

BREAKING THE LIGHT-BARRIER

to Scientific Progress

by N. V. Pope

Abstract

A logical analysis of the concept of ‘light velocity’ in relativity and quantum theory

Let’s face it, Modern Physics is a mess. Far from fulfilling its promise of providing us with a greater understanding of the physical world, Modern Physics has made it a complete mystery. One of its leading exponents, Richard Feynman, has remarked that no-one really understands it. Little wonder, then, that so few youngsters are interested in it and that in the Higher Educational curriculum it has become almost a non-subject. But how else would it be when Modern Physics is nothing but an eclectic mish-mash of theories-upon-theories-upon-theories, with not even the slightest suggestion of overall logical – far less philosophical – coherence!

Yet Physics is the science of our first and most basic contact with natural phenomena, which *should* make it the most vital and interesting subject of all. In the past, this was certainly the case among those intelligent enough to be curious about the physical world. But Modern Physics is no longer interesting. It does not satisfy our natural curiosity in the way it should. How can this be? How did it happen? The answer, we propose, is as follows.

Everyone knows – or thinks he knows – that light travels through space, that it forms rays across rooms, that it casts shadows, is bent in water, that it takes about eight minutes to reach us from the sun, four years from the nearest star, and so on. The assumption that light travels therefore seems so self-evident that it is now virtually embedded in our communal psyche. So ingrained is it, that to question it seems ridiculous.

The assumption has a very long tradition, predating the so-called discovery of the ‘speed of light’ by Olaus Römer in 1676. It was because this precept that light *travels* was already in general circulation that Römer’s discovery of the constant ratio, c , of distance-units to time-units in astronomical observation was interpreted at the time as a ‘velocity’ – not by everyone, it has to be said, but certainly by the foremost scientists, such as Galileo and Newton.

Following that precedent, further discoveries concerning that same basic relation between the dimensions of distance and time, by other eminent scientists such as Bradley, Fizeau, Michelson, *et al.*, were automatically interpreted as further proof of the ‘velocity of light’. Something else which has set the idea ‘in concrete’ is the authority of our most famous scientist, Einstein, whose basic axiom, in his Theory of Relativity, is that ‘light travels at the constant velocity c *in vacuo*’. To challenge the ‘velocity’ interpretation of c , therefore, is now to commit the sacrilege of questioning the great Einstein and the whole centuries-long tradition of which he and others like him are regarded as the modern cutting edge.

However, it is that same ‘cutting edge’ of science that has now become so completely blunted that, as Feynman has said, no-one understands it. And if the experts don’t understand it, then what price our common understanding!

What is it, then, that has so plainly stalled progress in our modern understanding of the physical world? The answer is that we have become ‘blinded by science’. What has blinded us – and science itself – is the traditional misinterpretation of Römer’s discovery of the distance-time constant c as the ‘velocity of light’. Here are ten short logical arguments to prove the fallacy of this ‘velocity’ interpretation of c .

1. The undeniable fact that c has the dimensions of distance divided by time explains all that is known about the time-delay in communications over distance. But the undeniable fact that all velocities are distances divided by time by no means entails that all distances divided by time are velocities, which would be as absurd as saying that because all bachelors are men, all men are bachelors.
2. Herman Bondi says: ‘Any attempt to measure the velocity of light is...not an attempt at measuring the velocity of light but an attempt at ascertaining the length of the standard metre in Paris in terms of time-units.’^[1] Also, it has been proved that all the practical consequences of Einstein’s Theory, both Special and General, can be deduced much more simply by adopting Bondi’s interpretation of c as a pure ‘conversion factor’ for interconverting measures in metres into time-measures in seconds^[2].

Now these two arguments were aimed to prove that c need not necessarily be a ‘velocity’. The following eight arguments contend that c cannot, logically, be a velocity.

3. For light to be seen, photographed or detected in any possible way, it has to shine on something. In a vacuum there is, by definition, nothing on which it can shine. So, logically, light cannot be seen, photographed or in any other way be detected in the vacuum of space, which signifies a reduction to absurdity of experiments claiming to have photographed ‘light travelling *in vacuo*’.
4. To be seen or otherwise detected travelling in a vacuum, light would have to give off light. And that secondary light would have to give off light; and that tertiary light would have to give off light ... and so on, *ad infinitum*, in a logical regress to absurdity.
5. If c is interpreted as a ‘velocity in the vacuum of space’ (as Einstein’s Second Postulate states), then in a vacuum to what can that ‘velocity’ possibly be referred, constant or otherwise? So the concept of light as having a ‘velocity *in vacuo*’ is just another absurdity.
6. Light energy is quantised in units of Planck’s constant h . These quanta have been interpreted as ‘flying photons’, claimed to have been photographed ‘in flight’ by Nils Abramson^[3]. However, since the ‘photon’ is defined as a single, irreducible light-quantum, it has no energy to spare in manifesting itself anywhere between its point of emission and point of absorption. A quantum interaction between a pair of atoms

¹ Bondi, H.: *Assumption and Myth in Physical Theory*: Cambridge University Press, (1965). p.28.

² See *Immediate Distant Action and Correlation in Modern Physics: the Balanced Universe*, by Edwin Mellen Press, USA and Britain (2005), Chapters 5 and 9. Also website www.poams.org.

³ ‘Light-in-flight recording: high-speed holographic motion-pictures of ultrafast phenomena’. *Applied Optics*, Vol. 22, No. 2, Jan. 1983.

therefore has to be instantly consummated, with there being no sensible question either as to where that quantum is or what it does between its source and sink. There are simply no parameters to describe that assumed ‘motion’. Any attempt to photograph or otherwise detect it absorbs its whole packet of energy at that point, so that there can be no question of how it exists or travels when undetected, that is, *in vacuo*.

7. In order to conform to the law of conservation of energy, the alleged ‘photon’ cannot just hang around unconsummated in limbo, waiting to be absorbed. As Tom Phipps (Jr.) put it, ‘the ‘photon’ sure don’t have a holding pattern!’^[4] So, what is a ‘photon’ when it is supposed to be travelling, say, between galaxies or, as it might be, *en route* to nowhere? The whole concept is meaningless.
8. Can light be scattered by light, as some experimenters have claimed? If a powerful laser-beam is shone across the path of another, do their ‘photons’ collide or their ‘waves’ interfere? In a simple experiment devised and carried out at Brunel University, in 1980^[5], two powerful lasers were beamed across each other’s paths and also shone head-on at each other. No blocking or interference whatsoever was detected. If any such interference *were* to take place, then that light would suffer dispersion. Considering the amount of light that is allegedly ‘criss-crossing’ around, it would be amazing if visual acuity were possible over the length of a single metre. All the light that is allegedly shooting about in all directions would be as much a barrier to vision as the densest fog that can be imagined. The fact, then, that there are photographs of the farthest galaxies that display awesome clarity militates against the validity of any such experimentalist claim.
9. All velocities, properly so called, obey the rule of the composition of velocities, according to which the velocity of an object is different relative to differently moving observers. But c is, eminently, the same for all relatively moving observers, as Einstein’s Relativity requires and as experiment confirms. Therefore, logically, c cannot be a velocity.
10. For a velocity to *be* a velocity it has to be the velocity of something that is physically identifiable. In physics both ancient and modern, there is nothing that can be physically identified as light travelling *in vacuo*, especially in view of Heisenberg’s Indeterminacy Principle, which makes the ‘track’ of an alleged ‘photon’ absolutely indeterminate. And if we think of what ‘travels *in vacuo*’ as ‘waves’, then what can possibly ‘wave’ in a *vacuum*? Moreover, if we think of what ‘travels’ as ‘photons’, then if those ‘photons’ travel at the ‘speed of light’, their mass has to be relativistically infinite at that ‘speed’. The mass of a single photon would be as great as that of the whole universe! To escape this logical consequence, some physicists have suggested that the ‘stationary mass’ of the photon is zero. But then, how can that ‘zero mass’ be conceived as a ‘particle’? And, anyway, when is a photon ever regarded as stationary, since its alleged ‘velocity’ is c in all observational frames, bar none?

A talk on this subject was delivered by this author at ANPA (the Alternative Natural Philosophy Association) on August 5th, 2006. In that talk, entitled ‘A Truly Alternative Natural Philosophy’, these ten proofs were presented and discussed. The absence of any successful refuting arguments strongly supports the contention that in our tradition of Physics we have evidently been looking at the world in an entirely

⁴ This was in a discussion with this author at a PIRT (Physical Interpretations of Relativity Theory) conference at Imperial College, London.

⁵ This author with Peter Louwse plus some laboratory assistants.

wrong way. This is undoubtedly why Modern Theoretical Physics is in such a mess. For instance, its most central theories, Relativity Theory and Quantum Theory do not gel. As Bertrand Russell wrote, in his popular book, *A History of Western Philosophy*,

The philosophy appropriate to quantum theory...has not yet been adequately developed. I suspect that it will demand even more radical departures from the traditional doctrine of space and time than those demanded by the theory of relativity.

That was in 1946, Now, sixty years on, so far as modern physics is concerned, nothing has changed. But if we have been looking at the world the wrong way, then in what other way should we be looking at it? The rather obvious answer is: the way we perceive it in ordinary, non-theoretical, sensual and instrumental perception. Here are eight arguments in support of that commonsense alternative.

1. We never actually see or detect light travelling in the vacuum of space, either from distant objects towards us or between objects themselves. The beams and rays of light that we see are never *in vacuo*, they are always in a real medium of some kind, such as foggy air or dusty rooms, in which cases what we see, in the ultimate analysis, are time-sequences of discrete particle-illuminations, never light ‘travelling’ in and of itself.
2. The fundamental, unembroidered fact then, is that ‘light’ is simply what we see, in the literal sense of being the opposite of ‘dark’. From all the information contained in the light, in its full spectrum, from the deepest infrared to the uppermost ultraviolet and gamma, we optically project space and all it contains, from ordinary everyday objects to planets, stars and galaxies on the macrophenomenal scale and to such things as fundamental particles on the micro-phenomenal scale. And, of course, a built-in characteristic of that perspectival readout is the fact that its distance-dimension is also a time-dimension in the constant ratio of measuring units, c which has the same time-delayed character as a velocity for all practical intents and purposes but which, as we have seen, cannot logically be conceived as such.
3. This, of course, signifies a radical departure from the customary conceptual approach to Physics. For instance, in this altogether different way of thinking, there is no paradoxical clash between relativity and quantum theory of the sort that has so chronically inhibited extant Physics. In its very inception, the new interpretation integrates those two theories within a single theory. As an extreme or radical form of empiricism, it mobilises Ockham’s Razor to shave off a whole swathe of purely theoretical and unseen (*i.e.*, metaphysical) entities such as the hidden *in vacuo* ‘fields’ and ‘field-forces’ associated with traditional ‘gravitational’, ‘electrodynamical’ and other such phenomena.
4. Now this is not an entirely new way of thinking. It has its own history, distinct from that of current Physics. It is known as *phenomenalism* and its philosophical tradition stretches from George Berkeley, the eighteenth century British philosopher, to Ernst Mach, the early twentieth century philosopher-physicist. These two natural philosophers were the source inspiration for the relativistic theory of Einstein (albeit abortively, in the estimation of Einstein’s mentor, Mach ^[6]). For those who may not know, phenomenalism is the view that material objects are not, as classically imagined, things-

⁶ In the Preface to his book *Prinzipien der Physikalischen Optik*, (1921), Mach disclaimed being a forerunner of Einsteinian relativity. He judged that in the end it would prove to have been no more than ‘a transitory inspiration in the history of science’. This was because in his view, Einstein’s theory was not a consistent relativism (*i.e.*, phenomenalism) but an oil and water concoction of relativism and classical ‘realism’ – as, indeed, it is in respect of Einstein’s absolutist ‘velocity *in vacuo*’ interpretation of c .

in-themselves existing in some metaphysical, ‘God’s-eye-view’ way, behind and beyond our perceptions and conceptions of them. Instead, they are perceptual interpretations and projections out of directly presented quantum information, something like the way in which, from the dots on the canvas, we project length, breadth and depth into a pointilist painting or, from informational patterns and sequences of lighted screen pixels we project the dimensions and actions in a video scenario.

5. Where do these ultimate informational bits, or quantum pixels, come from? From objects, where else? The world is thus an intercommunicational nexus, or matrix involving ourselves and other bodies (and other percipients, of course), as interacting physical objects, which is no more nor less than the realm of ordinary everyday objective experience that we are familiar with. This is *logos*, as the Greeks called it – the one and only real world that it makes sense to speak of.
6. Unfortunately, phenomenism, which emphasises our most basic informational contact with what there is in nature, is regarded as completely alien to what is traditionally conceived as ‘material realism’ which, typically, assumes the independent existence of ‘things-in-themselves’ underlying what it conceives as the ‘mere appearances’. Due to the circumstantial prevalence of this absolutist or fundamentalist, God’s-eye-view ‘realism’ in the formative stages of Modern Physics, phenomenism was banished to the cloisters of Academic Philosophy on the assumption that it is no more than a form of subjective idealism, a sort of psychological ‘dream-world’ of personal ideas, sensory images and language. But while this might truly be said of Berkeley’s original version of phenomenism, it is certainly not true of the later versions. Indeed, phenomenism was eventually cleansed of that unwanted subjectivist element by the Cambridge Commonsense Philosopher G. E. Moore (1873-1958). Moore was the founder, with others, such as J. L. Austin, G. Ryle, L. Wittgenstein, *et al.*, of what became known as Analytic, or Linguistic Philosophy. During the 1960s, insofar as they had heard of it, physicists regarded this philosophical movement as anathema to their subject. Unfortunately, however, being mostly unknown, even today, outside the circles of academic Philosophy, Moore’s seminal essay, ‘Refutation of Idealism’^[7], has never been a subject for study in the educational curriculum of physicists.
7. Recently, however, an updated form of phenomenism, or relativism has emerged. Called Normal Realism, it stems from the discovery by Bondi and this author, independently, of the non-necessity of thinking of c as a ‘velocity’, whereby it removes the ‘light-barrier’ that prevents natural logical progress towards a quantised relativity. This discovery followed from a brief correspondence between this author and Albert Einstein, in 1954, just before that great man died ^[8]. It was in trying to replicate Einstein’s abstruse mathematical time-dilation formula by a commonsense graphical depiction that, shortly before Einstein’s demise, this author discovered what we have now seen as the fallacy of interpreting c as a ‘velocity’. This has led to a massive simplification of relativistic physics by replacing Einstein’s basic time-dilation formula with an even more basic formula, which is no more nor less than the simple schoolboy-familiar theorem of Pythagoras applied to the four dimensions of kinematical perspective. Now of more than fifty years development, based on the Pythagorean

⁷ See Moore’s essay, ‘Refutation of Idealism’, in *Twentieth Century Philosophy*, ed. Morris Weitz, Macmillan, London 1966.

⁸ A record of correspondence entitled *Philosophical Glimpses*, held at the County Hall, Swansea, UK., Archives reference: D/D NVP/1-17, <http://www.swansea.gov.uk>.

quantum-relativistic formula, plus a synthesis of ideas taken from the commonsense philosophy of Moore and the phenomenalism of Mach, this has become known as POAMS (the Pope-Osborne Angular Momentum Synthesis). This is as described on the website of the POAMS group of science philosophers (www.poams.org) and in other relevant publications in the list appended.

8. To be consistent with this neophenomenalist way of thinking, as has happened with previous scientific words such as ‘phlogiston’ and ‘caloric’, current words and phrases in connection with light, such as ‘photons’, ‘fields’ and ‘waves’, ‘wave-particles’, *etc.*, would become redundant. ‘Photon’, for instance, would become *photum*. This is so as to match with ‘*quantum*’, which does not necessarily suggest a material particle in the way that words like ‘*electron*’, ‘*proton*’, *etc.*, do. ‘Field’ would drop out altogether in contexts of the language customarily used to describe the phenomena not only of light but also of what are called ‘gravity’, ‘electricity’, ‘magnetism’ and even ‘nuclear’. The concept of ‘electromagnetic waves’ would be replaced by that of direct *resonance* between atoms. This is in a manner similar to that once contemplated by Feynman and Wheeler, also by G.N. Lewis who, in 1926, conceived these interactions as direct ‘quantum touchings’ in accordance with Newton’s second law of reciprocal – and therefore instantaneous – equal and opposite action/reaction⁹. This makes each quantum pixel an event common to both the object and the observer (reagent), so that an informational (digital) monism would come to replace the mind-matter dualism of classical mechanistic (that is, analog) physics, the final stultification of which may now be witnessed on all hands.

Conclusion

The perennial aim of ‘breaking the light-barrier’ that Einsteinian relativity places on mechanical motion, conceived in a manner analogous to the sound-barrier, is a complete misconception. There is simply no such barrier – except to progress in our modern understanding of nature. That whole idea of a ‘light-barrier’ is what philosophers call a ‘category mistake’, like thinking that ‘putting the light out’ is directly analogous to ‘putting the cat out’ or asking how much an amount of justice or courage weighs.

What, it seems, is seldom understood – not even by Einstein himself, apparently – is that in relativity there is not just one ‘velocity’ applied to the phenomenon of a moving object but, in fact, two. One is the optical distance travelled by the body in the time of the observer of the motion; the other is that same optical distance travelled in the time registered by the object itself over that same distance – as read in the telescope, say, or the spectrometer of the observer. So there are, in fact, *two* observational velocities. In the observational frame of the observer, light has the dimensions of the customarily delayed ‘velocity’ *c*, whereas in the frame of the ‘light itself’ – that is, the intrinsic, or ‘proper-time velocity’ – it is infinite, that is, *instantaneous*. So light is both time-delayed in the way Relativity requires and instantaneous in the way quantum theory demands, without this being in any way ‘paradoxical’, as is assumed in the notoriously insoluble ‘EPR paradox’.

Indeed, both the time-delayed and the instantaneous ‘velocities’ of light are all part of the same relativistic time-equation. Any idea, then, that relativity and

⁹ *Nature*, **117**, 2937, 236, (1927).

quantum theory are fundamentally at odds is a fallacy. All attempts contrived to ‘solve’ it as it ordinarily stands are therefore misconceived. The problem is there not to be ‘solved’ but to be dissolved in the way that has now been demonstrated; that is, by ridding science altogether of what we have now shown to be the completely illogical interpretation of c as a ‘velocity’. When that misconception is removed, everything clicks into place in the most natural, commonsense-logical way possible – at least, as far as our long-inculcated and therefore habitual preconceptions allow it to do so.

In sum, then, in this new approach to physical science, called Normal Realism, light is no longer just incidental to the scheme of things; it is absolutely central. Logic now tells us, at long last, that the customary idea of the ‘light-barrier’ is a fiction, as are all the notorious ‘paradoxes’ associated with it. We must always remember that Nature does not have the guile to create fictions and paradoxes. Only we poor humans have the ability to deceive ourselves in that way.

ADDENDUM

Responses to this talk at the conference were encouraging. Some remarked that, so far as they could see, the arguments presented were ‘irrefutable’. Perhaps the best summing-up of it was by Dr. Michael Duffy. In conversation with him afterwards, *via* his speaking-machine, he stated, as far as I can correctly recall: ‘Light travels in the space invented by physicists; in the space of perception, it does not.’ This reminded me of some earlier discussions I had had with Michael, in which it seemed that his most recent philosophical leanings are away from classical Realism towards *Phenomenalism* as perhaps the best and most efficient of all the various Physical Interpretations of Relativity Theory. Indeed, this became clear in what, with his increasing voice problem, was possibly his last talk. This was at a Saturday Workshop on ‘Phenomenalism’, on September 10th, 2005, which he and I initiated and which was hosted and organised by Professor Alan Winfield at UWE (the University of West of England). In his talk, Michael revealed a scholarly and detailed study of the history of Phenomenalism. My talk that followed his was on the more recent developments of that philosophy, as I had experienced it in my own immersion in these seminal events at the University of Wales, Swansea where the Philosophy Department, under the influence of Wittgenstein’s right-hand-man, Rush Rheese, became known as the ‘hotbed’ of British ‘Wittgensteinism’. Unfortunately, due to Michael’s worsening indisposition, the intention of continuing these advances in further Workshops of that kind, under the aegis of PIRT and UWE, had to be abandoned. Otherwise, I feel sure that if that debate had continued, we would have eventually produced something of a breakthrough for PIRT along the lines Michael was anticipating. Perhaps, now, this recent development at the PIRT meeting in London will help to consummate those very brave efforts of PIRT’s founder and leader towards the kind of eventual resolution that there has to be, sooner or later, if PIRT is to fulfil its aim of making a positive contribution towards the real advancement of modern relativistic and quantum physics.

List of Relevant Publications

(Computer users: the articles in bold blue type are accessible by the usual operation of the mouse.)

By N.V. Pope:-

1. 1986 'Abstract: Is Relativity Quantized?' *Speculations in Science and Technology*, Vol. 9, No. 4, p. 242. **1987 (April) 'The Overdue Revolution'. MENSA, pp. 28-29 [PDF 211Kb]**
2. 1988 'Arts View of Science'. Times Higher Educational Supplement (Letter, November 11th.)
3. 1988 'Floating Free'. Times Higher Educational Supplement (Ltr. Dec. 23rd.)
4. 1989 'Experiments in God's Eye'. Times Higher Ed. Suppl. (Article, Feb. 2nd.)
5. **1989 'The New World Synthesis'. Philosophia Mathematica (II) No. 1, Vol. 4, pp. 23-28. [PDF 120 Kb]**
6. **1989 'Relativity is Kids' Stuff'. School Science Review, Vol. 70 (253) pp. 86-87. [PDF 92Kb]**
7. 1990 'Changing Philosophy'. Times Higher Ed. Suppl. (Ltr. May 4th.)
8. 1990 'The Quantum is Kids' Stuff'. *School Sci. Rev.* Vol. 71, pp.105-107.
9. 1990 *School Sci. Rev. (Forum)* Vol.72, No. 258, p. 161.
10. 1992 'The Sequential Paradigm', *Proc. of the 13th Annual International Meeting of the Alternative Natural Philosophy Association (ANPA)*, Sept. 1991, pp. 55-65.
11. 1993 'An Alternative Natural Philosophy', *Proc. of the 14th Annual International Meeting of ANPA*, Sept 1992, pp. 113-130.
12. 1994 'Normal Realism: A Challenge to Physicists'. *Proc. of the 15th Annual International Meeting of ANPA*, Sept. 1993, pp. 111-115. **Also 'A Rustic Rediscovery of Relativity', pp. 116-130. [PDF 261Kb]**
13. 1994 'A Critical Review of the PIRT Conferences to Date'. *Proc. of the 4th BSPS Conference: PIRT*, pp 257-272
14. 1995 'In Search of the ANPA Philosophy'. ANPA Newsletter No. 15, ISSN 1358-2240, pp. 6-10.
15. 1995 'The Lingering Death of Western Dualism', *Proc. of the 16th Annual International Meeting of ANPA*, ISBN 0 9526215 09, pp. 117-121. Also 'The Language of Light Velocity', pp. 122-134.
16. 1996 'The Two Aspects of Special Relativity', ANPA Newsletter No. 16, p. 10. Also 'Empiricism and the Quantum', pp. 8-16.
17. 1996 'Copenhagen, Yes or No?' *Apeiron*, Vol. 3, No.1, pp. 20-21.
18. 1996 'A Response' (to M.W. Evans), *Apeiron*, '@ Issue' section, Vol. 3, No 3-4, pp. 124-125.
19. **'To Hell With Education' ANPA Newsletter, Spring 1996; also ANPA West Journal, Summer 1996. [PDF 49Kb]**
20. 1997, 'A Quantum-Digital Theory of Light', in *The Present Status of the Quantum Theory of Light*, eds. Jeffers, Roy, Vigier and Hunter, (Kluwer Academic Publishers, Dordrecht, Netherlands.)
21. 1998 'Shedding Light on Light' in *Causality and Locality in Modern Physics*, Eds. G. Hunter, et al., Kluwer, Academic Publishers, Dordrecht NL, pp 187 - 194.
22. 1998 'A Relativistic Quantum Phenomenology', *Proceedings of the 5th International Conference; Problems of Space, Time and Motion*, St. Petersburg, Russia, June, 1998.
23. 1998 'Solving the "c" Conundrum of the Velocity of Light Relative to the Vacuum', *Proceedings of the 'Physical Interpretations of Relativity Theory*, London, September 1998.
24. 1999 'Newton is Dead, Long Live Newton', in *Instantaneous Action-at-a-Distance in Modern Physics: Pro and Contra*, Eds:A.E. Chubykalo, V.Pope and R. Smirnov-Rueda, Nova Sci., NY.

25. 1999. 'The Complete Physics Heresy', *Galilean Electrodynamics*, ed. C. Kolb-Whitney, USA.
26. 2000. Abstract: 'Too Many Theories, Too Few Syntheses', *Physical Interpretations of Relativity Theory VII Proceedings*, ed. M.C. Duffy.
27. [2000. 'A Logical Reconciliation of Einstein and Newton or a Synthesis of Relativity and Quantum Theory', *Journal of New Energy*, ed. Hal Fox, Vol. 5, No. 1. \[PDF 235Kb\]](#)
28. 2001. 'An Angular Momentum Synthesis of Gravitational and Electrostatic Forces' in *Physics as a Science Symposium Proceedings*, pub. in *Journal of New Energy*, Vol. 5, No.3.
29. 2001. 'The Tantalising Two-Slit Experiment' in *Recent Advances in Relativity Theory, Vol. 2, Material Interpretations*, eds. M.C. Duffy and M. Wegener, Hadronic Press, Florida, USA.
30. [2001. 'Umbala: A Polemic Against Jargon Addiction in Modern Science', *Proceedings of the 22nd Annual International Meeting of the Alternative Natural Philosophy Association*, ed. Arleta Griffor, pub. by ANPA. \[PDF 64Kb\]](#)
31. 2004 'From Light in Space to Space in Light, The Complete Relativistic Revolution' *Journal of Theoretics*, Vol. 6-1, Feb-Mar, 2004 (on line).
32. 2004. *The Eye of the Beholder: The Role of the Observer in Modern Physics*, Phi Philosophical Enterprises, Swansea UK. (This book can be purchased from the Welsh Book Council. The book is also available online, from their website, www.gwales.com using the following link: [Eye of the Beholder - Gwales.com](#) .
33. 2005. 'Do Distant Identical Clocks Tick Simultaneously? Correspondence section, *Galilean Electrodynamics*. Ed. C. K Whitney. Vol. 16, No. 4, 2005.
34. 2005. 'A Tale of Two Paradigms', Ch. 5, in *Immediate Distant Action and Correlation in Modern Physics: The Balanced Universe*, eds. Pope, N.V., Osborne, A.D., & Winfield, A.F.T. Publ. Edwin Mellen Press, (Lewiston NY USA Queenston Ontario, Canada, and Lampeter, UK).

By N.V. Pope and A.D. Osborne

1. 1987 'A New Approach to Special Relativity' (with A.D. Osborne). *International Journal of Mathematical Education in Science and Technology*, Vol. 18, No. 2, pp. 191-198
2. 1990 'Instantaneous Relativistic Action-at-a-Distance' (with A.D. Osborne). *Proceedings of the 2nd BSPS conference: Physical Interpretations of Relativity (PIRT)* pp. 460-488.
3. 1992 'Relativity and Realism' (with A.D. Osborne). *Proceedings of the 3rd BSPS conference: PIRT*, pp. 281-287.
4. 1992 'The Action-at-a-Distance Spectrum' (with A.D. Osborne). *Proceedings of the 3rd BSPS conference: PIRT* pp. 253-280
5. [1992 'Instantaneous Relativistic Action-at-a-Distance' \(with A.D Osborne\). *Physics Essays*, Vol. 5, No. 3, pp. 409-421. \[PDF 1.36Mb\]](#)
6. [1995 'Instantaneous Gravitational and Inertial Action-at-a-Distance' \(with A.D. Osborne\). *Physics Essays*, Vol. 8, No. 3, pp. 384-397. \[PDF 281Kb\]](#)

By A.D. Osborne and N.V. Pope:-

1. 2003 Osborne , A. D. and Pope, N. V., '[An Angular Momentum Synthesis of "Gravitational" and "Electrostatic" Forces](#)', *Galilean Electrodynamics*, Vol 14, Special Issue 1, Spring 2003, pp. 9 - 19. [PDF 199Kb]

By A.D. Osborne:-

1. 2005. 'The Pope-Osborne Angular Momentum Synthesis' Ch. 9 in *Immediate Distant Action and Correlation in Modern Physics: The Balanced Universe*, *op. cit.*,
2. 2006. 'Towards a Consensus', Ch. 4, *op. cit.*,
3. 2006. 'A Neo-Phenomenalist Alternative to Special Relativity Theory', (to appear). [ENDS]