A short version of the G.U.T.

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Initial State -> Final State $\tau \longrightarrow \tau'$

$$\frac{1}{\gamma} = \cos\theta \Rightarrow 1 = \frac{c\tau'}{c\tau'} = \frac{x'}{x'}$$

$$\beta = \frac{v}{c} = \sin\theta \Rightarrow \sinh\theta = \beta\gamma$$

$$1 \Rightarrow \cosh\theta = \gamma$$

$$\frac{\beta}{\gamma} = 1 = \tan\theta = \frac{\sin\theta}{\cos\theta} \Rightarrow \sinh\theta$$

$$1 = \cos\theta + \sin\theta$$

$$\psi^2 = 1^2 = \cos^2\theta + \sin^2\theta = (\cos\theta + i\sin\theta)(\cos\theta - i\sin\theta)$$

$$\varphi^2 = (\cos\theta + \sin\theta)^2 = \cos^2\theta + \sin^2\theta + 2\sin\theta\cos\theta = 1^2 + 2\sin\theta\cos\theta$$

$$s^2 = \sin\theta\cos\theta = \frac{\beta}{\gamma}$$

$$h^2 = 2\sin\theta\cos\theta = 2s^2$$

$$s = \frac{h}{\sqrt{2}} = \sqrt{\frac{\beta}{\gamma}}$$

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

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

$$\varphi^2 = \gamma^2 = (1 + \sinh\theta)^2 = (1 + \sinh\theta)(1 + \sinh\theta) = 1^2 + \sinh^2\theta + 2\sinh^2\theta$$

$$s^2 = \sinh^2\theta = (\beta\gamma)^2$$

$$h^2 = 2\sinh^2\theta = 2s^2$$

$$s = \frac{h}{\sqrt{2}} = \sinh\theta = \beta\gamma$$

$$\varphi = x + \frac{dx}{dt}$$

$$\varphi^2 = \left(x + \frac{dx}{dt} \right) 2 = x^2 + \varphi = x^2 + \left(\frac{dx}{dt} \right)^2 + 2x\frac{dx}{dt} = x^2 + v^2 + 2xv$$

$$\varphi = m_0 + \frac{dm_0}{dt}$$

$$\varphi^2 = \left(m_0 + \frac{dm_0}{dt} \right) 2 = m_0{}^2 + \varphi = m_0{}^2 + \left(\frac{dm_0}{dt} \right)^2 + 2m_0\frac{dm_0}{dt} = m_0{}^2 + v^2 + 2m_0 v = m_0{}^2 + v^2 + 2P_0$$

$$\varphi = \varepsilon_0 + \frac{d\varepsilon_0}{dt} = \varepsilon_0 + \mu_0$$

$$\varphi^2 = \left(\varepsilon_0 + \mu_0 \right)^2 = \varepsilon_0{}^2 + \mu_0{}^2 + 2\varepsilon_0\mu_0$$

$$c^2 = \frac{1}{\sqrt{\varepsilon_0\mu_0}} \Leftrightarrow c = \frac{1}{\varepsilon_0\mu_0}$$

$$\varphi^2 = \left(\varepsilon_0 + \mu_0 \right)^2 = \varepsilon_0{}^2 + \mu_0{}^2 + \frac{2}{c}$$

$$c \to \infty \Rightarrow \varphi^2 \to \varepsilon_0{}^2 + \mu_0{}^2 \Leftrightarrow \left(wow \right)^2 + \left(ow \right)^2$$

Initial State $c\tau$

$\frac{c\tau}{c\tau} = 1,\ v = 0$

Add perturbation $v\tau' \neq 0$

Absorption $\frac{\tau'}{\tau} = \gamma$

Radiation $\frac{\tau}{\tau'} = \frac{1}{\gamma}$

Final state $\frac{c\tau'}{c\tau'}=1, v=0$

Absorption of interaction energy

$$\frac{\tau'}{\tau}=\gamma$$

$$\delta E=2\beta\gamma$$
$$s=\beta\gamma$$
$$s^2=\frac{h^2}{\sqrt{2}}$$

(Note: h is depends on interaction product $s=\beta\gamma$

$$(c\tau')^2=(ct)^2+(v\tau')^2+2(v\tau')(c\tau)$$
$$\frac{c\tau}{c\tau}\to\frac{c\tau'}{c\tau'}\Leftrightarrow\tau\to\tau'\ \left(c\to c',\ \tau'=\tau\right)$$
$$\gamma^2=1^2+(\beta\gamma)^2+2\beta\gamma$$
$$\cosh^2\theta=1^2+\sinh^2\theta+2\sinh\theta\cosh\theta$$
$$\cosh^2\theta=1^2\Leftrightarrow\theta=0\Leftrightarrow\beta=0\vee\gamma=0$$
$$\beta=0\Rightarrow\gamma=1$$
$$\beta=1\Rightarrow\gamma=0$$

$$\delta E=2\beta\gamma$$
$$s=\beta\gamma$$
$$s^2=\frac{h^2}{\sqrt{2}}$$

Radiation of interaction energy

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

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

$$\frac{c\tau'}{c\tau'} \to \frac{c\tau}{c\tau} \Leftrightarrow \tau' \to \tau \ \ (c' < c,\ \tau' = \tau)$$

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

$$1^2 = \cos^2\theta + \sin^2\theta + 2\sin\theta\cos\theta$$

$$\cos^2\theta = 1^2 \Leftrightarrow \theta = 0 \Leftrightarrow \beta = 0 \vee \frac{1}{\gamma} = 0$$

$$\beta = 0 \Rightarrow \frac{1}{\gamma} = 1$$

$$\beta = 1 \Rightarrow \frac{1}{\gamma} = 0$$

Note that:

$$\cosh\theta = \frac{e^{i\theta} + e^{-i\theta}}{2} = \gamma\beta$$

$$\cos\theta = \frac{1}{\gamma}$$

$$cos\theta = \cosh\theta \Leftrightarrow \theta = 0$$

$$\cos^2\theta = \cosh^2\theta \Leftrightarrow \theta = 0$$

“Time Dilation” Equation

$$\psi = 1 = \frac{1}{\gamma} + \beta = \cos\theta + \sin\theta$$

$$1^2 = \left[\left(\frac{1}{\gamma}\right) + \beta\right]^2 \Leftrightarrow 1^2 = \left[\cos\theta + \sin\theta\right]^2$$

$$1^2 = \cos^2\theta + \sin^2\theta \Leftrightarrow 1^2 = \left(\cos\theta + i\sin\theta\right)\left(\cos\theta - i\sin\theta\right) = \psi * \psi$$

(Conjugation “destroys” the interaction) where

$\gamma = \frac{1}{\sqrt{1-\beta^2}}, \beta = \frac{v}{c}$ (only valid in “inertial” frames where $\left(c\tau, v\tau'\right)$ is orthogonal, but the interaction $\left(v\tau'\right)\left(c\tau\right)$ is eliminated by conjugation:

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

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

So that $s = 2\left(c\tau\right)\left(v\tau'\right)$ is ignored ($s = 0$ only if the perturbation is imaginary; “added” and “subtracted” from the correct equation). This is a model in which the perturbation does not affect the initial condition (light and matter do not interact; photons of different “frequencies” do not interact; colors once created do not change)

Both “Red Shift” and “Einstein Rings” are models in which the interaction is included; however, the general case is described by the Multinomial Expansion (in which the “nomials” are paramterized by the interactions)

Counting and its relation to the Binomial Theorem

(Note that an expression like $\left("1"_{pq}{}^{pq} \right) = \left("1"_{pq}{}^{pq} \right) = k_{pq} a^p b^q$ is "counted" as one "twidget".

Increasing or decreasing the power in the binomial expansion increases or decreases the "twidget" count by one.

, and twidgets of equal powers are "self interacting" (in Godel / Wittegenstein's models, "self referral" propositions / sentences). An arithmetic without multiplication is a "Pressburger" arithmetic, and Fermat's expression is an example of such an arithmetic, which is incomplete without subtraction (i.e., complex numbers). However, elimination of the interaction by conjugation only applies to the case n=2 for two-"nomials". Thus the relevance of other math relations (hamiltonians, Mandleborot sets, etc.) for higher orders and generalizations of the real numbers (which includes subtraction and division)

Philosophically, one only counts twidgets if they are invariant (exactly identical); and a change in a twidget has a "causal" interpretation, where the "zero mass" and "instantaneous speed" of light is detectable only if you get a sunburn or see a red shift or an "Einstein ring" on the focal plane of a detector. For ordinary experience, then setting $c = 1$ for Newton's and Maxwell's equations $\beta = \frac{v}{c} = 1$ means that change is described by "velocities" and "colors" of experienced (experimental) bodies, in which observers can agree on the results within error limits, and light does not interact with mass (i.e., ignoring quantum mechanics and relativity).

Note that for $\tau' > \tau \quad \beta\gamma < \gamma \Leftrightarrow \beta < 1$ so β cannot be an integer, and that $\beta = \frac{v}{c} < 1$ is a result of the invariance of $\gamma = 1$ at $v = 0 \Leftrightarrow \theta = 0, \beta = 0, \gamma = 1$ and is a mathematical result, not a physical one.

Also note that $\frac{d\varphi}{dn} = \frac{d(a+b)^n}{dn} = n(a+b)^{n-1} = n\frac{\varphi^n}{(a+b)}$ which corresponds to a reduction in dimension (the "contraction" of a tensor), which can be successively performed until $n = 1$, at which point $\varphi = (a+b)$

For STR (and the Binomial Expansion) the addition of a “perturbation” b to and initial (invariant) state a always results in an increase from the initial condition; reduction is only possible for $n=2$ where the “perturbation” can be removed by complex conjugation. In STR, $m_0 = ct_c$ is the “rest mass” of an initial invariant of the system and is the condition of its existence (for multiple system, there can be many different initial states, which correspond to the minimum mass of a “photon”; experimentally this corresponds to the minimum observable photon (at $T=0$ in the equation $\varphi^2 = \frac{N_d}{N_a}\exp(\frac{k}{q}T)$ where $N_d = N_a$ and $\frac{k}{q}T = 0$ so that $\varphi^2 = 1^2$ Note that the transformation $\tau' < \tau$ simply reduces the “rest” mass, so that $\tau' = \tau = 0 \Leftrightarrow \varphi_0 = m_0 = ct_c = 0$

Note that one can include the “change” in the perturbation so that $(\varphi')^2 = \gamma^2 + \beta^2 + 2\beta\gamma = \gamma^2 + (\beta')^2$ which can be characterized when $\gamma = \beta$ or:

$$\varphi = 1+1$$

$$\varphi^2 = 1^2 + 1^2 + 2(1^2) = 1^2 + \left[\sqrt{1^2 + 2(1^2)}\right]^2 = 1^2 + \left[\sqrt{3\left(1^2\right)}\right]^2 = \gamma^2 + (\beta')^2$$

This corresponds to the fundamental fiction of Quantum Field theory..

When interactions are included, the function $\varphi = v\tau' = c\tau$ is an "integer creator" from the initial state $\frac{\tau_i}{\tau_i} = 1_i$, $v = 0$ to the final state $\frac{\tau_f}{\tau_f} = 1_f$, $v = 0$ so that n integers are created by an initial state defined by $\gamma_i = (c\tau)_i = 1_i$. For c an invariant, $\gamma_i = c\tau_i = 1_i$.

For v an invariant, the transformation is defined by a transitional "non-interacting" state governed by the trigonometric relations $\sin\theta$ and $\cos\theta$ $\left(1, \frac{1}{\gamma}, \beta\right) \Leftrightarrow (1, \cos\theta, \sin\theta)$ and "interacting" hyperbolic functions $(1, \cosh\theta, \sinh\theta)$ with the "virtual" ("imaginary") interaction energies $s^2 = 2\frac{\beta}{\gamma}$ and the real hyperbolic interaction energies $s^2 = 2\beta\gamma$ where $v = 0$ at $\tau' = \tau$ at each integer increase.

It is important to understand that for $v \neq 0$, neither the product $\frac{\beta}{\gamma}$ or $\beta\gamma$ can be an integer in the relations $\varphi = \frac{1}{\gamma} + \beta$ $\varphi = \gamma + \beta$ for $v \neq 0$ in the second order relations

$$\varphi^2 = \left(\frac{1}{\gamma}\right)^2 + \beta^2 + 2\frac{\beta}{\gamma} = \sin^2\theta + \cos^2\theta \pm 2\sin\theta\cos\theta$$ or

$\varphi^2 = 1^2 = \gamma^2 + \beta^2 + 2\beta\gamma = \cosh^2\theta - \sinh^2\theta \pm 2\sinh\theta\cosh\theta$ since φ is a trigonometric or hyperbolic function. The interaction can be removed for

$$\psi\psi^* = \psi^*\psi = \left(\frac{1}{\gamma} + i\beta\right)\left(\frac{1}{\gamma} - i\beta\right) = \left(\frac{1}{\gamma}\right)^2 + \beta^2 = \cos^2\theta + \sin^2\theta = 1^2$$ but not for

$1_f{}^2 = \gamma^2 + \beta^2 = (1 + i\sinh\theta)(1 - i\sinh\theta) = 1^2 + \sinh^2\theta$ until $v = 0$ at $\tau = \tau'$ so that $1_f = \frac{\tau'}{\tau'}$, at which point $1_f = 2$ so the "unit count" has increased by one. n such transforms (Lorentz "rotations" for a particular θ defined by $c\tau$ and $(c\tau)'$ correspond to n integers.

This corresponds to increasing the dimension of the vector space by 1 (an "expansion" of the tensor); a corresponding reduction corresponds to a tensor "contraction". (Note that the interaction product is expressed by the "cross" and "dot" products fundamental to Maxwell's derivation using a "displacement current", and Einstein's prescription of $E = h\upsilon$, fundamental to quantum mechanics, but excludes initial and final states.)

The fact that the interaction energy cannot be eliminated in either case except by introducing complex numbers (an addition of subtraction of interaction energies relative to an “imaginary” hyper-plane) constitutes a proof of Fermat’s theorem for the case $n=2$ The proof is then expanded to the case $n>2$ by inspection of the Binomial Theorem (to “remove” the interactions, each term must have its own “imaginary” relationship, which means the components of the interactions in each term cannot be all positive integers).

This also means that the “Relativistic” unit circle is not valid (does not exist) for the case $n=1$ and is only valid for the case $n=2$ with hyperspheres defined for higher powers for $n>2$ by the Binomial expansion.

The derivative for the real number case can then be defined by:

$$f\,'(1^2) = \lim_{(\beta\gamma)^2 \to 0} \left(\frac{f\left(1^2 + (\beta\gamma)^2\right) - f\left(1^2\right)}{(\beta\gamma)^2} \right)$$

Finally, this is analysis is only valid for two elements; the analysis can be expanded to many bodies via the multinomial expansion (and thus constitutes a proof of Euler’s conjecture, provided on selects the minimum initial state so the interactions are all positive definite.) The selection of the body that characterizes the initial state is an example of the “axiom of choice”, fundamental to Russell’s paradox.

Fermat’s expression is an example of an “unprovable” expression in the case of $n=2$ in the case of Pythagorean triples, since the actual numbers depend on the base of the number system selected, and thus are “outside” the arithmetic formulation of Godel’s arithmetic expression of logical propositions. Including the base in the analysis makes the definition consistent and complete for any configuration of number of bodies and powers in the multinomial expansion.