https://www.youtube.com/watch?v=Q81_5O054oI

Is Time Dilation Just a Clock Issue Afterall???

Je dilatace času nakonec jen otázkou hodin???

Physics - problems and solutions

3,99 tis. odběratelů

14 203 zhlédnutí 13. 1. 2024 Quite recently channel @dialectphilosophy released a video about time dilation showing all the phenomena of special relativity (including the twin paradox) using a sound analogy of a typical light clock. All the phenomena of SR were replicated while preserving a privileged frame of reference namely air. So is time dilation in SR just a clock issue or is time dilation a real fundamental effect of nature? In this video, I will propose arguments about what makes special relativity different from this sound wave analogy and how it deviates in a way that can be experimentally proven. Big thanks belong to people supporting me on Patreon and buymeacoffee for giving me the motivation to create the video namely -Jason Mclane (Patreon) -Filip Blaschke (Patreon) -Nathan Myers (Patreon) -Walter (newly bought coffee) Since I am kinda busy I can't answer more elaborate questions in the comments but for this purpose, I created a possibility to ask questions for a small fee of 5 dollars on https://www.buymeacoffee.com/pprobnso...

14 203 zhlédnutí 13. 1. 2024 Nedávno kanál @dialectphilosophy zveřejnil video o dilataci času, které ukazuje všechny jevy speciální teorie relativity (včetně paradoxu dvojčat) pomocí zvukové analogie typických světelných hodin. Všechny jevy SR byly replikovány při zachování privilegovaného referenčního rámce, jmenovitě vzduchu. Je tedy dilatace času v SR pouze záležitostí hodin, nebo je dilatace času skutečným základním účinkem přírody? V tomto videu navrhnu argumenty o tom, čím se speciální teorie relativity liší od této analogie zvukových vln a jak se odchyluje způsobem, který lze experimentálně dokázat. Velké díky patří lidem, kteří mě podporují na Patreonu a buymeacoffee za to, že mi dali motivaci k vytvoření videa, jmenovitě - Jason Mclane (Patreon) - Filip Blaschke (Patreon) - Nathan Myers (Patreon) -Walter (nově zakoupená káva) Vzhledem k tomu, že jsem poněkud zaneprázdněn, nemohu v komentářích odpovídat na složitější otázky, ale pro tento účel jsem vytvořil možnost klást otázky za malý poplatek 5 dolarů na https://www.buymeacoffee.com/pprobnso...

My opinions will be in red font in the text (12.05.2024)

0:00
(01)- In 1905 Albert Einstein published one of his most famous papers to this day about the electrodynamics of moving bodies this paper solved a critical problem of its time the clash between Newton's laws of motion and Maxwell's electromagnetism however to achieve this

success Einstein had to sacrifies a lot since some quantities that were thought to be absolute for decades become relative and were replaced by different quantities that are much more abstract and harder to imagine and because of this rearrangement of the relative and absolute quantities we call it a special theory of relativity instead of just relativity so if somebody tells you that Einstein teaches us that everything is relative he's lying to you it is just the relative and absolute quantities are different than we originally thought one very important quantity that had to be sacrificed is time and whenever a new person learns about special relativity this is probably the first thing they learn time is relative this means that whenever you see clock moving it will always stick slower than yours and from this you get all the fun stuff like twin paradox and so on but the next whenever you attend a special relativity curse you will always learn about the time dilation the same way and it is by using light clock that bounces a photon off of a mirror and every time this Photon makes a round trip we detect it on the detector and by this way we Define a unit of time special Rel activity is based on a postulate that says that the speed of light is independent of the motion of the source and therefore it is always one number whether this clock is moving or not and because of this in the moving clock case the light has to travel a longer distance than in a stationary case and therefore the number of time units passed on each clock will be different if you did the math you would end up with the famous time dilation equation which tells you how longer the period on the moving clock is comp compared to a stationary one and from this we say that time runs slower for a moving Observer but natural question is what happens if we change the clock and make two mechanical clocks move relative to each other will the moving clock tick slower than stationary One how can we know that time dilation is not just a clock issue because if it applied only to a specific clock then our biological age would not change in the twin paradox scenario so all the fun stuff would become boring you might say that time dilation was experimentally proven by number of experiments and we didn't use this light clock but atomic clock and also GPS satellites need to use this time dilation to keep their atomic clock synchronized with the ones on Earth making them accurate but what are the atomic clocks anyway isn't it just a hidden light clock since it counts the number of oscillations of an electromagnetic radiation that is produced by some standardized Atomic transition to answer this question I want to briefly mention a video from the channel dialect as they were able to reconstruct the time dialation using sound wave in a medium instead of light waves now when the clocks are reunited you find that less time has elapsed on the traveling clock than on the stationary one and not only that they even reconstructed the whole twin paradoxical scenario using such a clock now we can repeat this experiment assuming any arbitrary initial velocities of our sound clocks with respect to the air and the end result will always be the same whichever clock turns around to rejoin its companion will always end up showing less elapsed time this is in consequence of it achieving a greater total average velocity with respect to the air over the duration of its trip likewise in special relativity we find that for any two clocks that are separated and rejoined whichever clock turned around or accelerated to rejoin its companion will always end up recording less elapsed time and this is no surprise of course since the derivation they used is exactly the same as is commonly done using light waves but if the clock is in motion the distance that the sound wave has to travel between detectors now becomes greater than D meaning it takes a longer amount of time for the wave to travel that distance and thus a longer time for the moving clock to tick but they were able to do all this while having a preferred frame of reference where the clocks are running the fastest and namely the air itself but what if we had our version of atomic clock that would be using sound waves instead of light waves well in this case we would count the number of oscillations in

the created sound wave but if the source was moving relative to the air there will be a shift in wavelength of the sound and since the wavelength is longer it will will take more time to
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(01)- In 1905, Albert Einstein published one of his most famous papers to date on the electrodynamics of moving bodies, this paper solved the critical problem of his time, the clash between Newton's laws of motion and Maxwell's electromagnetism, Newton's laws are non-linear (time flows in one direction) and electromagnetism is a manifestation of the microworld where the linearity of interactions rules, OTR. however, to achieve this success, Einstein had to sacrifice a lot, because some quantities, which were considered absolute for decades, become relative **??** and were replaced by other quantities that are much more abstract and harder to imagine , and because of this ||rearrangement of relative and absolute quantities|| we call this the special theory of relativity ?? ?? I don't think that will be the correct explanation… instead of just relativity, so if someone tells you that Einstein teaches us that everything is relative, they are **lying** to you, they are only relative and absolute quantities are different than we originally thought, one very important quantity to sacrifice is time ? um, as the author means it… and whenever a new person learns about special relativity, that's probably the first thing they learn time is relative, no it's not, that's an interpretation error…; the change in the pace of time is a consequence of the rotation of the systems, the dilation of time is a misinterpretation. The observer in the basic selected system receives (scans) information from the rotated own system of the observed object in motion. When "**v**" is approaching "**c**", the rotation of the system is already significant enough that the lengthening (in terms of time) and shortening (in terms of lengths) of the SENSED intervals is considerable, when compared to the reference interval. … this means that whenever you see the clock moving, it will always be slower than yours the clock will not run slower or faster, the clock is a mechanism with a deliberately set ticking rate. But time, i.e. measured intervals of time, will change…done, no further discussion necessary… https://www.youtube.com/watch?v=AhtFbUu3pqo and you get all the fun stuff out of it like the twin paradox and so on but next whenever you take part in the special curse of relativity you always learn about time dilation the same way and that using a light clock that bounces a photon off a mirror, and every time this Photon makes a round trip, we detect it on a detector and use this way to define a unit of time a special activity Relativity is based on a postulate, it's like physicists came up with what should the universe do? How should he behave? Or did the universe itself invent the postulate about the speed of light "for itself"? By my logic and in the spirit of this image http://www.hypothesis-of-universe.com/docs/c/c_038.jpg the state of smooth flat Euclidean spacetime will be the >interface< for sublight and superlight speeds. In a flat universe there can be no speed other than **c = 1/1**. Immediately when space-time begins to curve, matter (with mass) will be born and change $\mathbf{m \cdot v = m_0 \cdot c}$ change in speed, and it will only decrease **1/ infinity = v < c = 1/1**. so I don't consider this interpretation this interpretation to be a >postulate< for speed. Automatically, **c = 1/1** must apply even without postulating which says that the speed of light is independent of the movement of the source, the quasar always moves slower than light and therefore it is always one number whether does this clock move or not, the clock if it only moves like a "piece of matter" but...but the flow of time is different than "the movement of a clock". The clock must not change the set rate of flow, otherwise the clock loses its meaning..., i.e. a meter with a set frequency of ticks... and therefore in the case of a moving clock, light must travel a longer distance than in a stationary case, and therefore the number of time units that have passed on individual hours, it will vary,

if you did the math you'd end up with the famous time dilation equation that tells you how much longer the period on a moving clock is compensated for compared to a stationary one the famous equation of time dilation is the dilation of time and not the dilation of hours, on the one hand, and secondly, the famous equation of dilation shows us the rotation of the systems (the observer at rest and the material object in motion), it tells us how much the time interval has increased on the rotated coordinate for comparison with the standard interval on the base=observer coordinate... and from this we say that time runs more slowly for the moving observer, it does not run slower on the rocket, but the Observer in the basic system receives from the rockets information about the rotation of the rocket system and thus information about extending the intervals to a rotated coordinate to compare with the reference interval in the basic observable... but the natural question is what happens when we change the clocks and make the two mechanical clocks move relative to each other. This is rotten thinking. You can't change the "clock tempo = set tick frequency" but you can only change the real physical time, the real time tempo, not the clock!!! And this pace only changes as the time dimension warps, all 3+3 dimensions. A moving clock ticks slower **no, no, no !!!!!** than a stationary one. How do we know that time dilation isn't just a matter of hours, because if it only applied to specific hours, our biological age wouldn't change in a twin paradox scenario, so all the fun stuff would start to bore you? It could be said that time dilation was experimentally proven by a series of experiments if so, then only the rotation of the systems was proven. One system is brought to rest, and from it I OBSERVE the curvature of the dimensions of the entire universe, the various curvatures of all locations such as galaxies, black holes or the barren intergalactic vacuum, as well as the curvature of dimensions in physical fields and the curvature of dimensions in the interactions of matter (because precisely that matter is built of warped dimensions)** and we didn't use this light clock, but atomic clocks and also GPS satellites need to use this time dilation, **all this can be interpreted by **curvature** dimensions, 3+3D in spacetime around massive bodies, in each potential plane has a different curvature of the time dimension (and this is "scientifically" called dilation) to keep their atomic clocks in sync with Earth's to be accurate, but what atomic clocks are anyway, they are not just hidden light clocks because they count the number of oscillations of electromagnetic radiation that is produced by some standardized atomic transition to answer this question. I want to briefly mention the channel dialect video because they were able to reconstruct the time dialing using a sound wave in the medium instead of light waves, now when the clocks come back together you will find that less time has passed on the traveling clock than on the stationary one while both clock=the clock had the same ticking mechanism set, i.e. the clock is the same but the "time" (number of ticks) on different objects is different (when compared)
and not only that they even reconstructed the entire twin paradoxical scenario using such a clock we can now repeat this experiment assuming an arbitrary initial speed of our sonic clock relative to the air and the end result will always be the same no matter which clock is reversed to reconnect to its companion, it always ends up showing less elapsed time it is a consequence of the fact that it reaches a greater total average speed during its journey that is, a consequence of the different compared curvatures of the dimensions with respect to air, similarly in the special theory of relativity we find that for any two clocks that are separated and rejoined, any clock turned or sped up to rejoin its companion. Well, I don't want to get into deep and detailed dissection of "dilation" here in this video-text… so not here today. They always end up recording a shorter elapsed time and of course that's no surprise since the

derivation they used is exactly the same , as is normally done with light waves, but if the clock is in motion, the distance the sound wave must travel between the detectors now becomes greater than D, meaning the wave takes longer to travel that distance, again this knowledge can be translated into warping the systems aka dimension warping and thus a longer time for the moving clock to tick, but they were able to do all this while having a preferred frame of reference where the clock is running. The fastest and namely air itself, but what if we had our version of an atomic clock that used sound waves instead of light waves, well in this case we would count the number of oscillations in the sound wave created, but if the source was moving, relative to the air, there would be a shift wavelengths of sound and since the wavelength is longer, it will take longer, so...my will is not there to continue the logical construction of the reasons for "dilations" in the curvature of dimensions (and on them the intervals to be compared), respectively the rotation of the systems, which is the same explanation from another point of view…

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(02)- make the same amount of oscillations than for the stationary case and therefore the stationary cloak would see the moving clock run slower so the atomic clocks are basically light clocks so we can't easily say that experiments measuring time dilation using atomic clocks are really proof that time slows down in motion so if there was a similar medium for light as there is air for sound then using atomic clocks we wouldn't measure any difference from what we are measuring right now of course Soundwave analogy has some limits you could put one clock in a box to protect it from air and it would show the fastest time which you could use to determine the rest frame of the outside air but if there was a similar medium for light it must be such that it doesn't interact with matter otherwise the Earth would slowly spiral down to the sun due to drag and therefore such a box for Atomic Clock would not work but there is another issue with the Soundwave analogy if you are passing by a clock that is at AR rest relative to the air you would see it take faster than yours and theoretically if there were many clocks you could find the one that is the fastest and you would know that it's stationary in Sp pressure relativity every time you see a clock moving relative to you they tick slower the problem is that in real world there is nothing faster than light and therefore the only way to check how fast a clock is running is to check but if you are locking you have to include a longitudal Doppler effect this means that time between ticks of the clog You observe will be faster if you're are moving towards it and slower if you're moving away from it due to the fact that the wave has to travel different distance to The Observer after each tick if you calculate the contribution from the longitudal Doppler effect you would get that for the approaching clock the time interval on your clock is equal to the 1 minus beta Factor where this beta is the velocity in the units of the speed of light if if we approaching let's say with the velocity of 0.86 C then each second on The observed clock would equal only for 0.14 seconds on your clock so you would see the clock running fast and even if you accounted for the time dilation of the clock you would still get 0.28 seconds for each sck so it is not true that in special Rel activity you must always see the moving clock running slow so now I want to summarize all of what I said so far the Soundwave analogy predicts exactly the same result for a twin paradox scenario as in special relativity the Soundwave analogy predicts that one Observer could see other clock running slower than his own but that is also the case in the special Rel activity due to longitudal Doppler effect the atomic clock is basically identical to the light clock and since the medium for light doesn't interact with the matter we can't use this trick isolating the clock from this medium to measure the real time speed and ultimately all

clocks we are using today are somehow using the electromagnetic interaction so that the atoms can communicate with each other and therefore these interactions slow down in a moving frame so ultimately it might be the case that every clock we are using today is some version of a light clock in the end so what makes us believe that special relativity is somehow special after all I want to apologize now because some of the stuff I said were quite misleading and some of you might have already noticed and be quite angry with me but I want all of you to pause and think is there anything that makes an ultimate cut between Soundwave analogy and special relativity okay so to make the cut we have to ask simple question is there a simple clock that deviates from the light clock depending on the velocity relative to this eer and by simple I mean we can calculate the elapsed time on this clock and compare it with the light clock and it turns out it is very simple all you need to do is to just turn your clock by 90° because so far all of our discussion was about clocks that move perpendicularly to this medium and I have already told you that the longitudal effects on the elapsed time has much greater impact than transvers effect as we already know for the perpendicular clock the time dilation Factor is like this whereas for rotated clock we get a different Factor so the time dilation would be way stronger on such clock so in the sound analogy Universe if you had atomic clock and rotate it its time would run differently and
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(02)- make the same amount of oscillations as in the stationary case, and therefore the stationary shell would see the moving clock running slower, so the atomic clock is essentially light, so we can't easily say that experiments measuring time dilation using atomic clocks are really proof that that time slows down in motion, yes, time yes, but not watches. The pace of the passage of time (apparently!!!) slows down, because the Observer >must be< stationary (i.e. adjusted to rest) and from his observatory we then observe the entire universe as the tempo of the passage of time changes in the entire universe, anywhere, in all locations (and ..and the Einsteins then call it dilation.). We observe this because we "scan" intervals from rotated straight lines, rotated systems, and of course these intervals will and must be different from the basic standard. We observe intervals on a rotated line with the size of that interval changing. so if there was a similar medium for light as air is for sound, then we wouldn't be measuring any difference with atomic clocks from what we are measuring right now, of course the Soundwave analogy has some limits. He could put one clock in a box to protect it from the air, and it would show the fastest time you could use to determine the rest frame of the outside air, but if there were a similar medium for light, it must be such that it does not interact with matter, otherwise the earth would be slowly turning towards the sun due to drag and therefore such an atomic clock box wouldn't work, but there's another problem with the Soundwave analogy, if you walk past a clock that's at rest damn, the clock isn't at rest, the clock doesn't !!!, the clock ticks even in a system that is at rest, time changes its tempo, but the watch doesn't change the tempo. AR according to the air you would see is running faster than yours, and theoretically, if there were many clocks, you could find the one that is fastest and you would know that it is stationary in Sp pressure relativity every time you see the clock moving relative to you it ticks slower the problem is that in the real world there is nothing faster than light O.K. **1/ infinity = v < c = 1/1** ; and therefore the only way to check how fast the clock is running is to check, but if you are locking you have to include the longitudinal Doppler effect, which means the time between the ticks of the clog Observations will faster if you're moving towards it and slower if you're moving away from it because the wave has to travel a different distance to the observer after each tick if you count the contribution from the

longitudinal length. By doppler effect you would get that for an approaching clock the time interval on your clock is equal to 1 minus the beta factor where this beta is the speed in units of the speed of light if we approach at say **0.86 c** then every second on the Observed clock would be on your clock was only equal to **0.14 seconds** so you would see that the clock is running fast and even if you factored in the time dilation of the clock you would still get **0.28 seconds** for each sck so it is not true that in the special Rel activity you always have to see that clocks are running slow, so now I want to summarize everything I've said so far, the Soundwave analogy predicts exactly the same result for the twin paradox scenario as in special relativity, the Soundwave analogy predicts that one Observer could see another clock running slower than his own, but this is also the case for special Rel activity due to the longitudinal Doppler effect, atomic clocks are essentially identical to light clocks, and because the medium for light does not interact with matter. You can't use this trick of isolating the clock from this medium to measure the speed of real time, and ultimately all the clocks we use today somehow use electromagnetic interaction so that atoms can interact with each other, and therefore these interactions slow down in motion. Frame, so it may end up being that all the clocks we use today end up being some version of a light clock, so what makes us believe that special relativity is somehow special after all,
by the fact that STR shows the rotation of the systems beautifully (*), I want to apologize now because some of the things I said were quite misleading and some of you may have already noticed and were quite upset with me, but I want to to make you all stop and think if there is something that makes the final cut between the soundwave analogy and special relativity, ok so to make the cut we have to ask a simple question, there are simple clocks that deviate from light clocks depending on the velocity relative to to this eer and by simple I mean we can calculate the elapsed time on this clock and compare it to the light clock and it turns out to be very simple all you have to do is turn the clock 90° because so far our whole discussion was about a clock moving perpendicular to this medium, and I already told you that the longitudinal effects on the elapsed time have a much greater impact than the transverse effect, as we already know for a perpendicular clock, the time dilation factor is like this, while for a rotated clock we get another factor, so time dilation would be much stronger on such clocks, so in a sound analogy the Universe, if you had an atomic clock and rotated its time would run differently and
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(03)- therefore you could easily conduct an experiment which would tell you how fast you are moving relative to the air the GPS satellites would have to make sure that all clogs have the same orientation all the time otherwise their accuracy would go through the window but in our universe it doesn't matter how you rotate this atomic clock the time speed they show is always the same this is what Michaels and Morley experiment have measured a long time ago that the time delay does not depend on the orientation because we would get the interference on the detector so in our universe all clocks behave as if they were stationary the whole time because these two clocks will always show the same time if they are not moving relative to each other and if such a pair of clocks were moving relative to them both of those clocks would be slower by the same rate but that is only possible due to length contraction of the clock that lies in the direction of motion okay I know I said that when we see other clocks moving they don't have to show slower time due to longitudal Doppler effect the natural question would be can we somehow filter out this effect to measure just pure time dilation or in other words does the Doppler effect in special relativity behave differently than that in a

soundwave universe and the answer is simply yes in Soundwave Universe if if you move relative to a certain Source the total Doppler effect would look like this because you have only the longitudal effect in special relativity the situation is kind of different though because time dilation is a real fundamental effect and not the illusion if you move relative to a certain Source the longitudal Doppler effect would look like this and it is simply the combination of the classical longitudal effect and the transverse effect but what is the reason for this transverse part if the source wasn't moving in the transverse Direction at all you can analyze the equation for a source moving towards and away from you separately and you can use Tyler expansion you see that the first order of beta there is only a sign difference as it should be due to classical longitudal Doppler effect but when you look at the second order term you see that the sign is the same and this is the time dilation contribution and it is independent on the direction of motion and it always makes the moving clock run slower all you need to do now is to create an experiment that is sensitive enough to measure this second power in beta contribution in The observed frequency and you are done relativity is proven and it has been done a long time ago and that's where the sound analogy ends you probably know about the muon Paradox where we detect much higher Flux Of muons from the upper atmosphere than we should considering their mean lifetime the explanation is time dilation but what type of clocks is inside Elementary particles if you still think that time dilation is just a clock issue then why does it happen to muons can you imagine more fundamental clocks than that inside of Elementary particles so there you have it time dilation is about time after all even though dialect disagrees so that is it for this video and now when you fix your view of time dilation maybe you should also fix length contraction in this video up here I see you there
15:57
Bye

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(03)- therefore you could easily do an experiment that would tell you how fast you are moving relative to the air, the GPS satellites would have to make sure all the clogs are in the same orientation at all times, otherwise their accuracy would go through the window but in our universe it doesn't matter , as you turn this atomic clock, the speed of time it shows is always the same, http://www.hypothesis-of-universe.com/index.php?nav=d that's what the **Michaels and Morley experiment** measured a long time ago that the time delay does not depend on the orientation because we would get interference on the detector, so in our universe all clocks behave as if they are stationary all the time because the two clocks will always show the same time if they are not moving relative to each other and if if such a pair of clocks is moving relatively, for them both these clocks would be slower by the same speed, but this is only possible due to the longitudinal contraction of the clocks, Λ which lies in the direction of movement, I know well, I said that when we see that other clocks are moving, may not show slower time due to the longitudinal doppler effect, a natural question would be if we can somehow filter out this effect and measure only pure time dilation or in other words, does the doppler effect behave differently in special relativity than in the sound wave universe and the answer is simple yes in Soundwave Universe, if you are moving relative to a certain Source, the total Doppler effect would look like this, because in special relativity you only have the longitudinal effect, the situation is a bit different though, since time dilation is a real fundamental effect and not an illusion if you are moving relative to a certain source, the longitudinal Doppler effect would look like this >and it is simply a combination of the classic longitudinal effect and the transverse effect, but what is the reason for this transverse part if

the source ***didn't move*** in the transverse direction. And here we are in a situation , where one can discuss three-dimensional time (about 3+3D) In the direction of movement, dilations and contractions take place, in directions perpendicular to the axis of movement, the tempo of the passage of time does not change, nor do the intervals of length relative to standards. A Ferrari car on the Monza race track in the direction of movement of the **"x"** axis has **v_x = 250 km/h + v_y = 0.01 km/h. + v_z = 0.01km/h.** Dilation tx is thus observed by the Observer from the observatory at rest only in the **"x"** axis. Yet there are two other dimensions of time ty and **t_z** (in the transverse direction). The universe has the "extra" dimensions ty and tz only for that and only to use them to build matter. http://www.hypothesis-of-universe.com/index.php?nav=ea

In the direction at all, you can analyze the equation for the source moving towards you and away from you separately and you can use the Tyler expansion, you will see that the first order beta is only a sign difference, as it should be due to the classical longitudinal Doppler effect, but if you look at the term second order, you will see that the sign is the same and this is the time dilation contribution and it is independent of the direction of motion and always slows the clock down, all you have to do now is create an experiment that is sensitive enough to measure this the square of the beta contribution in the year. Observed frequency and you're done, relativity is proven and done a long time ago and that ends the sound analogy, you probably know about the muon Paradox, we detect a much higher flux of muons from the upper atmosphere than we should given their mean lifetime, the explanation is time dilation, the explanation is precisely that muons (or other monsters) arrive from space with already rotated systems, and in the THC collider muons are produced with the same, equally rotated "own" system as the Earth has, but what the type of clock is inside the elementary particles, what type of time is inside the elementary particles is clear: they have the basic curvature of some of the three dimensions of time http://www.hypothesis-of-universe.com/index.php?nav=eb if you still think time dilation is just a matter of clocks, clocks are not physical time why does this happen with muons? You imagine a more fundamental clock, ugh than the one inside elementary particles, so there you have it, time dilation is about time after all, even if the dialect disagrees, so that's it for this video and now, when you correct your view of time dilation, http://www.hypothesis-of-universe.com/docs/d/d_016.pdf ; http://www.hypothesis-of-universe.com/index.php?nav=f maybe you should also correct the contraction length in this video up here see you there 15:57 goodbye

JN, 24/04/2024

Me in 2000

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