Talk for PIRT (Physical Interpretations of Relativity Theory) 2000

TOO MANY THEORIES, TOO FEW SYNTHESES

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Abstract (for Pre-Proceedings)

This paper does not present a new interpretation of relativity theory. Instead it reports on the outcome of a series of discussions with colleagues who contributed to a book on the most fundamental issue of physics today, which is that of whether or not physical interactions can take place at speeds faster than light.

The book *Instantaneous Action-at-a-Distance in Modern Physics – Pro and Contra* [1], includes many different and interesting ideas and it was suggested that a follow-up conference or workshop might be organised aimed at reporting the findings of this group. However, a feasibility study of the prospects of informing the public of any such development revealed nothing so much as the extent to which modern physics is in complete disarray over this most fundamental issue of physical interaction. If that sample of contributions is truly representative, then it means that any notion we might once have had that there is a consensus view called 'Physics' providing the baseline for our ideas of how bodies interact, is now almost entirely vestigial. It is proposed that the reason for this seemingly hopeless state of irresolution is that physicists have forgotten the original intention of physics, which was by a dialectical process of logical reason, to determine *what*, not *who*, is right and to use Ockham's razor in checking the purely random proliferation and preservation of jealously defended 'interesting theories'. We show that mobilising this 'razor' to good effect reveals that many of the problems and paradoxes which modern physics imputes to nature are of that subject's own making.

The Talk (*verbatim*)

I was asked, recently, on the strength of my Editorial connection with an American science publication [2] to organise a Physics conference or workshop. In carrying out a feasibility study on this I began to realise that any idea that there remains a 'physics'

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1 *Instantaneous Action-at-a-Distance in Modern Physics, Pro and Contra,* Nova Science, N.Y.

2 *Op cit.*

which forms the foundation for our ideas of the world in the other sciences and in commonsense, is now almost entirely defunct.

The reason, it seems to me, is that there are now too many competing physics theories and too few attempts at synthesis. The meaning of 'theory' has therefore become lost. Theories are not supposed to be preserved and sanctified like rare paintings or other works of art. They are there to be refuted, as eggs are to be broken in making omelettes, and in any honest search for truth they are presented for no other reason – far less for purposes of personal acclaim or professional aggrandisement. From the point of view, then, of true natural philosophy, what else could it be but sheer benefit if all theories and theoretical jargon were dispensed with and the factual remainder integrated into the corpus of common language?

As it is, however, anyone attending as many physics conferences as I do soon realises the extent to which every such meeting becomes a traffic-jam of theories, far too many of which are presented for all the wrong reasons. The result is that far from seeking to produce a coherent picture of what is going on, physicists tend to wallow in happy obscurity, speaking and listening to one another, gravely and respectfully, but often with no more common understanding than if they were 'speaking in tongues.'

All this stands in complete contrast to what physics was originally. Called Natural philosophy, it was essentially a *dialectic*, a process of heuristic reason aimed at unearthing some unknown truth by the method of conversation or debate, conducted in common language and by the rules of common logic. Someone makes a guess as to what the truth of a situation might be and that suggestion is presented as a *thesis*, which is then tested by others who seek to find in it any logical faults or contradictions. If these are found, then the thesis is discarded in favour of an *antithesis*, which has to be tested in the same way, to destruction if necessary, in a logical winnowing-out process aimed at producing agreement, or *synthesis*.

This, as I say, is what theoretical physics *should* be, in its interpretations of natural phenomena. But nowadays, that is what physics, unfortunately, is *not*. It is what it *would* be if it were not for all sorts of intrusive influences of an altogether irrational kind, such as professional jealousies, egotistical clamourings for intellectual status, fame, and so on. Perhaps the worst sort of folly is that committed by people who, for these sorts of irrational motives, get locked in partisan combat over what turns out, on logical analysis, to be no more than personal preferences for uses of words and phrases of a stylised character which they adopt as an in-group and separatist jargon. In such cases, forms of description which might have been coined for purely expedient purposes and which, for want of more suitable alternatives at the time have been hastily cobbled together for communication among busy researchers, become sanctified and savoured by impressionable followers as bits of jargon with which to identify and on which to build their ideas, often counter to the evidence of their own senses. In this way, and for all the wrong reasons, natural philosophy has been corrupted into something we now call 'Modern Physics'. This is like a tottering tower of Babel, in which the original search for a common understanding of nature has been lost due to its builders languishing more and more in an enervating state of professionally inculcated jargon-addiction.

Allied to all this is a mind-numbing awe, or over-veneration for 'The Greats'. At a college where I once taught there had ruled, for more than thirty years, a principal who, with just one or two colleagues, had built up the institution from early beginnings. Charismatic in character and impressive in personality, with flowing hair that, as he approached retirement, had turned white, this patrician gentleman presented an appearance resembling that of some people's idea of the Olympian patriarch, Zeus.

When it came to his retirement, a large portrait of this man had been commissioned in his honour. It was hung in the Committee Room, where it stared down, with benign severity on all staff meetings. Such had been the charisma of this man that even without his actual presence in the room, the meetings were conducted in a stilted way, with every member having, as it were, one eye on the portrait, as though seeking its approval. Realising the inhibiting effect of the portrait, some of the newer staff members tactfully suggested removing it into the main hall 'for the benefit', as they said. 'of the public at large'. The effect was immediate. Without that inhibiting presence, the staff began thinking for themselves. New and quite radical innovations were freely discussed that were fitted to changing circumstances, ideas which would never have survived the conservatism of the previous regime.

Respect for great men and their ideas is one thing; lionisation is another. After Plato's death, his nephew, Speusippus, it is said, enshrined the institution called the Academy which his uncle had established. In so doing, he virtually put an end to the free discussion for which the Academy had been renowned, thus presaging the distinctly uncomplimentary meaning that the word 'Academic' sometimes receives in modern usage.

Such constraints militate against the philosophical need for keeping all scientific developments under continual review. But with those portraits of 'The Greats' staring down on us we forget that what we actually observe in nature are not 'electricity', 'magnetism', 'gravity', 'charges', 'fields' and so on, as those patriarchs of the subject have reported. What we observe are bodies moving in response to one another, both in direct contact and at distances apart, and all else is no more, in the end, than theoretical clutter. Take, for instance, what Newton called 'gravitation'. Newton said that a body left to itself with no forces acting upon it travels at a uniform velocity in a straight-line. But where, someone should have asked, has anyone ever observed that straight-line force-free motion? The fact that it is nowhere to be observed prompted Newton to make a second assumption, which was that all bodies exert on one another an invisible 'gravitational force' which tows them away from their straight-line, so-called 'inertial', motion into the sorts of orbits and trajectories we actually observe. And thus was created a plethora of *in vacuo* 'forces' and associated 'fields', the conceptual swamp that has been the breeding-ground for so many of today's buzzing and bewildering 'field propagation' theories.

But is all that theorising strictly necessary? Take the following formula (OHP):

$$L = mvr = 2Kr/v = GmM/v \qquad (1).$$

This is a formula for the orbital angular momentum of a free-moving mass m with velocity v around a central mass m at a radius r. (The orbit is assumed circular for simplicity.) G, of course, is the usual 'gravitational constant', and K is the orbital kinetic energy. Now for an <u>infinite</u> angular momentum L in this formula, all the other equivalent expressions are, of course, also infinite. This means that v in the two right-hand expressions is zero, so that *r* in *mvr* is infinite. In that case, since a circumference of infinite radius is a straight line, the motion is rectilinear in the manner envisaged by Newton. However, with *v* at zero, which signifies a non-motion, it follows that inertial motion in a straight line is impossible. In other words, all free motion has to take place, as Aristotle argued, in closed loops, or orbits, of finite radius *r*.

This removes any need to think, in the way Newton taught, that naturally orbital motions are maintained by a balance between invisible centripetal and centrifugal 'forces'. There is no 'gravitational force' dragging us towards the earth. We weigh what we do because wherever we are situated, even at the equator, our diurnal angular momentum is not sufficient for us to orbit freely at that distance from the earth's centre, so that our bodies seek to orbit the earth at a distance *r* which is way down below our feet. And since the earth's surface prevents us from reaching that orbit, it exerts on us, by reaction, the force that we measure on a weighing scale. This, of course, is a real force, which we feel and may measure with instruments, not some strange and inscrutable force acting *in vacuo*, as Newton and his followers imagined.

Given, then, the magnitudes of the angular momentum *L*, the masses *m* and *M* and the velocity *v* of the orbit of *m*, we can calculate the orbital radius *r* with no need whatsoever to talk in Newton's way about a balance between fictitious 'gravitational' and 'inertial' forces. The only forces are those real, actually measurable ones which are required to prevent a body from following its natural force-free trajectory. This is according to the following force-formula:-

$$F = [(GmM/r^2) - \mathcal{G}mM/r^2$$
$$= (G - \mathcal{G})\, mM/r^2 \qquad (2),$$

where $\mathcal{G}$, which we call 'curly gee', is now the gee factor $v^2 r/M$, for the constrained (or 'unnatural') orbit, according to (1).

Now let us add to the orbital kinetic energy *K*, in (1) a spin kinetic energy, K_S of a freely moving mass *m*. The formula for the orbital angular momentum of this spinning mass is now

$$L = mvr = 2K + K_S)r/v = \mathcal{G}mM/v \qquad (3).$$

So far, this spin kinetic energy has been implicitly $K_S \rightarrow 0$ and $\mathcal{G} \rightarrow G$, in (1). Now let's see what happens when we make K_S large in comparison with *K*. This is not so easy with bodies of planetary and satellite proportions because for them, any spin kinetic energy they may possess is usually very small in proportion to their orbital kinetic energy [3]. For microphysical particles, however, the opposite is more usually the case. For instance, for a mass *m* in (1) equal to the mass of an electron, and *M* the mass of a proton, given an orbital angular momentum of quantum magnitude → (h-bar), with zero spin, the distance at which *m* would orbit *M* would be in the order of 10^{29} metres, a truly extragalactic distance. But now let us give *m* a spin kinetic energy K_S equal to the so-called 'electron

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3 Notable exceptions are the giant planets such as Jupiter and Saturn, whose kinetic energies of spin are of roughly the same order of magnitude as those of their orbits. However, without being able to obtain independent information of the masses of those planets there is no way of comparing their actual with their predicted orbital parameters.

charge' in coulombs [4]. This reduces the size of the orbit to exactly that of the electron around the proton in the Bohr model of the hydrogen atom, with G now hugely increased to 1.5×10^{29} N m^2kg^2. In other words, the customary 'electrodynamical' atom of Bohr and his followers can be replaced in ordinary mechanical engineering terms by plain masses in kilograms and motion-energies in joules, without involving any of the usual 'electrodynamical' conceptions.

But why, it will be asked, have these spin-effects not been observed on those levels of mechanics that are intermediate between the atomic and the astronomical? It is because on ordinary mechanical levels, changes in the G-factor are so small as to be practically unobservable. For instance, according to formula (1), a steel cannon ball weighing 2.5 kilogram and 5 cm radius, spinning in the same plane as the earth's rotation at 2000 revs per second would either increase or decrease its weight in the order of 10 milligrams, depending on whether the spins of the ball and the earth are in the same or in opposite direction. This difference is approximately equivalent to the weight of a half-centimetre square of silver-foil.

It is therefore scarcely surprising that evidences of this effect have not been observed. Moreover, such experiments as have been conducted (*e.g.*, by Hayasaka and Takeuchi, Japan [5] have not taken into account the directions of the spins in relation to that of the earth, and attempts at making and replicating those experiments have been with spin-orientations and geographical locations chosen *ad lib*., which makes it predictable that the results would be equivocal. (In the Japanese experiment, for instance, the spin axis of the rotor was vertical at that location, which is 38.2 degrees north of the equator and therefore far out of line with the spin axis of the earth. Moreover, the results it claims, which other experimenters have challenged, are many orders of magnitude greater than what our formula predicts [6].)

However, the point I make here is that these are the sorts of predictions a theory should make in order to be properly accepted or rejected. For instance, if these predicted changes in the '*G*' factor for spinning bodies are confirmed, it will signal the end of our customary conceptions of bodies as possessing in themselves static properties such as 'gravitation', 'magnetism' and 'electric charge'. together with the whole historical panoply of associated 'field-theories'. By the judicious use of Ockham's razor, the numbers of theories presented at conferences should then be decimated. On the other hand, of course, if these predicted changes are experimentally negated, then the angular momentum synthesis will have to be abandoned. At Keele University, England, this possibility of unification in favour of an angular momentum synthesis, as an alternative to the overabundance of present field-theories, is systematically explored in an ongoing project involving inputs from, in particular, the disciplines of Philosophy and Mathematics.

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4 *I.e.*., 1.601×10^{-19} C times the ionisation potential 13.6 volts, for hydrogen, which gives = 2.18×10^{-18} joule).

5 See H. Hayasaka, 'Generation of Anti-Gravity and Complete Parity Breaking of Gravity', *Galilean Electrodynamics*, Vol. 11, Special Issues 1, Spring 2000, pp, 12-17.

6 For the mass, diameter and spin quoted for the Japanese experiment, our factor G/G would be plus or minus 1.000000054, as opposed to theirs, which is 1.000142.

(Anyone wishing to study the finer mathematical details of this proposed new mechanical-physics paradigm for elliptical orbits and vector orientations may do so in the handouts provided [7].)

Now whether or not the predictions of this angular momentum synthesis at Keele will be unequivocally confirmed by some suitable experiment is, of course, too soon to say. Suffice it for present purposes that by making itself as vulnerable to refutation as possible, in the way that Karl Popper would have approved, it illustrates the way in which theories ought to be presented – that is, not as works of art, to be treasured and protected like pictures in an art gallery, but as proposals which, if they fail, should be despatched unmercifully by the use of Ockham's razor. And if my angular momentum synthesis should be refuted along the lines I have clearly delineated, then you may rest assured that there will be one theory less to compete with at future conferences – as opposed to the hundreds fewer there will be if these predictions are confirmed and if their proponents are as honourable as they should be. ■

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7 These were copies of the latest prospective Pope & Osborne publication dealing with elliptical orbits and the vector orientations of spin in relation to orbital angular momentum.