What does a "frame of reference" describe in physics?

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The introduction of the concept of *"frame of reference"* marks the introduction of subjectivism into *"science"* which opens the door to creating a world of fictitious physics, where fictitious forces become reality, and with it the possibility to create any *"reality"* you want, based on the *"opinion"* of an observer under ***exclusion of knowledge.***

Here is a video which perfectly illustrates how that trickery of mind works, and I'll walk you through every scene in order to make that point clear.

0:35 – 1:50

A gentleman hanging upside down - but photographed right side up - and another one seemingly walking upside down, but in reality walking right side up of course. It is suggested that the reality of these gentlemen is a matter of choice of reference frame, which of course it is NOT. It only is under ***exclusion of knowledge,*** which is a fundamental characteristic of all relativistic concepts, including Einstein's:

"*For how should the first observer know or be able to determine, that he is in a state of fast uniform motion?*"

.....with this leading question Einstein tricks you into believing you can't know, when of course you can know, and thus Einstein excludes knowledge as a default setting of all relativity - an exclusion of knowledge though is the antithesis of science, which gathers all available knowable information in order to paint a picture of an independent and autonomous reality.

But back to the video: it is hilarious to believe that the gentleman hanging upside down for even an instant would have the right to claim that the other one is walking upside down - as he does here at 1:03..... his smoke is falling, his coin is rising, he cannot walk, the blood is rushing to his head..... he has overwhelming knowledge that he is wrong in claiming what he claims, yet it is introduced as a legitimate view of reality.

2:03 - 2:46

At 2:03 the professor announces that *"he's going to move in this direction"* when he perfectly well knows he doesn't, because he has not registered the necessary acceleration without which there is no motion. At 2:14 he poses the same leading question Einstein did: *"well, how do you know that I'm not standing still and the wall is moving?* thus planting the idea in your head that there is no way of knowing the difference, making frames of reference seem indistinguishable and thus relative, when in fact there is a very simple way of knowing: mount an accelerometer on table and wall, and the one that gives you a reading is the one that has been accelerated to a certain velocity and thus is in a state of motion.

2:30 *"and you have no way of telling if I am moving"* ... well, yes I have as described above.

...is is an absolute ...ven if

you are too sloppy to take notes, nature isn't, that is the difference between an ***autonomous reality*** and an ***observer based opinion***.

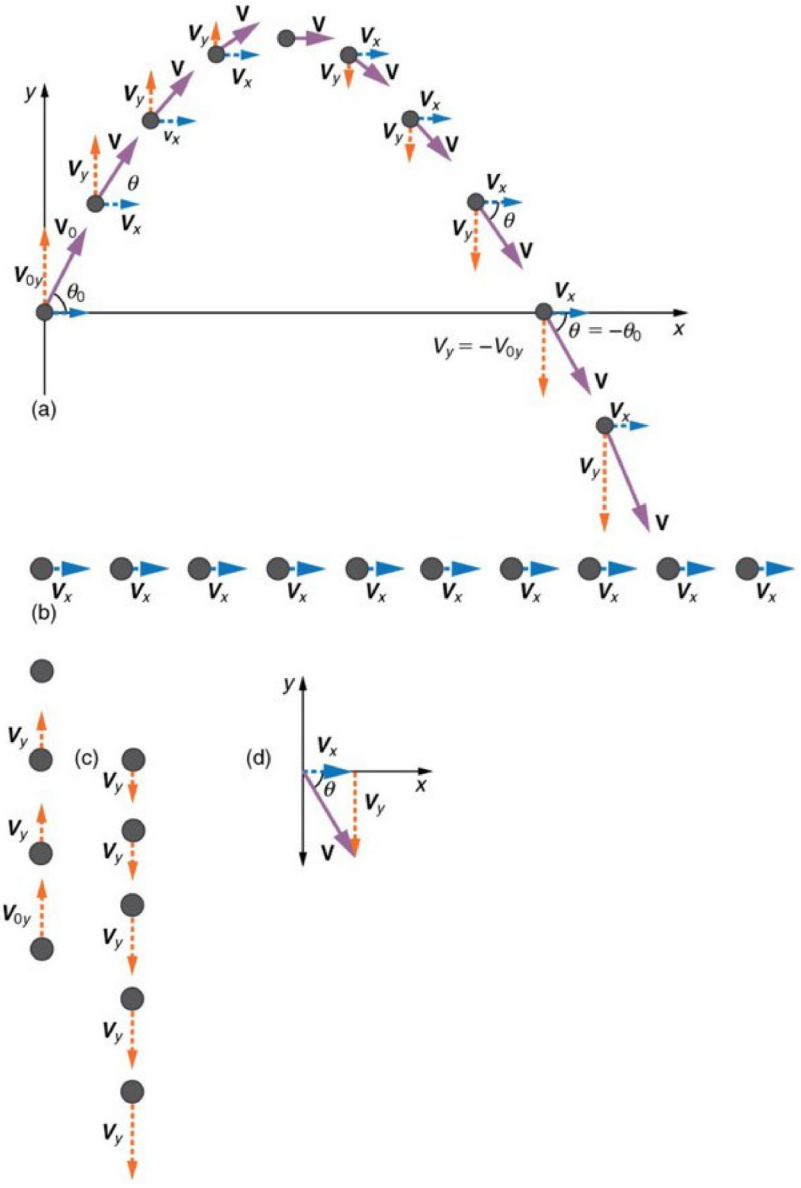
4:00 - 9:00

Here we see the classic Galileo mast drop experiment:

4:20 *"the ball is accelerated straight down by gravity along a line parallel to this vertical reference line"* ..... anyone who has paid attention in dynamics class knows that this sentence is only valid for the experiment being conducted on a stationary and flat platform, and because this platform is earth, it must be stationary and flat. On a spherical platform already, the ball would fall forward of the vertical reference line, because of conservation of momentum: p=mω(r+h) > p=mωr ..... on a spinning *and* spherical platform, the ball would in addition be offset in direction of the rotation for the same reason. When rotation and motion coincide the offset directly adds or subtracts ... that way you could in principle navigate over a spinning spherical ball with the help of Galileo's mast drop experiment, in direct contradiction of what Galileo wants you to believe. All rotation is absolute, because it has a finite *"origin"* (more on that later)

5:33 *"I think you can see that the ball landed in **exactly** the same position that it did before..."* again, the word *"exactly"* is only justified for an experiment conducted on a flat and stationary platform.

5:37 *"but this time the ball could not have fallen straight down"* ..... this is an incorrect statement, as bodies ALWAYS fall straight down, independent of any other motion they might have, gravitational acceleration is ALWAYS straight down.



lized that fact

6:24–6:26 you clearly see the ball fall straight down, as expected...

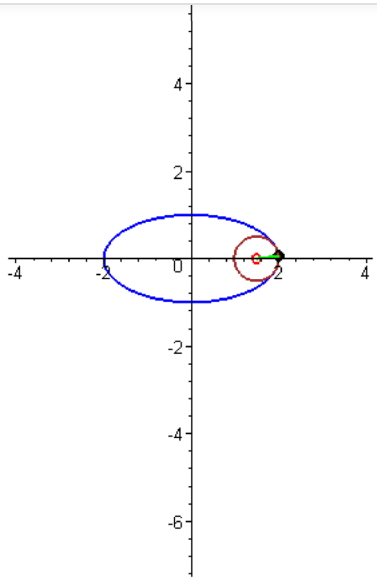
6:26–6:30 *"I'll show you this again, This time there will be a line on the film so you can see the path."*..... this is also incorrect, because it is ***not a path*** it is a ***trace.***

The difference is that a path is a *"dynamic reality"* whereas a trace is *"history"*. If we would have fireworks coming off the falling ball, this history would be visible for the captain on the ship as well as for the guy standing on land, so it is not a matter of reference frame as Galileo wants you to have it. In reality both the captain and the landlubber see the ball fall along the mast, and for both the history is a parabolic trace.

Now what about the ball itself, what if we where Müchhausen riding it, what would we experience? would we experience a curvilinear ride? or would we experience ***two superimposed rectilinear trajectories***, one uniform and the other accelerated? The latter of course - as shown in the diagram above - and we would actually only feel the falling, as - absent air resistance - the uniform rectilinear motion we would not experience at all. What we definitely would NOT experience is a ***radial acceleration perpendicular to the tangent*** on the white line in the above image.

Here we have come to an absolutely crucial point where it is time to address the tragic disconnect between physicists and the reality of engineering:

- There are only two types of motion: rectilinear and circular. Any and all curvilinear motion is composed of instances of rotation (i.e. circular motion) sharing the tangent to the curve at this particular instant. Any and all rotation has a ***dynamic origin***, a finite radius called the position vector, which is NOT an arbitrary choice as physicists want to have it, it is the very point around which the object is rotating at a given instant in time which in this instant is NOT moving. That is the definition of the ***instant center of rotation [IC].*** A body along a ***curvilinear path*** experiences at any given instant a radial acceleration away from the dynamic origin, i.e. the IC, amounting to ***a=v^2/r*** where ***[r]*** is the distance body to IC. We have rectilinear motion when the dynamic origin moves to infinity, as then we get ***a=v^2/∞=0***. Thus, if no radial acceleration is experienced, then the body does NOT move along a curvilinear path, although it may well leave a curvilinear trace. That is the case with ballistic trajectories: the ball in the experiment above never experiences a radial acceleration - which would be easily proven with a little accelerometer mounted on it - and therefore it does NOT move along a curvilinear path, it just leaves a curvilinear trace. Here below we see "instant rotations" of an object moving along an ellipse, as well as the trace of the IC and the evolvement of the position vector. The foci of the ellipse do NOT enter here at all dynamically: you may locate the drive gear in one of the foci and power the object with a force proportional to the inverse square of distance, which would change the velocities accordingly, but the dynamic reaction of the object would still look like this: the changing tangential velocity [v] only changes the radial load on the track with F=mv^2/r where [r] is the green line here, and NOT the distance to focus.

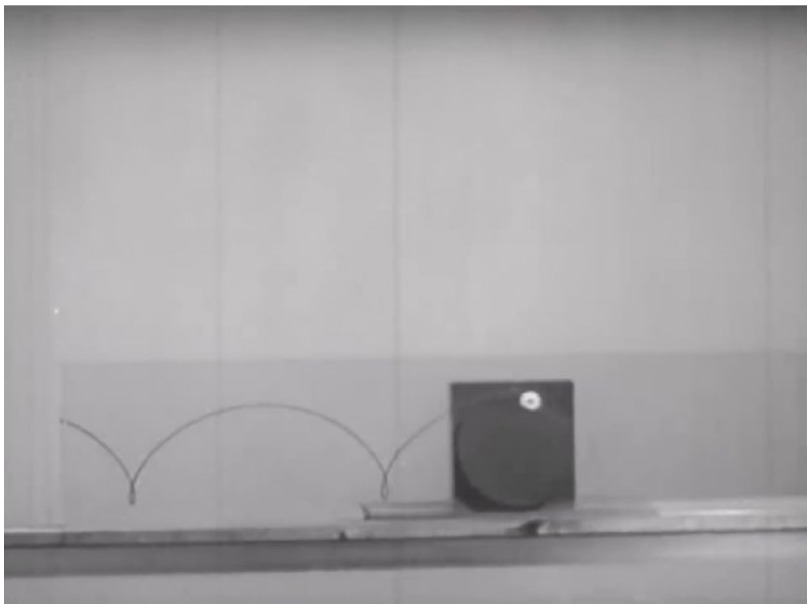


7:33 another perfect visualization of the independent vertical motion of free fall....

7:58–8:03 *"as a matter fact we wouldn't be able to tell by any experiment that we where moving at a constant velocity"* .....that is again not correct, as we have seen above: The history of the fall can be made visible, and thus turned into a tool to judge motion.... apart from keeping a log, where acceleration would show up as a nonzero reading. At 8:26 go back and compare to 6:33 and you'll see what I mean.

8:41 - 8:51 *"the important thing to realize here is that all frames of reference moving with constant velocity with respect to one another* ***are equivalent****"* ..... this only holds - like all relativistic thinking - only under the ***exclusion of knowledge***, the moment you admit the "flight logs" of all reference frames for instance, you immediately can tell who is moving and who is not: the one who never accelerated is not moving.

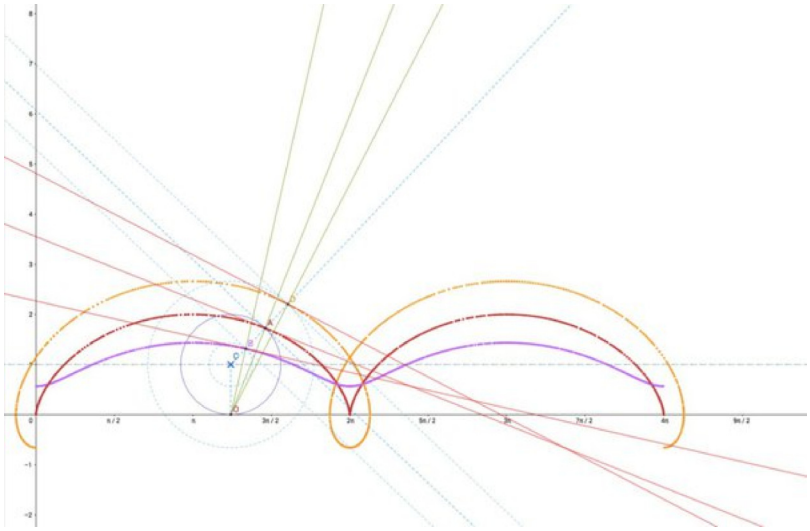
8:55 - 10:00 this is a prime example of how detached from reality the ***"philosophy of reference frames"*** actually is.



Here in the text it is NEVER the question of what the white wheel nut physically experiences, only what an observer focuses on, as if that would have anything to do with actual physical reality. That is obviously NOT what an investigation of *"the nature of things"* is interested in, as for *"the nature of things"* the opinion of an observer is totally irrelevant. Put yourself into the situation by doing multiple cart-wheels in a row and compare what you experience with an onlooker's uninformed comment: he could *"believe"* all he wants that your head is rotating uniformly around your belly button, you know - because you experience it - that your head is almost coming to a standstill at the bottom and quite

...t reality is NOT a ...eeds to do in that particular moment. If you pay really close attention to what your head does, you'll sense that at the lowest point it is actually accelerated towards your belly button, not away from it.

Here below the two different realities: the blue dotted lines for a stationary rotating wheel whereas the green lines and red tangent lines show the dynamic situation for a moving wheel. We see, that for a moving wheel the dynamic origin [O] moves out from the center of the rotating body and therefore the trochoidal path (magenta curve) at position 2π experiences an acceleration away from the IC towards the center of the wheel - that is your head in a cartwheel.



9:42 - 9:54 *"so you see it isn't always true that we view motion from the earth frame of reference: when the motion is simpler from the moving frame, you automatically put yourself in that moving frame"* ..... you couldn't express better the fact that the notion of a *"reference frame"* is that of opinion and bias, and has nothing whatsoever to do with an underlying autonomous reality.

10:00 - 12:50 again, an excellent example of how youp mind is tricked into believing that your choice creates physical reality.

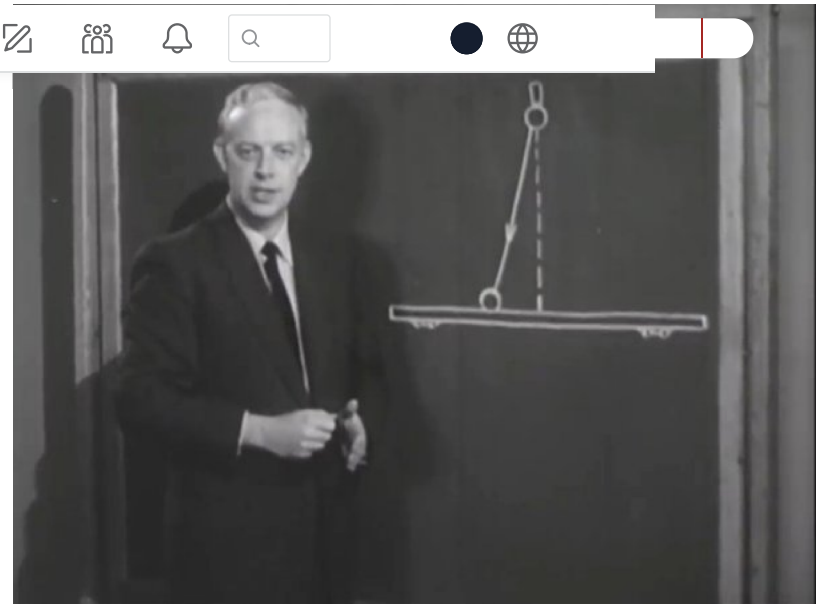
at 11:01 he says: *"if we were making measurements here..."* which measurements, against which frame? does the dynamic situation of the puck change according to the frame you choose? obviously not, and therefore reference frames have nothing to do with the underlying physical reality. That becomes blatantly obvious in the next setup, where we witness the introduction of fictitious physics:

13:35 - 17:04

14:43–14:45 drop of ball in accelerated "frame"

14:48 *"this time you saw the ball moving off to one side"* ..... a ball in free fall never moves *"off to one side"*, it always falls straight down, we know that. Here again, we see an artificial *"suppression of knowledge"* in order to make a pointless point. The accelerated frame is easily known to be one, especially if you are on it, if not, an accelerometer would deliver all necessary information.

And what comes next is so mind boggling, it is like David Copperfield giving away all the secrets of his conjuring tricks:



here's the entire quote:

15:08 *"Gravity is the only force acting on this ball, so it should fall straight down. But if the law of inertia is to hold, there must be a force pushing sideways on the ball pushing in this direction to cause it to deviate from the vertical path"*

.... say whhhaaat? ok, sorry, on he goes:

15:23 *"But what kind of force is it? it isn't a gravitational or electric or a nuclear force, in fact it isn't a force at all as we know one: so we are left to conclude - since there is no force that could be pushing on this direction on the ball - that the law of inertia just does not hold. This is a strange frame of reference"*

.... I'd say, things tend to get strange if you deprive yourself of all possible knowledge! ..... and then comes a rather long but very important monologue:

15:49 *"we call a frames of reference in which the law of inertia holds an inertial frame.* ***The law of inertia holds in the earth frame of reference, so it is an inertial frame"***

...can we pause here and reflect what these professors are telling us here? they are telling us that earth is flat and stationary, because that is the definition of an inertial frame - well, she could also be in an unknown but constant rectilinear motion, but certainly NOT spinning and orbiting, because these motions are defined as being non-inertial. And a motion over a sphere is also non-inertial.

16:19 witness here the official introduction of "*fictitious physics based on belief"* replacing *"physics based on knowledge"*

"When we go into a non-inertial frame like the frame of the accelerated cart, ***our belief*** *in the law of inertia is so strong, that when we see an acceleration of the ball sideways, we think there is a force causing it"*

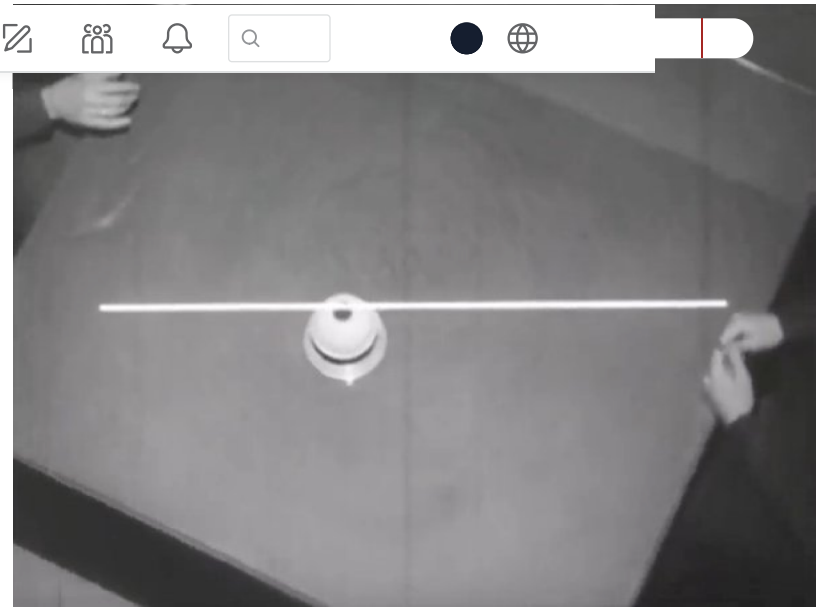
.... nooo, I didn't think there is a force causing it, I rather knew that a force is causing the cart to accelerate.....

16:38 *"****So we make up a fiction that there is a force****, and sometimes we call this a* ***fictitious force****. Fictitious forces* ***arise*** *in accelerated frames of reference"*

.... nooo, fictitious forces only ***arise*** in minds which suppress knowledge, as accelerated frames are always knowable, acceleration being absolute and measurable.

17:05 - 21:55 again a David Copperfield mind bungle easily solved with measurements: an accelerometer mounted on the puck will tell us that it follows the law of inertia, and an accelerometer on the table will tell us that it rotates. No need to invoke fictitious forces.

18:54



19:05 the professor says *"I'm dizzy"* which tells us that he perfectly well was aware of his own and thus his frame's rotation, and thus had all information he needed to *"know what's going on"* yet he pretends not to know in order to be able to make a *"fictitious argument"*.

19:10 – 22:00 watch this episode over and over, because it is like a cup shuffle in slow-mo, allowing you to follow the coin being moved around under the cups until you have no idea any longer where it actually is. Here the table is rotating

19:10 "In the first fixed frame of reference there was no unbalanced force, but in the frame of reference rotating in this turntable there was an unbalanced force, ***because the velocity of this puck kept changing****.* ***This was a fictitious force****"*

….. nooo, we just saw in the previous episode - enhanced with a white line - that the puck is NOT changing direction, and thus moves inertially along a rectilinear path at a constant ***velocity***. THAT is the physical reality, and this is *"measurable"* by way of absence of a positive measurement on the puck. F=ma with a=0 → F=0

20:23 *"you can see that now the puck is moving in a circle and Dr. Hume is exerting a force to keep it moving in the circle. And you can see this from the fact that the rubber ring is extended. He is exerting the centripetal force, and this is the only horizontal force acting on the puck"*

…. The above is a key sentence, because it illustrates how by pure choice of language your brain can be manipulated into oblivion if you don't pay very close attention: Dr. Hume doesn't *"do"* anything, he is fixed and (in this situation) unmovable part of the rotating setup, as he has locked himself to the rotating table with the pen. The only object free to do anything is the puck, and the puck doesn't want to follow the rotation, ***so it is the puck that exerts a force*** and stretches the rubber band, and NOT the pen. By choice of rubber

his intention to

... and even more subtle the use of manipulative language here: "*....and this is the only horizontal force **acting on** the puck*" again, the wording forces you to agree, as in fact the centripetal force is the only force ***acting on*** the puck, but it is NOT the only ***force present.*** In the Newtonian universe of masses, ***inertia*** is the only intrinsic property of mass, and thus the only intrinsic property of nature, and what we call force is actually defined by this only property of mass: ***a force*** is what overcomes the intrinsic resistance of a unit of mass to being set in motion, or change its state of motion. It is the puck's inertia that has to be overcome by the rubber band to keep it rotating and if the band is not up to it, the puck breaks free. The action is all in the puck, it is the puck who decides what force you have to mount against his intention to move along a rectilinear path. In order to hinder the puck from doing so you have to exert a force ***on*** him, but is the puck who decides by way of his mass what that force needs to be. F=***m***v^2/r It is the puck who breaks the rubber band and not the pencil.

Therefore, in a Newtonian world of nonlinear motion, the ***CENTRIFUGAL FORCE*** is the ***only intrinsic natural force*** and thus ***the only real force*** by definition. (we leave out gas and induction physics here, because it does not enter into the argument and Newton did not know about them either) The force of 1N is ***defined*** as whatever overcomes the intrinsic resistance of 1L of water (the definition of a unit of mass) to be accelerated to a velocity of 1m/s in 1s: F(1N)=m(1kg)·a(1m/s^2) 1N=1kgm/s^2

20:47 *"he is exerting a force towards the center of the table, and yet the puck is standing still. Now, he believes in the law of inertia, so he thinks there's an equal force **on** the puck away from the center of the table, so that there is no unbalanced force."*

.... here again, they put the thoughts they want you to have in your head, so you never again have your own thoughts: with the word ***"on"*** they trick you into agreeing, but if you not only believe the law of inertia, but actually ***know it,*** you will of course NOT think that there is an outward force acting ***on*** the puck, you will know that the puck IS the outward force, and therefore the outward force, i.e. the ***centrifugal force is as real as the puck.***

21:02 *"this outward force **on** the puck is the fictitious force in this case, sometimes it's called the centrifugal force. In the fixed reference frame there is no outward force on the puck"*

.... here again, subtle, subtle manipulation: the correctness of this statement rests on the word *"on"* but the word *"on"* itself is incorrectly applied. It is NOT a question of a force acting radially outward ***"on"*** the puck, the puck IS the radial outward force by way of it's inertia, and thus the term ***fictitious outward force*** is simply ***false*** and nonsensical and manipulative and deceptive.

21:15 *"now suppose that Dr. Hume stops exerting a force. Watch the puck! in the fixed frame of reference the puck moves off in a straight line. There is now no unbalanced force acting on it."*

... that is exactly what we expected: when the puck is released from forcefully following a rotation, his resistance to do so gets dormant again, as the resistance of a given mass to do exactly that is proportional to this very deviation from a rectilinear path: F=m***a,*** and thus the puck happily continues moving along a rectilinear path. The subtle manipulation here is to make you believe, that after being released there should be ***force left over*** which would propel the puck radially away from the center..... as if in a Newtonian world a force could exist on its own?

21:31 *"now let's look at it again from his point of view in the rotating system. When he releases the puck, which to him was at rest, it moved. The force away from the center is now an unbalanced force on the puck, to him"*

.... again, this only holds under suppression of knowledge, and even then it is irrational: what would an unbalanced force out of nothing be?

21:58 *"I hope Dr. Ivy and I have convinced you that a rotating frame of reference is not an inertial frame"*

...ok, now that we are convinced that a rotating frame is NOT an inertial frame, and we have also been convinced in this video that the earth IS and inertial frame, we are now legitimately convinced that earth is not accelerating in any direction, be it spinning or orbiting, or spherical for that matter, because then all movement across earth would be also amount to a rotation, i.e. and acceleration.

.... what this video also convinced us of is the fact that nature doesn't care about reference frames, nature is not a reality that changes with the opinion of an observer, as masses

end there has to come the big disclaimer:

22:06 *"now you've all been told that the earth is rotating about its axis, and that also it travels in a nearly circular orbit around the Sun. Why then do we find in a frame of reference attached securely to the earth, that the law of inertia seems to hold? Why don't we observe fictitious forces?"*

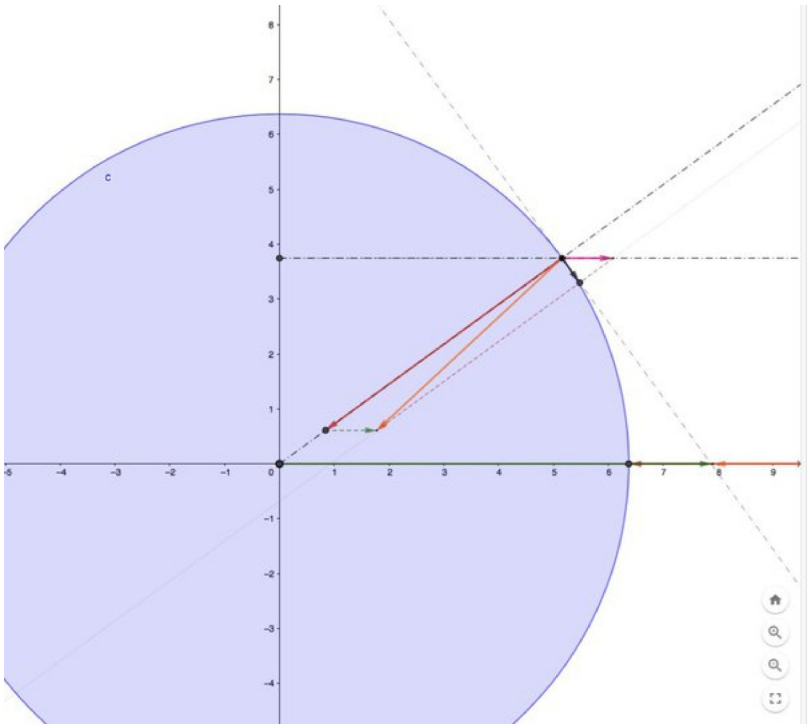
... well, first, because there are none as we have seen, and second because earth is in fact an inertial frame, just as the video showed through its entire length - until now of course, when the face can only be saved with brushing the train wreck under the *"negligible"* carpet:

22:50 *"the acceleration of this frame - i.e. the earth - is really very small. Because the earth is spinning around its axis, it has an acceleration of 3/100 of a meter per second squared"* ....

23:36 and again *"...but not really very much."*

... ok, so 0.03 of anything is not very much? well, what about 0.000000000061 (Cavendish) or what about 0.00000000000000000081 (LIGO)? numbers measured with medieval arrangements of balls and mirrors hanging from wires! so much for measurability when it is deemed fancy. 0.03m/s^2 is an absolutely huuuuge number compared to that. It would result in a velocity of 9Mach after only one day!

... of course they only give this *"negligible"* opposition for the equator, as only there acceleration due to rotation and gravitational acceleration align as they oppose each other. Everywhere else they don't, as gravity is ***central*** and radial acceleration is ***axial.***



That means that anywhere between equator and pole mirrors for instance would not hang perpendicular to ground, and pendulums would not swing regularly, as there is a nonzero resultant acceleration, i.e. force, pointing towards the equator.

This renders the final argument of the video invalid - that of the pendulum:

24:11 *"the fact that it is the earth that is rotating can be demonstrated by means of a pendulum"*

.... well, yes, but only if it can be shown that the pendulum swings biased towards the equator, but it doesn't and so, whatever it shows, it doesn't show what it is meant to show and we are where the video guided us all the way: Earth is an anchored, static, inertial frame because the law of inertia holds.

NASA btw acknowledges that by not bothering with calculations of flights over a spinning spherical earth, but satisfying themselves with doing the math for *"flying in a stationary atmosphere over a flat non-rotating earth"*.

Add a comment... Add comment

Zero Elevation · 3y
Great Michael, really massive work. I expected that you watch it in all detail. Just two minor corrections: Dr. Hume said, that the earth is ALMOST an inertial frame (21:22) "Have you been ever told, that earth is NOT an inertial frame". Be honest, Mic (more)

2 Reply

Michael Brenner · 3y
"Be honest, Michael! If you find tiny incorrect details doesn't mean, that everything is wrong." As long as it is about decimal points, that is, about level of accuracy, no, but if it is about principle, yes. You cannot use the word "exa (more)

1 Reply

Zero Elevation Dear Michael, thanks for the detailed reply. I don't have the time to give a...

Randy Layhey · 3y
Excellent as always, and of course the usual suspects show up in your comment section to add little other than "you're wrong" as they continue to blabber on making fools of themselves trapped in their tiny minds that can't see the trick (more)

3 Reply

Richard Russell · 3y
Incorrect again, as usual Brenner. And not worth reading through in detail - what a boring waste of words. Every paragraph I read had multiple errors of basic comprehension that if I was bothered to correct would take me a much longe (more)

2 Reply

Michael Brenner · 3y
It was expected that you would wine: "mom, he destroyed my favorite toy the fictitious force, boohoo!" You swallowed the "I don't know" , the "suppression of knowledge" pill hook and sinker and of course you reason accordingly. "A (more)

2 Reply

Richard Russell Incorrect as expected, Brenner. You cannot "destroy" that which you do not...

Martin Dennett · 3y
TL;DR. But probably wrong as usual.

1 Reply

Comment deleted · April 18, 2023

Michael Brenner · 3y

accused of making the laws of translational and rotational mechanics up, (more)

1 Reply

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About the Author

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