

GR & SR

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Twins Paradox

The [Twins Paradox](#) is a famous thought experiment showing a confusing potential outcome of time dilation predicted by Special Relativity.

Is there an answer by academics in the threads below (one referencing the other) providing a satisfactory explanation of the Twins Paradox? You be the judge. To me, these thoughtful answers bring up more new questions than answers; a tell-tail sign something might not be quite right.

- <https://physics.stackexchange.com/questions/620066/twin-paradox-in-sr>
- <https://physics.stackexchange.com/questions/2554/how-is-the-classical-twin-paradox-resolved>

In fact, predicted responses to this [Relativity Challenge](#) are well covered. On a humorous side, realistic, if not revealing, responses to relativity skepticism are addressed in [this satire](#).

Before [Einstein](#)'s theories of relativity, a universal frame of reference or, commonly known as [aether](#), was generally accepted. The [Lorentz](#) Ether Theory (LET) continues to be a common [alternate theory to relativity](#). Incidentally, LET [does not contain a Twins Paradox](#).

Speed of Gravity

In General Relativity (GR), the speed of gravity is ignored or assumed to be infinite (*warped space-time* explanation). In Special Relativity (SR), gravity is restricted to the same maximum velocity as the speed of light.

The speed of gravity — What the experiments say (Tom Van Flandern)

The most amazing thing I was taught as a graduate student of celestial mechanics at Yale in the 1960s was that all gravitational interactions between bodies in all dynamical systems had to be taken as instantaneous.

Orbiting bodies do accelerate through space even if gravity is due to geometry and not a true force. For example, one spacecraft following another in the same orbit can stretch a tether between the two. The taut tether then describes a shorter path between two points in space than the one followed by the spacecraft.

So are gravitational fields for a rigid, stationary source frozen, or are they continually regenerated? Causality seems to require the latter. If such fields are frozen, then what is the mechanism for updating them as the source moves, even linearly? Even a “rigid” bar pushed at one end would not move at the other end until a pressure wave had propagated its entire length. Moreover, we seem to need two mechanisms - one to curve space-time when a mass approaches, and another to unbend it when the mass recedes. This is because, once a curve is “frozen” into space-time, it will not necessarily “melt” back to its original condition when the cause is removed. Yet, there is no available cause for either process to result from a field with no moving parts.

Line of sight between satellites

If satellites orbited because they were following the curvature of space, then line of sight communications would not trace a shorter path between satellites and would not be blocked by the Earth. The RF beam would follow a similar curved path and curve around the Earth.

https://www.researchgate.net/figure/Distance-between-two-satellites-7_fig3_328133212

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GPS Proves Special Relativity?

Reference is often made to the Global Positioning System (GPS) as evidence for theories of relativity. But does GPS prove or *disprove* Special Relativity?

What the Global Positioning System Tells Us about the Twin's Paradox

Today, many physicists and students of physics have acquired the impression that these two [*Special Relativity*] postulates have been confirmed by observations. However, that is not the case. In fact, **none of the eleven independent experiments** verifying some aspect of SR [1] is able to verify either postulate.

The Speed of Gravity: Why Einstein Was Wrong and Newton Was Right

It may surprise you, but the GPS system doesn't actually use Einstein's field equations.

The fact that the Earth is not accelerating toward the visible location of the Sun, but rather 20 arc seconds in front of the visible Sun (where the Sun will visibly be 8.3 minutes in the future) is very strong evidence against gravity propagating at the speed of light.

Michelson and Morley

Often the null result of the 1887 Michelson-Morley experiment, as well as similar experiments at the beginning of the 20th century, are presented as evidence refuting a universal and absolute frame of reference. Seemingly ignored is the understanding that the [failure to reject a null hypothesis](#), the absence of evidence, is not [evidence of absence](#).

In fact, a 1998 paper by Héctor A. Múnera at *Centro Internacional de Física* (Bogotá D.C., Colombia) analyzes Michelson and Morley results and may correctly show that the MM experiment (as well as duplicate experiments by others) do indicate velocities consistent with the combined orbital and rotational velocities of the Earth. This would be evidence of a reference frame (i.e. "ether wind") stationary with respect to our Solar System.

Despite the null interpretation of their experiment by Michelson and Morley, it is quantitatively shown that the outcomes of the original experiment, and all subsequent repetitions, **never were null**. Additionally, due to an incorrect inter-session averaging, the non-null results are even larger than reported. Contrary to the received view, Illingworth's and other repetitions of the experiment were consistent with Miller's positive results.

The intra-session averages based on velocity **exactly correspond to the range of variation of the projection of orbital speed** at the moment and location of the observations.

[\[M\]ichelson-Morley Experiments Revisited: Systematic Errors, Consistency Among Different Experiments, and Compatibility with Absolute Space](#)

Sagnac Effect

The French physicist Georges Sagnac is nowadays frequently cited by the engineers who work on devices such as ring-laser gyroscopes. These systems operate on the principle of the [Sagnac effect](#). It is less known that Sagnac was a **strong opponent to the [theory of special relativity](#)** proposed by Albert Einstein. He set up his experiment to **prove the existence of the aether** discarded by the Einsteinian relativity. An accurate explanation of the phenomenon was provided by Paul Langevin in 1921.

The Sagnac effect and its interpretation by Paul Langevin

The new type of gyroscope has achieved something considered a benchmark for gyroscopes: the ability to **measure the rotation of the earth**.

New Chip-Based Laser Gyroscope Measures Earth's Rotation

Mach's Principle

If you think about [Mach's Principle](#), it actually brings attention to some logical contradictions. If you accept a universal coordinate system, then the contradictions are gone.

If you are alone in an empty universe, how is rotation defined? For that matter, how is acceleration defined?

You are standing in a field looking at the stars. Your arms are resting freely at your side, and you see that the distant stars are not moving. Now start spinning. The stars are whirling around you and your arms are pulled away from your body. Why should your arms be pulled away when the stars are whirling? Why should they be dangling freely when the stars don't move?

Why do we resist the possibility of a universal frame of reference?

[Newton's Bucket argument](#) was meant to bring attention to the need for a universal frame of reference.

The theory of relativity is ultimately a war of [reference frames](#). Each gravitational body attempts to control its own reality and the majority wins (democracy). Physicists call it [frame dragging](#). Does this sound a little bit like truth is relative to the observer - "*your truth*" and "*my truth*"?

Could it be there is a philosophical reason people are drawn to relativity?

What does the Bible say?

What does the Bible say about the layout and architecture of the universe?

There are some hints in the Creation record in Genesis:

Gen 1:6

And God saith, 'Let **an expanse** be in the **midst of the waters**, and let it be separating between waters and waters.'

Gen 1:7

And God maketh **the expanse**, and it separateth between the waters which *are* **under** the **expanse**, and the waters which *are* **above** the **expanse**: and it is so.

Gen 1:8

And God calleth to the **expanse 'Heavens;'** and there is an evening, and there is a morning -- day second.

Gen 1:9

And God saith, 'Let the **waters under the heavens** be collected unto one place, and let the **dry land** be seen:' and it is so.

Gen 1:14

And God saith, 'Let **luminaries** be in the **expanse** of the heavens, to make a separation between the day and the night, then they have been for signs, and for seasons, and for days and years,

Gen 1:15

and they have been for **luminaries** in the **expanse** of the heavens to give light upon the earth:' and it is so.

Gen 1:16

And God maketh the **two great luminaries**, the great **luminary** for the rule of the **day**, and the small **luminary** -- and the **stars** -- for the rule of the **night**;

[Gen 1:17](#)

and God giveth them in the **expanse** of the heavens to give **light upon the earth**,

[Gen 1:18](#)

and to rule over day and over night, and to make a **separation** between the **light** and the **darkness**; and God seeth that *it is good*;

Additional hints in Psalms:

[Psa 148:3](#)

Praise ye Him, **sun** and **moon**, Praise ye Him, all **stars** of light.

[Psa 148:4](#)

Praise ye Him, heavens of heavens, And ye **waters** that are **above the heavens**.

From hints, it sounds like the universe has an outer boundary: a water layer beyond the "heavens" or the "expanse". This would imply both a **finite** universe and also impose a **universal coordinate system**. The articles below, by Dr. Russell Humphreys, explain this in more detail.

[Water Near Edge of Universe Bolsters Creation Cosmology](#)

[Creation Cosmologies Solve Spacecraft Mystery](#)