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What is special about special relativity

The rules of special relativity are a special case of general relativity, where you can ignore the gravitational fields. That was a tall order. Since Scott wasn't moving near lightspeed, the actual difference in aging due to time dilation was negligible. Einstein's theories still hold up well today, after exhaustive experimentation and testing, and have been described as the single most important contribution by one man to science. He enjoys writing about science and technology as he finds the intricacies which come with each topic fascinating. A clown entertaining passengers on a train can trust their juggling balls will go up and down at a slow, steady rate. In other words, you can calculate how much force it takes to move objects with various masses at different speeds.For every action, there is an equal and opposite reaction.Newton's laws proved valid in nearly every application in physics, according to Encyclopedia Britannica. The special advance of special relativity was combining the fact that the speed of light is constant with the fact that observers in all reference frames perceive the same laws of nature. Imagine you're on a train, moving at, say, 100 miles per hour (45 m/s), and you shoot a cannonball from it at an additional 200 mph (89 m/s). No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. But because they are moving toward one lightning bolt and away from the other, the person on the train would see the bolt ahead of the train first, and the bolt behind the train later. These laws apply to everybody, regardless of how they happen to be travelling. That might not seem like a lot, but it's fast enough that there are experiments we can perform to see if the speed of light changes by that tiny amount. There are other phenomena that can be explained with the help the of the special theory of relativity, such as time dilation, the composition of velocities and certain optical effects. Our understanding of space is three-dimensional, while our concept of time is very linear. Michelson and chemist Edward Morley calculated how Earth's motion through the ether affected how the speed of light is measured, and unexpectedly found that the speed of light is the same no matter what Earth's motion is. His ground-breaking theories take into account the speed of light, the structure of space-time and the equivalence of acceleration and gravity. But some things couldn't be explained by Newton's work: For example, light. The speed of light in a vacuum remains constant for all observers. The second situation where this theory comes into play is length contraction. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Two years later, in 1907, Michelson was awarded the Nobel Prize for his interferometer experiments proving the constancy of the speed of light. Yet a little over 100 years ago, the laws of motion -- first set out by Newton, who built on ideas from Galileo -- were running into trouble. There are two light sources equidistant from him. It's not lightspeed that changes, he realized, but time itself that is relative. Text and images may be altered, removed, or added to as an editorial decision to keep information current. At the time, it completely revolutionised our understanding of space and time. One of the final points we will touch on is causality and the prohibition of motion faster than the speed of light. Researchers uniting special relativity and quantum mechanics — the smooth and the chunky, the very large and the very small — have come up with fields like relativistic quantum mechanics and, more recently, quantum field theory to better understand subatomic particles and their interactions. In fact, considering how much stress and radiation the airborne twin experienced aboard the ISS, some would argue Scott Kelly increased his rate of aging.But at speeds approaching the speed of light, the effects of time dilation could be much more apparent. If a bolt of lightning hit both trees at the same time, the person beside the track would see simultaneous strikes. Due to time dilation, Mark Kelly aged just a little faster than Scott — "five milliseconds," according to the earth-bound twin. Venkatesh is an Electrical and Electronics Engineer from SRM Institute of Science and Technology, India. For an object at rest, Einstein showed how its total mass equals its energy times the square of the speed of light. For anything that trudges along at a mundane – everyday pace whether it's juggling balls, rockets, bullets, or bull ants – the rules of special relativity don't really make much of a difference. In developing special relativity, Einstein began by accepting what experiment and his own thinking showed to be the true behaviour of light, even when this contradicted classical physics or the usual perceptions about the world. These transformations of length contraction and time dilation -- known as the Lorentz transformation -- have been borne out by experiment after experiment. Put your understanding of this concept to test by answering a few MCQs. Click ‘Start Quiz’ to begin! Select the correct answer and click on the “Finish” buttonCheck your score and answers at the end of the quiz Visit BYJU’S for all Physics related queries and study materials 0 out of 0 arewrong 0 out of 0 are correct 0 out of 0 are Unattempted View Quiz Answers and Analysis Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Later in the 17th Century, Sir Isaac Newton also took the principle of relativity for granted, asserting that if his famous laws of motion held in one inertial frame, then they also held in a reference frame moving at a constant velocity relative to the first frame. However, what if I told you that time and space do not behave the same way in all situations when we consider the physics of very high-velocity objects. These three laws are: You may like Objects in motion or at rest remain in the same state unless an external force imposes change. For example, one group proposes space-time loops to link the tiny, chunky quantum world with the wide relativistic universe.Additional resourcesThis article was originally written by Elizabeth Howell and has since been updated. The theory explains phenomena such as the relativity of simultaneity and length contraction. But because it appeared in Einstein's own memoir, the anecdote is still widely accepted.If a person could, theoretically, catch up to a beam of light and see it frozen relative to their own motion, would physics as a whole have to change depending on a person's speed, and their vantage point? This led Einstein to believe that Newtonian Mechanics did not work according to Maxwell’s Equations of Electromagnetism. This is when two events appear to occur at two different locations simultaneously in the reference frame of one observer, but may also appear to happen non-simultaneously in the frame of another observer. Here's how. No warranties are given. These two ideas might seem compatible, but Newton's laws of motion couldn't fit them together. Norton challenged Einstein's story in his book "Einstein for Everyone" (Nullarbor Press, 2007), in part because as a 16-year-old, Einstein wouldn't yet have encountered Maxwell's equations. If you were standing on Earth and a spaceship were to pass above you at 10% the speed of light you would be able to see the spaceship and note its length. Next Page: Speed of Light and the Principle of Relativity >> There are only a few ideas that are powerful enough to shape our entire picture of the Universe and how it works: gravitation, the laws of motion, electricity and magnetism, quantum mechanics. Never any faster. Isaac Newton's three laws of motion describe a relationship between a force, an object's mass, and its acceleration. Main Topics > (introduction) The “theory of relativity” (or simply “relativity”) generally refers to two theories of Albert Einstein, his Special Theory of Relativity (or simply special relativity) of 1905, and his General Theory of Relativity (or general relativity) of 1916. Whether the platform moves relative to the man or the other way around, both observers do not report the same timing of the light sources flashing! The man on the train always reports that both light beams are produced simultaneously, but the man observing from the platform reports one light beam being faster than the other (the one closest to him). To take an example, let’s consider a man standing on a moving platform. It rotates on its axis at about 465 m/s at the equator, but it orbits the Sun at about 30,000 m/s as it moves through space. At 99% the speed of light, you would probably see nothing but a line. Special relativity is a very important physics theory introduced by Albert Einstein in 1905, his "miracle year". Classical electromagnetism is a branch of theoretical physics that mainly deals with the synergy between electric charges and current by using the classical Newtonian model. Special relativity was discovered first, by Einstein, in 1905. He is deeply fascinated by Robotics and Artificial Intelligence. Special relativity implies consequences of mass-energy equivalence, relativity of simultaneity, length contraction, and a universal speed limit. In relative theory, reference frames play a vital role. Relativity and Unifying Electromagnetism Wave propagation was discovered during the theoretical investigation in classical electromagnetism. GPS clocks don't tick over to the next day until they have run a total of 38 microseconds longer than comparable clocks on Earth.Special relativity and quantum mechanicsSpecial relativity and quantum mechanics are two of the most widely accepted models of how our universe works. For example, PBS Nova explained, "If you could turn every one of the atoms in a paper clip into pure energy — leaving no mass whatsoever — the paper clip would yield [the equivalent energy of] 18 kilotons of TNT. That's roughly the size of the bomb that destroyed Hiroshima in 1945." Time dilationOne of the many implications of Einstein's special relativity work is that time moves relative to the observer. For slow moving juggling balls, this is hard enough to imagine. In Einstein’s theory of special relativity, causality means that an effect cannot occur from a cause that is not in the back (past) light cone of that event. Aainsqatsi/Wikimedia Commons) A light cone is the path that a flash of light takes when emanating from a single point in space and traveling in all directions of spacetime. The special theory of relativity or special relativity is a physical theory which states the relationship between space and time. Events in special (and general) relativity are continuous and deterministic, wrote Corey Powell for The Guardian, which means that every action results in a direct, specific and local consequence. The part that makes special relativity so "special" is because these laws apply to everyone, everywhere at every time, including deep inside gravitational fields of all magnitudes. This, wrote the physicist, led to his eventual musings on the theory of special relativity, which he broke down into another thought experiment: A person is standing next to a train track comparing observations of a lightning storm with a person inside the train. That meant it couldn't be explained by classical mechanics. As we will see, Einstein’s theories are somewhat more involved, even if his starting point was in many respects the same. The reason these postulates were framed was that Einstein found an inconsistency when he tried to apply Newtonian Mechanics to Maxwell’s equations of electromagnetism. He wasn't the only one pondering this relationship at the time – other physicists, such as Henri Poincaré, were also showing how energy and mass were closely linked. Her classmates, however, would be 65 years old — 50 years would have passed on the much slower-moving planet.We don't currently have the technology to travel anywhere near that speed. As the interferometer rotated into, perpendicular to, and against the Earth's direction of motion, there should have been shifts in the interference pattern produced by the beams of light as they moved through space. When the 15-year-old got back to Earth, she would have aged those 5 years she spent traveling. In a thought experiment as a teenager, he wrote, he imagined chasing a beam of light.Classical physics would imply that as the imaginary Einstein sped up to catch the light, the light wave would eventually come to a relative speed of zero — the man and the light would be moving at speed together, and he could see light as a frozen electromagnetic field. If anything were to cross the speed of light, numerous paradoxes would begin to occur. If you fly from Paris to New York and back in an airplane into a headwind followed by a tailwind of equal magnitude, it takes slightly longer for that plane to arrive than if there were no wind at all. The passengers sitting next to the juggler would also see the balls move up and down at light speed. The theory includes a way for the speed of light to define the relationship between energy and matter — small amounts of mass (m) can be interchangeable with enormous amounts of energy (E), as defined by the classic equation E = mc^2.Special relativity applies to "special" cases — it's mostly used when discussing huge energies, ultra-fast speeds and astronomical distances, all without the complications of gravity. It may have taken a while for the public to understand or accept Einstein’s wild postulations, but over time, we have found that his scientific theories – and his genius-level reputation – continue to be supported and validated! References (click to expand)Special Relativity Simultaneity.Light cone. The meaning of causality in classical physics implies that no action can occur before its cause. And because this is physics, of course, the train is moving nearly the speed of light.Einstein imagined the train at a point on the track equally between two trees. But no shift was ever observed; this experiment returned a null result. Instead, Einstein recounted, he sought a unified theory that would make the rules of physics the same for everyone, everywhere, all the time. The theory is based on two postulates: 1) The laws of physics hold in non-accelerating frames of reference and 2) The speed of light in a vacuum remains constant for all observers. So in 1905, Einstein wrote a paper detailing a strange explanation. What does E = mc^2 mean?One of the most famous and well-known equations in all of human history, E = mc^2, translates to "energy is equal to mass times the speed of light squared." In other words, wrote PBS Nova, energy (E) and mass (m) are interchangeable. That means it is impossible for any matter to go faster than light travels. The simplest way to explain this is with another “moving platform” example. Galileo predicted this much, and the results still hold up today. From someone else's perspective, on the ground, they'll see the cannonball move at 300 mph (134 m/s), since the speeds of the train and the cannonball should add. Nothing odd there. Sped up to lightspeed, it requires some clever thinking to make sense of. In 1887, wrote astrophysicist Ethan Siegal in the Forbes science blog, Starts With a Bang, physicist Albert A. (Photo Credit : K. Table of Contents (click to expand) The Special Theory of Relativity is a theory that explains the relationship between space and time. Einstein’s special relativity, which he formulated in his “miracle year” of 1905, was a theory that revolutionised our ideas of space and time – and ultimately paved the way for some even... But for any object at insanely fast 'relativistic' velocities (that means speeds that approach that of light) special relativity really packs a punch.All topic-based articles are determined by fact checkers to be correct and relevant at the time of publishing. If you imagine the current event (or the present moment) to be a plane horizon, then the light from that spreads out as a growing circle of events, resulting in a cone. Therefore, the same event’s occurrence appears differently for different observers due to the relative motion being observed separately. The conventional notion of absolute universal time is replaced by the notion of a time that is dependent on the reference frame and spatial position. Time moves differently for objects in motion than for objects at rest. This was perhaps the most important null result in the history of physics, since it meant that the speed of light was constant to any and all observers. Basically, the special theory of relativity establishes the relationship between space and time for problems that classical physics (Newtonian physics) fail to understand or explain. Meanwhile, the speed of light, as observed by anyone anywhere in the universe, moving or not moving, is always the same. It wasn't until 1915 that Einstein completed his general theory of relativity, which was verified by the gravitational bending of starlight observed during a solar eclipse in 1919. 'Right' just depends on the context of each person's difference in speed. The inverse of this future light cone is what we call the past light cone. Speed of light is represented using the letter ‘c’. This light cone is a mathematical representation of all future events that will occur after the event horizon. Michelson constructed a series of ultra-sensitive interferometers set up to exploit exactly this fact. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . Learn the basics of electromagnetism in this video. What does E = mc2 mean?Einstein came up with a new equation to describe how mass and force relate as a way of supporting his new idea. The license may not give you all of the permissions necessary for your intended use. This cosmic speed limit inspires new realms of physics and science fiction, as people consider travel across vast distances.What was physics like before relativity?Before Einstein, astronomers (for the most part) understood the universe in terms of three laws of motion presented by Isaac Newton in 1686. Einstein’s equation is E = mc^2. Einstein's solution was to view time and space as relative factors. ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. This is also known as the concept of inertia.The force acting on an object is equal to the mass of the object multiplied by its acceleration. An event is nothing but an occurrence that refers to a location in space corresponding to the reference frame. Special relativity implies consequences of mass-energy equivalence, relativity of simultaneity, length contraction, and a ... Albert Einstein's theory of special relativity is an explanation of how a change in an object's speed affects measurements of its time, space, and mass. The “ theory of relativity ” (or simply “ relativity ”) generally refers to two theories of Albert Einstein, his Special Theory of Relativity (or simply special relativity) of 1905, and his General Theory of ... There is no absolute position on time or distance. On the other hand, passengers passing on a second speeding train would look through the window to see those juggling balls whip by at the combined speeds of the two trains. Back in the late 1800s, the fastest thing we knew of in constant, controlled motion was the Earth itself. That effect adds microseconds to each day on a GPS atomic clock, so in the end engineers subtract 7 microseconds and add 45 more back on. It was invented by Albert Einstein to explain the inconsistency between Newtonian Mechanics and Maxwell’s Equations of Electromagnetism. For example, when astronaut Scott Kelly spent nearly a year aboard the International Space Station starting in 2015, he was moving much faster than his twin brother, astronaut Mark Kelly, who spent the year on the planet's surface. They are, in fact, just different forms of the same thing. How does speed affect time and space? But, Einstein wrote, this contradicted work by another scientist, James Clerk Maxwell, whose equations required that electromagnetic waves always move at the same speed in a vacuum: 186,282 miles per second (300,000 kilometers per second). According to the theory of special relativity, acceleration changes how time and distance compare between observers, especially as that acceleration becomes super fast. From your perspective, on the train, you see the cannonball move at 200 mph (89 m/s). Since the speed of light is constant, mass and energy are two sides of the same coin. Special cases where the physics calculations must be performed at velocities close to the speed of light are where special relativity comes to the fore. Now, a host of additional theories exist. The licensor cannot revoke these freedoms as long as you follow the license terms. Einstein concluded that simultaneity is not absolute, or in other words, that simultaneous events as seen by one observer could occur at different times from the perspective of another. But because those atomic clocks are on board satellites that are constantly whizzing through space at 8,700 mph (14,000 km/h), special relativity means that they tick an extra 7 microseconds, or 7 millionths of a second, each day, according to American Physical Society publication Physics Central. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. Or, put another way, E = m x c^2. Along with quantum theory, relativity is one of the two main planks on which almost the whole of modern physics is built. Attribution — You must give appropriate credit , provide a link to the license, and indicate if changes were made . The theory provides an explanation of electromagnetic phenomena whenever the field strengths and relevant length scales are large enough that quantum mechanical effects are negligible. But with the precision of modern technology, time dilation does actually affect human engineering.GPS devices work by calculating a position based on communication with at least three satellites in distant Earth orbits. Those sitting on the passing train would also see them move at the exact same speed, in spite of the differences between the train's velocity. This single speed limit also happens to be the same no matter how fast an observer is moving, which really doesn't make much sense at first. The juggler wouldn't think they were slow or thin at all, but would instead think those on the other train looked particularly thin and slow. But they're not easily exchanged. The broad study of moving charges forms the Liénard–Wiechert potential, leading to further development towards special theory of relativity. They formed the basis for our understanding of mechanics and gravity. Einstein officially added gravity to his theories in 1915, with the publication of his paper on general relativity.As an object approaches the speed of light, the object's mass becomes infinite and so does the energy required to move it. As Chad Orzel says, the big advance of Einstein's relativity was to state that the laws of physics do not depend on how you're moving, and that one of those laws is the fact that the speed of light is a constant to everybody! The thing that changes for different observers moving at different speeds is not how fast a light beam appears to move, but rather how fast one another's clocks appear to run and how long distances appear to be between objects moving at various speeds. Recommended Video for you:Time Dilation - Einstein's Theory Of Relativity Explained! The whole premise upon which special relativity is built consists of two simple postulates: The laws of physics hold in non-accelerating frames of reference. To shoehorn the odd behavior of light into Newton's framework for physics scientists in the 1800s supposed that light must be transmitted through some medium, which they called the "luminiferous ether." That hypothetical ether had to be rigid enough to transfer light waves like a guitar string vibrates with sound, but also completely undetectable in the movements of planets and stars. He is also a chess aficionado, He likes studying chess classics from the 1800 and 1900’s. Albert Einstein originally proposed this theory in the year 1905 “On the Electrodynamics of Moving Bodies”. This is often termed as STR theory. The two observers disagree on the timing of the event and the synchronicity with which the events occur. For decades, many viewed string theory to be the most promising area of research into a unified theory of all physics. Because the speed of light is already an enormous number, and the equation demands that it be multiplied by itself (or squared) to become even larger, a small amount of mass contains a huge amount of energy. It took a new view of the Universe, and Einstein's relativity, to make it work. But if you replace the cannonball with light, everything goes wonky. Now, let another man be present at a different frame of reference than the man on the platform. The equations are as follows: The case point scenarios where special theory comes into play can be proven through Lorentz transformation. This is relativity of simultaneity. It's fast enough that this second speed is approximately 0.01% the speed of light. Adapt — remix, transform, and build upon the material for any purpose, even commercially. Third law of Newton’s motion states that “for every action, there is an equal and opposite reaction”. That's different from quantum mechanics, Powell continued: quantum physics are "chunky," with events occurring in jumps or "quantum leaps" that have probabilistic outcomes, not definite ones. Now, if you saw the same spaceship pass you a second time at 85% the speed of light, you would see a significantly shorter spaceship. The first situation we will discuss is the relativity of simultaneity. The way this was discovered wasn't easy. Hendrik Lorentz was a Dutch physicist who invented the Lorentz transformation, which helped accommodate the notion that multiple frames of reference can be calculated simultaneously (the foundation upon which the special theory of relativity was written). Special relativity is an explanation of how speed affects mass, time and space. In the 1880s, Albert A. Those satellites have to keep track of incredibly precise time in order to pinpoint a location on the planet, so they work based on atomic clocks. This light cone that is formed is known as the future light cone. But it was also discovered that the speed of light was constant, no matter who the observer was or how they were moving. Imagine a 15-year-old leaves her high school traveling at 99.5% of the speed of light for five years (from the teenage astronaut's perspective). Neither is 'wrong' in what they see. This is by far the most interesting principle that we can deduce from the special theory of relativity. It is used to measure a time of events by using a clock. Philosopher of physics John D. Albert Einstein originally proposed this theory in the year 1905 “On the Electrodynamics of Moving Bodies”. This is a very surprising phenomenon arguing that the measurement of an object by one observer might be highly different from that of another observer. Light travels at 670,616,629 mph (299,792,458 m/s), and if you shoot a beam of light out from the train, you, a person on the ground, a person in an airplane, a rocket, or someone moving at any other speed will see the same thing: light traveling at that same universal speed, the speed of light. Yes, light is an electromagnetic wave which can travel in a vacuum. How can this be and who is wrong? Postulates of Special Relativity The Principle of Relativity “ The states of changed physical systems are not affected, whether these changes of state be referred to the one or the other of two systems in uniform translatory motion relative to each other.” The Principle of Invariant Light Speed “Light is always propagated in empty space with a definite velocity c which is independent of the state of motion of the emitting body.” The origin of Special Relativity not only depends upon these two postulates, but there are other factors such as the clock from their previous history and isotropy. In order to maintain pace with Earth clocks, atomic clocks on GPS satellites need to subtract 7 microseconds each day.With additional effects from general relativity (Einstein's follow-up to special relativity that incorporates gravity), clocks closer to the center of a large gravitational mass like Earth tick more slowly than those farther away. But to explain that, you need a more general theory: Einstein's theory of general relativity. But special relativity mostly pertains to extremely large distances, speeds and objects, uniting them in a "smooth" model of the universe. For instance, the explosion of a fire flower can be considered as an event. Researchers striving to connect quantum mechanics and general relativity, on the other hand, consider it to be one of the great unsolved problems in physics. Researchers set about trying to detect that mysterious ether, hoping to understand it better. By adding energy, such as by pushing it, you also add mass. A person on the passing train pass with a super thin, super slow juggler on board, his thin juggling balls almost locked in space as he passes at high speed. Physics needed a new paradigm.How did Einstein come up with special relativity?According to Einstein, in his 1949 book "Autobiographical Notes" (Open Court, 1999, Centennial Edition), the budding physicist began questioning the behavior of light when he was just 16 years old. Related Videos Albert Einstein's theory of special relativity is an explanation of how a change in an object's speed affects measurements of its time, space, and mass.Experiments that helped to establish a theory of electromagnetism showed waves in an electromagnetic field (which we see as light) zip through empty space at a speed of 299,792,458 metres per second (about 186,000 miles per second). If those balls were waves of light they could only move at a single speed, no matter who was watching. One famous hypothesis is that if one were to travel faster than the speed of light, there is a high chance that instead of going into the future light cone, one would be able to break the space-time barrier and move into the past light cone. Therefore, most scientists feel that it will be easier to travel into the future than into the past. If light obeyed this same principle, it would take slightly longer for a light wave to travel in the direction of the Earth's orbital motion around the Sun than for a direction perpendicular to that. Although Newtonian physics were highly instrumental when it came to everyday calculations, they failed miserably when considering high-velocity physics (physics at the speed of light). When it comes to the human perception of space and time, we have a rather straightforward approach. The funny thing about the special theory of relativity was that the math required for it had been invented before the theory itself! Albert Einstein went through many mathematical tools before finally settling on the mathematical framework of Hendrik Lorentz. And that's a fact of the Universe that's pretty special, even 111 years later. Albert Einstein's 1905 theory of special relativity is one of the most important papers ever published in the field of physics. The observer moving relative to the platform The platform moving relative to the observer The answer to this question is that neither observer is wrong. If the speed of light didn't change despite the Earth's movement through the ether, they concluded, there must be no such thing as ether to begin with: Light in space moved through a vacuum. They have led to some remarkable consequences, including the dilation of time, the contraction of length, mass-energy equivalence and the bending of light, as well as the prediction of the existence of black holes, wormholes and the “birth” of the universe in a Big Bang. As the accelerating object gains more mass, it requires even more energy to accelerate, which in turn makes it even harder to push. The video also covers the Right hand thumb rule which is used to find the direction of current or magnetic field if one is known. Special theory of relativity is based on two postulates – Laws of Physics are invariant Irrespective of the light source, the speed of light in a vacuum is the same in any other space. Using the infamous equations of Lorentz Transformation, Albert Einstein published the scientific paper “On the electrodynamics of moving bodies”, which we today know as the Special Theory of Relativity. Albert Einstein developed the special theory of relativity. This is because both observers view the same event from different spatial orientations to the relative motion of the occurring event. An object in motion experiences time dilation, meaning that when an object is moving very fast it experiences time more slowly than when it is at rest. However, it was not possible for the speed of time to be a variable, as it had been rigorously analyzed and experimented upon by numerous scientists. The idea of relativity had been studied almost three centuries earlier by Galileo, when he stated the principle of relativity in 1632 (that the fundamental laws of physics are the same for all bodies in uniform motion). Galileo had stated, back in the early 1600s, that there's no absolute and constant state of rest; no one observer would have a "privileged" position. This still holds up today! So rest assured, no matter how you're moving or where you are, no matter when you look or how you do it, the laws of physics are the same for you as they are for anyone and everyone else. Never any slower. Special relativity might seem weird, but more than a century after Einstein wrote his proposal, it's become one of the most well supported theories in physics.

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