

NASA's Missing Spin

“In the unlikely event that there is new physics, one does not want to miss it because one had the wrong mind set.”

[John Anderson, of the NASA Jet Propulsion Laboratory (JPL), speaking about the Pioneer Anomaly, which is the unexplained deviation in the trajectories of the interplanetary space-probes after travelling through and beyond the solar system.]

“New physics? Great idea! But what guarantee is there that the required “new physics”, regardless of how logically proficient it might be, will gel with our customary physics precepts? Most likely is that it would be too radical to be accommodated. As history attests, the conceptual shift required might well be altogether traumatic, so that any whiff of this would set the Establishment protectively against any chance of such a conceptual upheaval taking place.

However, sooner or later, “truth will out”, as the saying goes. So, what *is* the truth here? One thing seems plain from what Anderson and others say, that it is *not* where physics is now, where all prospect of a clear logical, democratic understanding of nature has spectacularly failed.

Nevertheless, there has been at least one systematic, dedicated attempt to fill this aching void. This is a physics philosophy called Normal Realism. Based on an idea gained after a short correspondence with Einstein in 1954, this seminal idea has been honed and developed over the more than half a century since then. Presented as an academic Philosophy-of-Physics thesis, this idea was rejected in 1972 and again in 1974. Karl Popper later declared this to be a failure, not of the thesis but of its examiners because the thesis fell between what, for them, were the two academically separate disciplines of Science and Philosophy. Such a mixture of subjects was simply not on the academic curriculum, which is why the thesis ‘failed’.

This monograph presents an encapsulation of that thesis which has matured to form a distinct paradigm of physics which is published under the name of POAMS (the Pope-Osborne Angular Momentum Synthesis).

The books referred to in this text are: *The Eye of the Beholder: the Role of the Observer in Modern Physics*, Viv Pope, Phi Philosophical Enterprises (2004); *Light-Speed, Gravitation and Quantum Instantaneity*, A. D. Osborne and N. V. Pope; Phi, (2007); *Immediate Distant Action and Correlation in Modern Physics*. Eds. N. V. Pope, A. D. Osborne and A. F. T. Winfield, Edwin Mellen Press, N.Y. USA (2005); *Instantaneous Action at a Distance, Pro- and Contra-* Eds. A. E. Chubykalo, N. V. Pope and R. Smirnov Rueda, Nova Science, N.Y. USA (2001). All these books are available on the website www.amazon.co.uk

“A DANGEROUS BOOK”

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Why is this (*Light-Speed, etc.*) a “dangerous book? In the same way that Copernicus threatened the earth-centred cosmology of the Medieval Church this book threatens, in its turn, the authoritarian physics and cosmology of today. If what the book says is true, then much of our now hallowed professional Physics will turn out to be ignorance. This would change the whole complexion of Physics as we know it.

The mind-set required for this conceptual ‘flipover’ is radically different from that of our Western tradition. Whilst perfectly compatible with all truly empirical physical *phenomena*, it is incompatible with some current theoretical interpretations of these. Both like and unlike its predecessor, Logical Positivism, this proposed New Physics is a form of *radical empiricism*, concentrating on direct and instrumental perception as opposed to the creation and conservation of theories for their own sake.

“I hope many will read this and think again”

Dr. Rowan Williams

Archbishop of Canterbury,

What made the Archbishop say this about the *Eye of the Beholder*? Our Western mechanistic tradition of physical science and our humanitarian principles have always been at variance. This new approach makes a “seamless join” between the two, merging our physical science with our humane social and moral ideals because it is based on digital *information* instead of traditional analog *mechanics*. This approach began over fifty years ago with the seminal realization that the so-called ‘speed of light’ is not a *speed* but simply a constant ratio of conventional units of distance and time, like the ratio of 39.37 inches to the metre and the ratio *c*-squared of joules to kilograms. This averts any metaphysical question of what *c* is. It is simply a *measure*, just like any other.

But a *measures* of what? Of *physical phenomena*, what else? All physical phenomena have the three spherical, or *polar*

dimensions: *range*, or observational distance; *azimuth*, or horizontal measure at right-angles to the range; and *elevation*, at right-angles to the other two. There is also a fourth polar dimension, *time*, which is the evolution, at the centre of the whole spherical frame. This is at the distance-time “contraction rate” *c* which is constant for all such frames. The centre might be a human observer, a scientific instrument or, ultimately, an atom. There is nothing spooky about any of these dimensions. They are just ordinary physical measures made by some suitable instrument such as a ruler or a clock. Note that in this proposed New Physics there is no *time in space* (the void) as such, hence no speculative ‘God’s time’ separating the polar centres’ to create mysteries like those of the notorious ‘EPR’ and ‘Twins Paradox’.

“Mon Dieu, but this is Dynamite!”

Prof. Michel Grossman

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Whereas the standard model for classical science is the *machine*, the model for this natural four-dimensional information-based system is more like that of a sequential or movie-like *hologram*. It is therefore automatically *relative* as in Einsteinian Relativity. However, it is mathematically and conceptually much simpler, more commonsensical and more logically self-contained than standard Relativity. It is also more firmly grounded in Natural Philosophy than the philosophically rootless Relativity of Einstein. The philosophical taproot of this new version is the *Phenomenalism* of Ernst Mach, Einstein’s philosophical mentor and source of his relativistic inspiration. It is also automatically *quantised* since all physical phenomena are ultimately reducible to quantum ‘pixels’ of magnitude equal to Max Planck’s action-constant *h*. (Compare Mach’s irreducible ‘sense-data’.) From these discrete bits of energy-*cum*-information the world is structured like the way in which, from the patterns and sequences of screen ‘blips’, a TV viewer projects the programme scenario.

These quantum pixels are *not* ‘photons’. They don’t ‘travel’; they simply *occur*, as *phota* (singular: *photum*) in spectral distributions resembling the bands in a

supermarket bar-code, ranging from the utmost extremities of infrared to ultraviolet and gamma. Every physical object is both a source and receiver of these *phota* in an *information-transacting* universe, including everything from galaxies to atoms. In this informational nexus, all the individual spherical, or polar frames become geometrically merged and de-centralised to form a *Cartesian grid*, of the standard sort familiar to engineers, architects and folks generally. (Astronomers, of course, have to adopt the more fundamental *polar* kind of frame.)

The essence of Physics, according to this neo-Machian paradigm is to interpret physical phenomena as objectively and efficiently as possible, making the very best use of extant Logical Analysis in the line of Wittgenstein, *et al*, and 'Ockham's Razor'. This entails keeping subjective guesses, or '*theories*' and their associated *jargon* to a barest minimum. This neo-Machian paradigm of natural philosophy is called *Normal Realism*, the basis of POAMS (the Pope-Osborne Angular Momentum Synthesis) as described on the website www.poams.org

This *ahistorical* new paradigm is conceptually incommensurable with the standard traditional paradigm, hence cannot be mixed or judged for conformity with that paradigm. For instance, there are no *in vacuo* 'light-waves', 'photons', or 'force-fields', no 'gravity', no 'electrostatics', no 'magnetostatics' or whatever. Nor is there need of any concept of 'charge' on those particles traditionally named 'electrons', 'protons', *etc.*, These conceptions belong to what, in this present context, John Anderson calls 'the wrong mind set' and are made redundant. For instance The conventional 'coulombs' of 'charge' on an 'electron' are cashed-out purely in mechanical units of spin, in joules, so that the so-called 'electron' becomes just an ordinary piece of matter like any other, except that it possesses an uncommonly large amount of spin angular momentum (*pace* Uhlenbeck and Goudsmit). These phenomena are interpreted in terms purely of *mass* and *motion* in one form or another of *angular momentum*. In an angular momentum nexus, such as, *e.g.*, the solar system, all bodies are automatically paired, balanced, correlated and holistically interconnected by the law of the conservation of angular momentum with no need of theoretical *in vacuo* 'forces' to explain orbital motion. So far, no known physical phenomenon, re-interpreted on this basis, has proved to be either logically or

empirically at variance with this new paradigm of Natural Philosophy. Indeed, some presently mystifying phenomena, such as the notorious 'Pioneer Anomaly' and the 'Missing Mass' anomaly are very simply explained. For instance NASA scientist, John Anderson suggests that these unexplained anomalies may signify the

“Need of a New Physics”

John Anderson. NASA Scientist

If so, says Anderson, “one does not want to miss it because one had the wrong mind set.”

The anomaly which concerns NASA in particular is that over thirty or so years of tracking their interplanetary space-probes, those spinning probes have veered mysteriously off track, as if pulled towards the planets and the sun with some invisible force additional to that of gravity.

Now in standard Newtonian physics bodies orbit because they are drawn to one another with an unseen *in vacuo* force which is proportional to the product of their masses divided by the square of the distance between them. This theoretical *in vacuo* 'force' is typically assumed to be the same for all bodies, regardless of whether or not those bodies are spinning. This assumption, however, runs counter to the law of the conservation of angular momentum according to which the total angular momentum of a spinning body, such as a NASA space-probe, has to include the angular momentum of its spin along with that of its orbit. So the anomaly is, basically, that in neglecting spin, *the Newtonian Law of Gravity which NASA uses for calculating the trajectories of their space-probes is fundamentally at variance with the Law of the Conservation of Angular Momentum.*

No such anomaly exists according to our proposed New Physics which is based on angular momentum instead of 'gravity'. In this Angular Momentum Synthesis, since angular momentum is automatically cyclic, or orbital, the only true *forces* are the real, felt and measurable ones which are manifest in preventing a body from following its natural force-free angular momentum orbit as, for instance, when Newton's fallen apple is prevented by the earth's surface from orbiting where it otherwise would, somewhere near the earth's centre, far down below our feet.

By that same token the 'Missing Mass' Anomaly needs no contrived explanation in

terms of invisible and undetectable ‘dark matter’, ‘dark energy’ or whatever. What is ‘missing’, quite plainly, is *spin*, which is not really missing but, obvious though the phenomenon is, is simply ignored. But just about everything in the universe spins, not least the host of spiral galaxies. Taking account of spin in the context of angular momentum conservation, in the case of the NASA space-probes, entails small but cumulative variations in the so-called ‘gravitational constant’ G sufficient to explain the Pioneer anomaly. The only difference in the case of the ‘Missing Mass’ anomaly is that the variations in G for the spinning galaxies, *etc.*, have to be very much larger than in the case of the spinning space-probes.

Our contemporary ‘gravitational’ Physics, then, which disregards this obvious natural phenomenon of the spins of orbiting bodies plainly needs to be replaced. And what else can replace it but an empirical, neo-Machian Physics such as *Normal Realism* based on real sensed and measurable physical *phenomena* instead of purely theoretical goings-on behind and beneath the scenes in an inscrutable void?

In sum, then, the answer to the Pioneer Anomaly is very simple and straightforward. Since angular momentum is a conserved quantity, then the total angular momentum of an orbiting spinning body includes the angular momentum of both its orbit and spin. The more there is of spin, therefore, the less there has to be of orbit; and the less there is of orbital angular momentum the smaller is the orbital radius. It follows, then, that for NASA’s spinning space-probes their orbital trajectories will be closer to whatever bodies they are orbiting than if they were not spinning. So if it is accepted that angular momentum is a conserved quantity – which it most definitely is – then the answer to the Anomaly is as simple as that.

But, of course, the proportion of spin to orbital angular momentum in an orbiting space-probe depends also on the *directions* of the spin and orbital angular momenta with regard to each other (by the law of the composition of vectors). These directions are also covered by the conservation law, which ensures that so long as no external force is involved, the spin directions of those probes at the start of the motion are maintained, gyroscopically, from then on. This is the same as viewed in any observational frame of reference, since angular momentum is a non-

relative or absolute measure..

In the current physics orthodoxy, neither these quantitative nor directional (vectorial) spin effects on the orbital trajectories of bodies are recognised. An inability to cope with such an obvious commonplace phenomenon as the spins of orbiting bodies surely suggests that such a paradigm, if not obsolete, is now at least obsolescent. ■



Fig. 1: The Andromeda spiral galaxy, nearest to our own Milky Way spiral galaxy. The phenomenon of these spiral galaxies orbiting one another is the manifestation of gigantic amounts of both orbital and *spin* angular momentum in the universe, ignored by ‘gravitational’ mechanics.



Fig. 2: Spiral galaxies in deep space. These angular momentum systems, all orbiting one another, continue on indefinitely as far as our telescopes can reach.