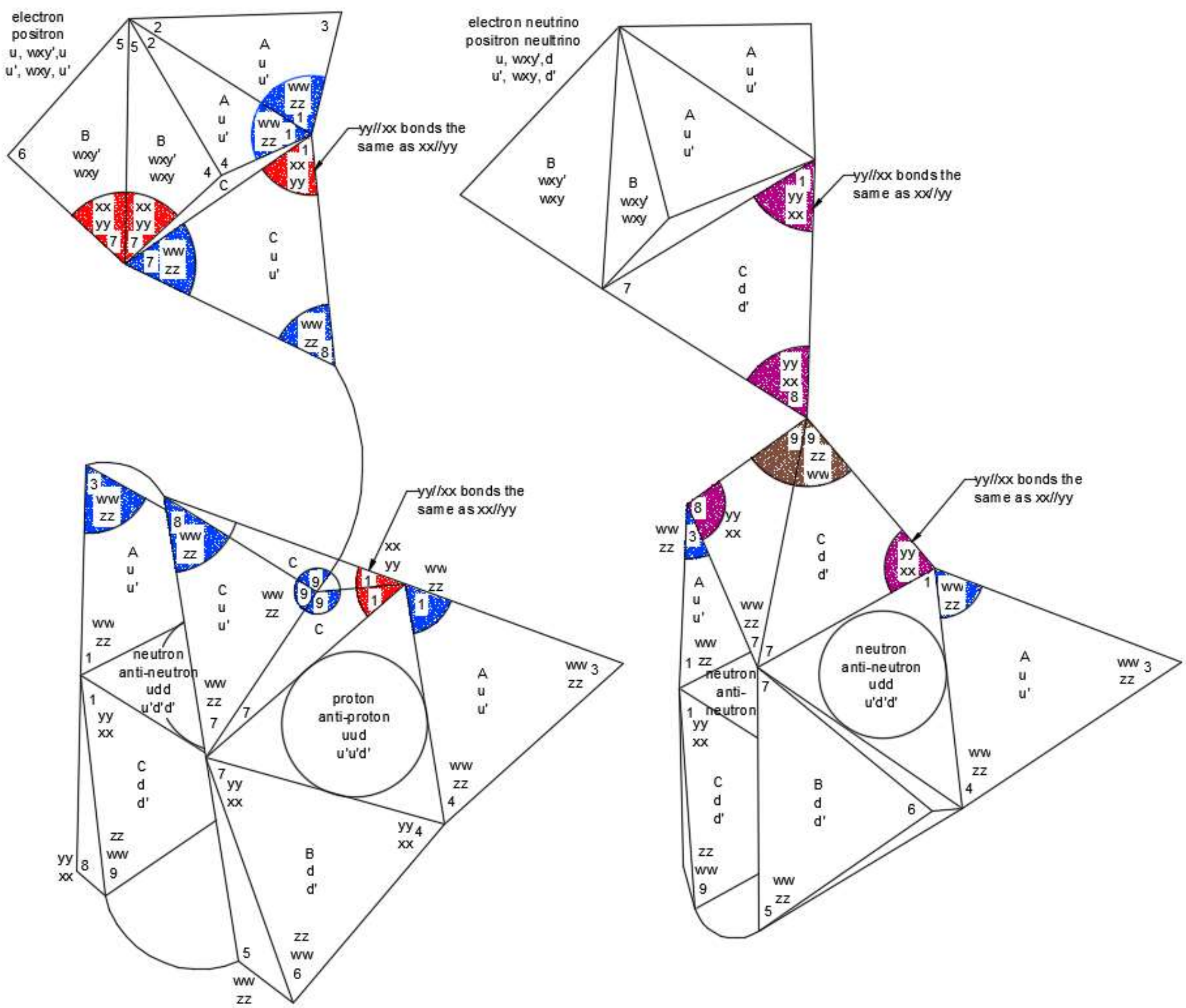

Figure 1 - Before and After the Weak Reaction

The above illustrates the mechanics of the beta reaction, but does not explain how 2 d quarks, one a part of a neutron and one a part of positron initiate this exchange of quark identities. As a minor side note, the labels on the #1 vertexes in both C quark positions change from yy//xx to xx//yy, so keep the C quarks bound continuously in the nucleon particles as a minor role in the weak reaction mechanics.

That yy to zz (and xx to ww) relationship is shown below in the tetron diamond of relationships. If this ability to change from xx//yy///ww//zz to yy//xx///ww//zz were not present, the initiator lepton and reacting nucleon would not maintain their particle identity. We can regard this as a rule of particle identity that tetrons can change identity in a quark, but that changed quark cannot leave the particle.

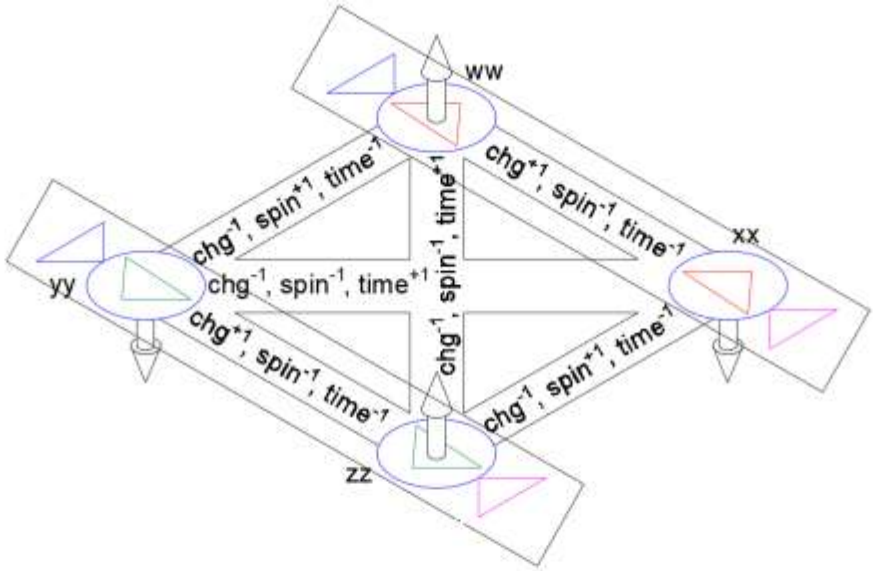

Figure 2 - The Tetron Interaction Diamond

The more fundamental issue is what compels a lepton and nucleon to change identities of their C quarks from d to u or vice versa? This does not follow a rule whereby d and u quarks are exchanged. Something else is going on, which requires an answer from the Two-Slit experiment, more than just a review of the experiment.

The Two-Slit Experiment

In a double slit experiment where the bulb emits a single photon, the detector at the wave crest location receives a single photon. The question is, "Why did one photon behave as if in a large group of photons?" One consideration is an anti-photon must have a single location where its velocity begins, which is the same location where the photon velocity ends.

Because the photon and anti-photon travel congruently along a cause-effect path as a matter and antimatter pair, they cannot have different paths. Since all possible wave crests could have been a destination for the single photon, those same wave crests could have been an origin for the single anti-photon. Conservation rules that the photon // anti-photon pair must have only one path.

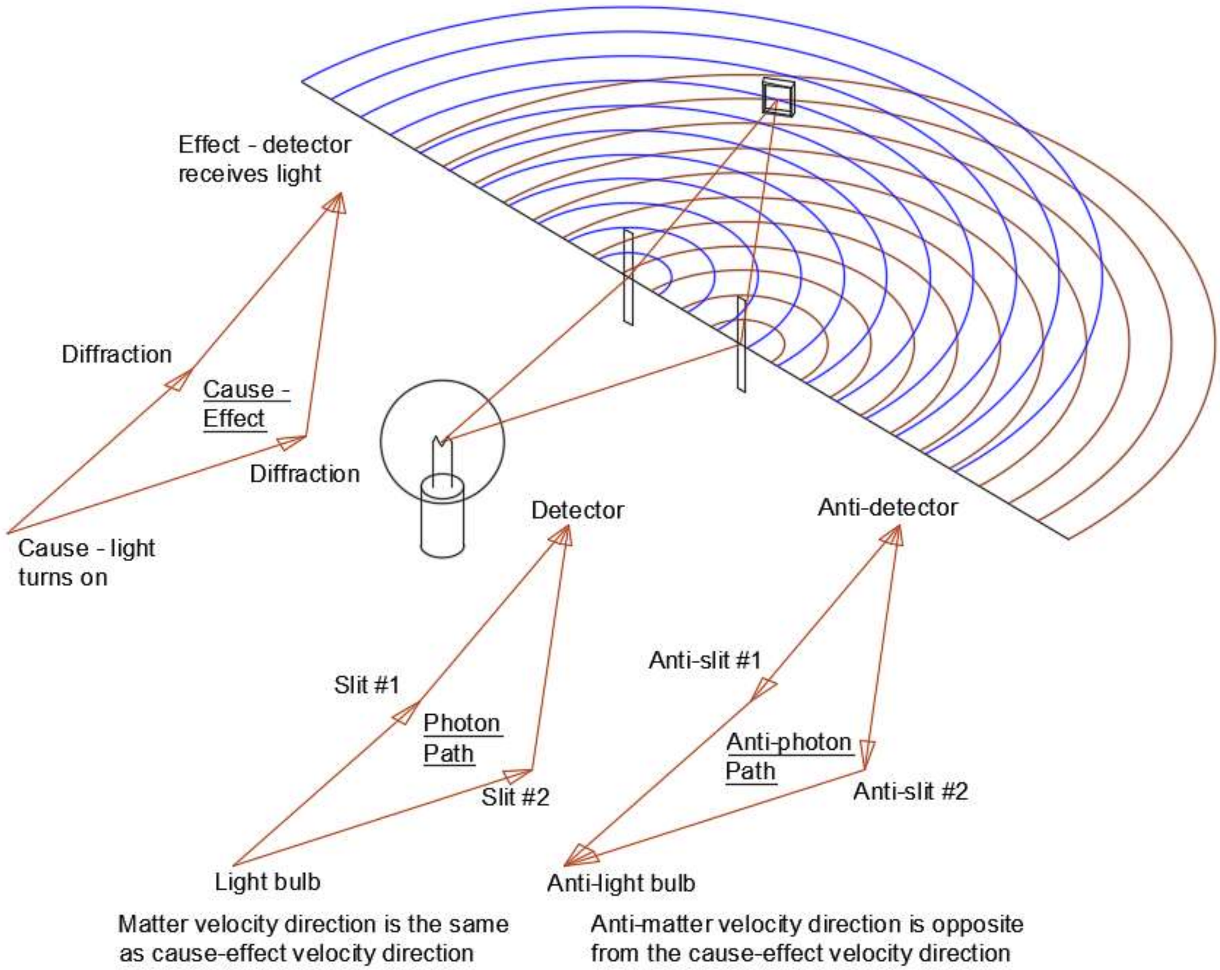

Figure 3 - Single Photon Going Thru Two Slits

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State Diagram of the Bulb-Slit-Detector System

The state diagram has zero velocity for the bidirectional cause-effect loop. Using a specific time example as shown in the diagram below:

- Energy of some origin builds up in an electron shell in the bulb
- Photon #1 to be emitted at 12:00
- Photon #1 arrives at slit at 12:01
- Atom on the knife edge of the slit absorbs photon #1 and emits photon #2 at a diffracted angle.
- Photon #2 arrives at detector at 12:02.
- Anti-photon #2, which has been traveling congruently with photon #2, is emitted.
- Anti-photon #2 arrives at anti-slit at 12:01
- Antimatter atom on the knife edge of the anti-slit absorbs anti-photon #2…
- … and emits anti-photon #1 at the same diffracted angle.
- Anti-photon #1 is absorbed, which builds up thermal vibration energy in the anti-bulb positron shell.

Thermal vibration completes the path because it is shared by matter and antimatter. The state diagram of a single bulb-slit-detector path is in the below diagram with four segments of the state diagram.

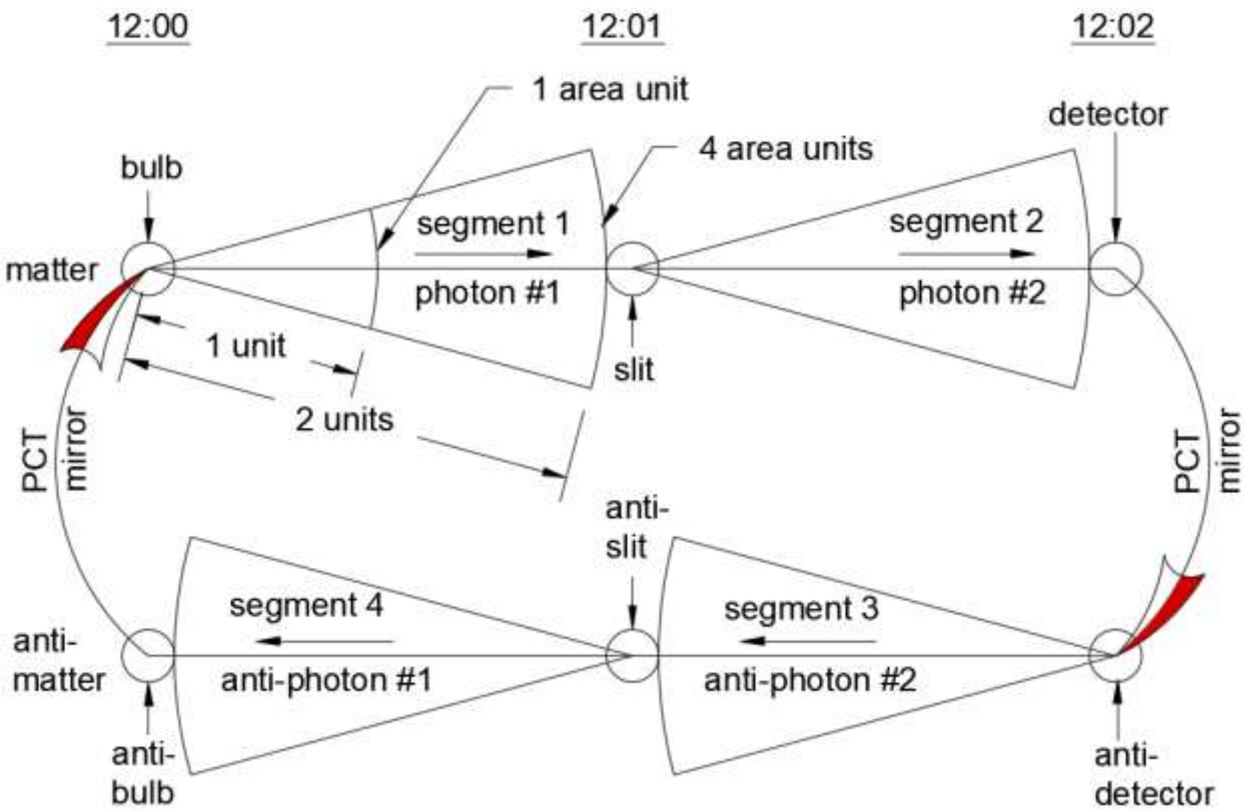

Figure 4 - State Diagram of the Bulb-Slit-Detector System

- Segment 1: photon 1 going bulb to slit
- *Pass thru slit at 12:01*
- Segment 2: photon 2 going slit to detector
- Segment 3: anti-photon 2 going detector to slit
- *Pass thru slit at 12:01*
- Segment 4: anti-photon 1 going slit to bulb

Per the web page, https://en.wikipedia.org/wiki/Double-slit_experiment, "…versions of the experiment that include detectors at the slits find that each detected photon passes through one slit (as would a classical particle), and not through both slits (as would a wave). However, such experiments demonstrate that particles do not form the interference pattern if one detects which slit they pass through."

Two slit experiment versions with detectors at the slits do not make any special conditions that would change if a photon went thru a slit and an anti-photon came back thru the same slit *at the same time (12:01)*. The photon // anti-photon model is not invalidated by the referenced experiment results.

The wave nature of matter also allows matter to have the same two slit experiment result.[2]

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Cause-Effect is a Step-Wise Process

Consider a photon emitted by some atomic process that travels for several billion years of Earth observer time from points A to B. Compare this to the two-slit experiment. It is intuitively obvious by this comparison that event separation has the largest influence on cause and effect. It is safe to postulate that cause-effect is very certain for nearby events and less certain with increasing distance.

It would be only a step further to postulate the certainty varies by the inverse square law because of the increasing dilution of any source event causing an effect on a far distant object. A “window of opportunity” for an event to cause an effect is an accurate saying. Let us name this inverse square law to uncertainty be a “step-wise cause and effect”. The “drunken walk” is an example of uncertainty, but taken one step at a time, it is absolutely certain one moment to the next.

Next, we apply the step-wise certainty to the two-slit experiment. If the light bulb were left on for a long period of time, all the wave crests would be lit up for a detector to read. One photon behaves as if it is emitted in a bulk with other photons. The electron moving down a shell level getting ready to emit as a photon is known. What is unknown is which atom beyond the slit will have an incoming photon raise an electron a shell up, if the shell is full.

What appears to happen is the outgoing photon has information as to where to go. The next section builds the case for information at a distance.

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Universe Center is the Root of Rotations

Postulate the universe has a center of angular rotations as well a center of its radius as described in section “All Observers are Correct in a Spherical Universe Containing Flat Worlds”, as shown previously.

	What is the center of the universe?	Where is the center of the universe?	What is the center rotations?	Where is the center of rotations?
4D	one point	center of a 4D sphere	one point	center of a 4D sphere
Flatten 4D to 3D to visualize	one point	center of a 3D sphere	one point	center of a 3D sphere
3D	every point	everywhere	every sub-quark	every sub-quark

In the diagram below, angular separation is one of the attributes contributing to information at a distance. Although the 3D distance from every point in 3D to the center of the universe, that does not mean shares the same information. The time vector always points to the center of the universe of a

[2] Double-slit Experiment | Brilliant Math & Science Wiki

given object with all its parts going in the same reference frame. This could be a rigid solid body, a building, an ocean, a cloud or whatever.

The center of the universe is not the same for all objects. In a running accelerator or at the observer's edge of the universe, the object therein has rotated space and time vectors angularly separated from the observer. This separation is measured with the Lorentz transform. When the accelerator stops, the test object returns to the unaccelerated frame where time and space vectors line up with the observer.

What occurred during that dimensional rotation does not affect the record-keeping of both the stationary and accelerated person or object. Elapsed time of the accelerated object is less than the observer. Since time dilation is symmetric, we presume if the observer were accelerated to travel beside the test object, they would again agree on time lapsed, lengths and such relative matters.

The newly accelerated observer now is in agreement with the test object. Their comparative elapsed time will still be different. The difference is the observer is older than the test object, but will not age more rapidly any more – as long as the accelerator runs. The time was not lost. The time rate just ran more slowly in the accelerated test object, which accumulated fewer elapsed seconds, minutes, hours, days, etc.

The simple way to think about the reciprocal relationship between time rate and elapsed time is, "If I drive faster, I will take less time to get to my destination". In special relativity, time dilation means time rate slowing and elapsed time lengthening. Elapsed time for an object to perform tasks such as emitting successive crests and troughs of an electromagnetic wave is lengthened.

The test object in the accelerator simulates an object near the edge of the universe for the observers. Wavelengths of photons created near the edge of our universe are normal for the materials they were emitted from. These wavelengths appear lengthened to us after the photons arrive to us billions of years later because they were created in a reference frame rotated from ours. If a photon could arrive immediately from that distant galaxy, it would still have the same redshift.

If an accelerated object could emit a known wavelength of light, that wavelength would lengthen as the object is accelerated. Even simpler, if a particle with a known decay rate were accelerated, its decay rate would lengthen. This experiment has already been done. A pi meson in a collection of "cosmic rays" traveling almost at the speed of light takes much longer to decay in an earth-bound frame than in its own "proper" frame. The example in Spacetime Physics on page 43 has the pi meson traveling 12/13 the speed of light and lives 2.6 times as long as its "proper life"[3] [measured by its own decay rate clock].

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Charge, Spin and Time are Instances of Universe Rotations

Unit charge, spin and time rate are instances of universe rotations, present at each tetron.

[3] Spacetime Physics 1963, 1966 Taylor/Wheeler.

	rotations	units	range	causing	causing motion
4D rule	connected at zero distance	angular separation & direction			
3D inherits from 4D rule	connected at a distance	distance separation & direction			
spin in 3D	inverse square influence	+spin, -spin			
charge in 3D	inverse square influence	+charge, -charge			
time rate proportional to gravity in 3D	inverse square influence	attractive force	zero to near infinity	internal spin	acceleration
electric field in 3D	inverse square influence	+polarity, -polarity	near +infinity to near -infinity	external electric & magnetic fields	velocity

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Fields

Fields originate at a field producing rotation. Charge, spin and time are examples of fields. Magnetism is another field. Fields like charge and magnetism stop at a conductor, whereas fields like gravity are pervasive and go thru all things. Fields act instantaneously to the extent of the universe, the intensity of which is acting according to the reverse square of distance from the source. Just as instances of rotation like charge, spin and time inherit their properties from the root of all spins, so instances of fields inherit their properties from the root of all fields.

Gravity

Gravity acts in two parts. The first part is the creation of curvature in space. The second is how entities react to that curvature. That is the essential message of the Misner, Thorne and Wheeler (MTW) book Gravitation. Those authors stay with the Einstein concept of gravity as a transverse acceleration of two particles as a consequence of their traveling along geodesic lines to a source of gravity.

The problem with that concept is it turns into a chicken and egg conundrum. If particles are going along geodesics and experiencing gravity with one another, what made that geodesic path they are following? That geodesic idea is not any more sophisticated than a 3D environment where particles going toward a gravity source in a Euclidean straight lines experience that same lateral acceleration.

Information at a Distance

Where a cluster of rotations exists at a 3D distance from a tetron, that cluster's existence is only known as a force and a direction. This is because those 3D rotations inherit angular separation but not distance information from their 4^{th} dimension rotation parent. Neglecting an empirical constant, the inverse square law for a single tetron's attraction to a cluster of tetrons may be simplified because both attractors have the same unit vector:

Force = (quantity of units in the cluster) / (distance to cluster)^2

The distance is in 3D and does not matter. *Action at a distance* by force transferring vector bosons is not necessary. All that is necessary is *information at a distance* and *rules by which to act according to this* *information*. Information at a distance is provided by rotations at each tetron connected to the root rotation of the universe at zero 3D distance.

	information at a distance	rotation connection
3D properties	mass	time rate
	electric field	charge
	distance	angular separation of rotations
	direction	direction of source

How This Applies to the Two Slit Experiment Result

The existence of a detector for an incoming photon changes the nature of this experiment. A detector will have an atom that will absorb the photon and raise the energy level of the resulting electron. Among all the possible locations detectors could be located, why is this location where the photon arrives special?

Postulate this detector has a greater requirement to have another electron arrive. Perhaps because it is slightly different from all other detectors that might be put elsewhere. Perhaps the material has more pure crystalline structure and has an atom closer to the material surface. Perhaps the electron in the receiving end will more readily accept a Pauli inclusion pair partner. Of all the possible reasons for variation among a set of detectors, the most efficient detector information will be known to the emitting atom.

The emitting and absorbing atoms for this form a closed loop path with the congruent anti-photon which is traveling with the photon. The emission time for the anti-photon is synchronous with absorption of the photon, and is in the future of the photon.

The emitting atom's electron's quark's tetron that is dominant by its position in the orbit and on the quark has information about the proper place to send its electron surplus. The gradient between the electron surplus in the emitter and the electron deficit in the absorber is highest between these two locations. This gradient directs the emission of the photon and also will direct the emission of the anti-photon.

There are two paths from the emitter to the absorber. The law of inverse squares uses the principle of greater area at a distance is less density of photons. For bulk emission, this is true. In a single emission, the less the density of photons equates to a lower likelihood of hitting the detector. The existence of the second slit, even though not used, increased the likelihood of hitting the sensor *at the time the direction to the most receptive receptor was sensed*. The two-slit experiment has demonstrated the existence of *information at a distance*.

Two half steps are taken in each step. First half is detecting how best to minimize the local gradient of energy present as seen by the tetron. Second half is executing actions to cause a lower energy level of the system. As the limit of each time step shortens to zero, the entire path that seems uncertain becomes certain if done step-wise.

How This Applies to the Weak Reaction

The Two-Slit experiment answer is that is best seen as a state diagram such as "State Diagram of the Bulb-Slit-Detector System". Similarly, the weak reaction is best seen as a lepton pair of matter and antimatter interacting with a nucleon pair simultaneously in both directions. In this state diagram, neither reaction direction has primacy. The weak reaction is a complex of two leptons and two nucleons that resolve the state diagram to a lower energy level.

It would be following common sense to consider the incoming lepton as having kinetic energy that would be reacted in some way by stationary nucleons. However, that would not take into account the reverse reactions as mandated by the tetron theory that for every reaction by matter, there is an equal and PCT opposite reaction by antimatter.