Einstein's Train.....

Derailed by

ALFA Truth!

Open with Overture: https://www.youtube.com/watch?v=j-kSEX8O9HE#t=12s

Abstract Einstein's favorite analysis of Special Relativity for the general public was the description of simultaneous events at both ends of a train from two different perspectives. His basic conclusion was that SR predicts that lengths contract and clocks slow down when in motion. Predictions of future motion were based on the Lorentz set of transformations, not those of Galileo. SR has been the mainstream theory of choice for mechanics and electromagnetism for over a century.

The re-analysis done here will carefully review the Train exp using the scientific method and classical realism, uncovering evidence that will shake many foundations of modern physics; indeed, some pillars will collapse.

Introduction The aether test of MMX in 1886 – to find the Earth's speed through the rigid Lorentz aether - had an unexpected result. Instead of finding the heliocentric prediction of 30 km/s, M&M found an average of about 6 km/s in 5 sets of data runs over 6 weeks. Not 30 km/s,,,,but not zero either! ..and way above the threshold of detection of the MMX interferometer.

Yet the physics texts called the result 'null' , a word which Webster defines as 'invalid' in legal usage, and 'zero' in math contexts. Is 6 km/s null or invalid because it countered their expectations? This measured average is over thirteen thousand mph! ...pretty far from zero.

Dayton Miller (1920s) and VV Demjanov (1960s) found that their careful repeat of the MMX found Earth's speed to be not a constant but a composite wave having (at least) wave periods that were yearly(of solar origin) and also 23 hrs, 56 m(of stellar origin).

This aether test, interpreted as invalid|zero, caused a great impasse in theoretical physics at the start of the 20th century, as many 19th century physicists, like Maxwell, firmly believed in the aether's existence.

Einstein’s 1905 theory offered a resolution, but SR was fraught with many paradoxes and logical challenges.

SR postulates:

1) The laws of physics are the same in all inertial reference frames (principle of relativity),

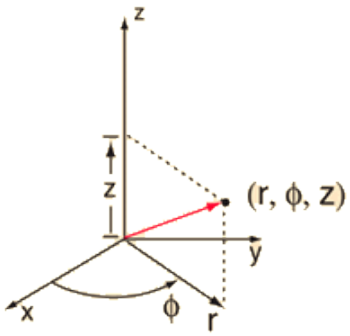
2) the speed of light in a vacuum is the same for all observers, regardless of the light source or observer motion (principle of light constancy).

Common ground definitions:

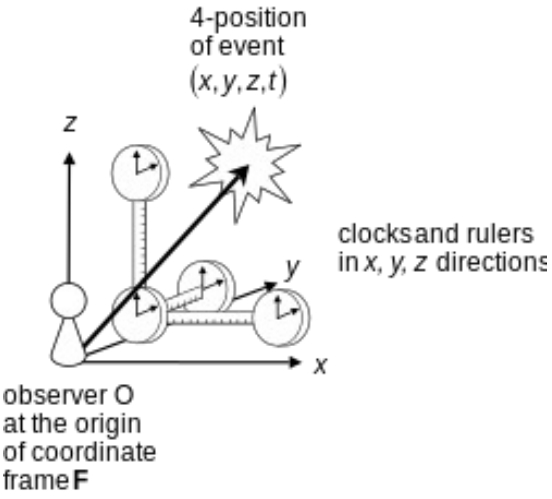
Kinematics: a branch of physics that analyzes motion with mathematics, but without considering any causes, forces or energy principles. Position, velocity, acceleration, and time are measured in the present…nothing else.

Dynamics : the physics branch that predicts the future motion of bodies using forces and energy principles.

Coordinate systems In physics, a **mathematical framework** defining an object's position in real space using numbers along each axis as distances from the origin point. This allows for the precise description and analysis of motion and physical quantities within space. No clock or observer. More simply,



Reference frames an observer(data collector|measurement system) consisting of a coordinate system, ruler and clock describing the motion of an object relative to the origin.



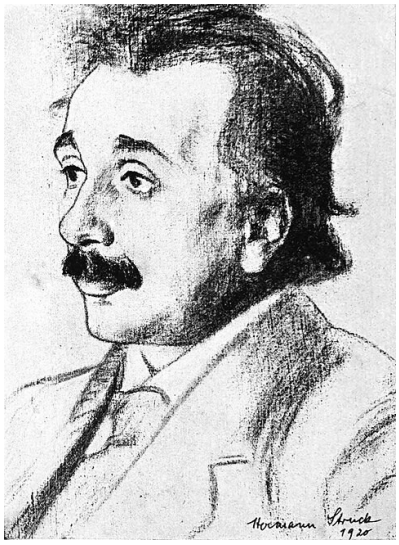
Kinematic laws of induction are equations of motion induced/derived from prior measurements.

Dynamic laws of physics are equations of motion deduced from Newtonian forces or the predictions of the Euler-Lagrange equations, based on variational principles applied to an energy model.

Inertial reference frame is one in which the laws of dynamics are valid

The Train Gedanken Experiment

Ref: https://en.wikisource.org/wiki/Relativity_(1931)



RELATIVITY

THE SPECIAL AND GENERAL THEORY

BY

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In the sections before simultaneity, the book reviewed current beliefs in mainstream physics….

Law of Inertia: A body removed sufficiently far from other bodies continues in a state of rest or of uniform motion in a straight line.

Galilean system of co-ordinates: the state of motion is that the law of inertia holds relative to it.

Galilean Covariance: The laws of the mechanics of Galilei-Newton are valid only for a Galileian system of co-ordinates.

Principle of relativity (in the restricted sense): If *K* and *K'* are reference frames in relative linear motion, then both follow exactly the same general laws of motion as with respect to *K*.

Law of light propagation: The speed of light(SoL) in vacuo is constant at c~300,000 km/sec.

STR Principle: "*in reality there is not the least incompatibility between the principle of relativity and the law of propagation of light*"

Simultaneity definition: In the train model**, light requires the same time to traverse the path A=>M as for path B=>M.**

The law of the propagation of light in vacuo may be compatible with the principle of relativity.

Galilean Transformation

$$x' = x - vt$$
$$y' = y$$
$$z' = z$$
$$t' = t$$

Lorentz transforms

$$x' = \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}}$$
$$y' = y$$
$$z' = z$$
$$t' = \frac{t - \frac{v}{c^2} \cdot x}{\sqrt{1 - \frac{v^2}{c^2}}}$$

In accordance with the Lorentz transformation, the law of the transmission of light *in vacuo* is satisfied for all inertial frames; x = ct and x' =ct'. The speed of light measured in any inertial fame is always c.

Length Contraction: The length of a rigid rod moving parallel to its length is shorter in motion than at rest by the factor of $\sqrt{1 - \frac{v^2}{c^2}}$

Time Dilation One second of time in one inertial frame will be larger by $\frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$

in a second inertial frame.

Galilean transformations predict no length contraction due to inertial frame motion, nor time dilation.

General laws of nature are co-variant with respect to Lorentz transformations.

Law of Covariance Every general law of nature must transform into a law of exactly the same form when changing reference frames.

The principle of relativity requires that the law of conservation of energy should hold for all "Galilean" system of co-ordinates|inertial reference frames. In contrast to classical mechanics, the Lorentz transformation is used in Special Relativity.

According to the theory of relativity, action at a distance with the velocity of light always takes the place of instantaneous action at a distance.

All facts of experience supporting the Maxwell-Lorentz electromagnetic theory also support special relativity.

Missing: Law of relative motion: The motion variables between <u>any</u> two reference frames a,b are equal and opposite.

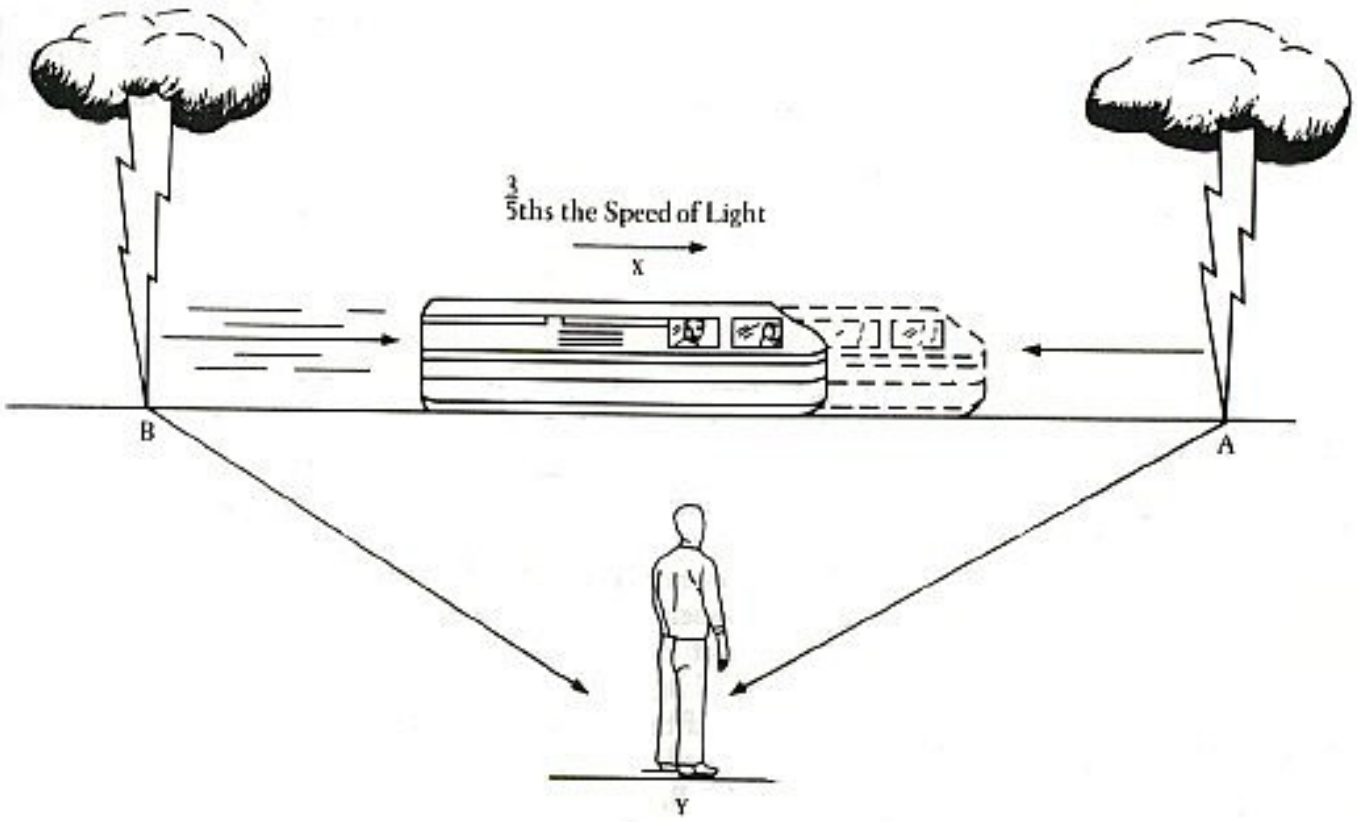
e.g., Define a mathematical truism: Xa-Xb = Xa,b = -(Xb-Xa) = -Xb,a

Let X = D,Vel, Acc,….. Then Da,b =-Db,a , Va,b =-Vb,a, etc.

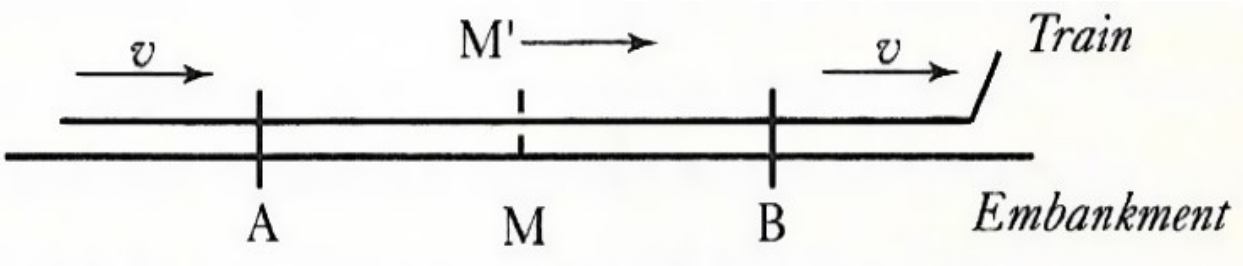
Kinematics vs Dynamics

Einstein's original train example(edited) Chap IX

The Basic Issue: Simultaneity



In Einstein's special train example, the light from A will arrive at X before that from B. Hence X will observe the lightning at A as happening before that at B. Y, however, will observe the bolts of lightning to be simultaneous. This is an example of how observations from reference frames moving at great speeds relative to each other reveal a different timing of events.



['embankment' will be replaced by station 'platform']

Train passengers will use the train as a rigid reference frame (co-ordinate system).

When the lightning strokes are simultaneous with respect to the platform, the rays of light emitted where the lightning occurs meet at the mid-point M. [Def of Simultaneity] But the light rays are also seen on the train.

Are the two events (lightning strokes) simultaneous in both the platform and train reference frames? .... the answer must be in the negative.

Let M' be the train's middle. When the flashes of lightning occur, M' = M, but M' moves right with the train's velocity v. Now in reality, in the platform frame, M' is moving towards the light

beam coming from B , while riding ahead of the light beam from A . Hence M' will see the light beam from B earlier than from A . Train observers conclude that the lightning flash from B was earlier than the one from A. We thus arrive at the important result:

Events which are simultaneous with reference to the platform are not simultaneous with respect to the train, and vice versa (relativity of simultaneity). Every reference frame (coordinate system) has its own particular time; unless we know the reference frame, there is no meaning in a statement of the time of an event.

Absolute time has been assumed to be independent of the state of motion of the reference frame. But this assumption is incompatible with the most natural definition of simultaneity; if we discard absolute time, then the conflict between the law of the propagation of light in vacuo and the principle of relativity disappears.

Note: Einstein doesn't separate the meaning of coordinate system(math) and reference frame(physics). This conflation of abstraction and reality pervades his research in Special and General Relativity.

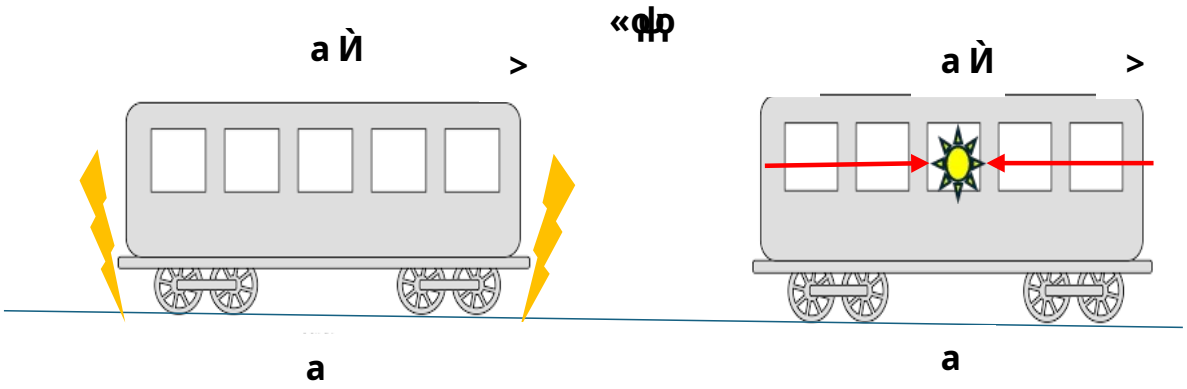
Kinematics: **Only measurements determine motion…by induction.**

Train at station Train length = L SoL = speed of light.

Train frame = Lab frame

clock = 0 v=0 clock = t

In both the Lab & Train frame

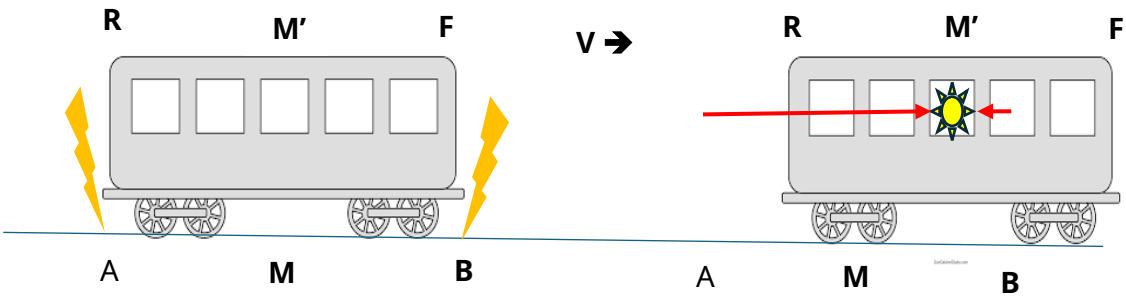


AM' = L/2 = Vam*t =SoL*t = c*t…. = BM =RM' = FM'

Simultaneity definition: light requires the same time to traverse the path A=>M as for path B=>M.

So t is the same for both light paths.

Lab : v=0 **Train: v > 0** **Photon: SoL**



Use f & r for motions from front & rear… Tr,Tf and SoLr,Solf

Note: No assumptions that times or speeds are equal

Train motion:

AR = v*Tr BF = v*Tf so AR=BF => **Tr = Tf = t**

Rear light beam: Front light beam:

A->M' =AM' = AR+RM' = v*t +L/2 = SoLr *t B->M'= BM' = FM'-BF = L/2 - v*t = SoLf *t

Add: AM' + BM' => L = SoLr *t +SoLf*t so **t = L/(SoLf + SoLr)**

Subtract: AM' - BM' = 2v*t = SoLr *t - SoLf*t so **SoLr – SoLf = 2v**

Now…..**SpRel Post #2: SoL = c ….always**

Contradiction: c-c = 2v = 0 But v > 0 so Train MUST BE AT REST….

SR is ONLY valid for co-moving observers …at relative rest! Statics, not dynamics!

t = L/(c+c) = L/2c same as stationary train…

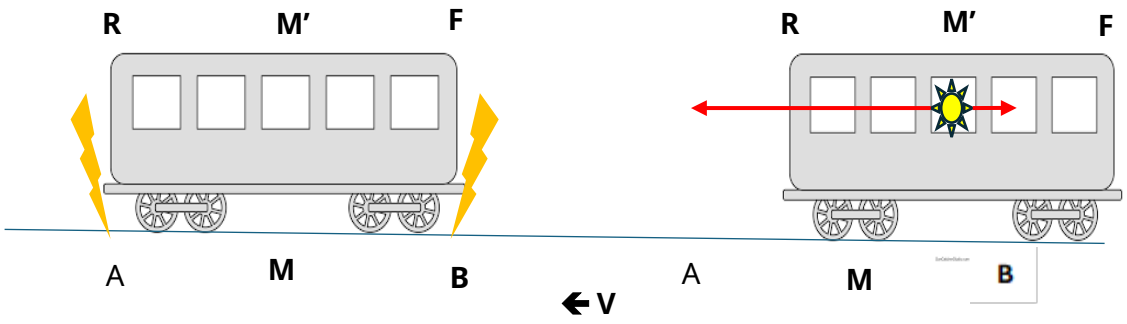
NB: No time dilation…no length contraction! A real world! 120 years of scientific farce…..

Galilean Transform: => SoL = c +/- v => SoLr=c + v SoLf=c - v

Then t= L/[(c-v) +(c + v)] = L/2c = t => same as when v=0…..simultaneity in all frames!

SoLr – SoLf = 2v = c + v - (c - v) = 2v √

Train Frame v = 0 **Lab Frame: <=v**



The Train frame diagram is the same as for the ground|lab reference frame; only the velocity vectors are reversed, in accord with the law of relative motion....$V_{T,L} = - V_{L,T}$

All distances remain the same , so are the conclusions, as above:

t = L/(SoLf + SoLr) **SoLr – SoLf = 2v**

Please note:

By definition, the **analysis here was based on kinematics** ... math applied to measurements of motion.

No laws of physics (derived from **energy variational principles in dynamics**) were invoked.

Train Analysis for <u>Dynamics</u>

<u>Dynamics: Energy-based laws of physics predict future motion</u>

We now analyze the train model dynamically, by computing the Total Energy, a conservation law of physics, in both frames of reference

and applying the Conservation of Energy principle of dynamics. The system consists of a train frame and one for the equivalent frame of station platform|tracks|ground|Earth.

In the Lab frame: Etot = KEtr = $(Mtr/2)Vtr^2$, Mtr being the mass of the train. Experiments validate that this relation is correct.

In the Train reference frame: Etot = KElab = $(Me/2)(-VLab)^2$, Me being the mass of the train. That is, relative to a train observer, not just the platform or tracks are moving at -V, but the entire Earth.

If Total Energy is conserved , then Etrn = Elab , or $(Mtr/2)Vtr^2 = (Me/2)(-VLab)^2$

Relative motion requires that Vtr,lab = -Vlab,tr

Result: Mtr = Mert XXX clearly invalid, since Mert >>>>>>Mtr!

This evidence that the Earth is the only valid reference frame in dynamics is supported by Newton's Bucket anomaly, in which the bucket frame incorrectly predicts the centrifugal force, but the lab frame does not.. and there are many more instances of the Lab as an absolute reference frame in dynamics.

The reader(s) are challenged to find predictions of Lagrangian laws that are

1) The same in the lab and non-lab frames.
   Or
2) Valid in the non-lab frame.

Einstein and his believers tried to save SR (and the MMX results) by using a Lorentz transformation, based on a universal rigid aether, through which motion occurred. Time wasn't absolute, but dilated(expanded} and lengths contracted along a light path, so space and time were distorted to accommodate a constant SoL of c.

The mental concoction of Length Contraction has never been empirically confirmed, without assuming time dilation is true.

Time dilation can be explained by the effect of aether wind on mass.

Summary from the train analysis:

SR postulate 2 is invalid for any relative motion frames if v <> 0

SR postulate 1 is invalid , since the energy-derived laws of physics are only valid in the lab frame.

Rehash of the SR principles:

Galilean Covariance: The laws of the mechanics of Galilei-Newton are valid only for a Galilean system of co-ordinates. **False. The laws of electrodynamics are also valid in Galilean reference frames, if aether motion in the lab frame is included.**

Principle of relativity (in the restricted sense): If *K* and *K′* are reference frames in relative linear motion, then both follow exactly the same general laws of motion as with respect to *K*. **False. The laws of motion (e.g., energy conservation) are not valid in the train reference frame.**

Law of light propagation: The speed of light(SoL) in vacuo is constant at c~300,000 km/sec. **False. SoL = c + v Ref: Sagnac, Dofour&Prunier, Ruyong Wang.**

STR Principle: "*in reality there is not the least incompatibility between the principle of relativity and the law of propagation of light*" **Both are false; see above.**

In accordance with the Lorentz transformation, the law of the transmission of light *in vacuo* is satisfied for all inertial frames; x = ct and x' =ct'. **False. When SoL was c, train speed had to be zero(0).**

The speed of light measured in any inertial fame is always c. **False. When SoL was c, train speed had to be zero(0).**

Length Contraction: The length of a rigid rod moving parallel to its length is shorter in motion than at rest by the factor of $\sqrt{1-\frac{v^2}{c^2}}$ **False. When SoL was c, train speed had to be zero(0).**

Time Dilation One second of time in one inertial frame will be larger by $\frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$ in a second inertial frame. **False. When SoL was c, train speed had to be zero(0).**

General laws of nature are co-variant with respect to Lorentz transformations. **False. The laws of mechanics are Galilean covariant.**

The principle of relativity requires that the law of conservation of energy should hold for all "Galilean" system of co-ordinates|inertial reference frames. **False. Conservation of energy was true for the lab frame, but not for the train frame.**

Kinematics vs Dynamics

SR applies relativity to kinematics and dynamics, to measurement and predictions. But relativity only applies in kinematics | measurements.

SR significantly impacts modern physics by fundamentally distorting our understanding of space and time, where space and time are not separate entities but are intertwined… new perspective on how we measure and perceive events in the universe.

$E=mc^2$ was known before 1905

High velocity research in particle physics using the illogic of time dilation and length contraction mis-represent the underlying explanations of aether models.

GPS systems the relativistic effects on time experienced by satellites in orbit. Aether effects

Special relativity is a fundamental principle in advanced quantum field theory and general relativity,

The precise timing of GPS satellites is heavily influenced by relativistic effects, requiring adjustments to account for time dilation experienced by the satellites in orbit.

Understanding relativistic effects is crucial for designing and interpreting experiments conducted at high-energy particle accelerators.

Summary; Kinematic frames are equivalent; dynamic reference frames are unique & absolute…

the ECEF/Lab frame

Q & A

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Closing melody: https://www.youtube.com/watch?v=-XLZszypUV0&t=121s