

More

MYTHPAGE Outrages at Mathpages

REFLECTIONS ON RELATIVITY?...REJECTIONS OF RELATIVITY!

Welcome. This is a reasoned response to the relativity section at mathpages.com, a site promoted as the on-line and authoritative reference for all seeking explanations of mainstream relativity and its math support.

Mathpages is in fact our favorite comedy site on the Web, a truly modern fantasy, full of contradictions. Presented as mathematical support for relativity, it actually brings the errors into focus, a *comedia errata*. It is puzzling why it is cited to support any type of science, as the site is saturated with logical and mathematical errors, an unintended satire of modern thought. If grounded firmly in logic and mathematics, no one need be troubled by the intimidation of special relativity flak launched therein.

Does lack of response to the mathpages outrages signal descent into agnosticism and to nihilism beyond? God help us all.

All comments will be posted that are civil, relevant and coherent.

PLEASE READ THE INTRODUCTION BEFORE COMMENTING.

t/h to Peter and Amy for tech support.

SEARCH

THURSDAY, JANUARY 20, 2011

2.1 The Spacetime Interval

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INTRODUCTION

Intro

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Galileo Was Wrong

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Relativity Survey

...The quantity dt is called the elapsed proper time of the interval, and it is invariant with respect to any system of inertial coordinates.

- [Where's the empirical support for this statement? Muon decay has been measured when its rest frame is co-moving with the lab frame; this is the 2 msec measurement.](#)

[But not when the muon is moving at high speed and altitude as the partial product of a natural cosmic ray collision, nor when the muon is generated artificially in the research accelerators. The measuring equipment in both prior cases would have to be co-moving with the muon, to measure its decay in the rest frame, using its proper time.](#)

[To claim the same 2msec decay time at high speeds relative to the lab frame – without decay measurements in the high speed frame, is an unsupported inference.... A guess that the lab frame is equivalent to the high speed frame. But there is copious evidence to the contrary.](#)

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BLOG ARCHIVE

- ▼ 2011 (1)
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18,823

Proton accelerators produce a shower of electrons (aka electron cloud) at the exit tube in CERN experiments. If the proton high speed frame ($v > .99c$) were equivalent to the lab frame, then we would not measure any such electron cloud, WHICH GIVES PHYSICAL EVIDENCE OF AN ABSOLUTE DISTINCTION BETWEEN THE LAB AND ANY FRAME MOVING WITH RESPECT TO IT.

To be equivalent physical system, both frames should see the same phenomenon – either both see no electron cloud, or both see the same electron cloud!

INERTIAL FRAMES ARE NOT EQUIVALENT IF ONE OF THEM IS THE LAB FRAME!

..Now suppose we assess this same physical phenomenon with respect to a relatively moving system of inertial coordinates, e.g., a system with respect to which the muon moved from the spatial origin [0,0,0] all the way to the spatial position [980m, -750m, 1270m] before it decayed. With respect to these coordinates, the muon traveled a spatial distance of 1771 meters.

- 1771 m is measured in the lab frame – not the muon's rest frame!

..Since the advance of the quantum wave function (i.e., the proper time) of a system or particle over any interval of its worldline is invariant,

- Speculation without empirical proof – see above. ...

$$dT = 6.23 \text{ microsec.}$$

This represents the time component of the muon decay interval with respect to the moving system of inertial coordinates.

- If so, confirm this with measurements MADE IN THE MOVING SYSTEM OF INERTIAL COORDINATES.

...Since the muon has moved a spatial distance of 1771 meters in 6.23 msec, we see that its velocity with respect to these coordinates is 284 m/msec, which is 0.947c.

- Which is the speed measured in the lab frame.

...The idea that neutrinos actually do have mass seems to be supported by recent experimental observations, but the questions remains open.

- If $E = hf$ and $E = mc^2$, then the neutrino (and photon) must have mass. Then neither travels on null intervals!

...the quantum state of a system gives (arguably) the most complete possible objective description of the system.

- Yes, arguably, definitely.

...we assume that two co-moving clocks will keep time at the same instantaneous rate, even if one is accelerating and the other is not.

- The obvious refutation of this is accelerating to the point of physical destruction of the clock.....

Also, What is the physical process behind the clock's use as time-keeper?

Gravity? EM?

Along with the environment this will determine the clock's validity as chronometer.

...This is just a hypothesis - we have no a priori reason to rule out physical effects of the 2nd, 3rd, 4th,... time derivatives. It just so happens that when we construct a theory on this basis, it works pretty well.

- For inconsistent theories, working well proves nothing...

...Another way of expressing this "clock hypothesis" is to say that an ideal clock is unaffected by acceleration, and to regard this as the definition of an "ideal clock", i.e., one that compensates for any effects of 2nd or higher derivatives.

- What is an example of an ideal clock in reality?

...The point is that these are both assumptions invoked by relativity: (1) the zeroth and first derivatives of position are perfectly relative and undetectable, and (2) the second and higher derivatives of position are perfectly absolute and detectable. Most treatments of relativity emphasize the first assumption, but the second is no less important.

· If $v_{a,b}(t) = -v_{b,a}(t)$ then the derivative is relative, not absolute: $A_{a,b}(t) = -A_{b,a}(t)$

· Absolute velocity was detected in the Sagnac & Michelson-Gale exps.

...The notion of an ideal clock takes on even more physical significance from the fact that there exist physical entities (such a vibrating atoms, etc) in which the intrinsic forces far exceed any accelerating forces we can apply, so that we have in fact (not just in principle) the ability to observe virtually ideal clocks.

· How do we know $F = ma$ applies in the quantum world of the nucleon?

· Nuclear clocks are sensitive to the environment.

...For example, in the Rebka and Pound experiments it was found that nuclear clocks were slowed by precisely the factor $g(v)$, even though subject to accelerations up to 10^{16} g (which is huge in normal terms, but of course still small relative to nuclear forces).

- The gamma ray energy was absorbed by the whole lattice; where do the accelerations up to 10^{16} g enter into the Rebka and Pound experiment?

...How can an entity have a well-defined velocity and yet have no well-defined rest frame?

- Because the concept of inertial frame has no existence in reality ... an empty definition.

...The only answer can be that the transformation is singular, i.e., the coordinate system moving with a uniform speed c relative to an inertial frame is not well defined.

- Contradictions cannot be logically well-defined. This is the fundamental contradiction in SRT:

From the SRT 1905 paper:

1. The laws by which the states of physical systems undergo change are not affected, whether these changes of state be referred to the one or the other of two systems of co-ordinates in uniform translatory motion.

So - if a,b,c are 3 different inertial frames and a is stationary,

Then take $V_a = 0$ and take $V_{b,a} = v_1$ and $V_{c,a} = v_2$, where $v_1 <> v_2$

Then $V_{b,a} <> V_{c,a}$

2. Any ray of light moves in the "stationary" system of co-ordinates with the determined velocity c, whether the ray be emitted by a stationary or by a moving body.

So - $V_{b,a} = c$ and $V_{c,a} = c$

Then $V_{b,a} = V_{c,a}$

3. SRT premise 1 contradicts SRT premise 2 ; SRT is inconsistent

... it's clear that for $v = \pm 1$ the individual t' and x' components are undefined, but the ratio of dt' over dx' remains well-defined, with magnitude 1 and the opposite sign from v.

- The ratio of 2 undefined quantities is defined to be c ??

Hence, the term 'mythpages'.

POSTED BY ROBERT B AT 2:27 PM 0 COMMENTS

LABELS: 2.1 THE SPACETIME INTERVAL

WEDNESDAY, NOVEMBER 24, 2010

1.9 Null Coordinates

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...according to Lorentz's view all configurations of objects moving through the absolute ether must be capable of infinite spatial "contractions" and temporal "dilations", without the slightest distortion.

- The Sagnac class of experiments invalidate the Lorentz transformations and the Lorentz fixed/absolute aether as relevant in physics.

..he [Lorentz] held to the possibility that absolute speed might, after all, make some difference to the intrinsic relations between physical entities. However, one hundred years after Lorentz's time, there still is no evidence to support his suspicion.

- Lorentz died in 1928, 15 years after the Sagnac exp., which showed that the aether measured in the lab frame makes a difference in the measured speed of light. If only Sagnac's result had been properly interpreted and promulgated, his intuition would have been acknowledged in his lifetime.

To the contrary, all the tremendous advances of the last century in testing the Lorentz transformation "to the nth degree" have consistently confirmed it's exact validity.

- Except for experiments sensitive enough to detect aether effects.

At some point a reasonable person must ask himself "What if the Lorentz transformation really is exactly correct?"

- This could only be true in a world where aether doesn't exist, or has no effects on motion.

Einstein's central contribution to modern relativity was the idea that there is no one "true" simultaneity between spatially separate events, but rather spacetime events are only partially ordered, and the decomposition of space and time into separate variables contains an inherent ambiguity on the scale of $1/c$.

- Simultaneity in the absolute time of the ALFA model is well-defined and space sequences are well-ordered. Simultaneity determination requires the knowledge of the distance between events and the aether effect on the measurement of the events.

(Late in life, as Einstein continued arguing against Bohr's notion of complementarity in quantum mechanics, one of his younger colleagues said "But Professor Einstein, you yourself originated this kind of positivist reasoning about conjugate variables in the theory of space and time", to which Einstein replied "Well, perhaps I did, but it's nonsense all the same".)

-an incisive anecdote

Summary: More math diversions, devoid of physical content.

POSTED BY ROBERT B AT 8:36 PM 0 COMMENTS
LABELS: 1.9 NULL COORDINATES

1.8 Another Symmetry

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We saw in previous sections that Maxwell's equations are invariant under Lorentz transformations, as well as translations and spatial rotations.

- We also saw that this was of no consequence. Nature has a absolute reference system.

...by reciprocity we have $v_{ij} = ?v_{ji}$

- A key relation for future analysis.

If acceleration were relative (like position and velocity), we would expect the cyclic symmetry $v_{ij} + v_{jk} + v_{ki} = 0$, which is a linear function of all three components. Indeed, this is the Galilean composition formula. However, since acceleration is absolute, it's to be expected that the actual relation is non-linear in each of the three components.

- In sum, position and velocity are relative; acceleration is absolute.

So saith mathpages.

... the relativistic composition law for velocities accounts for the increasing inertia of an accelerating object. This leads to the view that inertia itself is, in some sense, a consequence of the non-linearity of velocity compositions.

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1. Velocity compositions are linear.
2. Inertia is the effect of aether.

These are the Lorentz transformations for velocity v in the x direction. The y and z coordinates are unaffected, so we have $y' = y$ and $z' = z$. From this it follows that the quantity $t^2 - x^2 - y^2 - z^2$ is invariant under a general Lorentz transformation, so we have arrived at the full Minkowski spacetime metric.

-Further analysis of Lorentz transforms is of interest to mathematicians, but has no application to physics.

POSTED BY ROBERT B AT 8:03 PM 0 COMMENTS
 LABELS: 1.8 ANOTHER SYMMETRY

1.7 Staircase Wit

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In 1908 Minkowski delivered a famous lecture in which he argued that the relativistic phenomena described by Lorentz and clarified by Einstein might have been inferred from first principles long before, if only more careful thought had been given to the foundations of classical geometry and mechanics.

- This is 3 years after the publication of Einstein's SR paper. The Sagnac X was performed in 1913, 5 years later than this lecture. If only the Sagnac result had preceded the Minkowski abstraction of a non-existent space-time, perhaps the wrong turn of physics into mathematical speculation would have been avoided, saving a century of misguided effort.

Minkowski pointed out that special relativity arises naturally from the reconciliation of two physical symmetries that we individually take for granted. One is spatial isotropy.. The other is Galilean relativity... However, these transformations obviously do not leave the quantity $x^2 + y^2 + z^2$ invariant.

- These 2 symmetries - that are taken for granted - are both discounted by the Sagnac-type experiments. Space can move (aether flow) , introducing a preferred direction and spatial anisotropy. The discovery of the absolute lab frame converts Galilean relativity to Galilean absolutism.

Finally, a reference frame co-moving with the aether does leave distance invariant.

..the lack of an invariant measure for the Galilean transformations prevents us from even assigning a definite meaning to 'orthogonality' between the time and space coordinates.

- Why should time be orthogonal to space? Time is a parameter used to quantify motion. Why the arbitrary conditions of orthogonality for the time parameter and spatial dimensions in the absence of experimental proof?

Since the velocity transformations leave the laws of physics unchanged, Minkowski reasoned...

- Not when aether - which is ubiquitous - is included.

..this [Lorentz transformation] appears to be the most natural (and almost the only) way of reconciling the observed symmetries of physical phenomena.

- What observed symmetries of physical phenomena?

As Minkowski said,

'Such a premonition would have been an extraordinary triumph for pure mathematics. ...'

- Well said, but not as intended. There's no connection with real tests of light speed and motion, making the Minkowski mathematical 'premonition' devoid of physical importance.

The invariance of this quantity [s^2] under re-orientations is called spatial isotropy. It's worth emphasizing that the invariance of s^2 under these operations applies only if the x, y, and z coordinates are mutually orthogonal.

- No mention of the fact that the measurement process of this spatial abstraction is affected by the presence of aether.

The spatial isotropy of physical entities implies a non-trivial unification of orthogonal measures.

- Then the spatial anisotropy of physical entities as observed, involving aether, must not imply unification of orthogonal measures.

If an object is in motion (relative to the system of coordinates), then the coordinates of its endpoints are variable functions of time, so instead of the constant x_1 we have a function $x_1(t)$, and likewise for the other coordinates.

- Interesting - so here we see that t is a parameter measuring the changing location of x, not an independent fourth dimension in an unknown direction.

..experience teaches us that equation (1) does apply to objects in motion.

- Not if space itself - aether - is moving.

..the combined symmetry covering states of uniform motion is valid only if the time component t is mutually orthogonal to each of the space coordinates.

- Time is incommensurate with space, like the attempted comparison of apples and oranges. If we use latitude and longitude and altitude for x, y, and z on the Earth's surface, where do we put the time axis?

..we can only establish the physical orthogonality of coordinate axes based on physical phenomena.

- Then why is the physical phenomenon of aether ignored?

Evidently to establish orthogonality between space and time axes we need a physically meaningful measure of space-time distance, rather than merely spatial distance.

- This forces time to be a dimension, despite its parametric role in describing motion.

Using the logic above we could just as well look for converting space into the time 'dimension' by dividing x, y, z by c . Distances would then be measured in intervals of time that light travels!

Admittedly we could postulate a universal preferred reference frame for the purpose of assessing the complete separations between events, but such a postulate is entirely foreign to the logical structure of Galilean space and time, and has no operational significance.

- We do so postulate: the lab frame . Such an absolute postulate is entirely foreign to the logical structure of any flavor of relativity, and has no operational significance... Except being the preferred frame of reference for applying the laws of physics, according to Sagnac testing and the ALFA model.

The most natural supposition is that the squared spacelike intervals and the squared timelike intervals have opposite signs, so that they are mutually 'imaginary' (in the numerical sense).

- And in the cognitive sense.

Hence our proposed invariant quantity for a suitable class of repeatable physical processes extending uniformly from event 1 to event 2 is

$$s^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2 - c^2(t_2 - t_1)^2$$

- As noted, we could also choose to use an interval = s^2/c^2 with spatial units being x/c and t as is.

This quantity is invariant under any combination of spatial rotations and changes in the state of uniform motion, as well as simple translations of the origin in space and/or time.

- So is s^2/c^2

Minkowski remarked that,

" Thus the essence of this postulate may be clothed mathematically in a very pregnant manner in the mystic formula $300000 \text{ km} = (-1)^{.5} \text{ secs}$ "

- More mythic than mystic, more puzzling than pregnant.

The significance of this 'mystic formula' continues to be debated,

- It's clear enough - a real number equals an imaginary number. A contradiction, no matter how it's sliced and diced.

..we cannot assume, a priori, that permittivity and permeability are invariant with respect to changes in reference frame.

- That seems to be another empirical consequence of the Sagnac and Fitzau aether drag experiments.

Actually permeability is an assigned value, but permittivity must be measured, and the usual means of empirically determining permittivity involve observations of the force between charged plates.

Maxwell clearly believed these measurements must be made with the apparatus "at rest" with respect to the ether in order to yield the true and isotropic value of permittivity.

- This would be the co-moving aether frame, where aether is measured first from the lab frame. Too bad Maxwell wasn't contemporaneous with Sagnac.

According to Maxwell's conception, if measurements of permittivity are performed with an apparatus traveling at some significant fraction of the speed of light, the results would not only differ from the result at rest, they would also vary depending on the orientation of the plates relative to the direction of the absolute velocity of the apparatus.

- If velocity is measured in the lab frame... exactly!

Of course, the efforts of Maxwell and others to devise empirical methods for measuring the absolute rest frame (either by measuring anisotropies in the speed of light or by detecting variations in the electromagnetic properties of the vacuum) were doomed to failure..

- Well, the doom of failure ended with the Sagnac results, didn't it.

..even though it's true that the equations of electromagnetism are not invariant under Galilean transformations, it is also true that those equations are invariant with respect to every system of inertial coordinates.

- The Maxwell/Heaviside/Ampere EM laws and Newton's laws are not invariant in any frame other than the ALFA model (absolute lab frame + flexible aether).

Maxwell's equations are suggestive of the invariance of c only because of the added circumstance that we are unable to physically identify any particular frame of reference for the application of those equations.

- We were unable to, until 1913 - the Sagnac X. The above statement was false since then.

...the empirical invariance of light speed with respect to every inertial system of coordinates

- Why ignore the empirical evidence that light speed varies with aether speed in the lab?

..the Minkowski structure of spacetime ... strongly supports Einstein's decision to base his kinematics on the light speed principle itself. (As in the case of Euclid's decision to specify a "fifth postulate" for his theory of geometry, we can only marvel in retrospect at the underlying insight and maturity that this decision reveals.)

- We marvel that Einstein refused to acknowledge or comment on the Sagnac results, which disproved SRT only 8 years after the SRT postulates were proposed. The policy of ignoring contradicting evidence is inherited by his modern mainstream fellow travelers.

One problem with this line of reasoning is that it's based on a principle (causality) that is not unambiguously self-evident.

- Effects without causes? Causality violated? Causality may not be

unambiguously self-evident.. but it's never been refuted/disproven. in reality - by testing of nature. In the speculative world of pure mathematics - disconnected from physicality - anything goes.

..causality and the directionality of time are far from being straightforward principles.

- Only the future can disprove these 2 assertions - the past hasn't.

Every real number is finite, but it does not follow that there must be some finite upper bound on the real numbers.

- Nor does it follow that number - the abstraction of material quantity - has any relationship to the limit of real physical objects, space or time.

.we can't really say that Minkowskian spacetime is prima facie any more consistent with causality than is Galilean spacetime.

- Minkowskian spacetime will be covered in its own section.

If the spatial ordering of events is to have any absolute significance, in spite of the fact that distance can be transformed away by motion, it seems that there must be some definite limit on speeds.

- Why?

..the continuity and identity of objects from one instant to the next (ignoring the lessons of quantum mechanics) is most intelligible in the context of a unified spacetime manifold with a definite non-singular connection, which implies a finite upper bound on speeds.

- What is the argument for aether speed? How is a finite upper bound on aether speed 'most intelligible'?

This is in the spirit of Minkowski's 1908 lecture in which he urged the greater "mathematical intelligibility" of the Lorentzian group as opposed to the Galilean group of transformations.

- So mathematical intelligibility has priority over the scientific method of testing against nature?

We have the fundamental principle that for any material object in any state of motion there exists a system of space and time coordinates with respect to which the object is instantaneously at rest and Newton's laws of inertial motion hold good (at least quasi-statically).

- Only if aether is ignored.

Only the Lorentzian transformation, given by setting $k = 1$, has completely satisfactory properties from an abstract point of view, which is presumably why Minkowski referred to it as "more intelligible".

- Abstract points of view are fine, if there's a clear connection with reality.

.we can be persuaded to adopt such a postulate only by empirical facts.

- What desperation – accepting only postulates that are tested! Shocking.

POSTED BY ROBERT B AT 7:33 PM 1 COMMENTS

LABELS: 1.7 STAIRCASE WIT

MONDAY, NOVEMBER 22, 2010

1.6 A More Practical Arrangement

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.for every frame of reference except the one at rest with the origin, these coordinates [based on a single absolute measure of time] would not constitute an inertial coordinate system, because inertia would not be isotropic in terms of these coordinates, so Newton's laws of motion would not even be quasi-statically valid.

-Why the concern over avoiding anisotropy, when experiments show that light and matter are both in this category? Inertia effects can be eliminated by compensating for the aether effects. Likewise, Newton's laws can – and are – correctable by aether compensation. Action-reaction can involve aether and matter, not just matter.

Furthermore, the selection of the origin is operationally arbitrary,

-Not if the objects are particles or solids. Fluids need to be reduced to individual particles.

..even if the origin were agreed upon, there would be significant logistical difficulties in actually carrying out a coordination based on such a network of signals.

- There's only one frame to use – the absolute lab frame. With a knowledge of aether motion timing will not be problematic.

Einstein says "We arrive at a much more practical arrangement by means of the following considerations".

- What is the criterion in science.... Practicality or reality?

....inertia is homogeneous and isotropic (the latter being necessary for Newton's laws of motion to hold at least quasi-statically).

- Unnecessary if Newton's laws include aether effects.

He [Einstein] noted "the unsuccessful attempts to discover any motion of the earth relatively to the 'light medium'"

-We note that only one interpretation was successful.... The earth and its surrounding aether were at rest – or close to same.

...all the experimental results that are consolidated into Maxwell's equations imply that the propagation speed of light (with respect to any inertial coordinate system) is independent of the state of motion of the emitting source.

- But not of the aethereal state of motion.

...isotropy with respect to inertial coordinates is what we would expect if light

was a stream of inertial corpuscles (as suggested by Newton)

- Anisotropy is what we would expect if light was a stream of corpuscles either boosted or resisted by the medium of the corpuscles.

...light propagates isotropically with respect to every system of inertial coordinates (which is essentially just an extension of Galileo's principle of relativity)

- light propagates isotropically with respect to the lab frame ; else $SoL = c +/- V_{ae,lab}$

...the speed of propagation of light with respect to any system of inertial coordinates is independent of the motion of the emitting source, it follows that ...the speed of light is invariant with respect to every system of inertial coordinates.

- the speed of light is invariant in the lab frame when the aether is at rest.

Einstein notes that if a pulse of light is emitted from location x_0 along the x axis at time t_0 toward a distant location x_1 , where it arrives and is reflected at time t_1 , and if this reflected pulse is received back at location x_2 (the same as x_0) at time t_2 then $t_1 = (t_0 + t_2)/2$. ..the light pulse takes the same amount of time, $(t_2 + t_1)/2$, to travel each way when expressed in terms of any system of inertial coordinates.

- The Two Way Light Speed(TWLS) test proposed here fails to detect anisotropy.

If light is aided by an aether speed v one way and opposed by v on the return, then the TWLS speed will be $[(c+v) + (c-v)]/2 = c$.

Inertial coordinates are not arbitrary, and they are definable without explicit reference to the phenomenon of light.

- But they represent a specific situation rarely found in nature - no ethereal effects on matter or light. They are virtually non-existent in the real world. .. an esoteric class of coordinates to focus on.

The stationary ether posited by Lorentz did not interact mechanically with ordinary matter at all, and yet we know that light conveys momentum to material objects.

- The ALFA model emphasizes the interaction of dynamic aether and matter

..in Einstein's second paper on relativity in 1905, he explicitly concluded that "radiation carries inertia between emitting and absorbing bodies".

- Surely he meant energy, not inertia.

...light conveys not only momentum, but inertia. For example, after a body has absorbed an elementary pulse of light, it has not only received a 'kick' from the momentum of the light, but the internal inertia (i.e., the inertial mass) of the body has actually increased.

- We postulate that photon absorption transfers EM energy to the conversion of aether surrounding the absorber into the absorber's mass.

Galileo's principle of relativity automatically implies that light propagates isotropically from the source, regardless of the source's state of uniform motion.

- ALFA replaces Galilean relativity with $SoL = c +/- V_{ae,lab}$

.if we elect to use space and time coordinates in terms of which light speed is not isotropic (which we are certainly free to do), we will necessarily find that no inertial processes are isotropic. For example, we will find that two identical marbles expelled from a tube in opposite directions by an explosive charge located between them will not fly away at equal speeds, i.e., momentum will not be conserved.

- A constant wind will cause this effect, the same as an aether flow does for photons. Momentum will be conserved, if the wind/aether influence is addressed.

Einstein's "more practical arrangement" is based on (and ensures) isotropy not just for light propagation, but for all inertial phenomena.

- Isotropy is assured for all inertial phenomena if the aether flow is known.

If a uniformly moving observer uses pairs of identical material objects thrown with equal force in opposite directions to establish spaces of simultaneity, he will find that his synchronization agrees with that produced by Einstein's assumed isotropic light rays. The special attribute of light in this regard is due to the fact that, although light is inertial, it has no mass of its own, and therefore no rest frame.

- 1) Light does have mass, since it has energy, and $E = mc^2$.

2) Light is not inertial, but interacts with the cause of inertia – aether.

3) Why does relativity consider motion requires mass?

4) Why isn't the emitter's frame the rest frame?

It can be regarded entirely as nothing but an interaction along a null interval between two massive bodies, the emitter and absorber. From this follows the indefinite metric of spacetime, and light's seemingly paradoxical combination of wavelike and inertial properties.

- Not paradoxical - contradictory and inconsistent.

...a set of definitions based on the propagation of light is tenable, in contrast with a similar set of definitions based on non-inertial signals, such as acoustical waves or postal messages. A set of definitions based on any non-inertial signal can't possibly preserve inertial isotropy.

- Then this holds for light in moving aether, and leads to contradictions in synchronization, if ignored. Isotropy can only be addressed by including aether.

.. a signal requiring an ordinary material medium for its propagation would obviously not be suitable for a universal definition of time, because it would be inapplicable across regions devoid of that substance.

- What is the objection to using light from cosmic periodic motion as a universal time... that is, astronomical time?

Moreover, even if we posited an omni-present substance, a signal consisting of (or carried by) any material substance would be unsuitable because such objects do not exhibit any particular fixed characteristic of motion, as shown by the fact that they can be brought to rest with respect to some inertial system of reference.

- Inertial frames of reference are irrelevant, according to the Sagnac results. The lab frame must be used as the absolute reference frame; the stars cannot be brought to rest in this preferred frame.

.. if there exist any signals faster than those on which we base our definitions of temporal synchronization, those definitions will be easily falsified.

-The speed of GI aether (gravitational changes) is at least 2 million times faster than c .

Where is the easy falsification?

The fact that Einstein's principles are empirically viable at all, far from being vacuous or tautological, is actually somewhat miraculous.

- Sagnac results demo the inconsistency of the 2 SR principles with reality. Believing SR to be true is actually somewhat miraculous.

...if we were to describe the kind of physical phenomenon that would be required in order for us to have a consistent capability of defining a coherent basis of temporal synchronization for spatially separate events, clearly it could be neither a material object, nor a disturbance in a material medium, and yet it must exhibit some fixed characteristic quality of motion that exceeds the motion of any other object or signal.

- The heavens are full of material objects that are all embedded in aether, and their periodic motions were the basis for a universal clock until the enlightenment 50 years decided to use atomic clocks, having dependence on aether's motion.

The celestial objects cannot be associated with any IFR; they are all in rotational motion around the Earth!

...light propagates at a finite speed, and therefore the spacetime manifold is only partially ordered.

- With knowledge of the necessary parameters, including aether velocity and absolute time, well-ordered by definition, space is well-ordered.

1. The laws by which the conditions of physical systems change are independent of which of two coordinate systems in homogeneous translational movement relative to each other these changes in status are referred.

- The laws by which the conditions of physical systems describing motion change depend on the lab/ECEF reference frame. Refer to the Sagnac X.

2. Each ray of light moves in "the resting" coordinate system with the definite speed c , independently of whether this ray of light is emitted from a resting or

moving body. Here speed = (optical path) / (length of time), where "length of time" is to be understood in the sense of the definition in § 1.

- Each ray of light moves through the aether with the definite speed c , independently of whether this ray of light is emitted from a resting or moving body. Here speed is defined kinematically as (optical path) / (length of time).

In the first of these propositions we are to understand that the 'coordinate systems' are all such that Newton's laws of motion hold good .. This is crucial, because without this stipulation, the proposition is false.

- Even with the stipulation the proposition is false. Physical laws require use of the lab frame.

...coordinate systems related by Galilean transformations are in homogeneous translational movement relative to each other, and yet the laws by which physical systems change (e.g., Maxwell's equations) are manifestly not independent of the choice of such coordinate systems.

- Maxwell's EM field equations (and Newton's laws of mechanics) are valid in the lab frame, and in any frame of reference related to the lab frame by a Galilean transform using the aether speed as v .

the other laws of physics (e.g., the laws of electrodynamics) hold good in precisely the same set of coordinate systems in terms of which the laws of mechanics hold good. (This is also the empirical content of the failure of the attempts to detect the Earth's absolute motion through the electromagnetic ether.)

- The Sagnac result successfully shows the aether is mobile and the lab/Earth is not moving. This is consistent with the failure of the attempts to detect the Earth's absolute motion through the electromagnetic ether

Thus Einstein's first principle simply re-asserts Galileo's claim that all effects of uniform rectilinear motion can be transformed away by a suitable choice coordinate systems.

- And compensation for any aether flow.

Einstein also realized that a purely electromagnetic theory of matter based on Maxwell's equations was impossible, because those equations by themselves could never explain the equilibrium of electric charge that constitutes a charged particle.

- The presence of aether allows the EM fields to form matter via dynamic equilibrium.

See the photon model of Kanarev. www.journaloftheoretics.com/Articles/4-1/Kanarev-photon-final.pdf

...the stability of matter may not even have a description in the form of a continuous field theory at all,

- Ref: Bergman's CSS electron/proton/neutron model.

- www.commonssensescience.org/pdf/articles/electron_models.pdf

Einstein based it [special relativity] on the particular characteristic exhibited by those [Maxwell's] equations, namely Lorentz invariance, that he intuited was the more fundamental principle, one that could serve as an organizing principle analogous to the conservation of energy in thermodynamics, and one that could encompass all physical laws, even if they turned out to be completely dissimilar to Maxwell's equations.

- Lorentz invariance must be replaced with absolutism, the preference of nature, demonstrated by testing, for the Earth as reference system.

Relativity is a key aspect of the modern theory of quantum electrodynamics, which replaced Maxwell's equations.

- Are the virtual particles of QED the manifestation of aether?

The second principle states that light always propagates at the speed c , assuming we define the time intervals in accord with §1, which defines time intervals as whatever they must be in order for the speed of light to be c .

- Time dilation as interpreted here can never be disproven(= unfalsifiable). Time intervals are chosen to maintain c constant!

Einstein's presentation somewhat obscures the real physical content of the theory, which is that mechanical inertia and the propagation speed of light are isotropic and invariant with respect to precisely the same set of coordinate systems. This is a non-trivial fact.

- This is rather a trivial conjecture. Inertia and light are empirically shown to be anisotropic and consistently measured only in the lab frame.

...his [Einstein's] derivation of the Lorentz transformation also invoked "the properties of homogeneity that we attribute to space and time" to establish the linearity of the transformations.

- This invocation is contrary to Sagnac X results.

...he [Einstein] tacitly assumed spatial isotropy, i.e., that there is no preferred direction in space, so the intrinsic properties of ideal rods and clocks do not depend on their spatial orientations.

- Counter to the CMB dipole discovery.

...all experimental evidence (such as all "the unsuccessful attempts to discover any motion of the earth relatively to the 'light medium'") indicates that the speed of light is isotropic.

- Refuted by the Michelson-Gale results, which shows that the Earth is wrapped in an aethersphere rotating once each sidereal day.

....experience has shown that light propagates with the speed c in all directions when expressed in terms of any system of inertial coordinates.

- Not the experience of Fizeau, Fresnel, Sagnac, Dufour & Prunier or Ruyong Wang. One cannot ignore results that are contrary to current thinking - and the scientific method.

As Einstein says, this shows that our two fundamental principles are compatible, i.e., it is possible for light to propagate isotropically with respect to two relatively moving systems of inertial coordinates, provided we allow the possibility that the transformation from one inertial coordinate system to another is not exactly as Galileo and Newton surmised.

- Unfortunately the two SR fundamental principles are contrary to testing; continuing to use this model is unphysical and unrealistic, just a mathematical exercise.

The assumption that light propagates at the same speed in both frames of reference implies that a simultaneous spherical shell of light in one frame is also a simultaneous spherical shell of light in the other frame,

- An assumption that is strictly false on or near the Earth's surface .

Consequently we have the Lorentz transformation..

- A mathematical derivation of interest to science history , but without any practical use.

Naturally with this [Lorentz] transformation we can easily verify that the squared "absolute distance" from the origin to the point with K coordinates and the corresponding k coordinates are equal, which confirms that the absolute spacetime interval between two points is the same in both frames.

- The basic errors in these statements will be explored and exposed in the section on Minkowski space.

POSTED BY ROBERT B AT 9:16 PM 0 COMMENTS
LABELS: 1.6 A MORE PRACTICAL ARRANGEMENT

SATURDAY, NOVEMBER 20, 2010

1.5 Corresponding States

1.5 Corresponding States

In 1889 Oliver Heaviside deduced from Maxwell's equations that the electric and magnetic fields on a spherical surface of radius r surrounding a uniformly moving electric charge e are radial and circumferential respectively.

-Notice that the stationary frame of reference is the absolute lab frame, though not stated explicitly. V is definitely the speed in the Earth's lab frame.

Heaviside's formulas imply that the surfaces of constant potential are ellipsoids, shortened in the direction of motion by the factor $(1-v^2)^{.5}$.

-For motion in the lab frame. against an static aether. This would be modified to include any aether motion.

From the modern perspective the contraction of characteristic lengths in the direction of motion is an immediate corollary of the fact that

- that there's a relative aether flow.

....already in 1889 it seems that Heaviside's findings had prompted an interesting speculation as to the deformation of stable material objects in uniform motion..

- against the aether.

...the variations in the electromagnetic field implied by Maxwell's equations actually result in a proportional contraction of matter - at least if we assume the forces responsible for the stability of matter are affected by motion in the same way as the forces of electromagnetism.

- Both DeBroglie and Sagnac matter-wave experiments show the equivalence of EM photons and matter waves. We postulate that all matter is composed of EM aether in bound states.

Lorentz showed that the description of the equilibrium configuration of a uniformly moving material object in terms of its 'local coordinates' is identical to the description of the same object at absolute rest in terms of the ether rest frame coordinates. He called this the theorem of corresponding states.

- Lorentz missed the final step - the description of the same object at absolute rest in terms of the lab frame coordinates.

...consider a small bound spherical configuration of matter at rest in the ether. We assume the forces responsible for maintaining the spherical structure of this particle are affected by uniform motion through the ether in exactly the same way as are electromagnetic forces, which is to say, they are ...

- .affected/dragged/entrained by aether flow.

These forces may propagate at any speed (at or below the speed of light),

- But the aether's speed is unlimited, theoretically and experimentally.

...we unavoidably arrive at Fitzgerald's length contraction and Lorentz's local time dilation for objects in motion with respect to the x,y,t coordinates, provided only that all characteristic spatial and temporal intervals associated with physical entities are maintained for forces that are Lorentz covariant.

- And we ignore the possibility of a flexible/dynamic aether and an frame preferred for measuring motion... the lab or ECEF frame. Length contraction occurs in the absolute lab frame, for motion against the aether.

Time dilation is just a local Doppler shift for wave sources in the lab frame. Local clocks based on this effect are not reliable => an absolute universal time keeper is needed - the heavenly motions.

...we have so far omitted consideration of one very important force, namely, the force of inertia.

- This has been pointed out repeatedly - aether is the source of the inertia phenomenon.

...in order to arrive at a fully coherent theorem of corresponding states, we must assume that inertia itself is

- ..determined by relative aether flow.

...we must assume the inertial mass (resistance to acceleration) of every particle is ...

-...determined by relative aether flow.

Now, it was known that some portion of a charged object's resistance to acceleration is due to self-induction, because a moving charge constitutes an electric current, which produces a magnetic field, which resists changes in the current. Not surprisingly, this resistance to acceleration is

- caused by relative motion to aether.

..the linearity of Maxwell's equations implies that they cannot possibly yield stable bound configurations of charge.

- The models of Bergman (CSS) and Kanarev are bound configurations of charge and EM fields.

When a block of matter is moving through the ether of space its cohesive forces across the line of motion are diminished, and consequently in that direction it expands.

- The Heaviside analysis seems correct.. a quantitative support to the contraction of EM fields against direct aether motion and expansion in the transverse direction.

...the very same analysis that implies length contraction for objects moving relative to the ether rest frame coordinates also implies the same contraction for objects moving relative to the new local coordinates.

- No such implication. The variation in EM fields is only due to motion relative to the aether.

...the clock is contracted in the longitudinal direction relative to the ground's coordinates by the same factor that objects on the ground are contracted in terms of the moving coordinates.

- There is no clock contraction due to motion - time is absolute.

...we have isotropic clocks with respect to the local (i.e., inertial) coordinates of any uniformly moving frame,

- Local Doppler clocks are not isotropic; there is a longitudinal and transverse Doppler shift.

The writings of Lorentz and Poincare by 1905 can be assembled into a theory of relativity that is operationally equivalent to the modern theory of special relativity, although lacking the conceptual clarity and coherence of the modern theory.

- Neither physicist claimed that c was a universal constant, as does SR.

...toward the end of the 19th century it appeared electromagnetism was not relativistic, because the property of being relativistic was equated with being invariant under Galilean transformations, and it was known that Maxwell's equations (unlike Newton's laws of mechanics) do not possess this invariance.

- There is no need for Maxwell's equations to be invariant under Galilean

transformations. They need only be expressed in the absolute lab frame, the usual presentation.

...it still appeared that mechanics (presumed to be Galilean covariant) and electrodynamics were not mutually relativistic, which meant it ought to be possible to discern second-order effects of absolute motion by exploiting the difference between the Galilean covariant of mechanics and Lorentz covariance of electromagnetism.

- The consistency of the absolute lab and dynamic aether medium for both mechanics and EM - Newton and Maxwell - was demonstrated by the Sagnac and mass experiments.

Hence the only possible conclusion is that either the known laws of electromagnetism or the known laws of mechanics must be subtly wrong. Either the correct laws of electromagnetism must really be Galilean covariant, or else the correct laws of inertial mechanics must really be Lorentz covariant.

- Both physics branches are unified in the ALFA model of an absolute lab frame and flexible aether.

...as Poincare observed, it is not possible (and doesn't even make sense) for the intrinsic mass of elementary particles to be electromagnetic in origin.

- There is nothing to forbid elementary particles as bound states of aether.

...there is no reason to suppose that anything analogous to self-induction of the unknown molecular forces is ultimately responsible for inertia...

- as long as we ignore Sagnac X and similar aether experiments.

...Lorentz overlooked that fact that the Lorentz covariance of mechanical inertia cannot be deduced from the equations of electromagnetism. He simply postulated it, no less than Einstein did.

- We postulate aether as the source of inertia.

....Lorentz and Poincare both continued to espouse the merits of the absolute interpretation of relativity

- Their error was taking the aether to be fixed as the absolute frame for measuring motion.

There are today scientists and philosophers who argue in favor of what they see as Lorentz's constructive approach, especially as a way of explaining the appearance of relativity, rather than merely accepting relativity in the same way we accept (for example) the principle of energy conservation.

- Energy conservation is verified by experiments; relativity is internally inconsistent, so its use can explain any experiment as both true and false.

..is there any merit in the idea that the absolutist approach effectively explains the appearance of relativity?

-Yes, the ALFA model.

<http://alfachallenge.blogspot.com/>

...we are presented with many relativities in nature, such as the relativity of spatial orientation.

- Also present are the personal interpretations of applied relativity, which allows such 'relativities' to be modified post-hoc to agree with specific tests. One must choose a flavor of relativity to explain an experimental result, since some flavors will explain the opposite.

POSTED BY ROBERT B AT 1:44 PM 0 COMMENTS
LABELS: 1.5 CORRESPONDING STATES

FRIDAY, NOVEMBER 19, 2010

1.4 The Relativity of Light

Evidently the word "light" is being used to signify two different things on the first and fourth days [of creation].

-Not evidently. Light doesn't depend on its source.... Sun , stars . candles, light bulbs, or the divine. Light is light is light.

...if light consists of material corpuscles, then according to Galilean relativity there should be an inertial reference frame with respect to which light is at rest in a vacuum, whereas in fact we never observe light in a vacuum to be at rest, nor even noticeably slow, with respect to any inertial reference frame.

- A frame in which aether is flowing at c opposite to a light beam would zero net speed in the absolute reference frame, like a boat moving upstream in a river current that matches its still-water motor speed. .

..we find that light propagates best through regions (vacuum) in which there is no detectable material with a definite rest frame..

- If best means fastest, then the Sagnac exp. results has the co-rotating beam moving at $c + v$ in a definite rest frame – the lab.

...and again we cannot conceive of light at rest in any inertial frame.

- A frame in which aether is flowing at c opposite to a light beam is conceivable.

...numerous experiments showed that light propagates at the same speed in all directions relative to the source, just as we would expect for streams of inertial corpuscles.

-Numerous, but not all. Exceptions are the Fizeau confirmation of Fresnel drag, Sagnac, Ruyong Wang and Dufour & Prunier.

Hence some of the attributes of light seemed to unequivocally support an emission theory,

- Sagnac rules out emission theory.

...if we apply a Galilean transformation to these coordinates, the wave equation is not satisfied with respect to the transformed coordinates.

- An indication that aether motion in an absolute frame must be included.

...the wave equation could actually be relativistic, just like the dynamic behavior of inertial particles, provided we are willing to consider a transformation of the space and time coordinates that differs from the Galilean transformation.

- No need for this if aether motion is included in the analysis.

But a valid transformation has to agree with all physical experiments, like the Sagnac X, not just tests that obey the wave equation!

None of this conflicts with the observed behavior of light, because the motion of light is observed to be both linear and isotropic with respect to inertial coordinate systems.

- Inertia is not isotropic when aether is in motion. Note that $v \neq 0$ in Sagnac's lab or rotor frame.

The fact that light is not at rest with respect to any system of inertial coordinates does not conflict with the principle of relativity if we agree that light is not a material object.

- An aether flow of c counter to a light beam direction of c is a rest frame for light.

Light obeys $E = mc^2$, so photons have mass.

...two relatively moving systems of inertial coordinates are related to each other by Galilean transformations, so that the composition of co-linear speeds is simply additive. ...we aren't free to impose this assumption on the class of inertial coordinate systems, because they are fully determined by the requirement for inertia to be homogeneous and isotropic.

- Which it isn't, in general.

Toward the end of the nineteenth century, more precise observations revealed that is not quite correct. It was found that the speed of object C in terms of inertial rest frame coordinates of A is not $v + u$, but rather $(v+u)/(1+uv/c^2)$, where c is the speed of light in a vacuum.

- Lab frame must be used, not an IFR.

What are the precise observation references for $(v+u)/(1+uv/c^2)$?

The empirical correspondence between inertial isotropy and lightspeed isotropy can be illustrated by a simple experiment. Three objects, A, B, and C, at rest with respect to each otheretc.

-If done on the Earth with sufficient precision, the light flashes westward would be faster than eastward.. even on Earth this shows light anisotropy due to a westbound aether wind.

The experiment is meaningless without a specification of the aether's velocity. Speed and direction.

...we also find that if the light is emitted at the same time and place from an object D that is moving with respect to B, the light's speed is still isotropic with respect to B's inertial rest frame. Now, this might seem to suggest that light is a disturbance in a material medium in which the objects A,B,C just happen to

be at rest, but this is ruled out by the fact that it applies regardless of the state of (uniform) motion of those objects.

- The gap in logic again, is that the motion of the underlying aether is not considered. Would not the flight path of a plane be affected by the wind, the motion of the medium in which the plane is flying?

...with respect to the original x,t coordinate system, the speeds of the cannon-balls from D are not given by simply adding (or subtracting) the speed of the cannon-balls with respect to D's rest frame to (or from) the speed of D with respect to the x,t coordinates.

- They must include the aether flow as seen in the lab frame.

...although the speed of light is isotropic with respect to any inertial spacetime coordinates,

- The speed of light is isotropic with respect to any FR at rest in the aether, or the lab frame, with the aether flow subtracted or compensated for.

The relationship between the frequency (and energy) of the light with respect to the rest frame of the emitting body and the frequency (and energy) of the light with respect to the rest frame of the receiving body does depend on the relative velocity between those two massive bodies.

- Sagnac showed that aether motion must be included, with respect to the lab frame.

Incidentally, notice that we can rule out the possibility of object B and D dragging the light medium along with them, because they are moving through the same region of space at the same time, and they can't both be dragging the same medium in opposite directions.

-But the natural motion of the aether in the absolute lab frame can be dragging B and D.

...in the case of light we're unable to identify any definite material medium, so the medium has no definite rest frame.

- SagX identifies a causal aether and a unique reference frame, the ECEF or lab frame.

...Lorentz began with the absolute ether frame coordinates t and x , in terms of which every event can be assigned a unique space-time position (t,x) , and then he considered a system moving with the velocity v in the positive x direction.

- So Lorentz is using a fixed aether frame. V is the relative speed of the second system to the aether. But Sagnac results are inconsistent with this model (fixed aether).

...he [Lorentz] tentatively proposed an additional transformation that must be applied to x'',t'' in order to give coordinates in terms of which Maxwell's equations apply in their standard form.

- Maxwell's equations will apply in their standard form if the first frame is the lab frame.

Lorentz was dissatisfied with the proliferation of hypotheses that he had made in order to arrive at this theory.

- Understandable; he had crossed over to rationalism by removing the connection to reality (experiments) that the scientific method requires.

POSTED BY ROBERT B AT 12:59 PM 0 COMMENTS
LABELS: 1.4 THE RELATIVITY OF LIGHT

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