The Relation of the Number e to Foundations of Mathematics and Physics

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The following shows the relation of the number e to the Relativistic Unit circle, the Lorentz expansion, and the Binomial Theorem.

Physical System in Initial State

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

$$\cosh\theta = 1 + \sinh\theta$$

$$e = \lim_{n\to\infty}\left(1+n^{-1}\right)^n = \lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n = \lim_{n\to\infty}\left(\gamma+\frac{1}{\beta}\right)^n$$

$$\gamma = 1,\ \beta = n$$

$$\lim_{n\to\infty}\left(\gamma+\frac{1}{\beta}\right)^n = \lim_{n\to\infty}\left(a+b\right)^n$$

$$a = 1 = \gamma, b = \frac{1}{n},\ n = \frac{c}{v}$$

$$c^n = \left(a+b\right)^n = a^n + b^n + rem(a,b,n) = 1^n + \left(\frac{1}{n}\right)^n + rem(1,\frac{1}{n},n)$$

$$e = \lim_{n\to\infty}\left(\gamma+\frac{1}{\beta}\right)^n = \lim_{n\to\infty} c^n = \lim_{n\to\infty} c^n \left(a+b\right)^n = 1^n + \left(\frac{1}{n}\right)^n + rem(1,\frac{1}{n},n)$$

Physical System in Final State

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

$$\cos\theta = \frac{e^{ix} + e^{-ix}}{2} = \mathrm{Re}(e^{ix})$$
$$\sin\theta = \frac{e^{ix} - e^{-ix}}{2i} = \mathrm{Im}(e^{ix})$$

The number e is not defined for the system or positive real numbers in the final state where $\frac{c\tau'}{c\tau'} = 1$, since $i = \sqrt{-1} \Leftrightarrow i^0 = 0,\ i^1 = \left(i^0\right)^1 = 0^1,\ \left(i^0\right)^2 = \left(0\right)^2$ That is, the "translation" of the "zero point" energy to the center of the relativistic unit circle on the real axis implies an imaginary "connection" between the affine vectors of $\sin\theta$ and $\cos\theta$. But all rotations are positive since all values in the RUC are positive definite, so that $\sin(i\theta) = \sin\left(i^0\theta\right) = 0, \cos\left(i^0\theta\right) = 1$

$\sin\theta$ and $\cos\theta$ are defined for the RUC only in the relation $1^2 = \cos^2\theta + \sin^2\theta$ which is only valid in the conjugate product

$$\psi = \cos\theta + \sin\theta$$
$$\psi\psi^* = \left(\cos\theta + i\sin\theta\right)\left(\cos\theta - i\sin\theta\right) = \cos^2\theta + \sin^2\theta$$

Which is only valid with the interpretation $i^2 = \left(-1\right) = i^1 \cdot i^1$

But $i^1 = (0)^1 = 0$

Therefore the "negative' sign for θ in the a clockwise rotation implies a decrease from one positive value to a less positive one (or to a final value of $\theta = 0$, keeping in mind that the actual physical description is $\gamma = \frac{\tau'}{\tau},\ \beta = \frac{v}{c}$:

$$\gamma = 1 + \beta$$
$$\gamma^2 = 1^2 + \beta^2 + \beta$$

NOT

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

Which is only valid for an imaginary perturbation.

Note that for all three Pauli matrices, $Tr(\sigma_i) = 0 = Tr\begin{vmatrix} 0 & 0 \\ 0 & 0 \end{vmatrix} = 0$ and for the Dirac gamma matrix:

$$Tr(\gamma) = Tr\begin{vmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \end{vmatrix} = Tr\begin{vmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{vmatrix} = 0$$, which means that there is "nothing there",

corresponding to the "wow" of physics and the Electromagnetic Tensor, so that if rest mass is not included, then relativistic spin interaction corresponds to a "spin" of nothing (no particles).

$$\cosh\theta = \frac{e^{\theta}+e^{-\theta}}{2} = \frac{e^{\gamma\beta}+e^{-\gamma\beta}}{2} \Leftrightarrow \cosh(n\theta) = \frac{e^{n\theta}+e^{-n\theta}}{2} = \frac{e^{n(\gamma\beta)}+e^{-n(\gamma\beta)}}{2}$$

$$\sinh\theta = \frac{e^{\theta}-e^{-\theta}}{2} = \frac{e^{\gamma\beta}-e^{-\gamma\beta}}{2} \Leftrightarrow \sinh(n\theta) = \frac{e^{n\theta}-e^{-n\theta}}{2} = \frac{e^{n(\gamma\beta)}-e^{-n(\gamma\beta)}}{2}$$

$$\tanh\theta = \frac{e^{\gamma\beta}-e^{-\gamma\beta}}{e^{\gamma\beta}+e^{-\gamma\beta}} \Leftrightarrow \tanh n\theta = \frac{e^{n(\gamma\beta)}-e^{-n(\gamma\beta)}}{e^{n(\gamma\beta)}+e^{-n(\gamma\beta)}}$$

Absorption

$\tau' > \tau \Leftrightarrow \left(\frac{\tau'}{\tau}\right)^2 = (\gamma)^2 > 1^2,\ (\beta\gamma)^2 > \beta^2(1^2) = \beta^2$, where

$$\psi = 1+\beta\gamma$$
$$\psi\psi^* = (1+i\beta\gamma)(1-i\beta\gamma) = 1^2 + (\beta\gamma)^2$$
$$\mapsto |\psi|^2 = |\psi\psi^*| = \gamma^2$$
$$\gamma^2 = 1^2 + (\beta\gamma)^2$$
$$\cosh^2\theta = 1^2 + \sinh^2\theta$$

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

$$v > c \Leftrightarrow \tau' > \tau$$
$$\varphi^2 = (1+\beta\gamma)^2 = 1^2 + (\beta\gamma)^2 + 2\beta\gamma = 1^2 + 2(\beta\gamma)(1^2+\beta\gamma)$$
$$\beta = \gamma = 1$$
$$\varphi^2 = 1^2 + 2[2](1^2) = 1^2 + 4(1^2) = (4+1)(1^2) = 5(1^2)$$
$$\gamma = 1, \beta = n$$
$$\varphi^2 = (1+n)^2 = 1^2 + (n)^2(1^2) + 2n(1^2) = 1^2 + 2(n)1^2(n+1) = 1^2 + 2n(n+1)$$
$$\varphi^2 = 1^2 + 2A_{(n+1)},\ \ A_{(n+1)} = n(n+1)$$

With each increment of $n+1$, a new dimension (integer) is created via multiplication (interaction).

$$\varphi_{n+1} = \left[n + (n+1)\right]$$
$$(\varphi_{n+1})^2 = n^2 + (n+1)^2 + 2n(n+1)$$
$$\psi\psi^* = \left[n + i(n+1)\right]\left[n - i(n+1)\right] = n^2 + (n+1)^2$$
$$(\varphi_{n+1})^2 = \psi\psi^* + 2n(n+1) = \psi\psi^* + 2A_{n+1}$$

Note that A_{n+1} is an increase from an original state $A_n = n^2$

Radiation