Is special relativity falsifiable?

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From: Marcel Luttgens (*mluttgens_at_wanadoo.fr*)
Date: 07/27/04

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Reponse to Tom Roberts (see below):

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As no inertial frame can be found in the Universe, no real (physical)
experiment can falsify special relativity.

There are however two other possibilities:
1) To demonstrate that the derivation of SR formulas is logically
false, see http://perso.wanadoo.fr/mluttgens/LTfalse.htm
2) By way of a thought experiment, proving that mutual time dilation
is a hoax. Hereafter is such experiment:

Aircrafts thought experiment:

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A departure (and arrival) airport is situated exactly at
the North Pole.
At take−off, two aircrafts A and B synchronize their clocks
with the airport clock. All three clocks are set to 0.
Immediately after synchronization, they fly in opposite directions,
approximately at ground level, at some ground velocity v, each
following the same meridian.
At landing, after one circumnavigation, the reading of the clocks
A and B are compared, and found to be identical.

Let's notice that, according to the North Pole observer, the
circumnavigation took approximately t(P) = 2*pi*R/v sec,
where R is the Earth's radius.
Hence, at landing, the clock of aircraft A reads
tA = t(P) * sqrt(1−v^2/c^2) sec,
and the clock of aircraft B reads
tB = t(P) * sqrt(1−v^2/c^2) sec.
Thus, tA = tB, i.e. the readings of clocks A and B are identical.

This conclusion is compatible with the results of the Hafele
& Keating experiment, performed during october 1971:
"Four caesium clocks flown around the world on commercial jet flights,
once eastward and once westward, recorded directionnaly dependent

time differences which are in good agreement with predictions of
conventional relativity theory. Relative to the atomic time scale
of the U.S. Naval Observatory, the flying clock lost 59+−10 nanoseconds
during the eastward trip and gained 273+−7 nanoseconds during the
westward trip." (Cf. article in Science, Vol. 17, 14 July 1972,
pp. 166−179).

Readings tA(d) and tB(d) of clocks A and B be at a distance d
from the Pole:

Assuming a homogeneous and spherical Earth, the readings
would be
tA(d) = tA * d/2*pi*R sec, and
tB(d) = tB * d/2*pi*R sec.

Symplifying, one gets
tA(d) = 2*pi*R/v * sqrt(1−v^2/c^2) * d/2*pi*R
= d/v * sqrt(1−v^2/c^2) sec
Similarly,
tB(d) = d/v * sqrt(1−v^2/c^2) sec, meaning that clocks A and B
tick at the same rate.

Let's notice that tA(d) = tB(d) = d/v * sqrt(1−v^2/c^2) sec is
independent from the Earth's radius R.
Hence, if R is infinitely increased, one is left with a pure
SR situation, where two objects A and B leave at a time 0, in opposite
directions and at some velocity v, a third object P .
As shown above, at a distance d from P, both clocks on A and B read
d/v * sqrt(1−v^2/c^2) sec, meaning that they tick at the same rate.
Let's also notice that the velocity v is not necessarily constant.
For instance, it can be a function of the distance d. The clocks
A and B will tick at the same rate at any distance from each other
if, at every instant, A and B have the same opposite velocity.

Let's now forget the object P and its clock, and consider only
two objects A and B leaving each other in opposite directions,
at the same velocity v, after having sychronized their clocks to 0.
According to SR, observer A arrived at a distance d from B
will claim that tB = tA * sqrt(1−v^2/c^2), but, in his frame of
reference, observer B is perfectly right (sic) to claim that
tB = tA * sqrt(1−v^2/c^2)!
This can rightly be called a hoax, because both clocks keep ticking
at the same rate, meaning that neither A nor B can observe a
time "dilation" on the other's clock.

Conclusively, this "aircrafts thought experiment" falsifies SR.

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Aplication to an expanding universe:

In such universe, objects separated by a distance d move from
each other at a velocity v, which is a function of d.
We have seen above that clocks on A and B will always tick
at the same rate, hence that light emitted for instance by A
will be observed by B to be redshifted according to the kinematic
Doppler formula.

− According to an article published in 1999 by © CAMBRIDGE UNIVERSITY
PRESS (THE ORIGIN OF THE REDSHIFT, see
http://nedwww.ipac.caltech.edu/level5/Peacock/Peacock3_3.html):

"For small redshifts, the interpretation of the redshift as
a Doppler shift (z = v / c) is quite clear. What is not so clear
is what to do when the redshift becomes large. A common but
incorrect approach is to use the special−relativistic Doppler
formula and write
1 + z = sqrt((1+v/c)/(1−v/c))
This would be appropriate in the case of a model with Omega = 0,
but is wrong in general."

In fact, it is *never appropriate* to use the special−relativistic
Doppler formula, because expansion cannot have a decelable SR
effect, as clocks keep ticking at the same rate. Only a kinematic
Doppler redshift can be observed.
The error made by contemporary cosmologists is due to their
blind faith in SR, leading them to believe in the so−called
mutual time dilation. As this is a mere hoax, the special−relativistic
Doppler formula
1 + z = sqrt((1+v/c)/(1−v/c)), or rather
1 + z = sqrt (1−v^2/c^2) / (1−v/c)
reduces to
1 + z = 1 / (1−v/c), or
z = v / (c−v)

Assuming that v = Hd, and R (the radius of the observable universe)
= c/H0, one gets
d = (c/H0) * z/(1+z), whre d is the distance between the observer and
the emitter at the instant when the light was emitted.

One can disagree with the assumed values for v and R, but the
formula d = (c/h0) * z/(1+z) nevertheless leads to realistic results.
For instance, for z = 10 and assuming that
H0 = 71 km sec^−1 Mpc^−1, which corresponds to 13.772 Gly,
d = 13.772 * 10/11 = 12.52 Gly.

− Let's compare this value with that obtained by Wright in
his article "Most Distant Object Record Smashed"
(http://www.astro.ucla.edu/~wright/cosmolog.htm):

"1 Mar 2004 − Pello et al. have found a galaxy much further away
from us than any previously known. The evidence comes from a single

line observed in the infrared which implies a redshift of z = 10.
The source is seen magnified by a cluster of galaxies, Abell 1935,
acting as a gravitational lens, and the source location is where
sources with 9 < z < 11 should be very highly magnified. The colors
of the source are also very consistent with z = 10. The technical
paper and the press release both give pictures and spectra of
this object. My Cosmology Calculator gives for z = 10 and the
WMAP cosmic parameters (Ho=71, OmegaM=0.27 in a flat Universe)
an age of the Universe of 0.48 Gyr at the time the light we see
was emitted, a light travel time of 13.18 Gyr, and a current
distance of 31.5 billion light years. This distance is much
greater than the speed of light times the light travel time
because the Universe has expanded by factors between 1 and
1+z=11 since the light did its traveling.".

In view of the incertitude about which parameters to use
(vacuum−dominated flat model, OmegaM=0.27, etc...), one
cannot be sure that 13.18 Gly is the "true" value. It could as well
be 12.52 Gly.

− The mutual time dilation fantasy is also implicitly admitted
in article
"The same High Redshift Supernovae from the IfA Deep Survey:
Doubling the SN Sample at z > 0 . 7", by Brian J. Barris et al.
(arXiv: astro− ph/ 0310843 v1 29 Oct 2003)

Excerpt (p.12):

"Typically, the discovery epoch of a high−z supernova
is a few days before maximum brightness, and although
the time dilation factor of (1 + z) works to lessen
the delay in the rest frame, etc...".

Conclusion:

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Einsteinian relativists overlooks that in an expanding
universe, objects are simultaneously moving wrt each other.

They hypothezise that 1) B moves at v wrt A considered
at rest, and 2) A moves at v wrt B considered at rest. Or neither
A nor B are at rest relatively to each other (they could check
this by looking at the CMBR).

Both objects are moving wrt each other, hence clocks on A and B
tick at the same rate (as shown above), and the special−relativistic
Doppler formula, or *any other formulae directly or indirectly*
based on mutual time dilation, are false.

By the way, the formula d = (c/H0) * z/(1+z) is straightforwardly
obtained when hypothesising a stable (not expanding) universe

with a cosmic "deceleration" cH.

Marcel Luttgens

>From :Tom Roberts (tjroberts@lucent.com)
Object :Re: Is special relativity falsifiable?
sci.physics.relativity

Message n° 149

Pentcho Valev wrote:
> There is uncertainty about what would falsify special relativity.

Not at all −− just perform some experiment within SR's domain of applicability that reliably and reproducibly disagrees with any of its predictions. And subject your report to peer review so experts have a chance to critique your technique.

So far nobody has managed to do that. You're welcome to try.
But random posts in this newsgroup are useless....

> The
> standard logical procedure reductio ad absurdum simply does not work.
> "A's clock is slower than B's and B's is slower than A's" is a
> precious conclusion, not an absurdity.

That statement is FAR too ambiguous to be testable. Sharpen it up so it is testable, and any problems vanish. In particular, A and B make different measurements of the other's rate, and no contradiction is present.

> So perhaps relativists should
> clearly define the type of absurdity which, if obtained within the
> theory, would force them to reject special relativity.

No. People like you should sit down and LEARN WHAT SR ACTUALLY SAYS. Then you would realize that your "sound bite" attempts are hopelessly naive and/or downright wrong.

> if the theory predicts both the
> presence and absence of an event (e.g. something happens according to
> one observer but does not according to the other), the theory would be
> rejected. Is that true?

That would indeed be cause to reject a theory. It does not apply to either SR or GR, however.

> If the falsifiability criterium was stated
> explicitly, discussions of special relativity would become much more
> rational.

The "falsifiability criterium" is easily stated: make any measurement within the domain of applicability of SR; if that measurement disagrees significantly from the prediction of the theory, and if it can be reliably and reproducably obtained, then the theory is falsified.

To date, nobody has been able to do that for SR.

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