Application of the Time-Dilation Factor to Velocity, Acceleration, and Doppler Shift

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Abstract
The application of a light-speed separation time-dilation factor to velocity, acceleration, and Doppler shift.

With respect to the concepts outlined in [1], we shall consider the application of the derivation of the time-dilation factor.

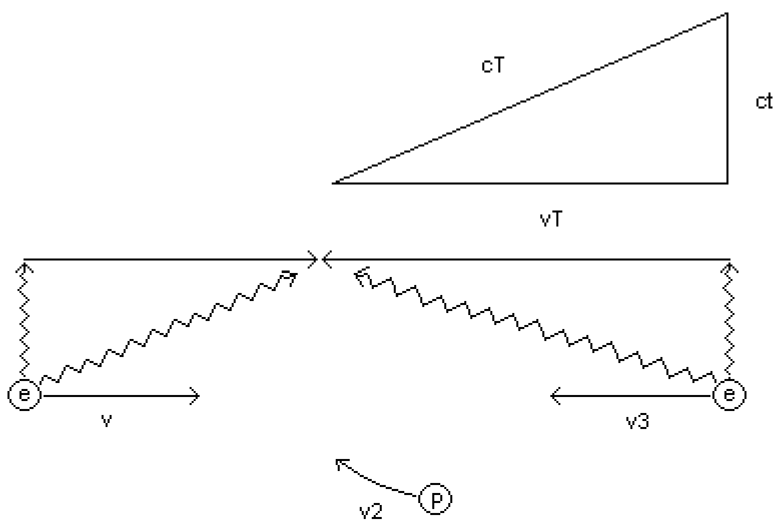

fig1

$$v_2{}'=\frac{v_2}{T}\cdot t$$

fig2

$$v'=v\cdot\left(\frac{c-v}{c}\right)$$

We define a new ratio t', $t'=\frac{v'}{v}$ (For $T=1$) Or the equivalent $\frac{t}{T}$, or t for $T=1$. And therefore, $\frac{v'}{t'}=v$. Considering: $v'=v\cdot\left(\frac{c-v}{c}\right)$ On the right side is the ratio, of the net light speed $(c-v)$ relative to e_2's speed v , to, the real absolute light-speed with e_2 still, c (or in other words, in e_1's POV, e_1 being still). For $c=1$ and $v=0.5$, $v'=0.5\cdot(\frac{1-0.5}{1})=0.25$ and $t'=\frac{0.25}{0.5}=0.5$. And $\frac{c}{t'}-v=\frac{1}{0.5}-0.5=1.5$, which states that, if velocity $v=0.5$, and the mover's length is compressed by $t'=0.5$ then, then the new, now faster, speed, with the compressed size, of light, is 2c , and if the speed of the mover in this new space weren't compressed, the separation of light ahead, the gain, is 1.5c . v' is then the world-apparent resulting speed, scaled to accommodate light to give a separation of c . And v by itself is the under-the-hood (to e_1's POV), true, hidden variable of speed. Likwise, $\frac{c}{t'}-v\cdot T'=\frac{1}{0.5}-0.5\cdot 2=1=c$ and $\frac{c}{t'}-\frac{v}{t'}=c$. The component of velocity v in the same direction as the component of light of c , must be used to make sense of the directionality of time dilation. From the previous equations, $\frac{v'}{v}=1-\frac{v}{c}$ follows.

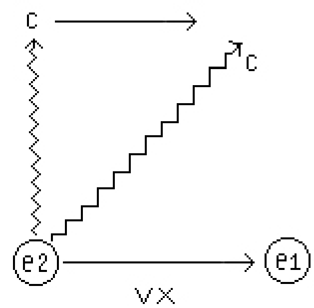

fig3

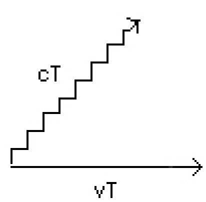

fig4

Using $-\cos(\angle(vT,cT))\cdot 2\cdot vT\cdot cT+(vT)^2+(cT)^2=(ct)^2$, if we take the case where the velocity direction of e_2 is aligned with the shooting of a flashlight, $\cos(0°)=\frac{adjacent}{hypotenuse}=1$, and $c=1$, $v=0.5$, and $T=1$, then $(-1)\cdot 2\cdot 0.5\cdot 1+0.25+1=(ct)^2=0.25$ and $t=0.5$. The angle between the velocity in the perspective of e_1, of e_2's velocity, and the angle that e_2 shoots the light at, in it's own reference frame (still frame of view), as is the angle that e_2 shoots its flashlight at and the opposite direction that it observes e_1 move relative to e_2's frame, is the angle $\angle(vT,cT)$. If the angle is a right angle, then the equation reduces to the classical equation, however, the component of vT is T (that is, the right-angle would be between vT and ct , while the cosine equations measure the angle between vT and cT). And with that, we can apply t' to velocity and acceleration.

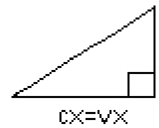

fig5

The component of light and velocity on the x axis, is an angle of 90 degrees for the classical train example. The angle of 90 would have to be for the vT and ct sides. We can decompose these and compare components somehow, in other cases.

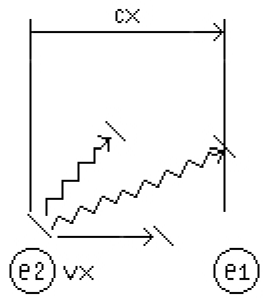

fig6

For $c=5$ and $v=2$, $v'=2\cdot(\frac{5-2}{5})=\frac{6}{5}$. Remember that $\frac{c}{t'}-\frac{v}{t'}=c$ and therefore $\frac{5}{(\frac{3}{5})}-\frac{2}{(\frac{3}{5})}=\frac{25}{3}-\frac{10}{3}=5$. And using the cosine equation outlined in [1]: $-1\cdot2\cdot2\cdot5+4+25=25\cdot t^2$ and $\sqrt{(\frac{(25+4-20)}{25})}=t=\sqrt{\frac{9}{25}}=\frac{3}{5}$. We can also see, $c-v=c\cdot t'$ and $c-v\cdot t'=c\cdot t'+\frac{v^2}{c}$.

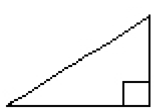

fig7

The classical application with a right-angle triangle, using the original equation, is: $(c\,t)^2+(v\,T)^2=(c\,T)^2$ and $t=\sqrt{(c\,T)^2-(v\,T)^2}=\sqrt{1-0.25}\approx0.866$, but $\frac{5-2}{0.866}\approx3.46\neq5$. As for the $t=\sqrt{-\cos(0^{o})\cdot2\cdot vT\cdot cT+(vT)^2+(cT)^2}=\sqrt{\frac{(29-20)}{25}}=\frac{3}{5}=T\cdot\frac{c-v}{c}$, for $\angle(vT\,,cT)=0^{o}$, it means that the original equation does not provide the necessary value to give $c=5$ separation with $v=2$. Whether we add velocity ($\frac{c+v}{c}$), or subtract ($\frac{c-v}{c}$), depends on whether velocity and the direction of light are positive or negative.

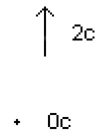

fig8

$$v'=v\cdot\frac{c-v}{c}=2\cdot\frac{1-2}{1}=-2 \qquad t'=\frac{v'}{v}=\frac{-2}{2}=-1 \qquad \frac{v'}{t'}=v \qquad \frac{c}{t'}-\frac{v}{t'}=c$$

If we consider the case where $v=2\text{c}$, the dilation is such that velocity is negative. For $c=1$ and $\downarrow v'=\downarrow v\cdot\frac{\uparrow c+\uparrow v}{\uparrow c}=6=\downarrow v\cdot\frac{-\uparrow c-\uparrow v}{-\uparrow c}$, $\downarrow t'=-3$, $\frac{\downarrow v'}{\downarrow t'}=\downarrow v$, and $\downarrow v=-2$. For $t'=-1$, $a_y'=a_y\cdot t'=-a_y$. We define the subsequent $x_2'=x_1'+v\cdot t'$ and $\downarrow a_y'=t'\cdot\downarrow a_y$. We define $v'=\Delta x'$ and $\frac{v'}{v}=\frac{\Delta x'}{\Delta x}$.

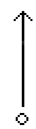

fig9

We can further apply this to the red- and blue-shift phenomena.

$$\frac{1}{3}\cdot c=\left(f\cdot\frac{1}{c}\right)\cdot\lambda \qquad f=\frac{1}{t} \qquad 3\cdot c=f\cdot(\lambda\cdot 3) \qquad \lambda=D \qquad f\cdot\lambda=c$$

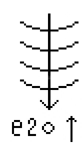

fig10

$$(c+v)=f\cdot\lambda+v \qquad T'\cdot(c+v)=T'\cdot(f\cdot\lambda+v)$$

$\uparrow\lambda'=\uparrow\lambda\cdot\frac{c-\uparrow v}{c}$ In the simple case with no time-dilation of velocity.

$\uparrow\lambda''=\uparrow\lambda\cdot\frac{c-\uparrow v'}{c}$ In the case where time-dilation comes into effect.

$$\uparrow T'\cdot(f\cdot\lambda+\downarrow v)=c \qquad \lambda=\frac{\frac{c}{\uparrow T'}-\downarrow v}{f}$$

$$\uparrow T'=\frac{c}{c-\uparrow v}\neq-(\frac{c}{c-\downarrow v}) \qquad \uparrow v'=\uparrow v\cdot\frac{c-|\uparrow v|}{c}\neq-(\downarrow v\cdot\frac{c-\downarrow v}{c})\neq\uparrow v\cdot\frac{c-\uparrow v}{c}$$

$$\uparrow f''=\frac{\uparrow f}{1+\frac{\downarrow v'}{c}} \qquad \uparrow\lambda''=\uparrow\lambda\cdot(1+\frac{\downarrow v'}{c})$$

$$(f\cdot 3)\cdot(\lambda\frac{1}{3})=c \qquad c+v=f\cdot\lambda+v \qquad t'\cdot(c+v)=t'\cdot(f\cdot\lambda+v)$$

$$\frac{\downarrow f\cdot\downarrow\lambda+\uparrow v}{\downarrow t'}=c \qquad \frac{\uparrow c\cdot(\frac{\uparrow c-\uparrow v'}{\uparrow c})}{\uparrow f}=\uparrow\lambda'' \quad \text{(For } \uparrow(v')>0 \text{)}$$

$$\uparrow f''=\frac{\uparrow f}{(\frac{\downarrow(v')+\uparrow c}{\uparrow c})}=\frac{\uparrow f}{(1-\frac{(c\cdot\uparrow t'-f\cdot\lambda\cdot\uparrow t'^2)}{c})}$$

This can be checked as, given $\lambda=1$ or $\lambda=0.5$, $T'=\frac{1}{12}$ for both cases, so the equations give the same Doppler effect with respect to the wavelength.

We shall consider two electrons e_2 and e_1, with e_2 moving toward or away from e_1 and emitting a light ray towards e_1.

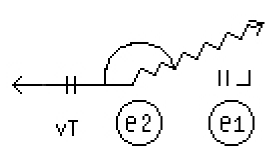

fig11

There is a degree of redundancy in that we can either use an angle of $180°$, or an angle of $0°$ and a negative v , to the same end.

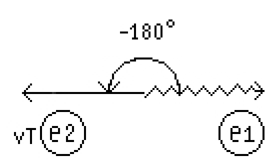

fig12

For a time-dilation factor $t'<1$, it means that e_2 is *younger.*

$$\frac{1}{\uparrow t'}+\frac{\downarrow v}{\uparrow t'\cdot\uparrow c}=1 \qquad \frac{1}{\uparrow t'}-1=\frac{\uparrow v}{\uparrow t'\cdot\uparrow c} \quad \text{(With appropriate bounds for } v \text{)}$$

$$\uparrow T'\cdot(f\cdot\lambda+\downarrow v)=c \qquad \uparrow T'\cdot(c+\downarrow v)=c \qquad \uparrow T'\cdot c+\uparrow T'\cdot\downarrow v=c$$

$$\uparrow T'+\frac{\uparrow T'\cdot\downarrow v}{c}=1 \qquad \uparrow T'-1=\frac{-\uparrow T'\cdot\downarrow v}{c}=\frac{-\downarrow V'}{c} \qquad \frac{\downarrow V'}{\downarrow v}-1=\frac{-\downarrow V'}{c} \quad \text{(For } \downarrow v<0 \text{)}$$

$$\uparrow T'\cdot\uparrow v=\frac{\uparrow T}{\uparrow t}\cdot\uparrow v=\uparrow V' \quad \text{(For } \uparrow v>0 \text{)}$$

For all observers, the speed of light will be observed to be c , the absolute speed will not exceed c , but the observed speed can exceed c in another POV.

We measure c or rather the time-dilation factor t' both behind and in front of the direction of movement v .

According to the linear Hubble's law: $z=\frac{(\lambda_{observed}-\lambda_{emitted})}{\lambda_{emitted}}$. Therefore: $z=\frac{(\lambda\cdot t''-\lambda)}{\lambda}$, where

$$t''=t'(v')=\frac{c-v'}{c} \quad .$$

$$v'=v\cdot(\frac{c-v}{c})$$

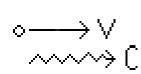

fig13

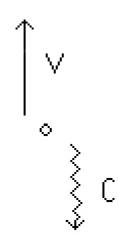

fig14

For $v<0$ and $c>0$, the case is that $v'=v\cdot(\frac{c+v}{c})$ and $\frac{v'}{v}=t'<1$.

And we can say that $\uparrow T'\cdot(f\cdot\lambda+\downarrow v)=c$.

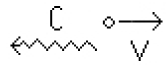

fig15

We must understand how to use the time-dilated velocity v' . If it is not v' that is displacing position x in terms of global time, then what is the purpose of v' ?

We can, at this point, deduce four general patterns:

1. light speed will be observed to be c
2. the hidden variable speed (to the stationary e_1's POV, observing the moving e_2) can exceed c
3. the time-dilated, effectual speed never exceeds c
4. to the observed-to-be-moving electron e_2, c is constant

Furthermore, we can say that:

$$\frac{f\cdot\lambda-v}{t'}=c \qquad t'\cdot c=f\cdot\lambda-v \qquad \lambda=\frac{(t'\cdot c+v)}{f} \qquad f=\frac{(t'\cdot c+v)}{\lambda} \qquad v=f\cdot\lambda-t'\cdot c$$

$$f'=\frac{f}{1-\frac{v}{c}} \qquad \lambda'=\lambda\cdot(1-\frac{v}{c})$$

This is the result of blue-shift, i.e., where $v>0$ and the direction being measured is such that $c>0$ and $v<c$ or else then the case is that $v'<0$ and it becomes red-shift. Alternatively, we may look at it as $f'=-f$ for $v=2c$, however this is only correct in one direction.

$$f'=\frac{f}{1-\frac{f\cdot\lambda-t'\cdot c}{c}} \qquad \lambda'=\lambda\cdot(1-\frac{f\cdot\lambda-t'\cdot c}{c})=\lambda\cdot(1-\frac{f\cdot\lambda}{c}+t')=\lambda\cdot t'$$

For the galaxy GN-z11, being observed to be moving away at super-luminal speeds, the red-shift away from the direction of motion is (we could just as well measure it as blue-shift in the direction of motion with reversed arrows):

$$z=11=\frac{\lambda''-\lambda}{\lambda}=\frac{\lambda\cdot t''-\lambda}{\lambda} \qquad t''=12 \qquad v'=-(t''\cdot c-c)=-(12\text{c}-c)=c-12\text{c}=-11\text{c}$$

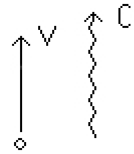

fig16

$$\frac{c-v}{t'}=c \qquad \frac{1}{t'}-\frac{1}{t'}\cdot\frac{v}{c}=1 \qquad \frac{1}{t'}-1=\frac{1}{t'}\cdot\frac{v}{c} \qquad \frac{1}{t'}-1=\frac{v^2}{v'\cdot c} \qquad \frac{v}{v'}-1=\frac{v^2}{v'\cdot c} \qquad 1-\frac{v'}{v}=\frac{v}{c}$$

We will observe two time-dilation factors in any axis, where one direction may result in positive time increase (*older*), or a negative (*younger*).

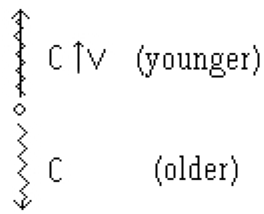

fig17

$$1-t'=\frac{v}{c}$$

With all of this, we must consider the sign of c , v , and the relation to f , whether it grows or decreases, with the direction of the receiver.

$$\frac{1}{t'}\cdot(f\cdot\lambda-v)=c \qquad t'\cdot c=f\cdot\lambda-v \qquad f\cdot\lambda=t'\cdot c+v \qquad \lambda=\frac{t'\cdot c+v}{f} \qquad f=\frac{t'\cdot c+v}{\lambda} \qquad v=f\cdot\lambda-t'\cdot c$$

For the case where $v<0$ (red-shift) and $v>0$ measures velocity away:

$$f'=f\cdot(1+\frac{v}{c}) \qquad \lambda'=\frac{\lambda}{1+\frac{v}{c}} \qquad f'=f\cdot(1+\frac{f\cdot\lambda-t'\cdot c}{c}) \qquad \lambda'=\frac{\lambda}{1+\frac{f\cdot\lambda-t'\cdot c}{c}}=\frac{\lambda}{1+\frac{f\cdot\lambda}{c}-t'}$$

In the Michelson-Morley experiment, it does not indicate that length contraction is equivalent to time-dilaiton, however, in this formulation, they may appear to be equivalent.

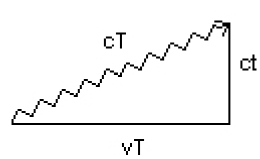

fig18

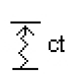

fig19

We may state the relation as a matter of proper, global time and the coordinate times T and t or as the proper, global time τ and the gamma-factor γ , now expressed in these terms as t' .

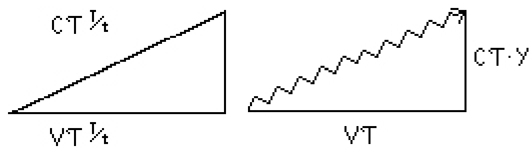

fig20

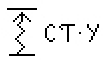

fig21

Where $\gamma<1$, for length-contraction of the coordinate y , $y'=y\cdot\gamma$. According to the original: $c\cdot\tau=\sqrt{(c\cdot\tau\cdot\gamma)^2+(v\cdot\tau)^2}$. It is as though *extra* space appears (in front) as it is traversed.

fig22

The spaces expand, so, from the outside, keeping the spaces constant, it is as if the mover is compressed.

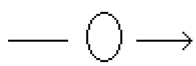

fig23

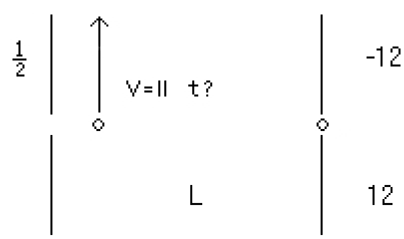

fig24

We shall refer to L as the separation of space between two objects. In the case of $v=11$, the naive application of γ would indicate that L increases to -12 in front and 12 behind, offsetting the net center of balance back by a factor of 12 .

If we try to apply the forward gamma:

$\frac{c-13}{c}=-12 \quad \frac{c-(-13)}{c}=14 \quad \frac{c-11}{c}=-10 \quad \frac{c-(-11)}{c}=12 \quad \uparrow v'=\uparrow v\cdot -12 \quad \uparrow a'=\uparrow a\cdot -12$

It would be interesting to apply this transformation of acceleration (and velocity) to the loop example given earlier in [2] to give a continuous path. Could it be that another transformation of $a'=-12$ leads to $v'=+12$ (i.e., an acceleration $|a|>c$ causing another reversal of the sign of velocity)?

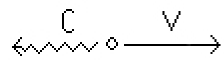

fig25

For the example above: $-\cos(180°)\cdot 2\cdot(-11)+121+1=(c\cdot t')^2$. With the angle $180°$ but velocity $v=-11$, $-22+122=t'^2$ $t'=10$, the angle $180°$ and negative velocity therefore cancel out, to give the forward gamma. However, the gamma must be $t'=-10$ as in the previous example, so the simpler equation must be used, or else the sign of the square root adjusted to match the forward equation solution.

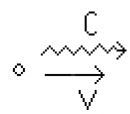

fig26

With $-\cos(0°)\cdot 2\cdot(11)+121+1=(c\cdot t')^2$ the result is still $t'=10$. Different linear Hubble law $|z|$ values of observed red-shift on different sides of the moving electron may give the same general $|v|$. At a' and v' at the back-side increase with increasing $|v|$ toward an attractive object (i.e., with $v>c$ giving $t'<0$ and thus a negative v and a , as would be the cae for GN-z11), but because the distance to the gravitational attractor is decreasing, even that doesn't help slow it down.

$\uparrow x'=\uparrow x\cdot(-10)$ $\downarrow x'=\downarrow x\cdot 12$ $\Delta(\uparrow x',\downarrow x')=2$ So, even though the new $\uparrow x$ is negative, there is still room between $\uparrow x$ and $\downarrow x$ for chemical activities and a domain of interaction. At most, a force $\uparrow F=1$ and $\downarrow F=1$ still give $\Delta(\uparrow F)'=2$ net force separation, because a $\uparrow F=1$ is $(\uparrow F)'=-10$ and $\downarrow F=1$ is $(\uparrow F)'=-12$.

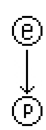

fig27

In the case of an electron being attracted to a proton or an electron e_1 and a moving electron e_2:

$\uparrow F=1$ gives $\Delta(\uparrow F)'=-10$, $\uparrow F=0$ gives $\Delta(\uparrow F)'=0$, and $\downarrow F=1$ gives $\Delta(\uparrow F)'=-12$.

To the still e_1's POV, it appears that e_2 still moves at v absolute, and only a' changes. And still,

$\uparrow a_{free} > \downarrow a'$, that is, the free acceleration effect outlined in [1], on the current velocity, is stronger than the backward acceleration due to gravitation and the net shifted center of balance, so GN-z11 continues accelerating. Perhaps the galaxy rotation curves of extra velocity can be explained by free acceleration.

Perhaps v' is the apparent velocity to both e_1 and e_2?

fig28

Then $v' = v \cdot (\frac{c-v}{c}) = (-10) \cdot (\frac{c-(-10)}{c}) = -110$, and, given a universal age of $13.82 \times 10^9 y$, it would indicate that GN-z11 is at a distance of $110 \cdot 299{,}792{,}458 \frac{m}{s} \cdot 60 \frac{s}{min} \cdot 60 \frac{min}{hour} \cdot 24 \frac{hour}{day} \cdot 365 \frac{day}{y} \cdot 13.82 \times 10^9 y = 1.43 \times 10^{25} km = 1.52 \times 10^{12} ly$.

Does it make sense that the spacing in front contracts by a factor $\frac{1}{\gamma}$, leading to $\uparrow a' = \uparrow a \cdot \gamma$, adding to velocity, giving $\uparrow v$, which is then again increased by factor γ , giving $\Delta x = K \cdot \gamma^2$? When e_2 slows down, moves out of contracted space (is relaxed back to normal shape), the acceleration and velocity should relax back too. So $\frac{\gamma_2}{\gamma_1}$ must be used, in $v_2 = v_1 \cdot \frac{\gamma_2}{\gamma_1}$. The previous velocity is adjusted during the velocity change and acceleration. At the $v = c$ point, $\frac{c-v}{c} = 0 = \gamma_1$, and $\frac{\gamma_2}{\gamma_1} = \frac{\gamma_2}{0} = \infty$, therefore. The sequence of transformations is $v' = v \cdot \gamma_1$, $v_2 = v + a$, and then $v_2' = (\frac{v_1}{\gamma_1}) \cdot \gamma_2$.

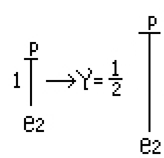

fig29

With $\gamma = \frac{1}{2}$, the spacing $D = 1$ increases to $D' = 2 = \frac{1}{\gamma}$, therefore the effect on acceleration across D , $a(D) = \frac{G \cdot M}{D^2}$, is $a(\frac{D}{\gamma}) - a(D)$ or $\frac{a(\frac{D}{\gamma})}{a(D)}$. If we consider $v = 1$, then in this case $v' = 1 = v \cdot \gamma$. Then $v' - v = v \cdot \gamma - v$ and $\frac{v'}{v} = \frac{v \cdot \gamma}{v} = \gamma$ for $v' = \gamma \cdot v$. $v_2 = v_1 \cdot \gamma_2 = (v_0 \cdot \gamma_1) \cdot \gamma_2$, then, perhaps. For velocity as a function of the distance, $\frac{v}{D}(D) = \frac{v_0}{D}$, and the time to traverse a distance as a function of the distance and velocity, $\tau = \frac{D}{v}(D) = \frac{D}{v_0}$, we may compute $\frac{D}{v}(\frac{D}{\gamma}) - \frac{D}{v}(D)$, and have $\frac{\frac{D}{v}(\frac{D}{\gamma})}{\frac{D}{v}(D)}=\frac{\frac{D}{v_0\cdot\gamma}}{\frac{D}{v_0}}=\frac{1}{\gamma}$. How much would $a':a$ compare with $D'=\frac{D}{\gamma}$? Because $\frac{(\frac{G\cdot M}{(\frac{D^2}{\gamma^2})})}{(\frac{G\cdot M}{D^2})}=\gamma^2$, it follows that $a'=a\cdot\gamma^2$. In the end, for mechanics, we only care about v_2' from v_2 , not v_1' , so $v_2=v_1\cdot\gamma+a'$, and v_1' can be further discarded. The " v " is a hidden variable, or the true, absolute value.

From the gamma-factor points $\gamma_1=\frac{1}{2}$ to $\gamma_2=\frac{1}{4}$, it means that velocity turns from $v_2=\frac{1}{2}v_1$ to $v_2=v_1\frac{\gamma_2}{\gamma_1}+a'$, being the result of a speed-up in the front. Length of spacing along the x-axis, L_x , increases, while the size of the object in front along the x-axis, s_x , decreases. From a speed-up up to c , the time-dilation factor goes from $\gamma_1=\frac{1}{2}$ to $\gamma_2=0$, and the velocity to $v_2=\frac{0}{(\frac{1}{2})}v_1+a'$, so $v_2=a'$. Slowing down from c , to $\frac{c}{2}$, the spacing L_x decreases, while s_x increases, according to $v_2=\frac{(\frac{1}{2})}{0}v_1+a'=\infty+a'$. In $v_2=v_1+a'$, the gamma is $\gamma_1=\frac{c-v_1}{c}$, while v_2 leads to $\gamma_2=\frac{c-v_2}{c}$, giving $v_2'=v_1\frac{\gamma_2}{\gamma_1}+a'$, so it makes more sense to write it as $v_2'=v_2\frac{\gamma_2}{\gamma_1}+a'$ now. Getting the gamma $\frac{\gamma_2}{\gamma_1}$ from $a':a$ gives $a_2':a_1'=\gamma^2$, if we have only the a_2' and a_1' to work with, and $\sqrt{\frac{a_2'}{a_1'}}=\gamma=\frac{\gamma_2}{\gamma_1}$. When D changes by $\frac{1}{\gamma}$, the *previous* v changes by the new γ , and acceleration a' automatically depends on $\frac{D}{\gamma_{previous}}$ or $\frac{D}{\gamma_{new}}$. So, after $x+v$ is used to obtain the new x , is v adjusted by γ_{new} then, for the next iteration? So the sequence would be $\gamma_{new\,of\ previous}=\gamma_1=\frac{c-v_1}{c}$ and then $v_2=v_1$, or $v_2'=v_2\frac{\gamma_2}{\gamma_1}$. When v changes, γ changes, but v only changes with a . So the *previous* a must be added to v . $v_2=v_1+a_1$, where the previous gamma is perhaps $\gamma_0=\frac{c-v_0}{c}=1$, set to unity before any movement takes place. This then leads to the gamma $\gamma_2=\frac{c-v_2}{c}$, leading to $v_2'=v_2\frac{\gamma_2}{\gamma_1}$, leading to $x'=x+v_2'$, where $a_2=a(\frac{D}{\gamma_2})$. All the v_2 , a_2 , and x_2 depend on $\frac{D}{\gamma_1}$. Or, we might have $x'=x+v_2$ and $v_1=v_2'$, leading to a cycle.

Or, we may just store the absolute value v to get v_2' , i.e., $v_2=v_1+a_1$, $a_1=a(\frac{D}{\gamma_1})$, $\gamma_1=1$, $a(\frac{D}{\gamma_1})=\frac{G\cdot M\cdot\gamma_1^2}{D^2}$, and we know that $v_2=\frac{v_2'}{\gamma_2}\neq\infty$ for $\gamma_2=0$, so $v_3=v_2'\frac{\gamma_3}{\gamma_2}=v_2\gamma_3$. $v_2=v_2'\frac{\gamma_1}{\gamma_2}$ for $\gamma_2=0$ and $v_2\neq\infty$, so we will arrange the sequence as $v_3=v_2'+a_3$, and $v_3'=v_3\frac{\gamma_3}{\gamma_2}$.

Where we have the unknown $v_2'=v_2\frac{\gamma_2}{\gamma_1}$ for $\gamma_1=0$, we have the known $v_2=v_2'\frac{\gamma_1}{\gamma_2}$, which we store, and therefore we skip $v_1=v_2\frac{\gamma_2}{\gamma_1}$. $v_2=v_1+a_1$, and for $\gamma_1=0$ and $v_1'=0$, $v_2=a_1$. Then $v_2'=a_1\frac{\gamma_2}{\gamma_1}$, so $v_2'=0$ because $a(\frac{D}{\gamma_1})=\frac{G\cdot M\cdot\gamma^2}{D^2}=0$.

$\lim_{x\to 0}\frac{0}{x}=0$ $\lim_{x\to 0}\frac{x}{0}=\infty$ $\lim_{x\to 0}\frac{x}{x}=1$ $\lim_{x\to 0}\frac{1-x}{x-1}=1$

How do we make sense of $v_2'=a_1\frac{\gamma_2}{\gamma_1}=0\frac{\gamma_2}{0}=C\gamma_2 m/s$?

For $\uparrow F=1$, $\downarrow F=1$, $\uparrow\gamma=-10$, and $\downarrow\gamma=12$, $\uparrow F'=-100$, $\downarrow F'=144$, and $\uparrow F_{net}'=\Delta(\uparrow F)'=-44$, giving a range of $[-100,-144]$, without free acceleration.

If $a\cdot 0_0=0_1$, then necessarily $\frac{0_1}{0_0}=a$, if we have the same occurrence of variables to produce 0_0 and 0_1 . So, $v_0'=v_0\frac{\gamma_0}{\gamma_{-1}}=v_0\frac{0_0}{\gamma_{-1}}=0_1$, where $\gamma_0=0_0$, giving $v_1'=v_1\frac{\gamma_1}{\gamma_0}=(v_0'+a_0)\frac{\gamma_1}{\gamma_0}=(0_1+0)\frac{\gamma_1}{0_0}=(\frac{v_0}{\gamma_{-1}}+0)\gamma_1=v_0\frac{\gamma_1}{\gamma_{-1}}$. And $a_0=a(\frac{D}{\gamma_0})=\frac{G\cdot M\cdot\gamma_0^2}{D^2}=0_2$, and $a_{-1}=a(\frac{0}{\gamma_{-1}})=\frac{G\cdot M\cdot\gamma_{-1}^2}{D^2}$, so if we were to obtain a_0 from a_{-1} , $a_0=a_{-1}\frac{\gamma_0^2}{\gamma_{-1}^2}=0_2=a_{-1}\frac{0_0^2}{\gamma_{-1}^2}$. $v_1'=v_1\frac{\gamma_1}{\gamma_0}=(v_0'+a_0)\frac{\gamma_1}{\gamma_0}=(0_1+0_2)\frac{\gamma_1}{0_0}=(v_0\frac{0_0}{\gamma_{-1}}+a_{-1}\frac{0_0^2}{\gamma_{-1}^2})\frac{\gamma_1}{0_0}=(\frac{v_0}{\gamma_{-1}}+a_{-1}\frac{0_0}{\gamma_{-1}^2})\gamma_1=(\frac{v_0}{\gamma_{-1}}+0_3)\gamma_1=(\frac{v_0}{\gamma_{-1}})\gamma_1$, where $v_0=v_{-1}'+a_{-1}$, gives $v_1'=v_0\frac{\gamma_1}{\gamma_{-1}}$. As we measure x in $\lim_{x\to 0}¿$, and $v\to c$ and therefore $\uparrow v'\to 0$ and $\uparrow a'\to 0$, then must it always be that $|x'|<c$? Then what of cases where $x\neq 0$ just before the transition to $v=c$, or $v>c$, and free acceleration? Rather, $v_1'=v_0\frac{\gamma_1}{\gamma_{-1}}$ is the case after slowing down from c , but that is $\downarrow v$, and what is the continuous curve for x position and v ?

For electrons e_2 and e_3, $x_2 - x_3 = \frac{x_2' - x_3'}{\gamma}$, i.e., the separation between them in the new, dilated frame of reference, must be the same as in the previous. And $x_{2,2} = x_{2,1} + v_2$ and $x_2' = x_2 \gamma$, where $\gamma_2 = \gamma(x_2)$ is a function of x_2 . But to e_2, $x_2' - x_3' = (x_2 - x_3)\gamma_2$, the separation appears the same under the gamma, which means that, $a_2' = a_2 \gamma_2^2$. But if there is length-contraction, then the forces must be unaffected, so $a_2' = a_2$, and there must not appear to be any changes with respect to the rest of the world, then, with no transformation, but, for e_1 and e_2, if a_2' does not change then what is length contraction, or then it must only appear after the movement is contracted. So does e_2 decrease acceleration a_2' after the γ_2 velocity change, or not? Or does that only change future changes to a_2' ? If they are co-moving they will gradually contract and expand together, and differences only appear when there is a difference in v , if e_2 and e_3 are co-accelerating, and one is in front of the other, through a uniform acceleration field. Is it necessary to store all connection distances, to simulate the physics? Then what is light propagation in absolute terms, if they have no acceleration force change between each other? Then what does distance matter? Or else, it does, and then they will have a difference in v , like e_1 and e_2. Will the rate of change of a_2' change by γ_2^2 with respect to time?

In a black hole singularity, where $\gamma = \sqrt{1 - \frac{2 \cdot G \cdot M}{r \cdot c^2}}$ becomes complex, the new $\gamma = \frac{c - v_{escape}}{c}$ can be used, without resulting in complex terms. The transformation then is $v' = v\gamma$ and $a' = a\gamma^2$.

References

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