

Radioactive Timekeeping ACS/RTIM

Background Note on New Model of Physics

It may be useful for the purposes of search to explain the terms “invariant” and “dimensionless” as used in the claims. They are fully covered in the description, but it simplifies discussion if I declare at the outset that they refer to a completely new model of physics which I have developed as an alternative to Special Relativity. I add nothing to what I have already said and give nothing away, because the model has been expounded in my previous papers, the whole series of which is published on my personal website, except for my last one or two notes.

All the objections which I have come across depend fundamentally on the assumptions of the Special Theory of Relativity. Thus when the term “absolute” is used of a time-interval in prior art, it is assumed that the length of the time-interval is not absolute in the sense of being invariant, but is subject to being multiplied by a “relativistic” correction factor in a new “relativistic” environment. So for instance atomic clocks in GPS satellites “run slower” than atomic clocks on Earth. This is the phenomenon which Relativity calls time-dilation. In other words their time-intervals have to be corrected by a factor which depends on the environment. By contrast according to my definition, invariant means they do not change and so need no correction.

I do not accept the assumptions of the Special Theory. In fact I think time-dilation is probably science fiction. Nor do I accept that mass increases with velocity or that lengths elongate. I do not dispute the observations, just the interpretation; I think that there may be explanations other than Relativity. What I do accept is that the velocity of light in vacuo is constant everywhere and at all times at a value of approximately $3 \times 10^8 \text{ ms}^{-1}$. On this basis I have formulated a new framework of physics which accounts for the current observations in quite a different way.

Any repeatable process can be used to define a time-interval, because processes must by definition operate over time. No one disputes, therefore, that the process of radioactive decay can be used to define a time-interval. The question is how to turn decay events which occur independently of each other into a meaningful time-interval, especially as the bulk rate is proportional to the number of radioactive nuclei present at any time, so that it declines exponentially.

The bigger question is how such a process could be susceptible to time-dilation. Time is nothing without an event to mark it (Einstein). Between independent decay events there is nothing to dilate. If time appears to dilate when measured by other clocks, it must be caused by some phenomenon other than the stretching of time, whatever that means. As a matter of interest, this argument must also apply to light, if it is considered to be particulate in nature i.e. photons. What is there between photons to dilate? I think the answer must be that time does not dilate at all.

This has become a problem only since the definition of the second in SI units changed from an astronomical observation (a fraction of the Solar Year 1900), which is

essentially geometrical or trigonometric, to the atomic clock, which depends on electromagnetic absorption and emissions of excited atoms.

It is my belief that the change of frequency observed in atomic clocks in relativistic environments, which is interpreted as time-dilation, is in fact related to electromagnetic phenomena. There is some broader phenomenon, as yet unidentified, which causes the change of frequency. The effect of this phenomenon changes as we leave the environment of the Earth. In the same way there are signs that there may be fundamental changes in the effects of light and gravity as the first man-made objects begin to leave the solar system i.e. the Pioneers 10 and 11 and Voyagers 1 and 2 spacecraft.

However, the unidentified phenomenon almost certainly does not affect non-electromagnetic processes. It cannot affect geometrical or trigonometrical relationships, or distances if you accept my analysis, unless one accepts Relativity's warping of space as well, which I do not. It follows that any ad hoc correction factor applied to electromagnetic phenomena will give misleading results if applied to processes which involve both electromagnetic and non-electromagnetic phenomena, as most do. Even simple measurements of velocity may be subject to such distortions: length may be a geometrical measurement and so invariant, but time on the atomic clock will need correction for the local environment (local in the context of space exploration).

I might also point out that computers are electromagnetic devices with clocks which need to be very precisely co-ordinated. Any phenomenon which affects electromagnetic processes might have drastic effects both on computers and on the processes they control.

This would be a good reason for frequent updating of time on spacecraft from a control centre on Earth, which is the practice, but that technique is of no use when there is no possibility of frequent communication between Earth and spacecraft, either because of obstruction or distance. In the absence of a central control update, it must also lead to problems when spacecraft which are in different electromagnetic environments, and so need different "relativistic" correction factors, exchange information which is dependent on the co-ordination of times. They would be on different times.

In the model of physics which I propose, mass does not increase with velocity. The force required to accelerate a mass to velocities approaching the speed of light increases because of hyperbolically increasing resistance from the medium of space (1). Time does not dilate, and the reasoning behind this invention is part of the bigger argument. The basic observation which led to Relativity is a misinterpretation; the velocity of light in vacuo is constant when you can see it, however fast you are moving, because its interaction with a detector depends not on relative velocities but on orbital interaction. The velocity which matters is the velocity of the electron in its orbit, not the velocity of the atom, which simply does not appear in the result. The contortions of Relativity and its coordinate frameworks are not necessary.

The implication is that it is possible to attain a velocity relative to light, which is different from what is implied by Special Relativity, but it would have to be tested by geometrical experiments, which is not easy at velocities comparable to speed of light. We have to fall back on comparisons of wavelengths, but this may be misleading in view of the above argument. This reasoning leads to a new particulate Theory of Light (2), an electrodynamic theory of atomic structure (3), and other fundamental re-appraisals. Hence the need for a firm place on which to stand, a time-interval which is hopefully invariant and permits unambiguous measurements to be made.

The model is consistent with current observations, but I have proposed additional measurements to confirm its difference from Special Relativity. Apart from disproving time-dilation, I have proposed reflecting a laser from the reflectors left on the Moon, now a routine procedure, and looking for an increase of wavelength in the reflected beam, a sort of local redshift (4). If this occurs, and I am confident that it will, it means that redshift is occurring as light travels through space i.e. during the astronomical (though small) distance to the Moon and back. This would be an indication of the broader phenomenon, which I postulated above. I have proposed this as an explanation of redshift of light from stars (5).

Such a result would throw doubt on one of the main pillars of the Big Bang theory, which considers redshift to be proportional to velocity as well as distance. It could not be “relativistic”, because the radial velocity of the Moon with respect to Earth is very small. I have proposed an alternative to the Big Bang based on stochastic regeneration, a form of steady state model (6). Moreover, a “local” redshift would indicate that the frequency of electromagnetic radiation used in atomic clocks might also be affected, which would account for apparent “time-dilation” without recourse to the Theory of Relativity.

All of this disagrees with Hubble and Einstein, and requires a modification to Newton’s Second Law. It differs from Relativity, in that it does not require Newton’s fundamental dimensions of physics to “stretch” in order to retain mathematical relationships. It also differs from Bohr’s theory of the atom.

The prior art I have seen on timekeeping using radioactivity all seems to relate to hybrid time-intervals. They turn radioactive decay events into units of time by using “well known” radioactive decay constants i.e. decay constants measured as the number of events per time-interval on Earth, otherwise known as seconds. In space such units would need “relativistic” corrections before application to the processes to which they are intended to relate, and even then these might be relevant to only some parts of the processes and in some locations in the Solar System.

None of them mentions dimensionless parameters of decay. Dimensionless means that the parameters are simply numbers of events, not numbers per second. Numbers are the same everywhere; even Special Relativity treats, say, 3 metres (or kilogrammes or seconds) as 3 and not an elongating 3. It is the fundamental dimensions of physics i.e. mass, length and time which are said to be dilating in Special Relativity, not the numbers.

Invariant time-intervals as I define them can be used to explore variation in processes and phenomena, particularly electromagnetic phenomena, in different parts of the

solar system. Instead of “correcting” time to suit the circumstances, the invariant time-interval can be used to test current relationships in different electromagnetic environments in the solar system. In addition it will continue to be invariant beyond the boundaries presently available, on the edge of the solar system and beyond. This has implications for space travel and astronomy, and could teach us things about the “local” environment on Earth which can be detected only by leaving it.

This is the context in which an invariant time-interval according to my definition has to be seen.

None of this envisaged in the prior art cited, or anywhere else as far as I am aware. My alternative to the Special Theory is just as valid an explanation of observed effects, and I believe time and measurements will show that it is right.

This new framework of physics is all an integral part of the definition of terms in the description. I have spelled it out to clear away the assumptions of the present model of physics, which are all too easily glossed over.

All the papers referred to may be seen on my personal website or downloaded. If preferred, I can send paper copies.

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