Relativity, The Binomial Theorem, and Pythagorean Triples

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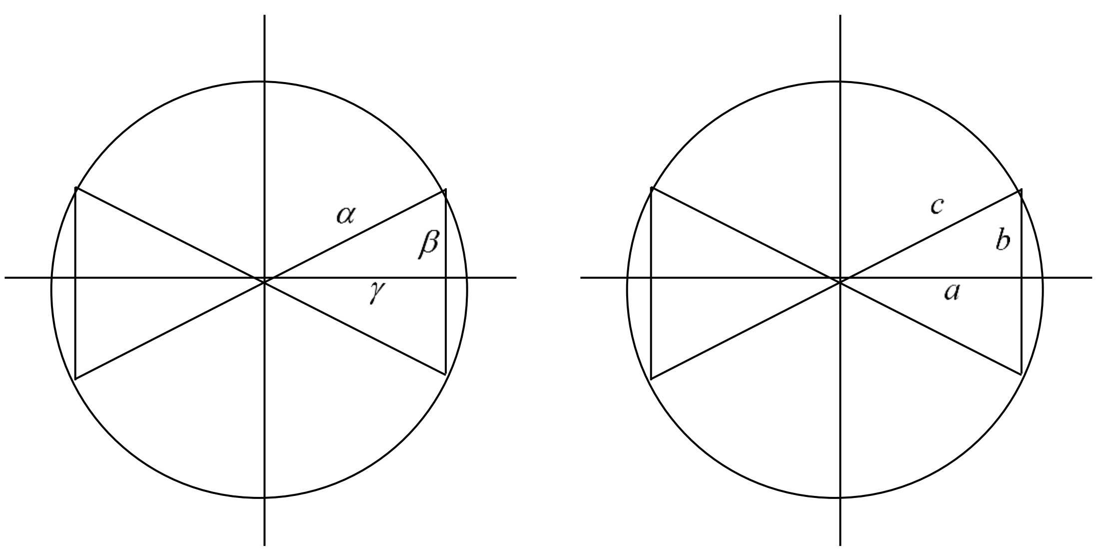
From the decomposition of β into its space-time components $\beta = \frac{v}{c} = \left(\frac{x_v}{t_v} \frac{t_c}{x_c} \right)$, it is clear that the "time dilation" equation $\tau' = \tau\gamma$ is a a relation of linear metric density γ, where the metric "mass" is represented by $m = c\tau$ where $\tau = \frac{x}{c}$ and $x_v = x_c$ in the decomposition, so that $\tau' = \tau\gamma$.

The metric density γ (the variation in "mass" per unit length, where $m' = c\tau' = (c\tau)\gamma = m_0\gamma$) can be plotted against β and compared with the plot of integers for Pythagorean Triples,



where $\alpha^2 = \gamma^2 + \beta^2$ and $c^2 = a^2 + b^2$ For Special Relativity, where $\beta = \frac{v}{c}$, and c is taken to be an invariant, the relativistic unit circle restricts $\gamma = 1, \ \beta = 0$ to a single dimension; however, if c is allowed to vary, then the metric density $\gamma = \frac{1}{\sqrt{1-(\frac{v}{c})^2}} = \frac{1}{\sqrt{1-(\beta)^2}}$ changes with c as well, so the plot represents a change in mass density with respect to β with a change in c - i.e., an "acceleration" with respect to a constant v.

Note that in the plot $\beta \perp \gamma$, so that $\vec{\beta} \cdot \vec{\gamma} = 0$ and $\begin{vmatrix} \beta & 0 \\ 0 & \gamma \end{vmatrix} \to 2\gamma\beta(\vec{0})$ This is the condition that the "perturbation" is independent of γ , so that β is independent of the β_0 of the relativistic unit circle $(\gamma = 1)$ as a change in in the unit density from the formerly "final" condition where c is invariant. (This is also the case with the Lorentz Transform).

Thus the new β is associated with a second orthogonal dimension as a linear acceleration of the original metric.

If "Energy" is identified with area, the area of each triangle in the circle is equal to $E^q{}_{\gamma\beta} = \sqrt{\left(\frac{1}{2}\gamma\beta\right)^2} = \frac{1}{2}|\gamma\beta|$, so the total energy due to the "interaction" represented by $|\gamma\beta|$ in each quadrant is $E_{\gamma\beta} = 4\sqrt{\left(\frac{1}{2}\gamma\beta\right)^2} = 4\left(\frac{1}{2}|\gamma\beta|\right) = 2|\gamma\beta|$

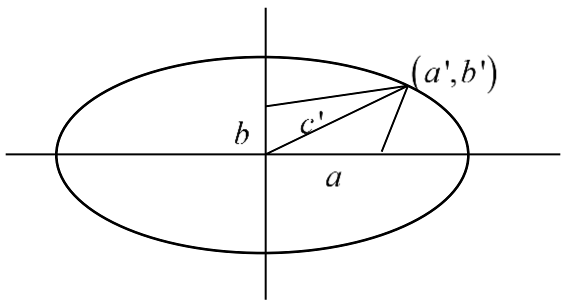
The total Energy of the system can then be represented by the individual energy due to the existence of each dimension plus the "interaction" energy $2|\gamma\beta|$:

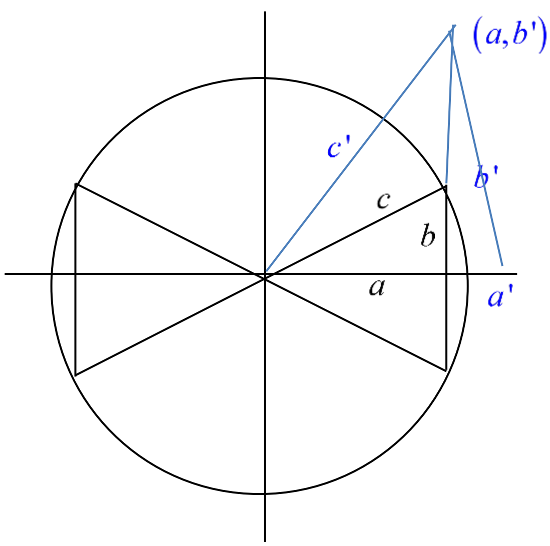
$E = \gamma^2 + \beta^2 + 2|\gamma\beta|$ However, in the case of the "linear" acceleration, there is no "interaction" between γ and β , since $\gamma \perp \beta$, so $\vec{\beta} \cdot \vec{\gamma} = 0$

The same is true of Pythagorean Triples for independent integers in the space (a,b) , since $\vec{a} \cdot \vec{b} = 0$, which results in the equation $c^2 = a^2 + b^2$

This can then be compared with the Binomial Theorem, where $c^2 = a^2 + b^2 + 2ab$ (and $\psi^2 = \gamma^2 + \beta^2 + 2\beta\gamma$) where the interaction energy is independent of the non-perturbed system so that $c^2 = a^2 + b^2$ (no multiplicative interaction between integers) and $\psi^2 = \gamma^2 + \beta^2$, respectively.

If the circle is distorted:





there will be interaction; in each case, however, the area of the triangle to the point (γ',β') or (a,b) relative to the γ or a axis will now be $A_{\gamma'\beta'}=\frac{1}{2}\gamma'\beta'$ or $A=\frac{1}{2}a'b'$, so the total energy will coincide with the Binomial Theorem for (γ',β') and (a',b') where $\overrightarrow{\gamma'}$ and $\overrightarrow{\beta'}$ (and $\vec{a}$ and $\vec{b}$) are not perpendicular, (i.e., (c',a',b') is not a Pythagorean Triple), so that $(c')^2=(a)^2+(b)^2+2(a'b')$ where $2a'b'=rem(a,b,n)$, a' and b' positive integers.

Thus a' and b' represent a "distortion" of the Pythagorean Circle from (a,b) .

The same is true for $\vec{\gamma}'$ and $\vec{\beta}'$, where $(\psi')^2=\gamma^2+\beta^2+2\gamma'\beta'$

In particular, note that c' cannot be an integer (since c included all possible integers in the cases of Pythagorean triples), and similarly for ψ'.

It is clear that $n=2$ represents the number of dimensions in the analysis, and the "interaction" product represents an external interaction to the unperturbed systems (γ,β) and (a,b) . For the case $n=2$, the perturbation can be eliminated by the expression $(\gamma'+i\beta')(\gamma'-i\beta')=(\gamma')^2+(\beta')^2$ where the "imaginary" interaction $i\gamma\beta$ is "added" and "subtracted" simultaneously from the system (effectively "morphing" the distorted diagram back into a circle). Note that the area $2\gamma\beta$ is independent of rotation for a given angle θ in the case of an ellipse, corresponding to Kepler's law.

For the case of higher dimensions $n>2$ for the Binomial Theorem (positive definite energies, or bosons), it is impossible to eliminate interactions by the complex number relation, since the terms in $rem(a,b,n)>0$ always in the relation $(c')^n=(a')^n+(b')^n+rem(a',b',n)$ where a' , b' , and c' do not form a Pythagorean Triple.

For the Pythagorean Triple, $c=a+b$ means that $c^2=a^2+b^2$ where the left and right hand sides of the equality refer to the same unique integer without interaction between a and b, which for positive integers, can only be accomplished by adding and subtracting an imaginary interaction in the case of $c^2=a^2+b^2=a^2+b^2+iab-iab$); otherwise, $c'^2=(a'+b')^2=a'^2+b'^2+2a'b'$, which now includes the interactions. The latter equation can then be easily extended to the Binomial Expansion $(c')^n=(a')^n+(b')^n+rem(a',b',n)$, where c' cannot be an integer, since $rem(a',b',n)>0$ for positive integers, thus proving Fermat's Theorem.

In the case of General Relativity, the Binomial Theorem means that for a linear change in the value of c , the equation $(\psi')^n=(\gamma')^n+(\beta')^n+rem(\gamma,\beta,n)$ implies that ψ' cannot be an integer (even in the case of $n=2$ for $(\psi')^2=(\gamma')^2+(\beta')^2+2\gamma'\beta'$ if there is an interaction between γ' and β'

If γ represents the energy due to electromagnetism and β' represents an interaction due to gravity, the equation becomes $(\psi')^2=(\gamma)^2+(\beta')^2+2\gamma\beta'$ where the components $2\gamma\beta'$ are the two-dimensional components of "gravitational" interaction. If β' represents a change in c , then this "gravitation" refers to "light-on-light" interaction – in QFT, a change in the value of Planck's constant).

In any case, for a linear change in c, for powers of n, the interaction elements in $rem(\gamma, b', n)$ ensure that ψ' cannot be an integer, and correspond to the elements of the Jacobian of the metric tensor in the General Theory of Relativity, where γ represents electromagnetism at the "zero point" energy in the parking lot on earth at a given value of c ("temperature"), and β' refers to a change in temperature, whatever the interpretation (nightfall, gravity, observed non-circular orbit around the Sun, etc.).

In particular, the energy of the metric tensor cannot be an integer if there are interactions between its basis vectors for $n \geq 2$

There is much more to this story, but I don't have space to write it here… ☺