Title -

General Relativity eliminates Dark Energy, Dark Matter and Universal Expansion

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Abstract -

This article is suggesting that dark energy, dark matter and universal expansion are intimately related. However, they aren't viewed as revolutions in cosmology which are essential to a complete understanding of the modern universe. They are instead viewed as properties which need to be added to the cosmos when Einstein's theory of gravity (General Relativity) is apparently still not thoroughly comprehended a little over a century after it was published. If General Relativity truly does eliminate Dark Energy and Dark Matter plus Universal Expansion, then its treatment of gravitation as a push must necessarily be reflected in every encounter with gravity. The author has developed possible solutions (hypotheses) about this in the following section - which has topics ranging from M-sigma through geysers on Saturn's moon Enceladus and the Law of Falling Bodies to Earth's magnetism and tides.

Science admires General Relativity. However, respect for tradition seems to prevent science from embracing Einstein's theory completely. General Relativity says gravity is a push exerted by the curvature of space-time. But the world still holds to the Newtonian view that gravity is a pull. Since Isaac Newton's mathematics works so well, it's understandable that his gravitational pull is accepted. It's time to explore ways in which gravitation as a push could produce identical physical results. The second part of this article proposes hypotheses – not formal theories – to this end. The first part suggests that acceptance of gravity as a push could delete the ideas of cosmic expansion, dark energy and dark matter.

Text -

General Relativity says gravity is a push exerted by the curvature of space-time. "(Bodies) merely follow the line of least resistance through the hills and valleys of the curved space that surrounds other bodies. Objects that fall the earth, for example, are not "pulled" by the earth. The curvature of space-time around the earth forces the objects to take the direction on toward the earth. The objects are pushed toward the earth by the gravitational field rather than pulled by the earth."(1) (I've also heard the modern physicist Michio Kaku agree that gravity is a push.)

So the Dark Energy giving the universe a push just doesn't seem necessary. Dark Energy is only required if we continue clinging to the Newtonian view that, instead of pushing objects together, gravity is a mysterious force whereby objects pull themselves together. Why doesn't the push of gravitation simply replace the push of dark energy ... and continue to expand the universe? This question relates to the entire universe, not merely our gravitationally-bound local part of it. The acceleration known as cosmic expansion is offset by the relativistic proposal that the space-time composing the cosmos IS gravitation. According to James Overduin, a physicist at Towson University in Maryland, USA who specializes in gravitation - gravity is just another term for the curvature of space-time.(2) In astrophysics, gravitational redshift or Einstein shift is the process by which electromagnetic radiation originating from a source that is in a gravitational field is reduced in energy and in frequency, or redshifted. Since gravity is just another term for the curvature of space-time, the gravitational field which electromagnetic radiation originates from - see letter's final 3 sentences - is not limited to a particular galaxy or galaxy cluster but spans (indeed, is) the whole of space-time, in agreement with general relativity.

The farther away a galaxy is, the greater is the amount of gravitation which any electromagnetic radiation has to traverse. So the electromagnetism weakens more than expected and the gravitational redshift, which is larger than anticipated, naturally increases with distance. All of the distance-indicating redshift not due to the Doppler effect is gravitational redshift, which is always grounded in space-time spanning gravity. It never indicates universal expansion, which would make it what is called cosmological redshift and would require space-time and gravitation to be separate things.

This gravitational redshift can be applied to anything and everything, including the type 1a supernovae used by the Supernova Cosmology Project and the High-Z Supernova Search Team when they supposedly discovered accelerating expansion of the universe in 1998 (they compared the stars' brightnesses with their measured redshifts, and attributed the apparent expansion to dark energy).(3)

Nor does Dark Matter seem to be necessary. The first formal inference about the existence of dark matter (4,5,6,7) said that some unseen matter provided the mass and associated gravitation to hold the Coma cluster of galaxies together. A minority of astronomers, motivated by the lack of conclusive identification of dark matter, or by observations that don't fit the model, argue for various modifications of the standard laws of general relativity (eg, 8). A galaxy or galaxy cluster would indeed tend to fly apart if its gravitation is considered to be a pull from its centre that weakens with the distance to its edge.* But thinking of general relativity's definition of gravity as a push means the galaxy's or cluster's edges are being accelerated towards its centre,** thus holding it together. Galactic shrinkage is offset by the orbiting speeds of bodies and / or Einstein's paper that was written 4 years after General Relativity was published - "Do gravitational fields play an essential role in the structure of elementary particles?"(9) His paper suggests electromagnetism is the other contributor.

* The inverse-square law says that if stars A and B emit light of equal intensity but star B is twice as distant, it will appear one quarter as bright as star A i.e. as the inverse square of 2 (1/4). It also says the gravity between any 2 objects is only one quarter as strong if the distance between the objects doubles.

** Since gravity is by far the weakest force in the universe, it's entirely reasonable to think that this acceleration towards the centre requires the 10^36 times more powerful electromagnetic force. In that case, the phrase in the second paragraph "the gravitational field which electromagnetic radiation originates from" could be interpreted as G (gravitation) and EM (electromagnetism) constituting a unified GEM force. This would be consistent with "Do gravitational fields play an essential role in the structure of elementary particles?"

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Astrophysical Journal, vol. 86, p.217, 10/1937, a second paper by Zwicky, was more widely read

(8) "Conformal theory: New light on dark matter, dark energy, and dark galactic halos." (PDF) Robert K. Nesbet. IBM Almaden Research Center, 17 June 2014

(9) "Do gravitational fields play an essential role in the structure of elementary particles?" ("Spielen Gravitationsfelder im Aufbau der materiellen Elementarteilchen eine wesentliche Rolle?" by Albert Einstein - Sitzungsberichte der Preussischen Akademie der Wissenschaften, [Math. Phys.], 349-356 [1919] Berlin).

HYPOTHESES SUPPORTING GRAVITATION AS A PUSH

M-SIGMA, THE NON-FUNDAMENTAL NUCLEAR FORCES

The M-sigma relationship was only discovered in 2000 and is observational, meaning scientists noticed it first and are now trying to understand the cause. M refers to the mass of a galaxy's central black hole, and sigma stands for the speed at which stars fly about in the galaxy's bulge. The bigger the black hole, the faster the stars move - the greater is their velocity dispersion. (1)

Gravitational waves would explain the cause. Some of the ocean waves passing an island are refracted - when they enter shallow water, they're refracted by friction with the mass of the seabed. They change direction and head towards the island, breaking onto its beaches. Similarly, gravitational waves are refracted and focus on the centre of a mass. In this case, the mass the waves are headed toward is the black hole, where they help form its composition. Some waves passing a star near the black hole strike the left side of the star and would set it spinning in a certain direction (say clockwise, as seen from above). But this motion is countered by waves striking the star's right side at the same time and producing counterclockwise movement. The result, if the waves on each side have identical strengths, is that there's no change in rotation. But the energy from the waves striking the star has to have an effect. It probably cannot push the star closer to the black hole since gravitational waves from the opposite direction are balancing that effect by trying to push it further away - there may be a tiny imbalance eg in regard to the Astronomical Unit. (2) The tiny imbalance could naturally affect rotation, too.

Though the energy from the waves impacting the star has little influence on stars' rotation or distance from the black hole, Imaginary Time says that it speeds up the stellar orbital movements. Imaginary time - which is as real to physicists and mathematicians as our familiar real time - obtained its name because it was originally a purely mathematical representation of time which appears in some approaches to the special relativity and quantum mechanics theories developed in the early decades of last century. We can picture imaginary time in the following way. One can think of ordinary, real, time as a horizontal line. On the left, there's the past - and on the right, the future. But there's another kind of time in the vertical direction. This is called imaginary time (it's described with imaginary numbers such as i which equals $\sqrt{-1}$).

As mathematical physicist Paul Davies writes in The Real Gleam In The Imaginary ‘i’ (20 FEBRUARY 2017 - https://cosmosmagazine.com/mathematics/the-gleam-in-the-i) -

"The name has stuck, even though today we accept imaginary numbers are just as real as real numbers."

It was, I think, in the next issue of Cosmos magazine that Prof. Davies wrote that imaginary time is just as real as the time we're familiar with. Professor Itzhak Bars of the University of Southern California in Los Angeles says, "one whole dimension of time and another of space have until now gone entirely unnoticed by us". ("A Two-Time Universe? Physicist Explores How Second Dimension of Time Could Unify Physics Laws" - May 15, 2007 by Tom Siegfried (Read more at: https://m.phys.org/news/2007-05-two-time-universe-physicist-explores-dimension.html). Could Prof. Bars' second dimension of space be imaginary (in the sense of $i = \sqrt{-1}$) space which is united with imaginary time the same way ordinary space and time are joined? And in the unification of a quantum gravity universe, the real and imaginary would be connected.* If the waves play a role in the black hole's mass and gravitational field, their influence would not be limited there and they'd also play a role in forming those properties in any other body they encounter.** The bigger the black hole, the more gravitational waves would be entering it, and the greater would be the effect on the orbits of nearby stars.

* General Relativity proposes that the space-time composing the cosmos IS gravitation. Gravitational waves not only compose space-time but also imaginary-space-time. The linear motion of waves headed towards the central black hole and striking stars' sides during the journey is converted into increased (and perpendicular) orbital speed of the stars since the gravitational waves of imaginary time are at 90 degrees to the gravitational waves of space-time (recall how we can picture imaginary time as another kind of time in the vertical direction when familiar time is a horizontal line). The waves give the false impression of penetrating the entire universe because they're constantly absorbed into what could be called wave packets to refresh matter and the nuclear forces associated with it, then re-radiated. See the final two paragraphs before the references, as well as Einstein's paper "Do gravitational fields play an essential role in the structure of elementary particles?" (3)

** See (3) - Einstein's paper was written prior to the discovery of the nuclear forces. However, it seems to imply to modern science that the 2 nuclear forces are not fundamental but, like the matter they're associated with, are products of gravitational - electromagnetic interaction (a coupling which produces the energy of the strong force's gluons, as well as the mass of the weak force's W and Z particles). This agrees with theories in which the role of the mass-bestowing Higgs field is played by various couplings (4).

Let's apply this aspect of gravity to a few more instances -

GEYSERS ON SATURN'S MOON ENCELADUS

"A small water jet on Enceladus, an icy moon of Saturn, spews its fiercest eruptions when the moon is farthest from the planet, a new study suggests, but the overall gas output doesn't increase much during that time. The study points to a mystery in Enceladus' plumbing." (5)

Basically, the problem seems to be that humans haven't caught up with Einstein's ideas about gravity yet. In 1919, he submitted a paper to the Prussian Academy of Sciences asking "Do gravitational fields play an essential role in the structure of elementary particles?" (3) If so, gravitational waves from deep space would focus on the centre of a planet's mass. When Enceladus is near Saturn, it would also be close to increased activity of the waves. The increased push from them would suppress emission of dust-sized water-ice grains, which is 3 times greater at the moon's farthest point because suppression is reduced there. Gas emission is also increased. Since this is not 3 times more, but only 20% more, a plumbing problem would be causing the discrepancy.

GRAVITY, FALLING BODIES, PLANETARY MAGNETIC FIELDS

An article (6) in a 50-year-old encyclopedia got me thinking. It said Newton's laws of gravity explain why an object loses weight when buried in the earth - because only the mass below the object is pulling down on it (at earth's centre, the object would weigh nothing, it said). Einstein's interpretation of gravitation can be regarded as a push by the curved space-time surrounding our planet, so I wondered how this push - rather than pull - could make objects lose weight when they're buried.

Gravitational waves penetrating the surface (let's call it surface A) would try to push the object towards the centre of Earth (the earth's substance would easily resist the push). But this couldn't make the object lighter. Waves passing thru the earth from the opposite side of the globe (from surface B) would try to push the object upwards. This makes the object a tiny bit buoyant, and lighter. The waves from the space-time above surface A supposedly propel all objects toward that surface at 32 feet per second (the falling-bodies law). Note that Einstein wrote a 1919 paper about gravitation playing a role in the composition of elementary particles. (3) Since gravity/gravitational waves is the curvature of space-time, our planet (and the rest of the universe) would not be separate from space-time. Everything in time and the universe is part of a continuum ... a unification. In the not-surprising eventuality that Einstein is proven correct yet again (regarding his 1919 paper this time); I think there should be a minuscule, presently unmeasurable difference in the rate of descent of more massive and less massive bodies. This is because a greater mass would, by definition, be a greater concentration of the gravitational waves pushing the object to the surface. The Microscope satellite currently in orbit will test the falling-bodies law with a precision that is 100 times greater than can be achieved on Earth - and could possibly confirm Einstein's 1919 paper, revising our understanding of the law.

The waves above surface B start out pushing objects at 32 ft/s but gravity weakens to 1/4 when distance is doubled. By the time they pass through the planet and emerge at surface A, they're far too weak to accelerate even the lightest objects upward enough to make them float. The weakening of the waves might be caused by their involvement in production of matter and mass. Perhaps they're also weakened by production of matter's associated strong and weak nuclear forces ie by production of the gluon's energy (strong force), as well as the mass of W and Z particles (weak).

At the exact centre of the world, the object could be perfectly spherical and the central portion of Earth's core. It would be subject to equal quantities and strengths of gravitational waves from every direction and consequently motionless (in the space-time normally perceived – see next paragraph). It would be in a state that may be regarded as lack of resistance … a perfect lack of resistance in which, according to Isaac Newton's first law of motion, it will remain in a state of rest unless acted upon by another force. It'd have no tendency to move in any direction and would be as weightless as if it were floating in space. Being in a state of perfect lack of resistance means it might be considered a variation of the condensed-matter physics known as superconductivity, which is zero (electrical) resistance. Electrical currents in the convective, liquid outer core would create earth's magnetic field. Naturally being in contact with the rest of the core, the central core interacts with the outer core and its analogy to superconductivity causes expulsion of the magnetic field - its Meissner effect.

Gravitational waves not only compose space-time but also imaginary-space-time. The gravitational (more precisely, gravitational-electromagnetic) waves of imaginary time are at 90 degrees to the gravitational waves in space or in time (recall how we can picture imaginary time as another kind of time in the vertical direction when familiar time is a horizontal line). Since the central core is in contact with the rest of the rotating core, it cannot truly be motionless in an absolute sense – only in the space-time dimensions we can perceive, and which are detectable with current technology. All its motion actually occurs in the perpendicular imaginary-space-time dimensions we can't perceive, and which aren't detectable with present technology. Why? No other part of the planet (not even a billionth of a millimetre from the central core) can experience exactly equal quantities and strengths of gravitational waves from every direction (including those in both space-time and imaginary-space-time), and consequently appear to be permanently devoid of movement. If the central core is not motionless (in the space-time sense) for some reason, it could push against the rest of the core (resist the non-central core's motion) and wouldn't have the lack of resistance characteristic of superconductivity. The size of the central core, though unknown, must have more than the zero-volume of a singularity - every planet with differentiated layers would possess a singularity-sized central core, and therefore a magnetic field. Venus' core is thought to be electrically conductive and, although its rotation is often thought to be too slow, simulations show it is adequate to produce a dynamo. [7] There'd be no perfect lack of resistance, and no Meissner effect, if the central core possessed spacetime motion - and certain astronomical bodies, such as the planet Venus, could have no intrinsic magnetic field [8] as a result. (It does have a much weaker one than Earth, induced by an interaction between the ionosphere and the solar wind [9]).

EARTH'S TIDES, ASTRONOMICAL UNIT, COSMIC BACKGROUNDS

When ocean waves pass an island, some enter shallow water and are refracted by friction with the seabed. They change direction and head towards the island, breaking onto its beaches. Similarly, gravitational waves are refracted and focus on the centre of a mass. Exerting a force on that centre (a push) in partnership with the 10^36-times-more-powerful electromagnetic waves, the gravitation might build up more mass concentrically with the centre to create a subatomic particle or a planet [3]. Newton's mathematics describes the gravitational force very well even though he describes gravitation as an attractive pull. Einstein says it's a push. To quote from [6]:

"(Bodies) merely follow the line of least resistance through the hills and valleys of the curved space that surrounds other bodies. Objects that fall to the earth, for example, are not "pulled" by the earth. The curvature of space time around the earth forces the objects to take the direction on toward the earth. The objects are pushed toward the earth by the gravitational field rather than pulled by the earth."

As the refracted gravitational wave passes through space, part of it is diverted by mass to form more mass (the more mass, the more gravity is diverted). Though the International Space Station weighs almost 413 tons, it has tiny mass compared to any planet and the isolation of its severely reduced number of gravity waves produces so-called weightlessness. Black holes – ranging from about 3 solar masses for the smallest stellar variety to billions of solar masses for supermassive black holes in galaxy centres – have so much mass and diverted gravity that light pushed into them is unable to escape.

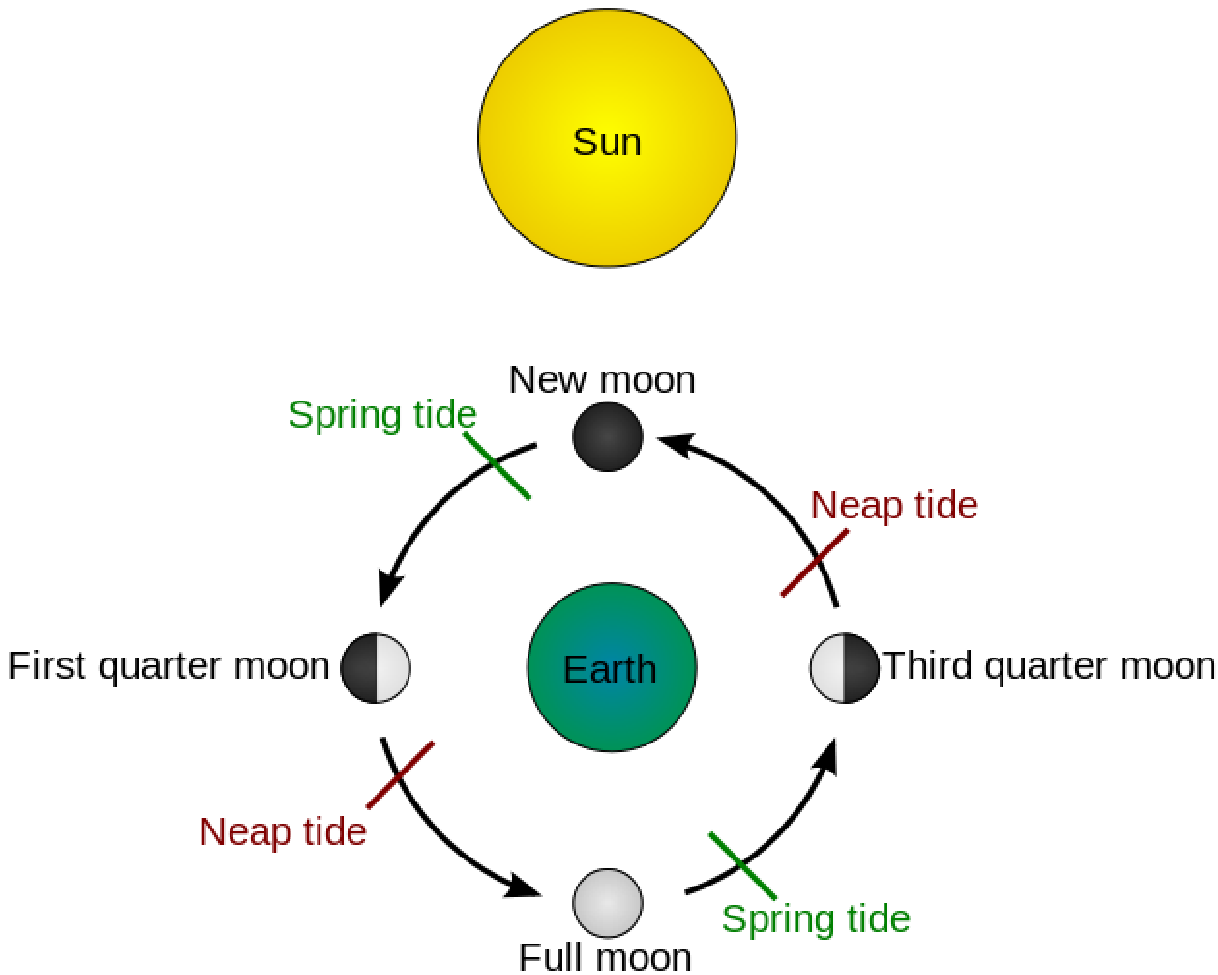
Entering a black hole on anything except a very special pathway into it is predicted to cause you to be shred into long, thin pieces – a process called spaghettification, and caused by the black hole's tidal forces (differences in its gravitational effect on an object's nearer and more distant ends). The relatively insignificant gravitational forces associated with Earth push your head and feet down without any noticeable difference, though the difference does exist. Experimenters have shown that a clock on the ground floor of a building 25 metres tall runs more slowly than one near its top, and attributed the difference to gravitational effects [10]. Assuming you fall feet first - the extreme gravitational waves associated with a black hole push your head towards the hole with tremendous force but are vastly magnified by addition of many more waves in the 5 or 6 feet between one end of you and the other. This results in your feet being much, much closer to the black hole's centre and you become spaghettified into a long, thin strand.

How, then, can repelling or pushing gravity account for the apparent attraction of ocean tides towards the Moon? I believe such an idea of gravity requires the idea of 17th-century scientists Isaac Newton and Johannes Kepler that the moon causes the tides, to be joined with Galileo's idea that the Earth's movements slosh its water.

"If a barge (carrying a cargo of freshwater) suddenly ground to a halt on a sandbar, for instance, the water pushed up towards the bow then bounced back toward the stern, doing this several times with ever decreasing agitation until it returned to a level state. Galileo realized that the Earth's dual motion—its daily one around its axis and its annual one around the sun—might have the same effect on oceans and other great bodies of water as the barge had on its freshwater cargo." [11]

Gravity's apparent attraction can be summarized by the following – gravitation-is/gravitational-waves-are absorbed into what may be called wave packets and the inertia of the theoretical gravitons (united with far more energetic photons) carries objects towards Earth's centre at 9.8 m/s or 32 ft/s. The mass of the oceans on Earth is estimated at nearly 1.5 billion cubic kilometres [12]. All this water is being pushed towards Earth's centre at 32 feet per second every second. But the seafloor prevents its descent. So there is a recoil, noticeable offshore (it is only where oceans and continents meet that tides are great enough to be noticed). This recoil is larger during the spring tides seen at full and new moon because sun, Earth and moon are aligned at these times.

The previous paragraph's alignment of Sun, Earth and moon therefore refers to their being lined up where the gravitational current is greatest (in the plane where planets and moons are created) - and to more of the gravitational waves travelling from the outer solar system being captured by solar and lunar wave packets, and less of them being available on Earth to suppress oceanic recoil (there are still enough to maintain the falling-bodies rate of 32 feet per second per second). At the neap tides of 1st and 3rd quarter; the sun, earth and moon aren't lined up but form a right angle and our planet has access to more gravitational waves, which suppress oceanic recoil to a greater degree. The same effect is achieved if we imagine the sun and moon pulling earth's water in different directions at neap tide, but suppression of oceanic recoil appears to be a more accurate description. If variables like wind/atmospheric pressure/storms are deleted, this greater suppression causes neap tides which are much lower than spring tides.



After absorption (whether in oceans, in space, or anywhere else), most of the gravitational waves are used in building and refreshing matter and its associated nuclear forces. The remnant is re-radiated from stars, planets, interstellar gas and dust, etc. It's radiated as gravitational waves (a Gravity Wave Background, challenging the idea that the traditional form of Cosmic Inflation was necessary to generate gravitational waves). Suppose "General Relativity eliminates Dark Energy, Dark Matter and Universal Expansion" is correct when it says G (gravitation) and EM (electromagnetism) constitute a unified GEM force. Then the gravity waves emitted after absorption could also be radiated as all types of electromagnetic waves – including an infrared background whose heat output exceeds that of the stars alone, in addition to a microwave background. The latter challenges the idea that existence of the cosmic microwave background proves the universe began with the traditional Big Bang.

If a star only received the input of gravitational waves from deep space entering it, there would be no limit to its potential growth. Since it also radiates mass-forming gravitational waves, there is a limit to the growth. 99% of the solar system's mass / gravitational waves / gravity are associated with our star, so the gravitational push on Earth from its sphere may be slightly greater than the push from the waves originating in deep space. In the end, our planet's orbit would be growing slowly larger. The distance between Sun and Earth is growing by approx. 15 centimetres per century according to [2]. The two authors attribute this increase of the Astronomical Unit (AU – the average distance between Earth and the Sun) to dark energy. The increase may actually be gravitational. **The waves from deep space are a possible unrecognized contributing factor to the Pioneer anomaly, where the Pioneer spacecraft near the solar system's edge are a few thousand kilometres closer to the Sun than predicted.**

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