PHYSICS MYSTERIES, PART ONE

Science underpins our way of life but people can be put off studying physics because some of it seems unbelievable. Many of these difficulties arise from Einstein's special theory of relativity, which is abbreviated to SR.

I will start by summarising SR. The theory is special in that it was based on observers who are "inertial" or not accelerating. (Einstein later extended SR to cover accelerations and gravity in his General Theory.) People had long thought that natural laws should be the same relative to any observer, i.e. the principle of relativity. Einstein combined this assumption with the idea that the speed of light is the same for every inertial observer. These two principles led to his initial theory of relativity in 1905.

The predictions of this theory are that clocks, and all other processes, will slow down the faster they are seen to move. As a clock approaches the speed of light, it slows down to the point of virtually stopping. In addition, anything having mass gains more mass the faster it is seen to travel. It cannot fully attain the speed of light because this would mean it had acquired infinite mass. Objects also contract in their direction of travel the faster they move relative to an observer. A rocket could therefore get shorter whilst its diameter stays the same. Its length would reduce to zero if it could reach the speed of light. Einstein of course also made famous the (pre-existing) equation $E = mc^2$.

For Einstein, all motion was relative. We can imagine an astronaut speeding through our galaxy, but in SR the astronaut can equally regard the galaxy as moving in the opposite direction whilst the astronaut is stationary. A rocket moving at 10% of the speed of light would shorten by 0.5% in its direction of travel, but for the astronaut the galaxy would contract, not the rocket. If a different astronaut simultaneously moved at 80% of the speed of light, the galaxy would contract by 40%. But how can the galaxy be different sizes at the same time?

It is natural to think the theory predicts the apparent size of things not their actual size, as if the changes are optical illusions. This is not the case. Einstein's 1916 book on relativity (revised in 1952) says on page 36 "*A priori* it is quite clear that we must be able to learn something about the **physical** behaviour of measuring rods and clocks from the equations of transformation …". (My emphasis.) Nowhere does he say that distances only appear to contract.

So objects such as the Earth are not only predicted to have physically different sizes but different total masses and energies. Perhaps even more oddly we are meant to exist at different times. So for very distant objects moving at different speeds a person may have died and also not be born yet. These are actual times not apparent ones due to any illusion of light. These different times, as distinct from different time rates, come from something called non-simultaneity, of which more later.

A simple guide to SR's equations

To understand the theory's prediction we need to look at the equations involved. These aren't too complicated. But before looking at these it will be helpful to understand the basis of the theory. Its starting point is the principle that motion is relative: observers have an equal right to regard themselves as at rest.

The problem of relativity can be thought of as follows. Suppose I see something move at a velocity of v with respect to me. This could be a car cruising at 60 mph with respect to the ground. How will this motion appear in relation to a differently moving object e.g. a truck coming in the opposite direction at 50 mph? If I said the speed will be 60 mph with respect to *every* other moving object you may think I was crazy. Yet this is equivalent to SR. The difference being that v has a greater value than 60 mph and the object is a beam of light not a car. Light though is not a magical substance that defies logic, and the famous Michelson-Morley experiment did not demonstrate otherwise.

Let us consider this in more detail. The speed of light is referred to as c and its value in a vacuum is approximately 300,000 km a second. (It isn't much slower in air.) Suppose we measure the speed of light from a laser with respect to the ground and a rocket travels at a speed of v toward the oncoming beam of light. The rocket has very accurate clocks and light detectors near the front and rear. Knowing the length of the rocket, the speed of light is then easily calculated from the different times recorded at the two detectors. We may expect the speed of light with respect to the rocket to be c+v but SR requires it to be c.

Just before measuring this tiny time difference it would be a good idea to check that the clocks are exactly synchronized. This could be done by sending light signals between the front and rear of the rocket. However in order to find a way of making c+v seem like c we might suppose the two clocks are not recording simultaneous times - despite our checks to make sure they are at exactly the same time. We might say the clock at the rear is somehow in the future. This would make it seem like the light had taken longer than it actually did. (The time warp would be $vL/(c^2+cv)$ where L is the distance between the detectors.) Light would then seem to travel slower at a speed of c even though common sense suggests it is c+v.

This may seem an implausible ruse but it is one employed in SR. The equation used though is different for an important reason. Einstein used the Lorentz transformation equations, but Lorentz and others had developed these equations for a different purpose. Following on from Maxwell's equations people had assumed light travelled through an "ether" and the Earth was moving through this ether. Physicists were trying to explain the result of the Michelson-Morley experiment. In effect this measured the time light took to be reflected to and from a mirror at a speed of c+v and c-v in the direction of motion through the ether. It should have taken longer than if light moved constantly at c. Yet the experiment found no increase.

A possible explanation suggested before the experiment was that the Earth and everything on it contracted as it moved through the ether. Lorentz's equations describe how this might work. Shortening the experimental apparatus would reduce the transit time and this could offset the extra time taken for light to travel at speeds of c+v and c-v through the ether.

Shortening our moving rocket though doesn't help. We need to make the light's transit time seem longer not shorter. It's already too short if light approaches the rocket at a speed of c+v. The situation is worse because moving clocks run slower. So they record fewer microseconds (or picoseconds or whatever) and this makes the light seem to move even faster. As a result SR needs the rocket to be even more time warped along its length than in the earlier case where the rocket's length was unchanged.

If you look at Einstein's 1905 paper *On the Electrodynamics of Moving Bodies* (www.fourmilab.ch/etexts/einstein/specrel/www/) you will see that clocks synchronization is the first subject he tackles. (The first subheading seems to be numbered 31 or 3.1.) Just before the end of the second section he quotes two equations which involve c+v and c-v. Although Einstein provides no diagram or explanation, these are the speeds of light that would be experienced by an observer moving through an ether toward and away from a light source respectively, but Einstein assumes there is no ether. He later applies his approach to Maxwell's equations despite these equations also being based on an ether. Nevertheless Einstein eventually arrives at the transformation equations at the end of the third section.

These transformation equations allow measurements made in a stationary frame to be converted into those seen from a moving frame. A frame is just a set of axes including one for time. So it's like two map references of eastings and northings plus a height above sea level plus a time. These axes give rise to four numbers that define the location of an event at any point.

Measurements along the observer's axes are defined using co-ordinates labelled as x, y and z plus t for time, but the y and z axes can be ignored for our purposes. The axes meet at right angles at a point called the origin. Here all the measurements in the observer's frame are zero, so $x=0$ and $t=0$. Measurements in the moving frame are referred to (nowadays) as x' and t', i.e. they are indicated by adding a prime symbol. This is much easier to follow than the Greek symbols Einstein used ($\xi=x'$ and $\tau=t'$).

The two frames are positioned so that the x and x' axes coincide with $x=x'=0$ and $t=t'=0$, i.e. the two origins are at the same time and place, and the moving frame travels at a speed of v along the x axis. I can now finally describe the most interesting Lorentz equation. In modern symbols it is $t'=\gamma(t - vx/c^2)$. The Greek letter γ (gamma) is still used for the Lorentz factor. γ equals $1/\sqrt{(1 - v^2/c^2)}$ which exceeds 1 assuming movement occurs. (This is because $v^2 > 0$ and $(1 - v^2/c^2) < 1$.) So if an event occurs at particular values of x and t then the equation tells us the corresponding time t' as measured in the moving frame. There is also an equation that gives us x' which is $\xi=x'=\gamma(x - vt)$.

γ can be between 1 and infinity but for illustrative purposes I will take it as equal to 2 so $t'=2(t - vx/c^2)$. The first part of this equation, i.e. $t'=2t$, is the ratio of clock rates in a purely time dimension. The second part takes account of the predicted time warp in the x direction. If this time warp is ignored a duration measured in the stationary frame, e.g. between two events at $x=0$, would be doubled in the moving frame. (This is similar to the corresponding equation for distances, i.e. $x'=2(x - vt)$. In a purely distance dimension, e.g. when $t=0$, we have $x'=2x$. So any distance in the stationary frame along x will be measured as doubled in the moving frame.) If measured times are doubled in the moving frame, the intrinsic time rate of a moving clock would be twice that of a clock at rest ($t'=2t$). This of course is opposite to the actual slowing of moving clocks. So SR's clock slowing arises from motion along a predicted spatial time warp.

Hence to understand SR it is necessary to distinguish intrinsic time rate from SR's predicted time warp along a direction of motion. Approaching clocks are seen to be increasingly in the future the more distant they are (and the faster they move). This time warp is not predicted in a direction perpendicular to a direction of relative motion between frames, nor is there any predicted perpendicular distance contraction. Yet the speed of an object moving in a perpendicular direction should differ between frames as moving clocks are predicted to be faster.

In Einstein's paper he uses the relation $x=vt$, which defines the position of the moving origin, to get rid of the x in the time warp term vx/c^2. He says "Therefore ... $\tau=t'=\sqrt{(1 -v^2/c^2)}t$". This means $t'=t/\gamma$. So whereas SR's co-ordinate transformation between frames depends crucially on a clock's position in the time warp along the x axis, Einstein arrives at the simpler relation $t'=t/\gamma$. Yet if $t'=t/\gamma = \gamma(t -vx/c^2)$ then $t/\gamma = \gamma t$ at $x=0$. This would only be true if $\gamma=1$, so $v=0$ and no motion occurs.

In summary, SR assumes there is no ether but it uses equations based on light moving at a speed of c in relation to an ether. Moreover SR has led to the idea that a single object will be physically different for different observers. So whereas science was meant to make sense of the world, relativity has had the opposite effect. It has taken people's idea of reality - of a single objective world lying beyond our senses - and turned it into baffling multiple realities.

Confusion is also promoted by Einstein's statement in the second paragraph that light always propagates through empty space at a definite velocity c. When observers (and emitters) move at different speeds, whose space are we talking about? How does light know in whose frame it should travel and arrive? Speed is measured in relation to objects not space. If speed is measurable in relation to empty space, as Einstein's statement implies, this invalidates his principle of relativity whereby the relative motion of observers is entirely arbitrary.

SR's predictions about time

I now want to look at a prediction based on the time warp of $t'=\gamma(t - vx/c^2)$. The orbital speed of the Earth around the Sun is 30 km a second or 0.01% of the speed of light, i.e. 0.0001c and so $\gamma = 1/\sqrt{(1 - v^2/c^2)} = 1.000000005$. For a distant supernova x can be a million light years. Hence in the equation $t'=\gamma(t - vx/c^2)$ $t' = 1.000000005(t - 0.0001c(-1{,}000{,}000c)/c^2) \approx t+100$ years. This is the time in an approaching supernova's frame relative to a stationary Earth (x is negative if v is in the positive x direction).

Suppose the supernova is a constant distance from the Sun. At one time of the year the supernova could be seen to approach the Earth and six months later to recede. The value of v would change from v to -v, so t' can change from t +100 to t -100. This time warping changes the age of the stellar explosion relative to the time on Earth, so if the explosion first appeared in the sky one day (a million years or so after the actual explosion) it could keep appearing many times later. This should provide dramatic support for SR, but of course it doesn't happen. The daily rotation of the Earth would be another significant source of time warping for supernovae and other cosmic events. (Although SR makes physics complicated the above is in the frame of a stationary Earth where c and distance are constant.)

The problem of SR's time warps is unsurprising. SR is founded on a logical contradiction, i.e. ether/no ether, and contradictions propagate into its paradoxes and its clashes with observations.

This brings me to another important point. If SR were to make any valid predictions they would be symmetrical. So if two observers are in relative motion each finds the other's clock is slower. This is impossible unless there are multiple realities, but it is also disproved by experiments. Moreover observers should always find moving clocks to be slower, but westbound clocks are found to be faster in relation to ground based clocks. Experimental observations are discussed in *Part Two*.

Historical context

For years I have tried to get physicists to explain the paradoxes I had devised to disprove SR. More recently I offered to donate £1000 to the British Society for the Philosophy of Science if they could explain some paradoxes. I then offered to increase this to £5000, but apart from a standard email saying they hoped to reply in two weeks I heard nothing.

I later bought a book by Professor Herbert Dingle who was a founder of this Society, a leading authority on SR and a President of the Royal Astronomical Society. He later realised that SR was illogical, but despite his credentials he had great difficulty getting anyone to engage with a basic paradox, i.e. two clocks can't be slower than each other. He was born in 1890 and lived through the relativity revolution. His book *Science at the crossroads* provides a valuable account of why physicists came to believe in SR.

It seems Einstein's paper was little known at the time; the theory of relativity was associated with Lorentz. This changed after a prediction from Einstein's 1915 paper on general relativity was experimentally verified. The paper made use of a mathematical approach (tensors) which most physicists hadn't studied and at the time they didn't understand. The view arose that maths must be the route to physical laws. Mathematical beauty then became the aim and it seems SR has this beauty (it is part of the Lorentz group). The fact that SR conflicts with logic and observational evidence seems to be of lesser importance. Yet without logic there is no valid maths - however beautiful the maths may be.

Although not in Dingle's book I should mention $E=mc^2$. The first person to assert its general applicability seems to have been Olinto de Pretto in 1903. Einstein's derivation in 1905 was criticised by Max Planck and is incorrect. This is discussed further in the article *$E=mc^2$* which refers to a Scientific American article on the subject. In fact it seems to me that a valid derivation of the equation from SR is impossible.

Paradoxes

I will describe one of my paradoxes here. If one measures the wavelength and frequency of light in a laboratory then one ought to be able to apply the Lorentz transformations to predict these quantities in the reference frame of the light. At the speed of light $\gamma = 1/\sqrt{(1 - v^2/c^2)} = 1/\sqrt{(0)}$ as v=c, so γ is infinite. If we use $x' = \gamma(x - vt)$ with γ equal to infinity and at a constant time, such as t=0, we find that any finite wavelength of x in the laboratory frame is infinite in the frame of the light.

The product of the wavelength and frequency equals the speed of light, and in SR this equals c for all frames. Dividing c by an infinite wavelength gives it zero frequency. If light had zero frequency and didn't change with time in its own frame it would have no frequency in the laboratory frame either. So we couldn't see it. It seems SR cannot apply to light.

Yet photons are said to have zero rest mass. They only have mass because their zero rest mass is multiplied by γ = infinity (or equivalently divided by zero). So if SR doesn't apply to light then photons are stuck with zero mass and energy. Using Planck's law, zero energy means light has no frequency so we still couldn't see it. Either way, SR is incompatible with light.

It is sometimes falsely claimed that light cannot be assigned a co-moving set of axes, i.e. a frame. However if there is anything fundamentally different about light's frame then this disproves Einstein's assumption that all inertial frames are equivalent. It disproves the principle of relativity and the basis for SR.

I also have paradoxes to show SR's other predictions such as distance contraction are illogical. This shows why physicists seem unable to find evidence of it. Accelerated atoms may contract but not the space between them. Space lacks motion. Physicists say the arrival of muons from the upper atmosphere is explained by the Earth's contraction, but this only demonstrates asymmetric time dilation. No contraction has been measured.

Relativistic mass

Mass seems to be such a fundamental property of matter that the relative motion of an observer should not be able to change it. Accelerating a body may increase its mass, but that's not the same as mass increasing simply because of a moving observer.

If a massive object could be accelerated to a very high speed, one might directly measure how any increase in its mass affects other masses. It would though be very difficult to accelerate a mass to such a high energy that the effect could be measured. Physicists routinely accelerate atomic particles, but their mass has no measurable gravitational effect on other masses. Instead, the mass of speeding particles can be estimated by deflecting charged particles in the presence of magnetic fields. Such fields have progressively less effect in deflecting the particles as their speed increases. This is exactly what one would expect if their mass is multiplied by the Lorentz factor.

However, electromagnetic forces are said to be mediated by the exchange of virtual photons. If a particle's processes have all slowed down because it is travelling at high speed, this means that the rate it accepts and emits photons should also reduce. If its time rate is half that of a particle at rest, it would exchange photons at half the rate of a particle at rest. It would experience half the force and so behave as if its mass had doubled. If a particle could travel at the speed of light, it would not exchange any photons. It would then not be deflected by magnetic fields so its mass would appear to be infinite. So if time slows down for such particles their behaviour at high speed seems to show that their mass is constant.

Physicists say particle experiments support SR's predicted mass increase, but they also say that all of SR's predictions are supported by experiments (and that Einstein invented $E = mc^2$). Hence I cannot trust anything I'm told about SR. To be honest I'm not sure what to think about mass increasing.

To try to make some progress, the following thought experiment may help. Suppose particles are moving with a velocity of v such that their kinetic energy, i.e. their energy due to motion, is just above a threshold value. As a result, when they hit particles that are at rest there is enough impact energy for some particles to change into higher energy particles. Now imagine that some particle detectors are moving at a velocity of v/2. For them, the particles at rest have more mass as they are now seen to have a speed of -v/2. The other particles have less mass as their speed has dropped from v to v/2. As the equation for γ is non-linear the total impact energy is less. So there is not enough impact energy to form the new particles. Does it make sense for the existence of particles to depend on an observer's speed?

If something with no rest mass is accelerated to 99.9999% of the speed of light, then its total mass is 0 divided by 0.001, i.e. 0. After a lifetime of adding 9s to the end of the percentage speed, the mass is still 0. At *exactly* the speed of light in a vacuum, its mass is said to be 0 divided by 0. If one thinks that a physics based on dividing mass by 0 makes sense then one can say 0/0=1 or 0/0=1000. Hence 1 = 1000; not much sense then. Yet this is how photons are said to be able to have mass but zero rest mass. This requires the speed of light to be infinitely exact in the frame of an absorbing particle. But what about quantum uncertainty? Quantum mechanics doesn't allow a particle to have an exact speed unless it is spread right across the universe.

If mass does increase then the increase isn't symmetrical as SR predicts, and it would seem physicists are wrong about forces being transmitted by photon transfer events. This process would then act in a way that is independent of time rate.

Neutrinos are particles that are thought to have mass, and the latest indications are that they move at the speed of light. This of course is impossible in SR. If a neutrino's tiny mass is divided by zero it would have more mass than the visible universe.

Inertial frames of reference

I ought to deal with an issue that I glossed over at the beginning. I said SR applies to inertial frames and these do not involve acceleration. (Atoms in thermal motion are usually accelerating, and atomic electrons are constantly accelerating toward nuclei. So SR seems to be particularly unsuited to particle physics.) But it seems better to say an inertial body is one that isn't being accelerated by an external force other than gravity. For example, objects within a free falling rocket do not accelerate in relation to the frame of the rocket. The Earth's centre is also locally inertial. Here the forces from the rest of the universe cancel out, but only because the Earth is accelerating toward the Sun, which is also accelerating toward the centre of our galaxy and so on.

Einstein's first postulate of SR says "all inertial frames are equivalent for the performance of all physical experiments". But this is not compatible with astronomical observations. For each point in space there is a frame at rest with the CMBR, the cosmic microwave background radiation. In this frame, the universe expands symmetrically and obeys Hubble's Law, i.e. the speeds of galaxies increase linearly with their distance. In a moving frame, relativity adds a constant velocity to the symmetrical velocities of the galaxies. But there is no sensible explanation for why the universe would behave asymmetrically. Hence inertial frames are not equivalent as SR requires. In addition, the faster the non-stationary frames move, the greater the observed asymmetry of cosmic radiation.

On page 14 of Einstein's 1916 book *Relativity* (revised in 1952) he says if there were a frame of reference in which natural phenomena could be described more simply than in others it follows that "We should then be justified (because of the merits for the description of natural phenomena) in calling this "absolutely at rest" …". Hence a point at rest with the universe is absolutely at rest, i.e. the universe expands more simply than in other frames because of its symmetry. So the basis of SR was disproved long ago using Einstein's own criterion.

A rational approach to the universe

The principle of relativity means we can each regard ourselves as being at rest and other things, including the universe, as moving. In contrast, I prefer a principle I call absolutivity. The universe as a whole is stationary: it cannot move in relation to itself. To be more exact the universe has no net momentum. (Momentum is mass times velocity. Velocity is speed in a defined direction; in the opposite direction the velocity is negative.) So we would be absolutely at rest if we saw that the visible universe had no net momentum. This is the absolute basis for judging motion.

Motion can be measured in relation to light from distant galaxies or to the CMBR which is the radiation detected from the earliest atoms in the universe. According to physicists' cosmological principle, we expect our visible universe to be like the whole universe. So if we are at rest in relation to what we can detect, we assume we are at rest in relation to the whole universe.

Measurements show the Sun is moving at about 370 km/second in relation to the CMBR (toward the constellation of Leo). It is irrational to say the Sun is stationary and the rest of the universe is moving at 370 km/sec in the opposite direction. This would mean the universe had enormous, or infinite, net momentum.

But how can we explain the fact that processes slow down? This seems quite easy if time is akin to a dimension of space and if our speed through spacetime involves "space-time" energy. In what follows I will refer to the traditional term potential energy as process energy. This will initially seem confusing but I hope you will soon agree it has considerable benefits.

Imagine an inertial neutral body in thermal equilibrium, i.e. it has no net electrical charge and there is no net radiation of energy. Such a body, e.g. an asteroid falling toward a planet, is regarded as having kinetic energy and gravitational potential energy, but I refer to potential energy as process energy. So the falling body gains kinetic energy and loses process energy. The sum of its kinetic and process energy is its constant space-time energy.

Process energy depends on the rate of a body's processes - its clock rate (e.g. a radioactive decay rate). These processes affect its rate of interaction with other bodies. In addition I should mention that particles such as electrons (and other fermions) also have intrinsic binding energy.

Let me recap. A body has binding and space-time energy. The latter is shared between space and time - between kinetic and process energy. These two motion energies are complementary. The maximum process energy that a body can have at rest is equal to the maximum kinetic energy it can have when it moves.

The kinetic energy of a moving body is $\frac{1}{2}mv^2$. Newton was able to work this out using his newly invented branch of maths called calculus. It is the energy that has to be supplied to accelerate a body of mass m to a speed of v. It is proportional to the square of speed through space, so I assume a body's process energy is proportional to the square of its speed through time. Speed through time is an odd phrase but it should make more sense in terms of a different view of spacetime that I describe in *Part Two*. Speed through time corresponds to process rate or clock speed. **If a body's space-time energy is fixed then the faster it moves through space, the slower it moves through time.**

The resulting relation between speed and clock rate is shown using simple equations in the appendix to this document. This approach leads to the same slowing of moving clocks as SR but the slowing is not symmetrical and there are no time warps.

So kinetic energy is gained at the expense of process energy, and process energy is normally called potential energy. These two energies don't just differ in name. Gravitational potential energy is not an intrinsic property of a body. A body's gravitational energy needs to be inferred from the distances and masses of other bodies. It varies with these bodies but is not directly measurable - unlike process rate and hence process energy. So process or clock rate is a measurable property of matter but potential energy is relative and is usually regarded as arbitrary.

Imagine a body at rest in outer space. It has no kinetic energy so all its space-time energy is process energy. But then it starts to fall toward a distant planet, so it gains kinetic energy and loses process energy (and time rate). It then crashes onto the planet. Its kinetic energy becomes thermal energy which radiates away, so there is a loss of space-time energy and time rate. However if the debris were taken to the top of a hill it would gain gravitational energy, and by interpreting this as process energy we see that its processes speed up very slightly. The simple maths involved are also explained in the appendix.

So space-time energy allows non-physicists to make sense of time rates. Crucially it does not lead to multiple realities. We can all live in the same world. Someone who travels at a different speed does not have their own personally shaped galaxies, and the speed of light is not constant for all inertial observers. This still leaves the question of what the speed of light is measured in relation to. Logically, a beam of light has to travel at c in relation to something - not c in relation to everything. This though needs to wait until *Part Two.*

Photons transfer energy at a speed of c through space in relation to matter, but space-time energy implies that matter at rest is also moving at c through time. As time is perpendicular to space it seems photons are moving equally through time and space. Adding these two velocities together gives a resultant speed of $c\sqrt{2}$ through spacetime. So a photon's kinetic energy, $\frac{1}{2}mv^2$, becomes $\frac{1}{2}m(c\sqrt{2})^2 = \frac{1}{2}m2c^2 = mc^2$. This would explain an anomaly that had long puzzled me. Photons have an energy of mc^2, i.e. their momentum of mc times their speed c, but the kinetic energy of everything else is $\frac{1}{2}mv^2$ which is only half the speed times the momentum of mv. If photons have a speed of $c\sqrt{2}$ then $\frac{1}{2}mv^2$ applies to everything, as simple calculus shows it should. Mass and energy can then be transferred between atoms by photons without the need to multiply the photons' zero rest mass and energy by infinity to get whatever answer one wants.

I now want to return to SR's multiple realities. Suppose a rocket is launched that flies away but then returns and travels at great speed past the Earth. Equipment on the rocket is used to measure the distance between two markers on the Earth. The rocket then beams its measurements down so we can compute the distance. This though is predicted to differ from the distance we can directly measure here on Earth. So for a single physical distance we would have two different measurements in our frame. But if different lengths, times etc are predicted for a single observer then multiple realities provide a disproof of SR.

Suppose the rocket has enough fuel to reach 100,000 mph. Frame equivalence should mean the fuel has enough energy to accelerate the infinite mass of the universe to 100,000 mph with the rocket at rest. Frame equivalence is the basis of relativity. It leads to multiple realities that fail to conserve momentum or energy. Yet their conservation is the bedrock of physics.

Physicists adopted Einstein's approach to multiple realities and later used it to interpret quantum mechanics in the early 1920s. Physics is now based on Minkowski spacetime that encapsulates Einstein's beliefs whereby elapsed time is computed from paths through spacetime. Imagine a clock moving along a straight line through empty space at a constant speed. The clock's elapsed time between two points depends on the differences between the spacetime coordinates of these points. In contrast, time rate in absolutivity depends on the clock's energy not on empty space. The point is that energy is absolute, it can be related to absolute speed in relation to the visible universe, but empty space is relative and can be claimed by any and all observers.

In effect there is now a church of Einstein that has a monopoly on how physics is taught worldwide. Students are keen to follow in the footsteps of their hero and are too busy trying to pass very difficult exams to notice errors in the beliefs being taught. Apostasy would also involve ridicule and rejection by their peers and maybe the end of their careers. Even so it's a shame no group of physicists has had the courage to speak the truth.

Electrically charged particles

Electrons are said to repel each other because they emit virtual photons that have momentum. To conserve momentum, an electron recoils away from the photon that it emits, much as a gun recoils when it shoots a bullet. When another electron absorbs the virtual photon, it also recoils away in the same way that a target recoils from a bullet. Thus the two electrons move away from each other. This very simple idea also explains the repulsion between protons which are both positively charged. But what about the attraction between an electron and proton?

The explanations I have seen involve quantum uncertainty. Imagine that an electron lies a metre to the left of a proton. The electron emits a photon toward the left and so recoils to the right - toward the proton. But quantum uncertainty means that the photon travelling to the left can actually be to the right of the electron and the proton. If the photon hits the proton it knocks the proton to the left. But how does a photon know to move to the wrong side only when the charges differ? And if the photons' positions are random why don't electrons attract each other as often as they repel?

If positive and negative particles travel through space from opposite directions of time they would experience each other travelling in reversed directions. A particle moving from X to Y will appear to go from Y to X if time is reversed. Their momentum will also be reversed and the particles will recoil in the opposite direction. Hence they recoil toward each other, not away. Opposite charges attract, like charges still repel. Works every time. We don't need to rely on nature being unsure where it puts things. Nor that things turn up in the right places anyway.

This bizarre idea is developed further and leads to a radically different view of spacetime and much else. Fortunately this approach does not require much maths. By abandoning SR I have managed to stumble across ideas that have amazed me. By the end of *Part Two* I hope the advantages of this approach in demystifying the universe will become clear.

Binding energy

A single electron is a concentration of negative charge, so what stops it from flying apart? I assume the repulsive energy that would be released if the electron exploded is held in check by something I refer to as its intrinsic binding energy. This is not the same as the binding energy *between* particles.

Similarly, particles such as protons and neutrons contain quarks which seem to be concentrations of positive or negative energy. Again I assume their repulsive energy is balanced by an intrinsic binding energy. If a particle's space-time motion energy is $\frac{1}{2}mc^2$, as suggested earlier, then adding an equal amount of intrinsic binding energy gives a total of $E = mc^2$.

In this simple picture a particle at rest moves through spacetime with a speed of c. If it disintegrates and its energy is converted into photons these would be moving at the increased speed of $c\sqrt{2}$ through spacetime. The total energy and mass are constant but the increase in kinetic energy can come from the intrinsic binding energy that no longer holds the particle together. Photons are unbound waves that spread across space.

I can now return to the earlier paradox about light. A bound particle would lose all its process energy if it moved at the speed of light and hence it would have no frequency. Photons are unbound so they still have process energies and frequencies.

Conclusion

Einstein's paper relies on light moving at a relative speed of c+v. This is incompatible with his principal assumption about light. In the end though the paper makes no valid predictions. It can't even predict a basic property of light - i.e. its frequency - despite SR's aim of explaining the behaviour of light. Any attempt to derive $E = mc^2$ using the conservation of energy is also invalid as SR is inconsistent with this conservation principle.

Thanks to Copernicus we no longer think the Earth is at rest in a moving cosmos, but relativists have an even more subjective view - the cosmos moves in relation to each observer. I think science should try to find a single objective view of the world to dispel life's many illusions, not create more. The post-modernist continental philosophy which denies a single reality has added to New Age quantum mysticism and SR's spacetime. "My truth" is what matters nowadays and speakers who disagree are cancelled and vilified. The more that society slides from reason into irrationality the less important scientists become. Physicists ought to decide which side of the argument to be on.

If one takes a few minutes to think about the postulates of SR, or the time to study the paradoxes or experimental evidence, the theory's falsity is obvious. It is irrational to believe in SR's multiple realities of different energies, momentums, masses, lengths or times. Although spacetime is not as simple as Newton envisaged, an object still has its own set of physical properties. These are not changed by observing an object at different speeds. Our motion does not change the universe's energy or momentum as required by SR's equivalent frames.

To make sense of the universe I will suggest a different model of spacetime. Yet for many people the price of tackling mysteries in this way will be too high. I can accept these ideas as I do not believe in freewill. I prefer the idea of freephysics. By this I mean it is physical laws that determine our lives, not our wills.

Appendix to Part One

This sets out the simple algebra behind an alternative approach to variations in clock rates.

A free-moving neutral particle in thermal equilibrium has two basic forms of energy. One is its intrinsic binding energy, E_b. The other is due to its motion through space and time. This motion energy can be split into two parts. One is kinetic energy, $\frac{1}{2} mv^2$, by virtue of its motion through space and the other is the energy of its processes, its motion through time. The latter can be expressed as kR^2 where R is the rate of the particle's time processes.

The total energy of such a particle would then be:

$E = \frac{1}{2} mv^2 + kR^2 + E_b$ **1**

If we regard this total energy as fixed, we see that there is a limit to v, the particle's velocity, otherwise the kinetic energy could become too large for this fixed energy (unless we accept that one of the energy terms can be negative). The velocity will be able to reach its maximum value when R is zero. If we assume the speed of light is this limiting velocity then when $v = c$ we have:

$E = \frac{1}{2} mc^2 + 0 + E_b$ **2**

Equating **1** and **2** gives $\frac{1}{2} mv^2 + kR^2 + E_b = \frac{1}{2} mc^2 + 0 + E_b$
or $\frac{1}{2} mv^2 + kR^2 = \frac{1}{2} mc^2$ so $R^2 = (c^2 - v^2)m/2k$ **3**

From **1**, when $v = 0$ then $E = 0 + kR_1^2 + E_b$ **4**
where R_1 is the process rate for a stationary particle.

From **2** and **4**, $\frac{1}{2} mc^2 = kR_1^2$ so $m/2k = R_1^2/c^2$ **5**

Substituting **5** into **3** gives $R^2 = (c^2 - v^2)R_1^2/c^2 = (1 - v^2/c^2)R_1^2$
so $R/R_1 = \sqrt{(1 - v^2/c^2)}$ i.e. the reciprocal of the Lorentz factor.
This is the rate of a moving process compared with one at rest.

When a particle is formed, we may say from the principle of equipartition of energy that its intrinsic binding energy E_b equals its motion energy. This would mean E_b is also $\frac{1}{2}mc^2$ giving a total of $E = mc^2$.

My aim has been to show that special relativity, SR, has been disproved and that the idea of space-time energy is a better and easier way to explain experimental results. This principle also seems to provide a much simpler way to view the prediction about time made by general relativity, GR.

GR's predicted gravitational time dilation differs from SR's symmetrical prediction. Suppose A moves at velocity v and B moves at –v. According to SR, A will see that B's clock is slow. Symmetrically, B will see that A's clock is equally slow. In contrast, GR makes a prediction about the effect of gravity on time that is not symmetrical. If A is nearer to a massive body than B then B will see that A's clock is slower and A will see that B's clock is faster. This prediction has been amply verified.

According to Newton, the force of gravity between two bodies whose masses are M and m is $\mathbf{GMm/r^2}$. G is the gravitational constant and r is the distance between their centres of mass.

A particle has its maximum process energy of $\mathbf{\frac{1}{2}mc^2}$ when it is at rest with the visible universe, i.e. v = 0, and when it is not affected by other masses, i.e. when r is infinite. As explained previously, gravitational energy can be regarded as process energy. Energy is force multiplied by distance. To calculate the change in process energy as r reduces it is necessary to integrate GMm/r^2 with respect to r. This gives –GMm/r. So process energy varies with r according to $\mathbf{\frac{1}{2}mc^2 - GMm/r}$.

The proportional process energy is $\frac{1}{2}mc^2 - GMm/r$ divided by the maximum process energy of $\frac{1}{2}mc^2$ i.e. $1 - 2GM/c^2r$. Process rate is the square root of process energy, so the slowing effect of gravity is $\sqrt{(1 - 2GM/c^2r)}$. This is the expression given for GR's predicted effect of gravity on time. If a falling particle is accelerated by gravity to the speed of light, its processes would stop, so $\frac{1}{2}mc^2 - GMm/r = 0$, i.e. this occurs at $r = 2GM/c^2$. This is the Schwarzchild radius of a black hole.