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The Relativistic Unit Circle (including proof of Fermat's Theorem)

Relativity Page (in progress, much more to be said, and revisions to be made)

(This page will be fleshed out with diagrams, explanations, etc, but the basics are here)

$$\frac{c\tau}{c\tau} = 1$$

$$\tau' = \tau \Leftrightarrow c\tau' = c\tau \Leftrightarrow v = 0$$

$$\frac{\tau'}{\tau} = \frac{1}{\sqrt{1-\left(\frac{v\tau'}{c\tau'}\right)^2}} = \frac{1}{\sqrt{1-(\beta)^2}},\ \beta = \frac{v\tau'}{c\tau'}$$

$$\tau = 1 \Rightarrow \tau' > \tau \Leftrightarrow \tau' > 1$$

$$\tau' = \frac{1}{\sqrt{1-\left(\frac{v\tau'}{c\tau'}\right)^2}} = \frac{1}{\sqrt{1-(\beta)^2}} = \gamma_{(v,c,\tau')},\ \beta = \frac{v\tau'}{c\tau'},\ v = 0 \Rightarrow \frac{c\tau'}{c\tau'} = 1'$$

In the linear case, the assumption is that there is no interaction between the initial condition $c\tau$ and the perturbation field $v\tau'$ via complex conjugation, where

$$\psi = c\tau' = v\tau' + c\tau$$

$$\psi\psi^* = (v\tau' + ic\tau)(v\tau' - ic\tau) = (v\tau')^2 + (c\tau)^2$$

If $\psi\psi^* = \psi^*\psi$ is then equated to the final result so that $\psi\psi^* = (c\tau')^2$ then the "time dilation" equation obtains, where one has eliminated the interaction product $\delta = 2(v\tau')(c\tau)$ which arises from the Binomial Expansion for n=2:

$$\varphi = c\tau' = v\tau' + c\tau$$

$$\varphi^2 = (c\tau')^2 = (v\tau' + c\tau)^2 = (v\tau')^2 + (c\tau)^2 + 2(v\tau')(c\tau) = (v\tau')^2 + (c\tau)^2 + \delta$$

Then $\left[(v\tau')^2+(c\tau)^2\right]_\psi > \left[(v\tau')^2+(c\tau)^2\right]_\varphi$ and

$w_\psi = (1_\psi)^2 = (v\tau')_\psi{}^2 = (c\tau)_\psi{}^2$ are countable widgets that don't include the interaction, so that

$2w_\psi = 2(1_\psi)^2 = (v\tau')_\psi{}^2 + (c\tau)_\psi{}^2$; i.e. $1+1=2$

The "metric" for such a system is then a Pressburger arithmetic, which doesn't include scalar multiplication (i.e., scalar "interaction").

For physics, δ is interpreted as "spin" s where h is Planck's "constant" and $h^2 = 2s^2,\ s^2 = (v\tau')(c\tau) \Leftrightarrow s = \sqrt{(v\tau')(c\tau)}$, so that $s = \dfrac{h}{\sqrt{2}}$.

Note that h depends on the set $\{v, c, \tau, \tau'\}$ in the case where interaction is included in the analysis. In particular, for $c=\tau=1$, the relativistic unit circle in terms of sine and cosine (no interaction) is generated, and the perturbed system γ is represented by hyperbolic sine and cosine.

The confusion lies in that $c\tau' = c\tau$ for both the initial state (where there is no field) and the final state when $v=0$ (the perturbation has stopped – i.e., the system has finally absorbed the field ($1 \to \gamma, \dfrac{c\tau}{c\tau} \to \dfrac{c\tau'}{c\tau'} \Leftrightarrow \tau \to \tau'$), corresponding to a positive "rotation" from $\beta=0 \to \beta=\sin\theta$ in the non-interacting case, and from $\theta=0 \to \tan\theta = \beta\gamma$ in the interacting case. These angles are the same in the relativistic unit circle, but in the interacting case, the unit radius has changed from $1 \to \gamma$ in the interacting case. Note that absorption corresponds to a positive rotation $\beta > 1$ and radiation corresponds to a negative rotation $\beta < 1$; for a single particle $\beta=0 \Leftrightarrow \gamma=1 \Leftrightarrow v=0$

Radiation involves the reverse product, so that $\gamma \to 1, \dfrac{c\tau'}{c\tau'} \to \dfrac{c\tau}{c\tau} \Leftrightarrow \tau' \to \tau$

If $\gamma=1$ in the rotation, there is no interaction (sin and cos are "orthogonal"); otherwise, the interaction term is $\delta = 2\sin\theta\cos\theta = 2\left(\dfrac{\beta}{\gamma}\right)$, but since this is 0 at $\theta = 0, 2\pi$, nothing has changed in a complete rotation, since it represents a final state = initial state.

For $n > 2$, each n widgets are non-interacting, where $v=0$ both for the initial case and the final case, and can thus be counted as integers. For the Binomial Expansion for integers, this means that $c^n = a^n + b^n + rem(a,b,n)$ for $\{a, b, c, n\}$ positive integers; since $rem(a,b,n) > 0$ represents integer multiplication, the factors $w^n = (w')^n + w^n \neq 2$ cannot be counted, since the widgets are not in either an initial state or a final state $v \neq 0$. For $v = 0$, $(w')^n = 0$, so $w^n = w^n = 1$, a tautology. This proves Fermat's Theorem.

In order to eliminate interactions where each widget is a dimension, complex conjugation must be implemented for each pair of products in the Multinomial Expansion or the interaction is eliminated by setting $v = 0$ for all interactions. The states are then either final states ("affine" vectors with no connection) or initial states ("affine" vectors with no connection), where the "connection" implies that there is a local interaction. This result also proves Euler's conjecture, and validates Gödel's theorem, where propositions that are NOT represented by sequences of prime numbers must also be included for arithmetic completeness (i.e., such propositions can be ambiguous, or "interact", and thus can't be counted).

φ can only be an integer if $v = 0$ so that $[n\varphi = nc\tau \wedge n\varphi = nc\tau']$, $v = 0$ for $\frac{c\tau}{c\tau} = 1$, $\frac{c\tau'}{c\tau'} = 1$, $v = 0$ for $\{c, \tau, \tau'\} > 0$, $v = 0$. That is, n is an integer only for the initial or final state, but cannot be an integer for $v > 0 \Leftrightarrow v\tau' > 0$ unless $v\tau'$ is a countable object by charge conjugation, so that

$$\psi\psi^* = \left[(ct')_{\psi\psi^*}\right]^2 = [c\tau + i(v\tau')][c\tau - i(v\tau')] = \left[(c\tau)^2 + (v\tau')^2\right]_{\psi\psi^*}$$

Where

$$\varphi^2 = (c\tau + v\tau')^2 = (c\tau)^2 + (v\tau')^2 + 2(c\tau)(v\tau')$$

Although it is clear that complex conjugation must be applied to achieve Fermat's expression, so that it doesn't conform to properties of real numbers (which include multiplication), and that the Binomial Theorem is valid even for n=2, it still doesn't show that the expression cannot be integers. This is accomplished by analysis from the Theory of Relativity, where the Time Dilation equation is a linearization of the general Binomial expression for real numbers, since it doesn't include the area of the included triangle (and hence the interaction energy, which is also missing in the outer product).

The Relativistic Unit Circle shows that phi can be an integer only at points such that beta=0 as the hyperbolic expansion is extended, with the "states" merging to a "continuum" as n '> infinity (physicists already know this, I think, anyway..:), the point is that for this model there is no continuum; each integer for which v=c is a final state, where ct'/ct' = 1 so nct'/nct'=1, beta=1=v'/c', c' = ct' with each rotation from theta = 0 to theta = pi/2 of the RUC (all elements are positive for v increasing).

It is easy to see this if my diagram is flipped so the vertical sides correspond to the gamma=0 axis, with integers increasing vertically (but the space between them diminishing as n -> infinity)

This result is then extended obviously to n>2, and finally to proof of Euler's conjecture for multinomials

$$\varphi_{ij} = \psi_{ij} = \left(x_i + x_j\right)$$

$$\left(\psi\psi^*\right)_{ij} = \left(x_i + ix_j\right)\left(x_i - ix_j\right) = \left(x_i\right)^2 + \left(x_j\right)^2 + ix_i x_j - ix_i x_j = \left(x_i\right)^2 + \left(x_j\right)^2$$

$$\left(\varphi_{ij}\right)^2 = \left(x_i + x_j\right)^2 = \left(x_i\right)^2 + \left(x_j\right)^2 + 2x_i x_j$$

$$\left[\left(x_i\right)^2 + \left(x_j\right)^2\right]_{(\psi\psi^*)} \neq \left[\left(x_i\right)^2 + \left(x_j\right)^2\right]_{\varphi\varphi^*}$$

$$\left(\psi\psi^*\right)_{ij} \neq \left(\varphi_{ij}\right)^2$$

$$\left(\psi\psi\right)^* = \left(\varphi_{ij}\right)^2 \Leftrightarrow \left(x_j = 0\right) \wedge x_i = x_j$$

$$x_i = x_j \Rightarrow 2x_i x_j = 2\left(x_i\right)^2,\; x_j \sim \exists_j$$

(An imaginary number is complex only if you think it is real)…. ☺ That is, an imaginary number (negative axis) results from imagining a "connection" at the center of the relativistic unit circle for a single particle in a single dimension or imaginatively removing the interaction between two particles connected at the center by complex conjugation so that $c\tau = c\tau', v = 0$ for all i, j

This result can then extended to the multinomial expansion, where removal of interactions (tensor "contraction") removes dimensions until $n = 2$, at which point the conjugate elements commute, so give the appearance that the result is real. However, the interaction is real only for two particles, in which case negative values only apply to $\beta\gamma = \pm\sin\theta$, representing absorption and radiation respectively, where the "velocity" is a resultant field from all particles relative to the dimension serving as a basis (which must be the smallest to avoid imaginary values where $\left(\frac{c\tau}{c\tau}\right) < 1,\ c = \tau = 1, v = 0$ for the total system (galaxy, universe, photon, ,,…, myself

Newton's laws of momentum and energy

(11/29/2017)

Note that $\frac{\beta}{\gamma}(\beta\gamma) = \beta^2 = \left(\frac{v}{c}\right)^2,\ v, c \neq 0$ for both negative and positive values. For a unit mass,

$V_m = m_0 = (1_m)\frac{v^2}{c^2} = (1_m)\beta^2 = m_0 v^2,\ m_0 = \frac{c\tau'}{c\tau'},\ c = 1,\ v \neq 0$ This is the "kinetic energy" of a single element (dimension) of the S-Matrix for two interacting particles .

When $v = 0$, the kinetic energy disappears, but $c\tau'$ remains as the final state, which is the correspondence to Newton's law of energy, and in first order represents the equal and opposite forces of two identical partcles.

$$\delta = h = 2(v\tau')(c\tau),\ h = h(c, \tau, v, \tau')$$
$$\frac{\tau}{\tau} = 1_{initial} \Leftrightarrow h_{initial}$$
$$\frac{\tau'}{\tau'} = 1_{final} \Leftrightarrow h_{final}$$
$$s^2 = (v\tau')(c\tau)$$
$$s = \sqrt{(v\tau')(c\tau)} = \frac{h}{\sqrt{2}}$$

$\delta = \tau = \tau' = c = 1 \Leftrightarrow 1_0 v = P = m_0 v,\ m_0 = 1_0$ which is Newton's Law of Momentum

Since the momentum is equal and opposite, the polarities of δ can be represented by $\pm\frac{v}{c} = \pm\beta$.

The Pauli Matrices 12/05/2017 (In progress)

Note to self (needs to be implemented) The square of an imaginary number is not a negative real number. That is, the product of two imaginary numbers is an imaginary area, not a real area.

$$i = \sqrt{-1}$$
$$i^2 = i \cdot i \neq -1$$
$$-i^2 = -(i \cdot i) \neq 1$$
$$i^4 \neq (-1)(-1) = 1^2$$

Much more to be said (I'm pedaling as fast as I can).

$$\sigma_1 = \begin{vmatrix} 0 & 1 \\ 1 & 0 \end{vmatrix}, \ \sigma_2 = \begin{vmatrix} 0 & i \\ -i & 0 \end{vmatrix}, \ \sigma_3 = \begin{vmatrix} 1 & 0 \\ 0 & -1 \end{vmatrix}$$

$$\sigma_3 = \begin{vmatrix} 1 & 0 \\ 0 & -1 \end{vmatrix} \neq \begin{vmatrix} -i^2 & 0 \\ 0 & i^2 \end{vmatrix}$$

(To be revised and re-written).

Adding the identity matrix for two dimensions yields

$$\sigma_0 = \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} = \begin{vmatrix} -i^2 & 0 \\ 0 & -i^2 \end{vmatrix}$$

$$\sigma_{03} = \sigma_0 + \sigma_3 = \begin{vmatrix} -i^2 & 0 \\ 0 & -i^2 \end{vmatrix} + \begin{vmatrix} -i^2 & 0 \\ 0 & i^2 \end{vmatrix} = \begin{vmatrix} 2 & 0 \\ 0 & 0 \end{vmatrix}$$

Where $Tr(\sigma_{03}) = 0$ and $Det(\sigma_{03}) = -2(1^2)$

Note that $Tr(\sigma_0) = 2$ and $Det(\sigma_0) = 1^2$

(To be continued)

(In progress)

Since $c\tau > 0$ this can then represent charge with no mass in the Pauli Matrix:

$$\sqrt{\sigma_1} = \begin{vmatrix} 1 & 0 \\ 0 & i \end{vmatrix}$$

$$\sigma_1 = \begin{vmatrix} 1 & 0 \\ 0 & -1 \end{vmatrix} = \left(\sqrt{\sigma_1}\right)^2$$

Note that the trace of this matrix is 0, but the cross product is

$$\sigma_1 \otimes \sigma_1 = -(v1_0)^2 = (iv \otimes iv)(1_0)^2$$
$$v = 1 \Leftrightarrow \sigma_1 \otimes \sigma_1 = -(v1_0)^2 = -(1_0)^2$$

That is, the interaction of the two positive elements is zero if referenced to the center of the circle, where $\gamma = \cos\theta, \beta = \sin\theta$, since $\sin\theta \perp \cos\theta$ so that $\sin\theta \bullet \cos\theta = 0$.

Where the imaginary number means the system is viewed from the center of the rest mass $c\tau$, so that this is equivalent to the matrix

$$|S| = \frac{1}{2}\begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} = \begin{vmatrix} \frac{1}{2} & 0 \\ 0 & \frac{1}{2} \end{vmatrix},$$

where the observer of two particles is at the zero point mass/energy $c\tau = 0$. The interaction of each particle is then $s_i = \frac{1}{2}$ with the diameter of the circle equal to $2 = 2c\tau.\ c = \tau = 1$, and $r = c\tau$. Note that the trace of the spin matrix $|S| = 1$.

For two particles

$$2|S| = \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} = \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}$$, so that

$$\varphi^2 = 1^2 + 1^2 + 2S = \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}^2 + \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}^2 + 2\begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}\begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix},\ v = 1$$

For the interaction of two positive particles $c\tau, v\tau' > 0$ with the interaction at the center if the circle, representing equal and opposite momentum/force,

$$v \neq 0,\ \beta < 1$$

$$\varphi^2 = \frac{1}{\gamma}^2 + \beta^2 + 2S = \frac{1}{\gamma}^2 + \beta^2 + 2\frac{\beta}{\gamma} = \frac{1}{\gamma}^2 + \beta^2 + 2\tan\theta$$

This interaction can then be eliminated by the Pauli Matrices where

$$\sigma_2 = \begin{vmatrix} 0 & 1 \\ 1 & 0 \end{vmatrix},\ \sigma_3 = \begin{vmatrix} 0 & -i \\ i & 0 \end{vmatrix}$$

$$\delta = \sigma_2 + \sigma_3 = \begin{vmatrix} 0 & 1-i \\ 1+i & 0 \end{vmatrix}$$

$$\delta\delta^* = \begin{vmatrix} 0 & 1-i \\ 1+i & 0 \end{vmatrix}\begin{vmatrix} 0 & 1+i \\ 1-i & 0 \end{vmatrix} = \begin{vmatrix} 0 & 1^2 \\ 1^2 & 0 \end{vmatrix}$$

$$Tr(\delta\delta^*) = 0$$

So that the mass interaction is imaginatively removed in σ_1 by moving the reference point to the center of the circle and modeling charge as complex, and by charge conjugation in the case of σ_2 and σ_3

Note that $Tr(\sigma_1 + \sigma_2 + \sigma_3) = Tr\left(\begin{vmatrix} 1 & 0 \\ 0 & -1 \end{vmatrix} + \begin{vmatrix} 0 & 1-i \\ 1+i & 0 \end{vmatrix}\right) = 0$

So that charge is imaginary if referenced from the center of the circle, which corresponds to the relation

$\psi\psi^* = \frac{1}{\gamma}^2 + \beta^2$ where the interaction term $2\left(\frac{\beta}{\gamma}\right)_\varphi$ has been removed by charge conjugation:

$$\psi = \left(\frac{1}{\gamma} + i\beta\right)$$

$$\psi\psi^* = \frac{1}{\gamma}^2 + \beta^2 = \left(\frac{1}{\gamma} + i\beta\right)\left(\frac{1}{\gamma} - i\beta\right)$$

$$v > 0$$

$$\varphi^2 = [\gamma + \beta][\gamma + \beta] = \gamma^2 + \beta^2 + 2\beta\gamma$$

$$\psi\psi^* = [\gamma + i\beta][\gamma - i\beta] = \gamma^2 + \beta^2$$

$$\varphi = \gamma = 1 + \beta\gamma$$

$$\varphi^2 = \gamma^2 = 1^2 + (\beta\gamma)^2 + 2\beta\gamma$$

$$\varphi^2 = \cosh^2\theta = 1^2 + \sinh^2\theta$$

$$v = 0,\ \theta = 0 \Leftrightarrow \cosh^2\theta = 1^2,\ \sinh^2\theta = 0$$

The Minkowski matrix

$$\sqrt{\left|\mathrm{I_m}\right|} = \begin{vmatrix} \sqrt{1} & 0 & 0 & 0 \\ 0 & \sqrt{1} & 0 & 0 \\ 0 & 0 & -i & 0 \\ 0 & 0 & 0 & i \end{vmatrix}$$

$$(-i)^2 = (-1)^2 i^2 = -1$$
$$i^2 = -1$$
$$-(i)^2 = 1(-1) = 1 \quad ???$$

$$\left|\mathrm{I_m}\right| = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -i^2 & 0 \\ 0 & 0 & 0 & (1)^2 i^2 \end{vmatrix} = \begin{vmatrix} 1^2 & 0 & 0 & 0 \\ 0 & 1^2 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & i^2 \end{vmatrix}$$

$$\varphi = \psi = \sqrt{1} + \sqrt{-1} = \sqrt{1} + i$$
$$\varphi^2 = \left(\sqrt{1}\right)^2 + i^2 + 2i\sqrt{1} = 1 + (-1) + 2i\sqrt{1} = 2i\sqrt{1}$$
$$\psi\psi^* = \left(\sqrt{1} + i\right)\left(\sqrt{1} - i\right) = 1 - i^2 = 2$$
$$\varphi^4 = -4$$
$$(\psi\psi^*)^2 = 4$$
$$\left[\varphi^2 + i(\psi\psi^*)\right]\left[\varphi^2 - i(\psi\psi^*)\right] = \left(\varphi^2\right)^2 + (\psi\psi^*)^2$$