The Derivation of Dirac's Equation

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Abstract: By quantizing time and space, I was able to explain matter, its wave, charge and mass; both the electric and gravitational forces and calculate e, m_e, h and G. In the universe, time proceeds in ticks of the Plank time = dt_p = $(Gh_c/c^5)^{1/2}$ = 5.39056 x 10^{-44} s. The time that we observe and do our measurements, proceeds in ticks of dt = $(3/5)dt_p$ = 3.2343 x 10^{-44} s. Spacial distance proceeds in steps of cdt = dx for us and dx_p = cdt_p for the universe. (c = speed of light) dt = $(3/5)dt_p$ was determined by my calculation of the electric charge in a previous (unpublished) paper. 3_0 and u_0 are the permittivity and permeability of free space. The relation dt = $(3/5)dt_p$ indicates a phase factor for our time of 53^o. The triangle 3, 4, 5 is the only triangle with integral values for each of its sides and since time proceeds in an integral number of ticks, which cannot be divided, this triangle, involving only the angle 37 and 53 is the only one that nature allows. Phase factors can only be (besides 0) 37 and 53. Our time's phase factor is 53. Since the hypotenuse of this special triangle is 5, it requires 5 ticks of dt_p before time can become real and proceed. These 5 ticks represent a ½ cycle of an oscillatory motion. Our time proceeds at dt_pcos53 = $(3/5)dt_p$ or 3 ticks of dt_p. Space-time consists of an ocean of random virtual pairs of points (VP's), one point travels a time dt_p forward in time while the other point travels a time $-dt_p$ backward in time. If their time isn't connected to a 5-tick half cycle, the points quickly (10^{-44}s) lose their time and disappear. These virtual pairs are random and pop up anywhere, as long as their points are always dx away from each other.

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The unpaired point (UP)

The unpaired point (UP) is a point without a partner and thus cannot share its time with a partner. The UP is, therefore, stuck in time and cannot move without the help of the ocean of virtual space time pairs. Since distances must be in integral numbers of dx, only equilateral triangles with angles of 60^o are allowed for the Ups motion.

-dt
UP
*+ dx +dt

O----------------------* UP

The unpaired point shares its time with the –dt virtual point of a VP. The UP and the –dt point disappear and the +dt point of the virtual pair now suddenly becomes the UP. The Up has moved a distance dx in a time of dt.

When an UP suddenly jumps a distance dx in a time dt, a small impulse, I_{min}, is given to a virtual pair directly in front of the UP, and this pair now becomes an unsynchronized pair (USP).

|
|
|
\ \ ←2 | ←1 /
| \
\ | /
|
\ \ | / +dt
| \

\ | /
\
\ | /
|
| \ /) 53^0
/ \
/ \ -dt
/ | \
/ | \
/ | \
/ →1 | \

When tick 1 happens to both points, they both hit the imaginary axis and disappear.

However, with a small impulse, I_{min}, one of the points could move to tick 2. Tick 2 is becoming a point while tick one is disappearing. They are, therefore, unsynchronized and cannot share their time and disappear like a virtual pair. They last until their small impulse is taken away. They travel in a straight line from the UP movement at the speed of light. Every second, N = (1/dt), USP's are created by the unpaired point.

Electric force and charge

The USP's are flying at random at a rate of N = 1/dt, since the UP makes a jump every dt amount of time. The number of USP's per unit area at a distance r is: $N/(4(pi)r^2)$. If a USP gets close enough, dx, to another UP that can alter its motion, a force occurs. The cross-sectional area that the USP must be within is $(dx)^2$, since it is a trapezoid, not a square or circle (only 60^o angles are allowed). The cross-sectional area is then $2(dx)^2$cos60 = $2(dx)^2(1/2)$

= $(dx)^2$. The number of USP's getting close enough is: $N(dx)^2/(4(pi)r^2)$, setting this equal to the electric force, we have:

$N(dx)^2/(4(pi)r^2) = e^2/(4(pi)3_0r^2)$ hence $N(dx)^2 = e^2/3_0$ and since $N(dx)^2 = c^2dt = dt/(3_0u_0)$

$e = (dt/u_0)^{1/2} = 1.6043 \times 10^{-19}$ C

Recall that $dt = (3/5)dt_p$. If it wasn't for the phase factor in time, the electric force would be stronger, perhaps disallowing large molecules to form.

I_{min}

The energy needed to create a USP is I_{min}, the minimum impulse allowable. I_{min} should be proportional to the time, dt, that it is transferred and the strength of the force constant involved, $1/(4(pi)3_0)$. The terms should be squared since two points are involved:

$I_{min} = (dt/(4(pi)3_0))^2 = (e^2u_0/(4(pi)3_0)^2 = (e^2u_03_0)^2/(4(pi)3_0)^2 = (e^2/(4(pi)3_0^2))^2 \times (1/c^4)$

$C_f\ (e^2/(4(pi)3_0^2))^2 = 6.627 \times 10^{-34}$ Js = h

and $1/c^4 = (5/3)^2\ 4(pi)dx$

$I_{min} = (5/3)^2\ (4(pi)hdx) = (5/3)^2\ (4(pi)hcdt)$

The factor (56.25/57.29) converts angular distance in the small realm to the larger realm where $57.29^0 = 1$ radian. The $(5/3)^2$ factor indicates that the universal time, dt_p, was used in I_{min} 's calculation, whereas only our observational time was used for h.

When a USP causes a permanent change in the motion of the UP, the USP disappears and uses its energy to create an etching in space-time which will cause the UP, on occasion, to permanently move in that direction (non-random motion).

These small velocity changes occur in sequences where if m = the number of movements, then mdx = wavelength = l_w. The number of sequences, n, is determined by the velocity or momentum of the wave. These sequences are the non-random part of the wave. The frequency is the number of times per second that the wave oscillates between the random and non-random parts of the wave. The velocity of the wave is:

$V = (N_0/N)\ c$ where N_0 is the number of non-random movements and N is the total number of movements per second.

The wave will be developed later.

Inertia

The smallest velocity change is $N_0 = 1$ or (c/N). The acceleration looks like:

.a = (#USP's passing close enough to the UP to change its motion (force))(the probability, $(I_{min})^{-1}$

For the etching to occur)(the change in velocity – (4(pi)c/3N))

$.a = F\ (I_{min})^{-1}(4(pi)c/3N)$; $m_e = F/a$

$.m_e = (3NI_{min})/(4(pi)c) = (25dt)/(12(pi)3_0^2)$

$= 9.108 \times 10^{-31}$ kg

Gravitation

The gravitational force is mediated by dual USP's, one from a + charge and one from a – charge, in order to maintain neutrality.

The dual USP's are transferred from one mass to another and vice versa. The force should depend on the number of charged particles in each mass and the probability that one dual USP makes a successful transition from one mass to the other.

# of charged particles in mass $M_1 = M_1/m_0$ where m_0 is the mass of a nucleon.

The success rate (1/P), from the m_e calculation is: $(I_{min}/4(pi)r) \times (N/c) \times (4(pi)/3)$

This rate must be squared since two USP's have to act successfully, together.

$F = (M_1M_2/m_0^2)[(5/3)^2(4(pi)\ h\ dx)/(4(pi)r)]^2 \times [(4(pi)N/3c)]^2$

$F = (5/3)^4(h/m_0)^2\ (4(pi)/3)^2\ (M_1M_2/r^2)$

$(5/3)^4\ (h/m_0)^2\ (4(pi)/3)^2 = 6.67 \times 10^{-11}$ = G

Hence: $F = GM_1M_2/r^2$

Gravity, using universal time (indicated by $(5/3)^4$), should be detected in all phase angle universes, whereas the electric force uses only our observable time and would not be detectable in other universes.

Energy of a wave

$(I_{min}/(4(pi)\ l_w))$ = energy of one step or movement in a sequence $= E_0$

$E_0 = (5/3)^2\ (hdx/l_w)$ for one sequence $E_1 = mE_0 = h(mdx/l_w) = h$

For n sequences per second, the total energy of the wave is E = hn, and since n = f = frequency we have:

E = hf

Spin

The only angle that the momentum vector can be moved to is 60^o. The energy in the motion of the momentum vector when it is moved to 60^o is:

$E = (I_{min}/(4(pi)\ l_w)) = (5/3)^2\ (hdx/\ l_w)$ since $h/\ l_w$ = momentum, p we have $pdxcos60 = .hdxcos60/\ l_w$ for one sequence we have: $E = h(mdx/\ l_w)cos60$ since $mdx = l_w$ and cos60=1/2

E = (1/2) h = spin

```
        \ ← 4       |                  /
   \                |      ←3        /
        \  → 5      |              /
       \            |            /
        \    1→        2→      /
          \         |        /
            \       |      /
              \     |    /     ) 53⁰
                \ | /
 ______________________________time
```

Each tick (1, 2, 3, etc) is a dt_p tick in time. 5 ticks gives a half cycle which can become real time because it fits the 3, 4, 5 triangle, the only triangle with integral sides and the only triangle that can be used for quantized time. Only then, can time progress. Our observable time is $3dt_p$ for every 5.

This produces a phase angle for time of 53^0.

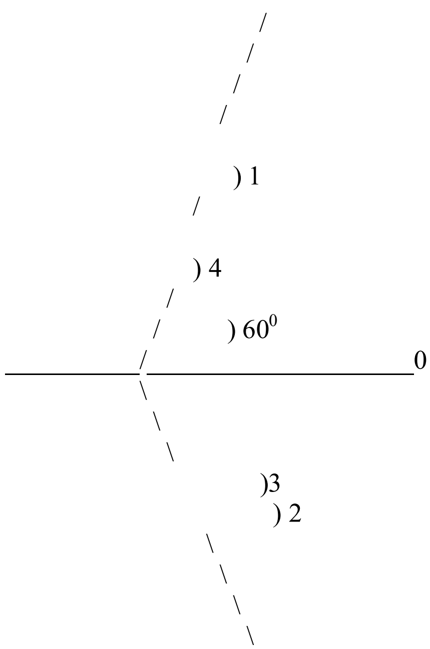
.w = angular velocity = $(.20(pi)/dt_p)$ and ~~Θ~~ = 53 or .29(pi)

Ticks 1 and 2 move forward in time and have +iwn'dt where n' is an integer.. Ticks 3 and 4 are traveling backward in time and have -iwn'dt. Tick 5 is the same as tick 1 and the wave continues.

$$.dt' = \begin{vmatrix} e^{i(wndt+\Theta)} \\ e^{i(wndt+\Theta)} \\ e^{-i(wndt-\Theta)} \\ e^{-i(wndt-\Theta)} \end{vmatrix} dt_p \quad \leftarrow$$

The components do not happen at the same time but happen a time dt after the previous component.

<u>Differential Space wave</u>



Each step (1,2,3,4) is a dt tick and 5 steps are needed for time and motion to progress.

Step 1 (60 to 0) clockwise, +cos60 = +1/2 (up spin)
Step 2 (0 to -60) clockwise, -cos60 = -1/2 (down spin)
Step 3 (-60 to 0) counterclockwise +1/2
Step 4 (0to 60) counterclockwise, -1/2

The spacial differential wave can be written: (k = (pi)/(3dx))

$$\mathbf{.dx} = \begin{vmatrix} +e^{ik.dx} \\ -e^{ik.dx} \\ +e^{ik.dx} \\ -e^{ik.dx} \end{vmatrix} \mathbf{dx_p}$$

The combined differential wave is:

$$X_0\,\mathbf{dx} = \begin{vmatrix} +e^{i[wndt+k.dx]} \\ -e^{i[(wndt+\Theta)+k.dx]} \\ +e^{i[(-wndt+\Theta)+k.dx]} \\ -e^{i[(-wndt+\Theta)+k.dx]} \end{vmatrix} \mathbf{dx_p}$$

Where X_0 = (1, -2, +3, -4) are the numbers for the steps.

The next cycle starts where the first one left off at 0. The steps are:

1) 0 to 60 is + step 2
2) -60 to 0 is –step 1
3) 0 to 60 is + step 4
4) 60 to 0 is + step 3

The new wave set is (+2, -1, -4, +3) which is represented by the matrix transform:

$$\begin{vmatrix} +2 \\ -1 \\ -4 \\ +3 \end{vmatrix} \quad \begin{vmatrix} 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{vmatrix} \quad \begin{vmatrix} +1 \\ -2 \\ +3 \\ -4 \end{vmatrix}$$

Or $X_1\, dx^1 = @^1\, X_0\, dx^1$

The next axis cannot exist since 60 + 60 cannot fit into a 90 quadrant. By multiplying by .i we can use the imaginary part of the wave instead.

.i(cos53 + .i sin53) = .icos53 – sin53 = cos37 + .i sin37

It seems that the phase angle changes from 53 to 37 when the imaginary part of the wave becomes real. The steps are -.i step2, +.i step 1, +.i step 4 and -.i step 3. Or:

$$\begin{vmatrix} +2 \\ -1 \\ -4 \\ +3 \end{vmatrix} \quad \begin{vmatrix} 0 & -.i & 0 & 0 \\ .i & 0 & 0 & 0 \\ 0 & 0 & 0 & .i \\ 0 & 0 & -.i & 0 \end{vmatrix} \quad \begin{vmatrix} +1 \\ -2 \\ +3 \\ -4 \end{vmatrix}$$

Or $X_2 = @^2\, X_0\, dx^2$

The next cycle starts at -60: 1. -60 to 0 is –step1, 2. is – step2, 3 is + step 3, 4. is +step 4:

$$\begin{vmatrix} -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix} \quad \begin{vmatrix} +1 \\ -2 \\ +3 \\ -4 \end{vmatrix}$$

Or $X_3 = @^3\, X_0\, dx^3$

In order for the differential wave to repeat itself the last entry in the last field should take the wave back to the first entry of the first field. To do this the last field must run backwards so that step 4 of the last field goes directly to step 1 of the first (or original field). The steps must be:

$$\begin{vmatrix} -4 \\ +3 \\ +2 \\ -1 \end{vmatrix} \quad \begin{vmatrix} 0 & 0 & 0 & +1 \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{vmatrix}$$

Or $X\, dx = @^4\, X_0\, dx$

<u>The Matter Wave and Dirac's Equation</u>

A larger wave can be constructed with w = 10((pi)/(5dt)), since there are 10 ticks in time's complete cycle; since 1/ndt = f, we have w = 2(pi)f ; similarly, k = 2(pi)/ l_w . To construct the wave, integrate the energy $I_{min}/(4(pi)\ l_w)$ over the differential waves of space and time.

X = ($\underline{I_{min}}$ = $(5/3)^2$ (4(pi)hdx
)4(pi)l_w)4(pi)l_w
= (h X_0cdt + (h@$^i X_0 dx_i$ + (h@$^4 X_0$dx
) l_w) l_w) l_w
h/l_w = hc/l_wc = mc^2/c = mc
= ħw (1/iw) X_0 + ħ @^{i} k_i (1/ik_i) X_0 + @^{4} mc (1/ik) X_0
.w's and k's cancel and 1/.i = -.i

= -.i ħ X_0 -.i ħ @^{i} X_0 + mc @^{4} X_0 (1/ik)

Since this is a free particle, the energy and momentum are constants. Therefore the total derivative of the wave should be zero.

dX/dt = 0
0 = -iħ O) X_0 –iħ @.V X_0 + mc@^{4} X_0
O) t

Where V is the gradient. Not the best looking Dirac's equation but it'll have to do.

Unpairing of Points

A highly improbable occurrence could happen in which three points (one –dt and two +dts) from three different virtual pairs line up exactly dx apart at exactly the same moment. The –dt could start sharing its time with both +dt points simultaneously. The ticks in time would travel from one of the +dts to the –dt then to the other +dt. The –dt would spend twice as much time within the triangle with either +dt than the +dt would. Inside the triple point triangle, the –dt spends 2/3 of its time – outside 1/3, hence its external charge is -1/3. Likewise the external charge for the +dts is +2/3.

These three points would become unsynchronized with their original pair partners and all points would become permanent – two negative Ups and one positive, and three stuck together cause of circumstance.

Once they become permanent, they polarize space-time, so that the once highly improbable occurrence now occurs every dt_p amount of time. This can also happen with the phase angles 0 and 37. They have a slightly better chance because the real time of their virtual pair existence is slightly larger. Our type universe's chances are about 1 in 4.

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