

# Extraordinary Physics, or Is Modern Theoretical Physics Just a Teetering ‘House of Cards’

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Like a house of cards, scientific theories depend on and support one another, so that those at the base cannot be disturbed without everything above them falling down. Such an edifice is what, in science contexts, Thomas Kuhn called a ‘paradigm’. Many of those who use this term most familiarly, nowadays, are often unaware of what, in its Kuhnian context, a ‘paradigm’ really means. In the modern vernacular, an appropriate variant for this is, perhaps, ‘mindset’. A typical example of this mindset is the manner of thinking about the world that was bequeathed to us by Galileo and Newton. So ingrained has this become in our Western cultural psyche that most members of our society cannot contemplate thinking about the world in any other way. Having imbibed it ‘with their mother’s milk’, so to speak, they believe, implicitly, that this way of thinking into which they happened to have been born and educated represents the one and only true ‘realism’ there is, and that in comparison with it any other, radically different way of thinking is tantamount to lunacy. Consequently, when a different paradigm comes along, few people can cope with it. For example, when this classical-science paradigm of Galileo and Newton – quaintly called ‘Realism’ – was found to be flawed in some of its basic assumptions, namely, those of time, space and motion, this call for a whole change of paradigm, or ‘new physics’ paradigm of ‘Relativity’ could not be accommodated by those steeped in the old familiar ‘realism’.

## 1. The House of Cards

First, let it be emphasised, here, that not all members of the Natural Philosophy Alliance (NPA) who are critics of Einstein are of the anti-relativity sort. Some who disagree with Einstein – being ‘dissidents’ in that respect – are nevertheless in agreement with relativity and time-dilation, being dismissive of any idea that there is any untoward consequence, of the alleged ‘Twins paradox’ or ‘Clock paradox’ sort. There are those dissenters who argue that Einstein was wrong – in one very important particular respect, as may be seen – but *not* that *relativity itself* is wrong. This may be appreciated from the following analysis.

From the standpoint of the classical-science or *absolutist* paradigm of Galileo and Newton, when the alternative paradigm of ‘Relativity’ was introduced by Einstein it was something which many people could not even contemplate, far less adopt. And so was created the reactionary anti-Einstein movement that was called ‘Dissidence’. Led by people such as Herbert Dingle, these reactionaries, or physical fundamentalists, could not – and still cannot – contemplate any view of the physical reality of space, time and matter other than of that absolutist or Newtonian, ‘God’s Eye-View’ sort. According to that fundamentalist mindset, time has to be the same everywhere, all over the universe, even in space – that is, in the void, or vacuum – and matter is simply what it is in itself, as ‘God’ or some other tacitly imagined ubiquitous spirit might be presumed to see it behind all its observational appearances. Otherwise, they fear, there is no reality in anything. By reaction many of these self-styled ‘Dissidents’, in defence of their traditionalist precept, often forsake rationality altogether and resort to *ad hominem* rhetorical arguments, which amount to little more than a crude sort of ‘Einstein-bashing’.

Meanwhile, for the Mainstream or Establishment thinkers, those professionals actually engaged in the practicalities of physics, that classical paradigm of ‘Realism’ has proved defective and

is supplanted, on pragmatic grounds, by the radically different physics of Einsteinian Relativism. In that alternative physics, time and space are *dimensions of observation*, not of some assumed absolute, all-seeing and all-knowing ubiquitous Presence transcending all finite observation and experience [1].

However, this radical shift in our traditional ways of thinking, despite its practical value to professional physicists, has done little for the general populace other than to create and maintain complete conceptual mystification. For some of the more level-headed and independent philosophical thinkers, this chronic irresolution at the commonsense-logical level has prompted them seriously to re-evaluate Einstein’s conceptual contribution to modern scientific understanding. They accept the relativistic conception of space, time, matter and motion but for this they revert to the view of Einstein’s relativistic predecessor and mentor, Ernst Mach, the true originator of modern relativistic physics. This Machian view was that Einsteinian relativity is not a true replacement paradigm but is no more than a transitional phase in the shift from one logical paradigm to another – what Mach disparaged as ‘a transitory inspiration in the history of science.’

Nevertheless, this transitional phase in scientific thought, albeit in its currently unfinished, hybrid state, has been embraced by those educated in conformity with it, so that it has become, in its turn, the mindset of the Establishment, or ‘Mainstream’ exponents of Modern Physics. This is simply because, as these people judge ‘it works’. Undoubtedly, it does work, quite spectacularly, and for that purely pragmatical reason these Mainstream exponents of ‘relativistic physics’ have become as fixed in that contemporary way of thinking, regardless of its faults, as ever their Newtonian predecessors were in theirs. So when some inexplicable anomaly arises in this Einsteinian paradigm – as indeed there has – its conventional fixity of mindset prevents any further natural development towards a clear and philosophically distinct

logical alternative. This anomaly is not least in respect of extant Relativity's notorious inability to gel with the evidences produced by its powerful contemporary and adversary, Quantum Physics.

In this respect, our present 'Relativistic' Physics is like a precariously elevated conceptual card castle. Just one or two more little shakes of the table should bring the whole thing tumbling down into a loose collection of disparate ideas, with perhaps no more than just a few bits of the original edifice remaining. Such, it may be judged, is the state of our Theoretical Physics and Cosmology today [2].

## 2. A Consolidated Logical Alternative

The point of departure between Einsteinian and Machian (now Neo-Machian) relativity is what is familiarly called 'the velocity of light.' In the Galilean paradigm, light was thought to be the mediating agency travelling in the space between physical bodies and our observations of them. By contrast, in the Neo-Machian paradigm, as in extant Relativity, the basic physical dimensions of matter such as mass, length and time, are non-existent on their own but are inextricably bound-up with observation itself. The only difference is that in this Neo-Machian context, light is simply *what we see*, or otherwise detect in its total range of frequencies, from deepest infra-red to farthest ultra-violet and gamma. It is, most emphatically, *not* something travelling invisibly in space between observer and observed, as in Einsteinian Relativity, and *this is* where the dissention arises between this author and the Einsteinian interpretation of relativity that was mentioned at the beginning of this article [3].

For the traditional 'Realist' this dependence on 'observation' suggests that relativity is a form of subjectivism ('subjective idealism') in which reality dissolves into a kind of dream. With this assumption in mind, they naturally see 'relativity' as an affront to commonsense realism and they react accordingly. This, however, is a very much mistaken view of what relativity truly means. 'Relative' and 'subjective' are *not* synonyms. What relativity does, in *Machian* terms, is basically to quantise light into what Mach called 'sense-data' which, in the most recent developments of his approach to physics, are conceived as informational 'pixels'. These are bits of light-energy (action) transacted between all objects, only *some* of which may be human beings like ourselves. Other objects are the instruments we use in scientific observation, such as mirrors, microscopes, telescopes, telephones, spectrometers, television cameras and so on – and not least, of course, other observers like ourselves with whom we interact and intercommunicate on a daily basis. This provides us with what is commonly experienced as the objective physical world in which one's own place in it is just one point-perspective among countless others in what might be called an observational community. There can be nothing 'subjective' about this. In fact, it is considerably less subjective than the traditional view of physical reality as something with which we are never directly in contact but only *via* an incidental space-travelling intermediary called 'light'. This interposes what philosophers have called the 'veil of perception' between ourselves and physical reality, which makes physical reality inexorably remote, in both space and time, from our perceptions of it. Thus it becomes an insoluble problem

as to how we can ever be sure that our perceptions of this 'remote reality' are veridical. (This is what philosophers have long known as the vexatious 'Epistemological Problem', or 'Problem of Knowledge'.)

In the Neo-Machian paradigm this recalcitrant philosophical problem is solved at a stroke by dispensing with the assumed mediatory, 'middle-man' role of light between perception and reality. In this Neo-Machian paradigm, light is not something that travels. The quantum pixels, into which light is analyzed, at their most fundamental level do not move, they simply *occur*. They are the ultimate physical *events* out of informational patterns and sequences of which the world is projected by each observer in a manner similar to that in which the viewer projects the dimensions of length, breadth and depth into a video scenario or a pointillist painting. In this distinctive Neo-Machian paradigm, these quantum pixels are identified in language by the neologism *phota* (singular: *photum*), which are the tiny, irreducible packets of *action* (i.e., the product of energy and time) into which all physical phenomena ultimately analyse – as discovered by physicists at around the turn of the nineteenth and twentieth centuries [4]. Having died in February 1916, Mach was not around to make the connection between his ultimate sense/instrument data and these energetic informational elements. Be that as it may, these observational 'sense-data' of Mach's have now achieved solid physical significance in what is well known to physicists as the quantum '*h*', like *c*, is one of the most fundamental of all the fundamental physical constants.

Now *that* is relativity, the *true and original relativity* of Mach as opposed to that of his student, Einstein. It is also *quantum theory*. As we have said, compared to this pristine, Machian form of quantum relativity, Einstein's Relativity is a notoriously incomprehensible hybrid, languishing in a veritable limbo of conceptual irresolution. What keeps it in this suspended state of indecision is its adherence to the seventeenth century idea of light as having a 'velocity'. What was actually discovered, originally, by Olaus Römer, was *not* that light has a 'velocity' – as is automatically assumed – but simply that there is a ratio of conventional distance-units to time-units in the observational measuring of space. Nevertheless the facile notion that what Römer had discovered was 'the velocity of light' became embedded in the mindset of that time and was carried over into all the later observations and experiments to refine the value of this constant, the ratio which became known as '*c*', whose measured value is the ratio of approximately 300,000,000 conventional metres to the conventional second. There is no mystery to this number. It is a product purely of convention. For instance, in imperial units it is 186,000 miles to the second. With a more fortunate choice of units, the constant *c* would be just one, and would disappear altogether from all the relativistic formulae as something completely redundant.

Logically, the fact that all velocities are ratios of distance to time *by no means* entails that all ratios of distance to time, such as *c*, are velocities. Nevertheless, this classic over-interpretation of *c* as a 'velocity' has been included in Einstein's Theory of Relativity, altogether incongruously from the Machian point of view. This 'velocity' interpretation of *c* is encapsulated in Einstein's well-known Second Axiom, according to which 'light travels *in vacuo* at a constant velocity *c*' [5]. This notion persists despite the

fact that, unlike anything truly called a *velocity*,  $c$  is found to be the same for all observers regardless of their motions with respect to one another, which is impossible to reconcile with any commonsense understanding of a velocity. It is the carrying-over into relativity of this relic of traditional 'Realism' which marks Einsteinian Relativity as both a theoretical hybrid and a prime source of conceptual confusion. By contrast, in the Neo-Machian paradigm,  $c$  is no more than what Hermann Bondi has called a 'conversion factor' for interconverting conventional distance measure and time measure without implying a 'velocity' [6]. This is in the same way that a metre converts to 39.37 inches without this implying an actual length, or that a metric kilogram converts to 2.2 imperial pounds without this implying an actual weight. The ratio  $c$ -squared, interconverting joules of energy and mass in kilograms is another such purely mensurational constant.

The defining attribute of all such constants is that unlike a velocity, they are, needless to say, the same for all observers regardless of how these move with respect to one another. It is to be noted that this far more economical Neo-Machian, non-velocity interpretation of the constant  $c$  makes no material difference to the relativistic time-dilation equations, which are the same in these Neo-Machian terms as in Einsteinian relativity [7]. The only difference that the changed interpretation makes is to bypass all the nineteenth century puzzles as to what, in the *vacuum* of space - literally *nothing* - constitutes the reference-zero of 'light-velocity'. Our Neo-Machian, ahistorical bypass avoids that century's confusions which were created by the many contrived attempts to solve those puzzles in terms of mediating 'fields' and 'ethers'. It should have been realised that, logically, there can be no invisible 'fields' or 'ethers' as such but only objects observed to behave in various ways, and that what has been inferred from these behaviours are no more than abstractions which are never *per se* manifest in any measurable physical way. The same goes, of course, for Einstein's 'Space-Time Substratum', or 'Continuum' which is never empirical, or factual, but only, at best, inferential.

In complete opposition, therefore, to the Einsteinian derivation of the time-formula, which is based on artificial precepts of 'field electrodynamics', the Neo-Machian equivalent of that formula derives directly from applying school-level Pythagoras to the four geometro-temporal dimensional components of motion, i.e., distance and time, in the same way as ordinarily applied to the three static or geometrical dimensions. That is to say, in these Pythagorean terms, the length of an ideally straight-line motion trajectory, measured in time-units (metres/ $c$ ) is the geometrical resultant (hypotenuse) of the two rectangularly projected distance and time components of the motion measured in the same units [8, 9, 10].

It is worth noting, in passing, that in the Neo-Machian account of relativity there is nothing like that division between Special and General Relativity which characterises Einsteinian relativism. In the relativistic time-dilation formula and the standard orbital angular momentum formula there is the term  $v^2$ , common to both. The simple move of substituting for  $v^2$  in the time-formula the whole expression of that variable in terms of the parameters of the angular momentum formula automatically extends the time-dilation formula to orbital motion in a simple seamless way which involves no additional hypotheses or special

reasoning [11]. This encloses and unifies Special and General Relativity within a single angular momentum synthesis known as POAMS (the Pope-Osborne Angular Momentum Synthesis, see [www.poams.org](http://www.poams.org)). This synthesis predicts that the closer an artificial satellite, say, gets to a massive body like the earth, the slower, or more 'time-dilated' its clocks automatically become, precisely as in Einsteinian General Relativity. This is well confirmed by observation in the case of satellites like those, for example, of the American GPS and the Russian GLONASS geographical positioning systems.

In this way, the Neo-Machian paradigm bypasses not only all the jargon-infested language connected with 'General Relativity', with its warped and twisted 'gravitational space-time continuum', but also with the whole of nineteenth century physics, with its customary talk of 'magnetism', 'electrostatics', 'electromagnetic propagation', invisible 'forces', 'fields', etc. All these various 'field-forces' and other alleged goings on *in vacuo* are made redundant and are replaced by a single, overriding observational principle, namely, that of *angular momentum*, which, as we shall now see, defines its own space, time, mass and motion.

### 3. Angular Momentum

Starting with the simplest possible definition in the plainest possible language, *angular momentum* is a *quantity of motion* (i.e., the product of energy and time) involving at least two bodies orbiting each other - or, rather, orbiting a common centre of balance or barycentre. The simplest example to start with is that in which two bodies are balanced on opposite ends of a beam, or moment-arm, like that of a weighing scale or a see-saw. In this familiar situation, the mass of the one body multiplied by its distance from the centre of balance is equal to the mass of the other body multiplied by that body's distance from the same centre. This is known in Physics textbooks as the Law of Moments. In space, where there is no material connection between the two balancing bodies, this same Law of Moments applies, except that the see-saw-like motion of the moment-arm or beam is replaced by a continuous cyclic motion of the bodies around the centre of balance. This is such that their respective distances from that centre are the radii of those angular momentum orbits conceived, here, for simplicity as ideally circular.

Angular momentum is therefore *automatically* orbital, without having to postulate the opposition of 'centrifugal' and centripetal ('gravitational') forces of Newtonian theory. In an angular momentum system, all free motions of the component masses are automatically paired and balanced without need of metaphysical speculations as to 'how those bodies influence one another across the intervening void'. The size of the orbit (the orbit radius) is determined, in general, by the amount of angular momentum, the larger that amount the larger the orbit radius, and *vice versa*. In the Neo-Machian paradigm it is angular momentum, and angular momentum alone, which keeps bodies apart, hence the loss of it automatically draws bodies closer together. Angular momentum is thus, in effect, what constitutes space i.e., the space or distance between bodies in the Machian sense of 'space'. With zero angular momentum all bodies would collapse together at a point with theoretically infinite kinetic energy, whereas with theoretically infinite angular momentum, all bodies would be

kept infinitely far apart with *zero* kinetic energy, that is, in a theoretically motionless state. Since neither of these extreme situations is possible, all real free-moving bodies are separated by *finite* amounts of angular momentum at distances determined by the measure of that quantity. In a real situation, therefore, involving large numbers of bodies, each one seeking to orbit each and every other, the ideal of simple circular orbits has to be abandoned, so that all real trajectories are either elliptical (closed) or parabolic (unclosed). Moreover, not all bodies are in free orbit, either circular or elliptical. On our earth, for instance, bodies resting on the surface, with the small amount of angular momentum they are given by the earth's rotation are prevented by that surface from orbiting where they otherwise would, far down below our feet, near the earth's centre. This creates the force of reaction commonly known as 'weight'. (In the same way, the weightless orbital trajectories of cannon balls, bullets, cricket balls, etc., with lack of sufficient angular momentum to orbit the earth, are interrupted by the earth's surface as they accelerate towards orbits nearer to the earth's centre [12].)

In general, therefore, this basic tendency of bodies to orbit one another freely and forcelessly is restricted by contact forces, such as contact with the surface of our earth or some other planet, collisions with meteorites, comets, etc., and between particles in densely packed regions like, say, the asteroid belt or the rings of Saturn. For all the complexities of motion in such situations, however, and for all the various torques and other forces involved, the basic simple orbital principle described is not compromised, any more than the simple principle of hydrodynamics that is demonstrable in a teaching laboratory is compromised by the example of the Niagara Falls.

According to the simple principle enunciated, then, it is not that angular momentum 'occurs in space', but that '*space occurs in* - that is, as a component of -*angular momentum*'. There is also another law, which is that of the Conservation of Angular Momentum. This rules that both the amount, or *magnitude* and the direction (*vector*) of a freely orbiting body, such as a space-probe, say, or a gyroscope, once set at the start and then left to itself without any external forces acting upon it, remain the same throughout the motion thereafter. This, of course, implies that angular momentum is a holistic system in which all free-moving bodies seek to orbit one another in an overall-conserved magnitude and directional (vector) relation. As Mach pointed out, this is why a gyroscope 'mysteriously' orientates itself not locally, i.e., with respect the earth or the sun, but non-locally, that is, with respect to what astronomers call 'the fixed stars'. This overall nexus the angular momenta of spinning and orbiting bodies is, in effect, what is known as Mach's Principle, after the name of this paradigm's philosophical founder.

Some traditional Realists evidently have the greatest difficulty in trying to understand how the motions of bodies in angular momentum relations can be correlated in space with no material connection between them. This is why pseudo-material entities such as 'gravitational fields' and other theoretical intermediaries, such as 'ether', etc., have had to be invented to explain these *in vacuo* correlations. However, these theoretical intermediaries are unnecessary, because it is a full and sufficient explanation to say that those bodies behave in empty space in the way they do, simply because to behave in any other way would be to

disconserve the overall energy and angular momentum. This is in the same way that, say, a governmental devaluation of the pound sterling instantly affects everyone in the community without anything material or quasi-material having to reach out in space to enter into everyone's purses and pockets to affect every single note and coin.

Something else about angular momentum is that, being the measure *action* divided by  $2\pi$ , since *action* is quantised, then so, also, is angular momentum. (This is in quantum units of  $h/2\pi$ , conventionally symbolised by  $\bar{h}$ , or  $\hbar$ ). In a closed system involving a pair of flywheels, when one of the wheels loses a quantity of action the other must immediately gain it (by the law of angular momentum conservation) without anything visible or physically detectable passing between them. Any imagined delay in that transfer would, for that interval, disconserve the action, which the conservation law forbids. This means that such a delay cannot happen. So when, like the flywheel, an atom loses a quantum of light-energy (*photon*) another inter-resonant atom gains it - *instantly*, regardless of what might be the distance between those atomic constituents of bodies on the observational macrolevel. This is a phenomenon familiar to exponents of Quantum Physics as 'spooky action-at-a-distance'. In the Neo-Machian terms of POAMS, multiples  $n$  of these quantum units  $h/2\pi$ , conventionally called 'atoms', are sometimes referred to, more appropriately, as 'quantum accumulators'. These are structures of stored orbital energy at integer levels  $n$ , with a bar-code-like distribution of frequencies described by a direct derivative of the relativistic time formula predicting the Balmer-Rydberg series  $n$ ,  $n_1$ ,  $n_2$  ... etc., of frequencies (lines) in the spectra of atomic substances without the usual involvement of 'electrodynamics' [13].

#### 4. 'Electrons' and 'Protons'

The law of conservation of angular momentum demands that the total angular momentum of a freely orbiting body includes that of its orbit plus any spin angular momentum it might have. The full consequences of this will be seen in due course.

According to the Neo-Machian unified angular momentum principle (Mach's Principle, in effect) all the classically named 'electrons', 'protons' and so on become plain mass-components of holistically connected angular momentum systems, their only individual attributes being those of mass, orbit and spin, in various proportions according to the nature of the particles involved. In this way, the hoary problem of the 'unified field' is solved at a stroke by dispensing with 'fields' altogether, as well as with the whole accumulation of theoretical jargon relating to them. For instance, in our Neo-Machian paradigm, in the case of the so-called 'electron', the same angular momentum formula applies to that mass particle as to ordinary planets and satellites, the only difference being that in the case of the 'electron' and 'proton', the spin-to-orbit ratio of the particle is huge as compared to that of a planet or satellite. This spin is simply the esoteric 'charge' on an 'electron' in conventional 'coulombs' cashed-out in practical spin kinetic energy units of joules, which gives the same spin energy to the electron as that ascribed by Uhlenbeck and Goudsmit [14].

The orbit of an 'electron' is therefore obviously much tighter than that of a body in 'gravitational' orbit, so that it takes a much larger force to remove that 'electron' from its natural force-free

trajectory than it does for a comparatively slow-spinning body such as, say, rifle bullet or a cricket ball, a GPS satellite or a NASA space-probe. This accounts for the immense difference noted between the strengths of the so-called ‘electrical’ and ‘gravitational’ forces. Note that in the Neo-Machian paradigm, the language of ‘forces’ is couched exclusively in terms of those truly *sensible and measurable* ones manifest in *removing* bodies from their natural force-free orbits instead of sustaining them in those orbits, as in Newtonian theory.

From the Neo-Machian point of view, this conceptual ‘flip-over’ is from classical God’s-Eye-View ‘Realism’, which conceives of light, gravitation, etc., as space-travelling intermediaries between the way things are and how we perceive them, into thinking of things and the space which separates them as *observational projections* out of patterns and sequences of quantum pixels. This virtually inverts classical ‘Realism’ whose intricate historical gymnastics have landed it on its head, to stand firmly, albeit perhaps dizzily, on its feet.

## 5. Non-locality, or Action-at-a-Distance

Something needs to be said, here, about how, in the Neo-Machian paradigm, distance-separated bodies interact, as manifest in the correlated motions, for instance, of bodies within the solar system and even among bodies on the galactic scale. This is traditionally assumed to be due to the theoretical *in vacuo* ‘force of gravity’. However, quantum physicists have discovered that this same distant correlation takes place among the spin motions of fundamental particles, which correlation can in no way be ascribed to ‘gravity’. In contemporary science-speak, this interatomic correlation is called ‘non-locality’, or ‘action-at-a-distance’, which is generally considered to be anathema to Relativity. What this means, in POAMS terms, however, is simply that in the relativistic time-equation, in its own intrinsic, or ‘proper’ time, a quantum interaction, of ‘light’, ‘gravitation’ or whatever, takes place *instantly*. That is to say, the ‘beginning’ and ‘end’ of the action are one and the same event – as befits the above description of such an action as an integral and irreducible quantum pixel. (Recall that in the Machian paradigm, these events don’t take place ‘in space’ but that space is what is informationally projected out of them. These quanta cannot, therefore, be thought of as being both the information *out of which* space and motion are projected and, at the same time, as travelling *in that same space*, which notion is no more than a conceptual conundrum.)

This paradigm flipover, therefore, from the orthodox thinking of light-quanta as space-travelling ‘photons’, to thinking of them in the Neo-Machian way as informational ‘blips’ (*phota*), if it is to be mentally accomplished, has to be *complete and consummate*. Anything less inevitably creates total confusion by having to think in two opposite ways together – as someone has said, like trying to whistle with flour in your mouth.’ Completing this conceptual flipover, however, has proved to be the most intellectually challenging move to achieve. Indeed, some people obviously find it quite impossible. This is evidently due to their having to remain ‘for safety’s sake’ suspended between the two paradigms like someone wanting to fly but refusing to take his feet off the ground. However, in the same way that in order to

fly one has to accede, completely and unconditionally, to the idea of being airborne, so, in order to comprehend the new paradigm one must leave behind, even if only provisionally, all the traditional precepts about ‘gravity’ and other such ‘field-forces’, together with all their associated classical jargon. The view from this new perspective is then seen to be perfectly simple, clear, logically self-consistent and sufficient.

A prime example of the kind of conceptual confusion created by an uncompleted, half-hearted paradigm shift is the notion that quantum instantaneity and relativistic time-delay in distant interaction, are somehow contradictory. This, of course, is the notorious conflict between Einstein and Bohr over instantaneous and time-delayed distant action. However, there is, in fact, no contradiction whatsoever. It is well known that the velocity of an object, expressed as its observational distance travelled in the time seen to be registered by the object itself tends towards infinity, whereas the velocity of that same object expressed as that same observational distance registered by the time of the outside *observer* of that motion tends to the finite limit  $c$ . That is to say, in the relativistic time equation proper-time instantaneity and relativistic time-delay are both equally represented as *complementary aspects of the same interaction*. In other words, in its own intrinsic, or ‘proper’ time, an interaction at the quantum level, where there is no such thing as distance, is immediate, whereas on the macrolevel, where distance is a kind of holographic projection from statistical numbers of these quantum events, that same interaction takes place in the time which is the observational distance divided by the dimensional constant  $c$ . Once those two different but complementary expressions of velocity in the time equation are properly distinguished, the ‘contradiction’ simply vanishes, leaving the chronic Bohr-Einstein controversy as no more than a ‘storm in a teacup’.

## 6. The Cinematic Model [15]

A conceptual model revealing this lack of conflict between instantaneous and time-delayed distant action is a cinematic model. This is the familiar phenomenon of, say, a video scenario projected out of informational patterns and sequences of screen pixels. Obviously, no single pixel conveys, in itself, that necessary depth or distance information. The same applies to quantum interaction. For instance, a single quantum flash in the eye, a telescope or a camera plate carries no information as to whether its source is a centimetre away or as far off as a distant galaxy. Note that in neither case can there be any diminution in the measure of *action* in that quantum jump ascribed to (non-existent) distance. Since the quantum is the irreducible product of energy and time, any spectral change in its *energy* is compensated by an inverse change in the spectral *period*. Also, because there is no spatial distance in that quantum, any change in its energy cannot be attributed to any property or quality of ‘space itself’ in between the two interacting atoms – unless, of course, by being relayed (*i.e.*, *refracted*) by the atoms of some mediating substance such as air or glass [16]. Otherwise, the quantum associated with both the source and the observer of that source are one and the same, as pristine at the observer end as at its source, as befits the description of a ‘quantum pixel’. It needs to be stressed, here, that in the Neo-Machian physics-philosophy of

Normal Realism the primary reality is that of the *phenomenon* as such, replete with all its characteristic physical dimensions, quantities and properties – e.g. an observed Doppler shift in its light-spectrum. It needs to be borne in mind that the quanta are the terminal irreducibles of all physical phenomena, with no reality of their own, save as the ultimate parts of the whole phenomenal package as manifest on the level of normal observational reality. If these micro-phenomena are Doppler-shifted then it is only because the macro-phenomenon with which they are associated is Doppler-shifted, not *vice versa*. So it is what happens on the macro-phenomenal level that causes what happens on the quantum level, not the other way around.

## 7. Causality and the Quantum

Since there is no distance-information conveyed by a single quantum, neither can there be any *causality* as such at the quantum level. Each quantum occurrence is, in itself, completely indeterminate – which is to say that no single quantum event causes another. Causality exists only on the ordinary macrolevel involving statistical numbers of these informational elements. Nor is there any true causal determinacy on the macrolevel. At that level, causality is purely *probabilistic* in obedience to the statistical *Second Law of Thermodynamics*, or Law of Entropy, which governs all physical – and informational – processes (see following section). These processes are as described by the Schrödinger Probability Function – usually called (or, rather, miscalled) the ‘Wave Function’. In the Neo-Machian Paradigm this reference to ‘waves’ has to be omitted, since on the quantum level there is no medium for the propagation of waves – and, in any case, what can possibly ‘wave’ in a vacuum? In that Probability Function, therefore, there are no such things as waves but only *direct resonances* – or inter-resonances between atoms. In this case, the title ‘Probabilistic Wave-Function’ is replaced in Neo-Machian physics by the alternative title: *Probabilistic Resonance Function*. Otherwise, the significance for quantum physics of the two differently named ‘functions’ is, in essence, the same.

## 8. Energy, Information and Entropy

Something else which also needs to be mentioned in this same context is the Second Law of Thermodynamics. A characteristic of classical science is a category distinction between physical energy and information. *Energy* is customarily regarded as ‘concrete’, i.e., physical, and *information* as ‘abstract’, or mental. This follows the classical distinction between the categories *mind* and *matter*. In the Machian paradigm, supported by modern science and technology, that category distinction can no longer be maintained. This is not least because, since the work of Claude Shannon (1948) the statistical Second Law of Thermodynamics, originally conceived as relating to steam engines, is now, since the appearance of computers, understood to apply equally to both categories of physical energy and information, which merges Mechanics and Information Theory within a united theory of Quantum Relativity. In this merger, little remains of the classical compartmentalisation of ‘Mind’ and ‘Matter’. In other words, at the fundamental quantum level the old mind-matter problem that has enervated Academic Philosophy for so many centuries practically vanishes.

Information, in any event, is not something that can exist on its own. It exists only in a correlative interaction between an encoder and a decoder, in the same way that there can be no ‘up’ without a ‘down’ or an ‘inside’ without an ‘outside’. Without either one or the other of these correlatives, information cannot be information, any more than energy can exist on its own except as an interactional relation between at least a pair of bodies. Neither can information signify as such other than to some cognitive being, whether complex or elementary. This lends point to the custom, in Relativity, of employing the term ‘observer’ for the participants in physical interactions, rather than ‘particle’. In this wider, Neo-Machian sense, every particle becomes, by implication, an elementary ‘observicle’ as well as a ‘particle’. This merging of the two categories makes it scarcely surprising that in creative computing, (e.g., word-processing, problem-solving, etc.) both energy and information are employed together, as testified by the heat generated by the computer in proportion to the difficulty of the task, or by the brain in what is familiarly described as the ‘fevered brow’ in dealing with difficult mental problems.

In fine, then, in the Neo-Machian paradigm there is no need to worry about this ‘interface’ between the two allegedly ‘different worlds’ of ordinary macrophysics and quantum microphysics. In the Neo-Machian paradigm, these classically divided ‘worlds’ become, quite unproblematically, one and the same. The fact that this is not generally recognised was made plain on BBC Radio 4, March 5th, 2009. This was in a discussion on the programme ‘In Our Time’. The presenter, Melvyn Bragg, interviewed a panel of physicists comprising Roger Penrose, Basil Hiley and Simon Saunders. Bragg quotes these as saying:

‘There are at least fifteen groups in Oxford working on the micro/macro interface between quantum mechanics and classical physics. It seems that the solutions are manifold and incompatible.’

By contrast, as we have seen, in the Neo-Machian paradigm there is no such ‘interface problem’ to be solved, since in modern information technology, energy and information, far from being categorically detached, are just complementary aspects of the same ‘stuff’, so to speak – the heads and tails, as it were, of the same conceptual coin.

## 9. Conclusion

Ideally, then, if only Newton had cast his First Law of Motion in terms of naturally orbital angular momentum  $mvr$  instead of his purely theoretical straight-line momentum  $mv$ , and if Einstein had not unnecessarily interpreted the constant  $c$  as a ‘velocity’, our physical science and cosmology could never have ended-up in the conceptual ‘Gordian Knot’ that now defeats all conventional attempts to unravel it. As it is, we have a Physics and Cosmology which have become completely overweighted towards *theory* and all its associated jargon; that is, with its card castle of theories-upon-theories expressed in a language which towers grandiloquently above that of commonsense [17]. As an alternative we could have had a whole self-consistent commonsense-philosophical system of empirical physics based on plain observation of the phenomenon of orbital motion as angular momentum instead of the opposition between fictional ‘rectilinear’, or ‘inertial’, motion and ‘gravitation’. The law of angular

momentum conservation could thus have replaced Newton's *in vacuo* 'gravitational force'. This would have made the so-called 'gravitational constant'  $G$  a variable, depending on the proportion of the spin to orbital angular momentum of a freely moving body. The consequence of this would have had deep significance for what is currently known as 'electrodynamics'. For instance, the empirical (i.e., experimentally measured) value of  $G$  for a non-spinning body is  $6.637 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$ , whereas for that spinning particle called the 'electron',  $G$  has the immensely larger value of  $1.5 \times 10^{29} \text{ Nm}^2\text{kg}^{-2}$  [18]. For the comparatively slow-spinning planets the difference in the value of  $G$  has so far seemed practically negligible, which is why, for so long,  $G$  was thought to be a constant, whereas for fast-spinning bodies,  $G$  is a variable have, however, been mooted [19].

This introduction, then, of a *variable*  $G$  extends the same law of orbital motion to 'electrons', etc. as to planets. It is demonstrable that in this way, the whole mess of jargon terms relating to 'electrodynamics' and 'gravitation' would never have been inflicted upon us, which would have left our physical science to evolve freely on cleaner, more conceptually streamlined, more logical lines. The 'father' of Modern Physics and Cosmology might thus have been Mach rather Einstein. (No disrespect is meant here, of course, to Einstein, the undoubtedly heroic pioneering genius who was the first to venture into the conceptual no-man's-land beyond classical physics.) Nor would the paradoxical conflict between relativity and quantum theory ever have arisen, since both of these principles are shown to stem logically together from the same philosophical root. This, of course, is Machian phenomenalism, the seeds of which were sown originally, in the 18th century, by Berkeley, Hume and Kant and which, in the 20th century, grew into what became known, in philosophical circles as Linguistic Analysis, associated with the names of G. E. Moore, J. L. Austin, G. Ryle, A. J. Ayer and L. Wittgenstein. (See [www.poams.org](http://www.poams.org) section entitled: 'The philosophical basis of POAMS'.)

These Neo-Machian prescriptions, then, for paradigm change, are as much Philosophy as Physics. The distinction between these disciplines known to academia is certainly not known to Nature, where 'Nature', here, is no more nor less than what we describe it to be with our very best, most economical and efficient uses of language. The goal towards which, in both science and philosophy, human language should naturally converge is the state of logical-linguistic perfection which the Greek philosophers such as Heraclites conceived as *logos*, the one-to-one correspondence of our concepts of things to things as they really are. This *logos* is the source from which, in science language, all our various scientific '-ologies' stem, such as 'Geology', 'Palaeontology', 'Psycho-logy' and, of course, 'logic'. Bishop Berkeley identified this same goal towards which scientific language evolves as that of 'The Great Author of Nature'. In any event, this final arbiter of the correct use of language has to exist in the nature of things as something corresponding to human language but far in advance of it, in the same way that Christopher Wren's design for St. Paul's Cathedral had to exist prior to the building's actual construction. In the Neo-Machian paradigm, this prospect of reaching ultimate truthfulness in our use of language in our dealings with nature – or *logos* – provides the basis for organising the aims and objectives to be pursued in rational science and cos-

mology. This motive, plainly (albeit unpopularly) described as the 'search for truth', satisfies the need for a logical directive for the pursuit of science, the lack of which, in contemporary Theoretical Physics and Cosmology becomes more and more conspicuous and precarious with every new addition to the already teetering conceptual card castle.

So much, then, for the philosophical underpinnings of the Neo-Machian paradigm, which, it is proposed, is the cleanest, most theoretically unencumbered and streamlined account of the so-far known natural phenomena. It has no need, for instance, to postulate metaphysical 'field-forces'. The only true *forces* it recognises are those actual sensible and measurable ones manifest in *preventing* bodies from travelling freely in orbits defined by a First Law of Motion expressed in terms of *angular* rather than rectilinear momentum. This would have made balanced 'action-at-a-distance' an automatic consequence of the conservation law – that is, with there being no question of the existence of invisible mediating agencies, such as 'fields', 'ethers', or whatever. All that jargon-ridden tradition of physics would have been logically circumvented.

In this way, the whole theoretical 'house of cards' that now rejoices in the names of Modern Theoretical Physics and Cosmology, need never have been constructed. We would have been spared those recently discovered twin anomalies such as the inexplicable 'Pioneer Anomaly' and 'Missing Mass Anomaly', both of which are due to nothing more than the inability of the orthodox 'gravitational' theory of Newton to include the spin angular momentum in the total angular momentum of orbiting bodies such as a NASA space-probe or a spiral galaxy. Billions and billions of pounds and dollars would not have been squandered over the years on vain projects such as in the search for 'dark matter', 'gravity waves', 'gravitons', 'WIMPS' (Weakly Interacting Mass Particles) the 'God Particle' (Higgs boson) and the like, so that the moneys now poured into those vain pursuits could have been put to much more positive, more humanitarian use. Indeed, with all those old conceptual and jargonistic stumbling-blocks removed, a whole new understanding of nature might have been allowed to flourish along the empiricist lines pointed by Mach along the lines established by Berkeley, et al.

As things stand, however, despite the intrinsic logical simplicity and conceptual economy of the Neo-Machian alternative to present physics, so extreme would have to be the switch in mindset from the one paradigm to the other that any prospect of such a revolution actually taking place on a global scale may be practically discounted. Evidence for this is that all attempts to question the Establishment view on the basis of this Neo-Machian thesis over its more than half-century's development, including its time as a *bona fide* university research project, have met, not with properly expressed attempts either to support or refute it but with absolute silence. 'They know no more what to do with it', as someone has said, 'than a moose with a musket!' This can be seen in the historical record of the thesis contained in seventeen hard-bound volumes, each about three inches thick, held at the County Archives, Civic Centre, Swansea, UK [20], which clearly reveals what readers concur is an indictment of establishment science and education. For instance, after only a short reading of those volumes, a French professor, of the Uni-

versité Louis Pasteur, was heard to say: 'Mon Dieu, but this is dynamite!'

It seems, then, that the prospect of any useful official examination of this proposal of a change of paradigm may have to remain no more than just a rational ideal, at best an interesting might-have-been in the annals of our scientific history. Yet there are, nowadays, definite signs of unease in the public view of Modern Science. From what one gleans, the highly publicised LHD (Large Hadron Collider) experiment at CERN to recreate the 'God Particle' (Higgs boson) that is supposed to have been at the origin of the universe, looks set fair to be recorded as, predictably, the biggest non-event in the history of Science. In ordinary commonsense circles one hears disparaging witticisms about these claims by Modern Theoretical Physics and Cosmology which contrast sharply with what is claimed for them in the media. In these commonplace circles, the whole thing is treated as, at best, a huge joke, and, at worst, a criminal waste of public money. As for the whole 'Big Bang' Moment of Creation, for all that it has been part funded by the same Church that persecuted Galileo, many people regard it as by far the most ridiculous idea ever conceived. Not least is the reason that since 'universe' means everything that there is, there can be nothing outside it by which its size can be judged to be either large or small. Nor is there anything by which it can be judged to be either expanding or contracting at any sort of 'speed'. As the young schoolgirl asked, on TV, in the advert for recruiting teachers, 'If the universe is expanding, then what is it expanding into?'

No answer has been given by scientists to this innocent, forthright question. Indeed, how could there be since the 'Big Bang' is, in its own terms, pure nonsense. To say that the galaxies are seen to be receding from us and from one another is simply not true. What is *seen* is the galactic redshift originally reported by Hubble and Slipher. To infer from this that the universe is expanding is a howler of a fallacy. Saying that a receding light-source produces a redshift, so that seeing a redshift is to see a light-source receding is like saying that since all dogs are quadrupeds seeing a quadruped is the same as seeing a dog. (There are other perfectly valid explanations of the Hubble redshift which POAMS has provided but these, typically, have been ignored – not refuted nor even challenged, but just *ignored*.)

From all of this one gets the distinct impression that the Public is a 'sleeping giant' on the verge of awakening to an increasing irritation from the self-serving, commercially motivated, non-discerning media. This dissatisfaction is rather well put by David de Hilster, of the NPA (Natural Philosophy Alliance), who writes about the necessity of

"... revealing to the public in a big way that physics and cosmology are in a mess, and that we need to change the way we formulate scientific theory..."

"The populace is unaware of this and believes all is well in science. Yet, billions are spent on dead-end science that produces no benefit for mankind, while there are thousands of scientists around the world working on theories and technologies that can greatly benefit the world..."

Now, whether or not one agrees with de Hilster's particular projection for the future of science, one has to agree with his sentiment regarding the present stultification of scientific official-

dom in its conservationist resistance to radically new thinking. Another commentator, William Dallimore, concerned about the virtual suppression, by publishers, of the possibility of any return to rationality on the part of Modern Science, writes:

"The media are being swamped by all sorts of different theories as to what is wrong with modern physics and how to put it right, and according to a former BBC Science correspondent, they 'only ever report developments with the most impeccable peer-reviewed or other professional provenance.' The trouble, the correspondent says, is that if there is a solution to the Problem it will be lost amidst the mess of 'totally wacky but much more amusing theories' that the media likes to publish. And how is the public supposed to evaluate these theories other than by calling on the very same people whose theories are no less 'wacky' but have somehow gained the attention of the media, making those theories seem the norm. This, of course, is the main part of the Problem in question, similar to the 'Catch 22' situation described in the book of that title. Those who defend these norms are the same sorts of people who persecuted radical thinkers such as Socrates, Copernicus, Galileo and others who went in fear of their lives for being right when their critics were profoundly wrong. In the end, of course, it was the public, with their feet firmly on the ground of commonsense, who, eventually, were the ultimate judges of the true and the false among the various competing theories.

"Can today's public be trusted to judge truth and falsity in that same way? Hardly, when it is so completely bemused by 'authoritative' but ridiculous scientific ideas such as the 'Big Bang', 'black holes', 'wormholes', 'dark matter' and so on, all of which have to be taken on trust whilst being beyond the reach of all commonsense understanding."

What is particularly ironic regarding what Dallimore says, here, about official persecution is that less than thirty years ago, three-hundred years after he was condemned for 'heresy', Galileo was 'forgiven' by Catholic Church! '*What a nerve!*' says Dallimore.

However, regardless of whether or not today's updated form of that same official suppression will succeed, Mach's logical alternative to our ailing traditional physics exists as something in its own right, if only as an intellectual curio or brain-teaser to challenge anyone of a truly adventurous logical and philosophical spirit. As for the prospects for progressive science, modern Education's almost exclusive emphasis on immediate commercial cost-effectiveness and industrial viability, a great deal depends on how much of this natural philosophical spirit survives as to whether or not this current loss of rational integrity in Modern Science may ever be recovered.

## References

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- [1] Paradoxically, Einstein was a party to this God's-Eye-View assumption in stating, in his opposition to quantum indeterminacy, 'God does not play dice'. This supports Mach's view that Einsteinian Relativity was philosophically confused.
  - [2] N. V. Pope, "The Overdue Revolution", *MENSA*, pp. 26-29 (Apr 1987), [www.poams.org](http://www.poams.org), Section 10, "Seminal Publications", item 2.

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- [ 3 ] The fact that light can be projected by torches, lasers, *etc.*, that objects cast shadows, and so on, makes no difference to the argument that light is not something travelling. It is well known that time-sequences of illuminations can create the illusion of something travelling where there is nothing travelling at all. This is what perception psychologists call the '*phi* phenomenon', as used in cinematography and in many forms of billboard advertising. The sequences of illuminations of particles of mist and dust in the atmosphere, create the light-rays and beams we see, for instance, in a hazy sky at sunset or in a sunlit room. Without this process of mediation by intervening particles (quantum events, ultimately) there is no evidence whatsoever, even with the strongest lasers and searchlights, that light travels in a pure vacuum, far less at a constant velocity with respect to that vacuum.
- [ 4 ] These are the same quanta that have been called 'photons', except that unlike the word 'photon', *photum*, in this context, does not suggest a space-travelling particle.
- [ 5 ] More recently it has been reported, in a *New Scientist* article, 'Shedding Light on Light' (N.S., 1/11/08, pp. 28-31) that some scientists have now found it more convenient in dealing with Relativity, to ignore Einstein's Second Axiom regarding the 'speed of light *in vacuo*'. This same discovery was made by this present author almost six centuries previously, in concurrence with that same discovery by Herman Bondi at about the same time. No precedence, however has been accorded to either of those authors by in the *New Scientist* article.
- [ 6 ] This was discovered independently at about that same time by this author and was agreed in correspondence between him and Bondi in the late nineteen-seventies. (In his Neo-Machian version of relativity, Pope had described *c* as a 'dimensional constant'.)
- [ 7 ] A. D. Osborne & N. V. Pope, "A Neo-Phenomenalist Alternative to Special Relativity", at [www.poams.org](http://www.poams.org), Section 3, 'The Time Dilation Formula'.
- [ 8 ] N. V. Pope & A. D. Osborne, "A New Approach to Special Relativity", *International Journal of Mathematical Education in Science and Technology* **18** (2): 191-198, at [www.poams.org](http://www.poams.org), Section 10: 'Seminal Publications', part 2, item 1.
- [ 9 ] N. V. Pope, "A Rustic Rediscovery of Relativity", *Proceedings of ANPA* **15**: 116-130 (Sep 1993), [http://www.poams.org/wp-content/files/pub\\_RusticRediscovery.pdf](http://www.poams.org/wp-content/files/pub_RusticRediscovery.pdf).
- [ 10 ] N. V. Pope, "Relativity is Kids' Stuff", *School Science Review* **70** (253): 86-87 (1990), at [www.poams.org](http://www.poams.org), Section 10: 'Seminal Publications', item 7.
- [ 11 ] N. V. Pope & A. D. Osborne, "Instantaneous Gravitational and Inertial Action-at-a-Distance", *Physics Essays* **8** (3): 384-397 (1995), at [www.poams.org](http://www.poams.org), Section 4. 'Gravitation and Inertia'.
- [ 12 ] N. V. Pope, A. D. Osborne and A. F T. Winfield, Eds., *Immediate Distant Action and Correlation in Modern Physics: the Balanced Universe*, p. 213 (Edwin Mellen Press, 2005), and [www.poams.org](http://www.poams.org). With the amount of angular momentum received from the earth's diurnal spin, a body (any body) standing on the earth's surface would seek to orbit the earth's centre at a distance below our feet of 289/290 ths of the earth's surface radius.
- [ 13 ] N. V. Pope, "A Logical Reconciliation of Einstein and Newton, or A Synthesis of Relativity and Quantum Theory", Section 2: "Quantisation or The Demise of 'Infinitesimals'", *Journal of New Energy* **5** (1) (2000), at [www.poams.org](http://www.poams.org), 'Relevant Publications', item 28.
- [ 14 ] *Op. cit.*, Section 1, p. 5: 'Relevant Publications, item 28.
- [ 15 ] N. V. Pope, "(The New) Quantum Touching, a Cinematic Model of Instantaneous Action-at-a-Distance", (Apr 2003), [http://www.viv.pope.co.uk/implications\\_for\\_cosmology.html](http://www.viv.pope.co.uk/implications_for_cosmology.html).
- [ 16 ] This, of course, calls in question the interpretational authenticity of claims to have observed light *in vacuo* being bent by 'gravitational fields'.
- [ 17 ] On the question of science *versus* commonsense, some of the sophistications of Modern Physics have abandoned commonsense with what seems almost like relish. For instance, on the BBC Radio 5 programme, 'Start the Week', at 9-0 a.m. on Monday 24th March), on the subject of Modern Theoretical Physics, Professor Michael Duff, of Imperial College, London, declared. to Andrew Marr: "This is the point at which common sense is no use". In the same vein, Richard Feynman once famously remarked "No-one, but *no-one* understands quantum theory!"
- [ 18 ] See the book by Osborne and Pope, *Light-Speed, Gravitation and Quantum Instantaneity*, section 7.6: 'POAMS at the Quantum Level', p. 152. Website [www.poams.org](http://www.poams.org).
- [ 19 ] For full details, see the sources listed at [www.poams.org](http://www.poams.org).
- [ 20 ] City and County of Swansea, *Philosophical Glimpses*, Ref. D/D NVP/1-17, <http://www.swansea.gov.uk/westglamorganarchives>.