Towards a New Physical Theory

A monograph examining some fallacies of Modern Western Science

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"Though religion may be that which determines the goal, it has, nevertheless, learned from science, in the broadest sense, what means will contribute to the attainment of the goals it has set up. But science can only be created by those who are thoroughly imbued with the aspiration toward truth and understanding. This source of feeling, however, springs from the sphere of religion. To this there also belongs the faith in the possibility that the regulations valid for the world of existence are rational, that is, comprehensible to reason. I cannot conceive of a genuine scientist without that profound faith. The situation may be expressed by an image: **science without religion is lame, religion without science is blind.**"

- Albert Einstein

Chapter 1

The social role of science

This small book is addressed to laymen, primarily those of Buddhist or similar persuasions, who are dissatisfied with the present use being made of science and the very powerful technologies which it has engendered. It is especially for those able to think independently, and who refuse to accept the dictates of 'experts' in a world run by them that is increasingly violent and insane. It presents a possibility that the Reader may never have considered: that of a completely new type of science founded in his own culture and traditions; addressing and serving his own interests and needs rather than those of major corporations, governments and the military; and compatible with the world of Nature and the spiritual ambitions of Mankind. From this can arise new kinds of technology on which to base a better society.

Science and technology are commonly thought to be products of the modern world, but in a very general sense they have always been part of human life. The spinning of yarn and weaving of cloth are fundamental to civilized life, and although both are usually designated as crafts, they are a form of technology. Both rely on bodies of knowledge learned by trial and error over centuries, and passed down from one generation to the next by families, trades and guilds. An established body of knowledge is the basis of all science; so whether we speak of traditional knowledge begetting arts and crafts, or science begetting technology, the process is the same. All technology results from the application of science to practical ends, and although technology can be learned and applied without any knowledge of the science from which it sprang, its ongoing development requires such knowledge.

Of particular interest is the original source of the traditional knowledge of a race or tribe. Many ancient races attribute the foundations of their culture and learning to figures popularly regarded as mythological. These are often described as gods, but many now believe that at least some were of extraterrestrial origin. This is refuted by orthodox academia, but the topic makes for interesting reading.

It leads in turn to the subject of religion, which is just as fundamental to emerging human culture as are arts and crafts. Worship of and obedience to a god or gods is evident in every primitive culture, and is still an important part of all present-day cultures. However, disbelief in the gods has existed since antiquity as well, and its appearance within a tradition marks a new stage of intellectual development in which philosophy develops separately. The relationship between these four disciplines - philosophy, religion, science and technology - is an important focus of the material examined here, since it is of crucial importance in understanding the modern world: where we came from,

how we arrived here, where we think we are going, and what alternative futures might be available.

The publication of Newton's *Philosophiae Naturalis Principia Mathematica* in 1687 is generally taken to mark the beginning of Modern Western Science, which differs so significantly from all earlier scientific traditions that it will be referred to hereinafter by the abbreviation *MWS*. At the time, the *Principia* was considered to be a work of Natural Philosophy, as the full title indicates: *Mathematical Principles of Natural Philosophy*. Neither was Newton a scientist; the word was coined in the 1930s by William Whewell in order to differentiate scientists from philosophers, since many of the latter were overly fond of fruitless speculation and religious manias. Nonetheless, from a modern perspective, MWS was well under way by the eighteenth century, and its demands on technology often overflowed into industry and home life, usually as improvements to such things as utensils, glassware, tools and the like, but occasionally as significant new technologies such as electricity.

By the nineteenth century this process was well recognized. European universities first appeared in the eleventh century as centres of religion and medicine, but gradually became repositories of many other intellectual activities including science, philosophy, mathematics and engineering. Although they preferred to remain aloof from politics and military ambitions, their potential to contribute to both saw academics frequently inveigled into schemes and intrigues that, in a conventional view, were beyond their purview, and often morally dubious if not corrupt. *Comme ca change, plus la meme chose.*

A significant change that occurred from the fifteenth century onward remains all but unrecognized by laymen and academics alike, this being the relationship between philosophy and science. The ancient Greeks possessed both, and are revered as the progenitors of European arts, learning, and intellectual life. However, Greek academic science was considered to be a part of philosophy: an intellectual activity quite separate from the sciences on which the arts and crafts of laymen were founded. In other words, academic science tended to be purely theoretical and remote from mundane affairs, as often parodied in the joke about learned elders disputing the number of teeth in a horse's mouth.

In 350BCE Aristotle wrote that horses have forty teeth, and this was accepted as absolute truth until the end of the Middle Ages. In the parody, when 'a youthful friar of goodly bearing' suggested to his elders that a horse be fetched and its teeth counted, he was drummed out of their convention for his impertinence. This emphasizes the important change that occurred after the fifteenth century: philosophers had come to understand that some of their seemingly abstract speculations could be put to the test in practical experiments. Of course, this had been true of alchemists, magicians and the

like throughout history; but although their accumulated bodies of knowledge could be considered as sciences, they lacked rigour, consistency and rational coherence. They had failed to discover the key to true scientific work: empiricism.

It is often remarked that the basis of science is 'observation, analysis and deduction': the so-called 'scientific method'. What this means in practice is that an idea should be so formulated as to be amenable both to stated conclusions and to experimental validation. Suitable experiments can then be devised and performed, and the results collated and analyzed for comparison with the conclusions. Almost always there are differences; these are applied to reformulate the original idea so as to produce new conclusions in accord with the results, and the process is repeated until conclusions and results concur.

This is why philosophy and science split into two distinct disciplines: the former is primarily abstract and speculative, often addressing questions such as the origin of the universe that cannot ever be proved. The latter begins thus, but with the intention of devolving to practical insights and determinate proof. This is best seen by noting etymologies and definitions:

> *Philosophy* is from the Greek *philos* meaning *lover* or *seeker*, and *sophia* meaning *truth* or *wisdom*.
>
> *Science* is from the Latin *scientia* meaning *knowledge*.
>
> *Technology* is from the Greek *tekhne* meaning *art* or *craft* and *logos* meaning *discourse*.
>
> *Religion* is from the Latin *religio* meaning approximately *reverence*.

In practical terms, religion can be thought of as the technology of social and spiritual philosophy. Few people have the time or inclination to pursue the deeper questions of life and existence in any detail; what they require is a set of rules and activities for use in daily life, with occasional rituals, ceremonies and celebrations throughout the year. Today, all religions have decayed into ossified doctrine and meaningless ritual. A few determined individuals sometimes risk their reputations by forcing new creative insights and activities into them, but these soon fall prey to the same degeneration, though many become commercially successful.

The crucial point concerning philosophy and science is their parent-child relationship. Modern science consists of a body of facts and doctrine under ongoing development by the scientific method as previously described. Philosophy, by contrast, is an active pursuit of truth in its many guises: social, spiritual, planetary and cosmic. Strictly speaking, science has no concern with truth, which is always and ever a personal value judgement. Its concern is validity: how well its body of ideas corresponds to the evidence of reality. Equally strictly, there is no such thing as 'scientific truth': the term is a misnomer revealing a lack of understanding of what science actually is.

The importance of this for the modern world is never understood for a number of reasons, perhaps the most important being the demotion of philosophy to an outdated relic of the past, and its replacement by Science as the sole arbiter of truth. This occurred in 1927, a date all but unknown to laymen, and marked the beginning of a crucial change in social philosophy. Scientific thinking at the time was veering strongly towards materialism, whereas society in the main was religious in varying degrees and persuasions. The advent of the atomic bomb in 1945 immediately changed that. Scientists obviously had the power of God at their command, almost literally if only destructively, Their philosophy must surely be the truth: who could gainsay them?

During the last half of last century, materialism and its inevitable concomitants, moral relativism and ethical degeneration, quickly dominated the attitudes of major corporations, since it freed them from social obligations to focus solely on expansion, hegemony, and above all, ever increasing profits. Corruption soon saw these spreading to politics, government, bureaucracies, academia and society in general. Everyone employed today by major corporations must either accept and adopt corporate materialism, or maintain a form of schizophrenia: materialist at work but religious or spiritual at home. Few are happy with this demand; still fewer can escape it.

Equally unknown to the public is the course followed by what remained of real science after 1945. Theoretical physics quickly adopted Quantum Mechanics (QM) and General Relativity (GR) as its foundations: the former applies at the smallest scales of subatomic particles, the latter at the largest of stars and galaxies. Most of what passes for scientific research these days is, in fact, technological R&D (research and development). No-one understands what QM and GR mean in philosophical terms, as a perusal of the literature will prove. More to the point, understanding itself is regarded by MWS not just as unnecessary, but as meaningless and delusional. Laymen may find this incredible, and one of the tasks of this book's successor is to explain why and how this came about.

Technological researchers do not need philosophical understanding of the phenomena they investigate; nor, at the leading edge, do they possess it. All they require is a clearly specified goal, almost inevitably defined to accord with corporate and military interests; equipment and funds provided by the same; and sufficient time and patience, by a process of trial and error, to identify those materials and procedures that can attain their goal. It is the scientific equivalent of the fabled thousand monkeys at their thousand typewriters hammering away at the works of Shakespeare. For all their many remarkable achievements, this is not science: neither based on nor in pursuit of insight and understanding, only of results.

It can now be understood why MWS no longer serves the needs or interests of the general public, and in many areas acts against them. It is the paid servant of an international elite bent on establishing a global corporate state in which laymen provide a workforce, a consumer base, a gene pool, organ farm and cannon fodder. Scientific personnel are required to accept materialist doctrines in order to gain accreditation and preferment; dispute results in disapprobation.

Most people have spiritual or religious convictions of some kind. Many have experienced what are commonly called supernatural or psychic events; many more make conscious or semiconscious use of psychic faculties in daily life, and so cannot accept materialist philosophies. A science that served their needs would not only admit the existence and reality of these things, but would investigate them with a view to developing practical exercises, disciplines and methods that allow ordinary people to strengthen, enhance and apply their natural psychic gifts. Instead, MWS denies and ridicules everything other than purely physical phenomena and techniques.

In the nineteenth and early twentieth centuries, many leading scientists were firmly convinced of the reality of extra-physical phenomena, and devoted much effort to investigating them. The development of atomic energy and the philosophical change it engendered within MWS made such work impossible, at least publicly. Behind the scenes, the military and secret services of large countries have spent enormous amounts of time, effort and money seeking military uses of psychic faculties. They have also devoted considerable effort to ensuring that the public is persuaded that such things are impossible.

A public science that used modern technology to investigate extra-physical phenomena would soon develop psychophysical technologies to replace chemicals in agriculture, medicine and industry. This goal may seem overly ambitious to some, but it can be achieved with patience, determination and courage. As explained in the final chapter, the purpose of this book's successor is to explain how this can be done. What concerns us here is to explain, simply and clearly, why it can never be achieved by Modern Western Science.

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Chapter 2

Physical reality

The reality we inhabit is comprised of five fundamental components: space, time, matter, radiation, and consciousness. MWS accepts the first four, but insists that consciousness is a product of neurochemistry: sc. that it is an epiphenomenon. Here the view is taken that consciousness is not only fundamental and autonomous, but that it is primary, the ultimate source of all manifestation, and the final sink into which the entire Universe eventually merges. Similar ideas are presented in many ancient documents and teachings. As Sir James Jeans (1877 - 1946) put it,

> "The stream of knowledge is heading toward a non-mechanical reality; the universe begins to look more like a great thought than like a great machine. Mind no longer appears to be an accidental intruder into the realm of matter, we ought rather hail it as the creator and governor of the realm of matter. Get over it, and accept the inarguable conclusion. The universe is immaterial - mental and spiritual."

The interaction of these five components creates both Physical Reality and our perception of it. The body of ideas explaining it is called *Physical Theory*, a term that has fallen into disuse and is seldom encountered today for reasons that will shortly be explained. MWS insists that Physical Reality is the one, unique, all-encompassing Reality in which the whole Universe is contained, and by which all can eventually be explained. In this it is emulating the monotheistic culture from which it emerged, especially the Abrahamic Traditions that brook no rivals and punish heretics severely.

Having discarded the religious notions that gave it birth, MWS now teaches a philosophy of uncompromising materialism to which unflinching adherence is required by those seeking academic qualifications in the sciences. This is not monotheism - the belief in a single god - but materialist monism - the belief in a single reality: matter. The similarity with its parent religions is so great that it is now regarded by many as having itself become a religion: S*cientism*. Generally speaking, this is the belief that the assumptions and methods of the physical sciences are equally appropriate to all other disciplines, including philosophy, the humanities and the social sciences, which results in *physicalism*: the doctrine that reality consists solely of the physical world.

However, belief in other realities is widespread across the world in all countries and cultures. Most common are innumerable religious and quasi-spiritual traditions and doctrines that teach the existence of alternative realities such as heaven, hell, paradise, an afterlife, a spiritual realm or 'plane', and so on. The relationships existing between these and Physical Reality are seldom addressed, much less described in any detail, but most

assume the existence of a soul or spirit in human beings that incarnates in and animates the physical body during its life, but is released into its natural or resulting environment on the death of the physical.

Eastern and Oriental traditions contain a vast amount of teaching on such matters. No physical proof of any sort is offered other than occasionally reported 'miracles' and anomalous events of various sorts. Most teach mental and emotional disciplines as the only means of experiencing these non-physical realities whilst incarnate, but those disciplines do not allow the objective, third-party observation required by the empirical methodology of MWS.

A materialist summary of the present situation appears to present a clear, simple picture. The laws of Physical Reality set down by MWS are held to explain all manifest phenomena and events; nothing external is required to account for all observations. Therefore, it is claimed, nothing other than Physical Reality need exist; nor does it. All ideas beyond MWS are speculation at best, describe only phenomena of the imagination, and are thus not real: merely fantasies. This obvious but simplistic perspective and belief is now enforced in all official, authoritative and academic discourse as the only true, acceptable and rational one. Dissenting views are tolerated amongst the general public; but any person who rises to a position of authority and declares belief in extra-physical realities other than traditional religions meets first with strong disapproval, then with censure, and finally with punitive action of some sort, including loss of reputation and employment. A few have managed to survive these onslaughts and sustain their positions amongst an increasingly vocal community of like-minded supporters, but their influence on the general public - and, more importantly, on society and the course of events - is minuscule.

However, it is amusing to note that the very foundation of modern, rationalist thought is attributed to Rene Descartes, whose key inspirational ideas came to him in a series of dreams. As noted by Stanislav Grof in *The Holotropic Mind*,

> "The paradox is that Rene Descartes' *Discourse on Method*, the book that reformed the entire structure of Western knowledge and that provided the foundations for modern science, came to its author in three visionary dreams, and a dream within a dream which provided the key for interpreting the larger dream. What an irony it is that the entire edifice of rational, reductionist, positivist science, which today rejects 'subjective knowledge', was originally inspired by a revelation in a non-ordinary state of consciousness!"

The results of this were stated quite clearly by Dr David Gross at the 2005 Solvay Conference when he stated, "We don't know what we are talking about". He said that the field is in "a period of utter confusion" comparable to that of 1911: "They were missing something absolutely fundamental. We are

missing perhaps something as profound as they were back then." He was quickly forced into a retraction by colleagues, but his words ring true.

The most obvious question arising here is whether these matters are of any import or consequence. Two primary aspects must be addressed; the personal and the social. Should the scientific materialists somehow succeed in proving their case beyond doubt, all those holding spiritual or religious beliefs would have their entire world-view and attitude to life demolished. The converse is also true: should proof of the existence of extra-physical realities be obtained, all holding to materialist views would need to reinvent themselves from fundamentals. The social consequences of either eventuality are readily apparent to all who have investigated them impartially. They are so diverse, wide-ranging and complex that even a summary would require a book devoted to them, and many have been written. This monograph presents a single chain of arguments founded in present-day ideas about Physical Reality. Each link in the chain is discussed briefly, but in sufficient detail for clear comprehension by those having some knowledge of the subject-matter. Not all will agree with the conclusions presented.

The second obvious question is how to determine which of these - the physical monism of materialism or some sort of extra-physical pluralism - best describes our reality. Many criteria have been proposed. That offered here is very simple, but will have limited though useful appeal. In terms of consequences, both perspectives can be applied to ones personal ideas and experiences of love and sex. In the materialist view, love is simply an emotion aroused by sex. All emotions result from chemical states and processes in the body, and so are emergent and ephemeral. Every other attitude about love is fantasy and imagination; and therefore illusory and without reality.

There are many variations and interpretations in the extra-physical understanding of love, but all require accepting that it possesses several levels, shades, or degrees of purity. The highest form of love is spiritual and impersonal. It is not love of a person or object, but a flow of what may be called spiritual energy into mundane consciousness, stimulating emotions that, when intense, are indescribable, being compounded of a deep joy, gratitude, contentment, yet also empathy and even sorrow for life and being with its suffering and struggle. This intense, pure love only arises occasionally, but leaves a deep 'echo' or impression that subtly colours all other experience, and can last for weeks or months. Other feelings of love - for people, places, things - are recognized as being 'lower', less 'high' and pure, but coloured by whatever 'echo' of pure love is present at the time. For those who experience this, sex is a private, deeply-valued expression of love, not the source of it.

The reason why this criterion is recommended here is very simple. Not everyone is capable of experiencing spiritual love, and those who do so experience it in varying degrees. Those for whom it is intense have no doubt

of its reality, nor of its extra-physical nature. Such people cannot accept materialist philosophies because they do not describe or explain their own deepest subjective experiences. The converse again is true: people who do not experience spiritual love regard it as an illusion: a mawkish sentiment indulged by those of weak mind and immature emotions. These people readily accept materialist philosophies and extol them as the only valid and rational ones. The majority fall somewhere between these polar extremes, and their philosophical ideas and convictions usually vary from day to day along with the many mixed emotions they experience.

It will undoubtedly seem strange to recommend love as a criterion for judging philosophical and scientific ideas, since these are conventionally regarded as purely intellectual activities in which emotions are not only inappropriate, but potentially misleading. It is a measure of how far we have become separated, not just from our own inner beings, but from all of Nature, that our deepest emotions should be regarded, not merely as antithetical, but as decidedly inimical to our philosophy and science. It is therefore no wonder that MWS is now actively destroying the very biosphere which nurtures and sustains us. No self-respecting modern scientist would confess to loving the natural world, even in the unlikely event that it were true. His job is to try to understand it, learn to control it, and thereby force it to yield the requirements of human ambitions, which today find dominant expression in the greed, exploitation and profit of gigantic industries and corporations. If this results in the destruction of Nature, and along with it the end of humankind, that is not his concern.

True love - spiritual love - is not a mere chemically-stimulated emotion, but the most fundamental relationship between life, consciousness and the manifestations through which they find expression. Science without love is mere mechanical manipulation via a distorted, limited and destructive understanding of the grossest elements of life and living beings. Only a science imbued with love, and scientists practising their arts in its light can guide and encourage Nature to serve Man's ambitions willingly and in accord with life and natural processes.

MWS has become the diametrical opposite of this, and is now so ruthlessly committed to its present course that there is no possibility of changing it. A new scientific tradition is needed based on a cultural foundation that recognizes life and consciousness as real and fundamental. This new tradition can, however, take what is best from MWS as a starting-point, and correct its errors to forge a new direction and path to a far more promising future. Let us examine some obvious errors.

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Chapter 3

There is no such 'thing' as energy

"There is no such thing as matter. Everything is energy." Statements such as this have entered into popular belief and are implicit in the mathematics of every physics textbook. Everyone with a high-school education 'knows' that it is true; yet not only is it incorrect, it implies something that very few understand. The explanation here may be the only one publicly available.

The statement is based on 'the most famous equation in the world': $E = mc^2$. This is a reformulation of of an idea examined in Einstein's 1905 paper *Does the inertia of a body depend upon its energy-content?* although it was presented, not as an equation, but as a statement in words. It took several years for its present form to emerge, gaining direct empirical proof in the 1930s with the discovery of the neutron and the so-called 'mass defect' in atomic nuclei. Most crucially, it was imprinted indelibly in the public mind with the arrival of atomic bombs. Since then it has been universally accepted as unquestionably true, which indeed it is *as a mathematical statement*. The fundamental conceptual errors to which it has given rise derive from its interpretation, and are never discussed because they are all but unrecognized.

In order to understand this, it is necessary to distinguish clearly between three things that are often conflated: mathematical statements, intellectual concepts, and manifest realities. The material objects around us are manifest realities, or at least we commonly define them as such; but not always. Some philosophies teach that the whole physical universe is a gigantic illusion: a fantasy created in human minds by imagination, appearing real to us only because of the power of belief. Maybe it is; but anyone who chooses so to believe exists in a quandary. If brick walls are only illusions, it should be possible to walk through them. No credible report exists of a living human being who has done so, and any determined attempt will result in injury, possibly severe. Philosophers are free to indulge all manner of speculation, and modern scientists often exercise similar liberties. Here we will adopt commonsense practicalities as our guide to sound judgement, unadventurous though they may be. We assert that brick walls are real, solid, massive objects, and that the same is true of all material objects. This provides a fundamental definition of physical reality for practical purposes. Closer consideration requires greater detail: clouds are also real, but not solid in the accepted sense; but ordinary commonsense suffices for understanding what is intended.

All material objects have mass - bricks, walls, clouds, whatever - and again this is an obvious statement about reality for educated folk. But what do we mean by 'mass'? This is more difficult. In general, it means that all objects near the Earth's surface possess weight, and also that they possess inertia, two more facts well known to high-school students. Mass is commonly defined

as 'the amount of matter in a body', more accurately as 'the property of matter that measures its resistance to acceleration'. We can say that 'mass' is the quantification of matter that finds manifestation in weight and inertia. Both of these are observables: they can be detected, sensed, and measured; that is, quantified. They are qualities or properties of material objects that can be given a value on a scale of measurement.

Similar statements are true of motion. Generally speaking, all objects around us are either stationary or in motion relative to us, as determined by observation. Motion is also a manifest reality that can be quantified. If we know the mass and motion of an object, we can make statements and deductions about it. A tennis ball rolling along level ground will slow down and stop, whereas on a slope it will continue to move. In either case, appropriate measurements allow us to calculate the ball's motion to any desired degree of accuracy using well-established mathematical statements, and to calculate much else besides: velocity, acceleration, force of impact and so on. These properties can be called *parameters* of the object from the Greek *para* meaning *beside* and *metron* meaning *measure*.

Thus matter demonstrates mass, whilst radiation demonstrates motion; yet matter can also move, and radiation has an effective mass. This agrees with our initial postulate: that matter and radiation are fundamental components of Physical Reality.

A most useful parameter of a material object is its *momentum*, a mathematical term that is difficult to conceptualize: it is the product of an object's mass and velocity. $\mu = mv$. Although derived from mass and motion, momentum is not an observable, but a calculated parameter. Neither is it a manifest reality as are mass and motion. If an object's momentum changes, it is not the case that momentum has been added to or subtracted from it: rather has its mass or its motion changed, and the calculated value of its momentum changes accordingly. Conservation of Momentum is one of the most valuable laws in the study of Dynamics; but momentum is a concept: a product of the human mind, not a component of Physical Reality.

A similar parameter is *kinetic energy*. This, too, is a concept: a mathematical term naming the product of mass and the square of velocity: $E = ½mv^2$. What applies to momentum applies equally to kinetic energy, and to energy in general. It is a calculated quantity, neither an observable, nor a manifest reality. Energy cannot be added to or taken from an object; rather does it change in accord with mass, motion, position and composition. All calculation of energy requires the inclusion of a value for mass. If mass is unknown, energy cannot be calculated.

Recall now the first statement of this chapter, "There is no such thing as matter. Everything is energy." Here we take the alternative view stated above: that matter is real - a manifest observable - and that all matter has mass. To

claim that matter and radiation are both energy is to replace manifest realities with a mathematical parameter, and this is absurd.

It is true that all substance - sc. matter - is ultimately vibration, a contained, stationary resonance rather than the propagating vibrations of radiation; but vibration is not energy, even though it can be assigned an energetic value. In the case of electromagnetism, Planck's constant substitutes for the mechanical aspects of mass and motion: $E = h\nu$.

This is one reason why MWS claims to have arrived at insights and conclusions similar to those of the Oriental mystery traditions, another false and misleading boast. The mystery traditions originally obtained their insights using advanced forms of meditation that permit direct subjective perception of subtle aspects of reality. Most have today decayed into psychism and religion, but their core teachings remain valid when correctly understood. MWS obtains its 'mystical' conclusions from flawed observations and faulty reasoning: its 'mysteries' are quandaries or fallacies that deny reality, whereas meditative insights confirm reality.

In spite of the foregoing, energy has proved to be one of the most valuable concepts in modern science, which is undoubtedly why it has been *reified*: that is, turned into a 'thing'. For more than a century, scientists have treated it as an actual physical reality instead of as a useful concept. In the vernacular, of course, this happened much earlier, since the word has a different meaning in common speech. We are all accustomed to saying such things as "I'm full of energy this morning", or "I'm tired and low on energy", which are perfectly correct uses of language; but when a scientist speaks of "the energy within an atom" he is bordering on loose language, whilst to deny the very existence of matter yet insist that it is a form of energy is patent nonsense.

The solution to this quandary is to realize that the remarkable properties ascribed to energy belong instead to mass, motion and radiation. This may seem inconceivable, since they appear so commonplace and well understood as to be incapable of so fundamental a revision. Only those who have pondered long and deep on them can realize that they are three of the deepest mysteries in Nature.

What is needed is a new conceptual understanding of mass and motion; and because they are fundamental aspects of Physical Reality, this necessitates a new Physical Theory. Having established the first requirement of this new theory, let us proceed to another.

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Chapter 4

There is no 'electric current'

Electricity and magnetism have been known since antiquity as mysterious curiosities of Nature. Until the nineteenth century there is no record of their being applied to practical ends other than for entertainment, puzzled speculation, and, in the case of magnetism, as an aid to navigation. They offered proof of mysterious forces in the natural world that seemed connected with the deeper mysteries of life and living things.

Anyone who plays about with a few magnetized objects quickly realizes that their mysterious force emanates from two opposite points or poles, and that these are complementary: like poles repel, whilst unlike poles attract. The same is soon discovered about electricity. The easiest way to generate it is by friction, and the electric charges generated by rubbing rods of glass and amber with a cloth, for example, can be used to charge two metallic objects with opposite polarities that disappear when they are touched.

Such charges are called static electricity, the only type known until 1800 when Alessandro Volta discovered low voltage current electricity and announced his 'Voltaic pile': the first electric battery. Even a tiny spark of static electricity has a potential of a thousand volts or more, but is only a minuscule quantity: perhaps a millionth of a coulomb. Volta's pile produced a few tens of volts, but did so continuously at rates up to a few coulombs per second: a few amps in modern terminology. The fact of its continuous supply allowed current electricity to be investigated in detail, whereas the instantaneous - and often alarming - flash of static discharges made repetitive, controlled experimentation impossible.

Theorists soon realized that static and current electricity were identical phenomena at different orders of magnitude, but opinions differed as to their constitution. The two dominant schools of thought were the 'single fluid' and 'twin fluid' theories, the former holding that only a single 'electric fluid' existed, and that charged bodies possessed either an excess of this - a 'positive charge' - or a deficit - a 'negative charge'. Two-fluid theory proposed the existence of two distinct fluids with opposite charges.

The truth eventually emerged as a combination of them. Two opposite charges are now known to exist within all atoms; their nuclei are assigned a positive charge, and the cloud of electrons surrounding them a negative. An excess of electrons gives an object an overall negative charge, a deficiency gives a positive, and a flow of electrons from the former to the latter - the flow of 'electric fluid' - neutralizes both.

Elementary science courses generally begin with an example such as a battery powering an electric light, typically a small globe with a thin metal filament

heated to incandescence by the passage of a current through it. Measurement and calculation being fundamental to science, students are taught to apply these to such simple examples. The battery may have a potential of 12 volts, the lamp a resistance of 20 ohms, and Ohm's Law is used to calculate a current of 0.6 amps. Multiplying the voltage by the current yields a power of 7.2 watts. So far, so good.

Confusion arises, however, in a very simple matter. Current is said to flow from the battery's positive terminal to its negative. This is necessary in order to give the magnitudes their correct signs, positive or negative. For example, if the lamp is dimmed by inserting a 20 ohm resistor in series with it, the current is halved and the lamp operates a half power. Half of the voltage is dropped across the lamp, half across the resistor. Adding these equals the battery's potential, and Thevenin's Theorem is validated. This appears to be equally satisfactory.

Problems arise when overly curious students question the given explanation. An electric current consists in a flow of electrons, and these move from the battery's *negative* terminal to its *positive*, not from positive to negative. What, then, is this 'electric current' that moves from the positive terminal to the negative? Both teachers and textbooks would prefer that this question did not arise, but it must be anticipated and addressed, however summarily. Electrons, it is explained, have a negative charge, and the same calculation can be performed for electron flow by inverting all of the signs to obtain an identical result. The two are mathematically equivalent, so there is no problem.

This explanation is perfectly rational, logically correct, and must therefore be accepted. Nonetheless, it leaves thoughtful students with an uneasy feeling that something is amiss. None are able to put their reservation into words; were they so able, they would object that it constitutes a conceptual error. If asked why, none again would know how to respond. If they did, the response would be, “Why don't electrons have a positive charge? That way, everything still works, but is now conceptually correct.” It is likely that no teacher has ever met this challenge, nor does any textbook present it. Instead, students who cannot accept what is taught are criticized for failing to understand simple physics and basic mathematics.

Occurring as it does so early in the study of electricity, this simple, obvious dilemma has caused many students to doubt their own ability to understand physics, to fear the mysteries of mathematics, and eventually to decide against science in favour of other subjects. It has been and remains a significant early deterrent to a clear understanding of Nature's fundamental essentials. Its resolution can only be discovered by returning to the period of the fluid theories, or perhaps a little earlier in order to establish a context for clear understanding.

In 1733 Charles du Fay formalized the two-fluid theory by proposing that electricity comes in two varieties that cancel each other. In his terminology, when a glass rod is rubbed with silk, du Fay said that it was charged with vitreous electricity; conversely, when an amber rod is rubbed with fur, it is charged with resinous electricity. Benjamin Franklin demurred, since he imagined electricity to be an invisible fluid present in all matter. Rubbing insulating surfaces together caused this fluid to flow between them, this being an electric current. In his terminology, when matter contained too little of the fluid it was 'negatively' charged, and when it had an excess it was 'positively' charged. By 1750 he had identified the term 'positive' with vitreous electricity and 'negative' with resinous electricity, but without giving a reason for the choice: it appears to have been purely arbitrary.

Remembering that atoms were still in dispute at the time, and electrons quite unknown, it is readily appreciated that names for the two electrical polarities had no physical meaning and relied on established convention. Du Fay's nomenclature had a physical reference and was valuable for this reason, since it permitted consistency. Franklin was not only an enthusiastic experimenter, but a successful publisher and politician. Established scientists relied for their authority on professional standing, social status and collegial recognition, none of which guaranteed widespread acceptance of purely personal preferences. Franklin relied instead on the printed word, his scientific achievements, and political fame. If serendipity were his guide in his choice of terminology, then it proved false. He got it wrong.

By the time cathode rays were discovered in 1869, Franklin's names for electrical polarity were solidly cemented into the foundations of scientific terminology. Cathode rays were soon shown to be negatively charged by deflection in a magnetic field, but their nature was uncertain: some thought they were charged atoms, others that they were a type of electromagnetic radiation. Thompson succeeded in measuring their mass in 1897 at about two thousand times less than that of a hydrogen atom; they were a stream of unknown particles that were soon named *electrons*. The foundations of modern electrical theory and the guaranteed confusion of generations of students were irrevocably laid at the same time.

Consider now what might have happened had Franklin's choice been more fortuitous. Nothing of consequence would have happened at the time, nor thereafter until Thompson's famous discovery. From that time forth, however, mathematical expressions and physical theory would have had a far closer and more natural correspondence. This may seem of trivial import to experienced practitioners today, but they will automatically ignore the very significant psychological consequences of the change, and dismiss it as meaningless if so challenged.

The truth is surely otherwise. The first consequence would have been generations of students who found electrical theory as simple and straight-forward as its elementary stages certainly are, and much more comfortable studying both it and its mathematical formalisms. A considerable number may thereby have been persuaded to choose science as a career, producing a larger body of more confident practitioners and researchers, with undoubted benefits for the entire field.

A second consequence will be more controversial to some. The study of science requires competence in several abilities, among them that of creating clear mental images in the mind. This is the basis of all true understanding of material phenomena, and is of essential assistance in mastering abstractions. The closer our concepts come to being an accurate reflection of reality, the more confident our understanding and critical our reasoning.

As obvious as this will seem to laymen, many scientists will not only contest, but refute it. Since 1927 it has been held that conceptual understanding of physical phenomena is ultimately impossible; that only mathematical models of physical events are of use in comprehending them, and that conceptual analysis should be discouraged in undergraduate studies, and abandoned thereafter. In practice, this belief is honoured more in the breach than the observance, though never so confessed by those with an eye to their reputations.

A third result is too controversial for discussion here, but concerns the biological aspects of electricity. All living organisms rely on chemical reactions for their functioning, and all chemical interactions involve electrical processes. Higher animals possess nervous systems that control their bodily functions, and these operate directly by means of tiny electric currents. The question as to whether electrical or chemical processes are primary is moot, but it is obvious that electricity is crucial to life. Any improvement in our understanding of electricity must therefore offer deeper insights into biology.

In the ideal case, MWS would have reversed its assignment of electrical polarity following Thompson's discovery. In practice this would have cost so much time, money and confusion that it could never have been considered worthwhile, despite the long-term benefits. At the very least, however, the above explanation should be an essential component of all elementary instruction in electrical theory. That it is not says much about the state of modern education, the characters of those who become scientists, and MWS itself. Those who either question the existence of electric current or have trouble accepting it are deemed unsuitable for training as scientists. Only those who accept the fiction, for whatever reasons, are suitably qualified. Any discipline that favours belief in doctrine and dogma over belief in reality is, by definition, a religion, not a science. It is with good reason that MWS is now regarded by many as the religion of Scientism.

Electric current, too, has been reified, but without even the poor excuse that it is a useful concept. It is merely a fiction used to disguise an historical error, and should never have been invented.

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Chapter 5

Physical force fields do not exist

No matter where one travels on planet Earth, one is held to its surface by the mysterious something we call gravity. It is ever-present, almost constant in magnitude even at the tops of high mountains, and only dwindles as one travels into space. There, however, one comes under the influence of the Sun's gravity, and must travel still farther to escape that.

Today, everyone with a basic education 'knows' that the Earth is surrounded by a gravitational field, as are the Moon, the Sun and other planets; and, indeed all massive bodies large and small, right down to individual atoms. Few older folk are aware that MWS no longer uses the concept of gravitational fields, having replaced it by concepts presented in Einstein's Theory of General Relativity. Younger people may have been taught this in high-school physics classes, but the concept of a gravitational field seems so easy and natural that it probably remains the basis of their understanding. Besides, a multitude of other fields abound in modern theory, since all elementary particles are believed to have their own fields. Electrons have an electron field; protons have the electromagnetic field; neutrinos have a neutrino field; and so on. What, then, are fields? When were they discovered, and how?

A scientific novice who has never encountered a magnet will be delighted when first presented with a few bar magnets. He will quickly discover that their ends attract and repel, and that there appear to be two types of 'end': let us call them A and B. All A-ends repel each other, as do all B-ends; but A-ends attract B-ends and vice versa. If asked for an explanation, he will likely reply that there must be two mysterious somethings, one within each end of each magnet, and that these attract and repel each other. We may call this the 'point-source theory', meaning that the forces have their origin in individual objects.

If one of the magnets is now cut in two, our scientific novice will be mystified that he now possesses, not separate A- and B-ends in the two pieces, but two complete smaller magnets. Additional A- and B-ends have suddenly appeared at each side of the cut. His point-source theory will be unable to account for this, and a new theory will need to be devised. Let us turn to history to see how modern ideas emerged and developed.

The concept of a field of force, as presently understood, is a comparatively recent development, having emerged during the nineteenth century; but the idea of magnets and electric charges being being surrounded by a region of influence dates to antiquity. It was usually conceived as an invisible fluid with properties appropriate to the behaviour demonstrated, and usually included

within a larger set of ideas in which the concept of an *aether* - an invisible fluid filling all of space - played an important role.

In some theories, an electric field was thought to be a 'tension in the aether', whilst a magnetic field was a flux (or flow) in it. In other theories, electric and magnetic fluids were postulated as independent, discrete entities. No relationships between electric and magnetic phenomena were evident, primarily because current electricity was unknown and static charges were difficult to control, as previously explained. Nor was there any means of making them visible, other than as the spark of a static discharge, and they remained invisibly enigmatic until the nineteenth century.

Educated laymen generally credit Newton with introducing the concept of a gravitational field; but the word 'field' does not appear even once in Motte's English translation of the *Principia*. The fact is that Newton met so much controversy just by introducing the concepts of gravity and inertia that the further introduction of a field, had the idea occurred to him, may have turned many potential supporters against him. Apparently it did not, and with good reason.

At the time, Aristotle's ideas dominated scientific thinking, wherein objects occupied their 'natural positions' when at rest. If a stone be tossed in the air, it automatically seeks to return to its natural position on the ground. What need, then, of gravity? The force acting is inherent in the object itself; why postulate an external agent or reference when the matter is so simply and obviously explained as something quite natural? Similarly, when a stone is thrown at a passing bird, its passage through the air causes causes a displacement of the air around it, and it is this displacement that causes the stone to keep moving. Why, then, invent inertia?

Newton's arguments compelled attention and ultimate conviction for two main reasons. By employing his two new concepts of gravitation and inertia, he was able to unite, within a single theory, a whole range of apparently disparate phenomena, from planets orbiting stars down to pebbles falling off cliffs. Even more convincingly, by applying the new mathematical techniques of his differential calculus, he was not only able to give exact mathematical descriptions of the motions involved, but to provide accurate predictions of them before they occurred. It was a tour de force that earned him just recognition as one of the greatest of Natural Philosophers.

Three important points should be noted concerning the *Principia*:

1. At no stage is the action of a field implied, nor even its existence. The forces are inherent in the objects themselves.
2. There is no apparent connection between the forces of gravity and inertia, although both are proportional to mass. Yet gravitational mass

and inertial mass are identical. This remains one of the oldest unexplained mysteries of MWS.

3. There is no explanation of how or why these forces arise in bodies.

What, then, is a force? The answer hearkens back to Chapter 3. It is a mathematical concept derived from the product of the magnitude of two observables: mass and motion. The simplest expression for it is $F = ma$. Like energy, force is not an observable: not a manifestation within physical reality: only its effects are manifest. Also like energy, it is a remarkably useful concept that has also been reified: turned into a 'thing'.

The reason why the force-field was so late in arriving, as opposed to the more general field of influence, is that, being a mathematical entity, the prior development of suitable mathematical techniques was essential. A formal definition states that a force-field is "a vector field that describes a non-contact force acting on a particle at various positions in space." Although regarded today as an obvious entity for undergraduate study, it required most of the nineteenth century for the necessary mathematical techniques to be devised, refined, and cast in accepted formal terms and notation.

A strong impetus to clarification of the field concept came from the works of Faraday and Maxwell. The former was a gifted experimenter and clear conceptual thinker, but an indifferent mathematician. The latter shared many of Faraday's gifts, but was also a talented mathematician who benefited greatly from the mentoring of Sir William Rowan Hamilton, himself one of the most renowned mathematicians.

Faraday's seminal contribution was the concept of 'lines of force' emanating from the north pole of a magnet and returning to the south. Not only did these define the 'shape' of the field, but their density indicated its strength or intensity. Thus, at the poles, the lines are closest together where the field is strongest, but move farther apart as distance increases and the field is weaker. Maxwell gave formal expression to these ideas in *A Dynamical Theory of the Electromagnetic Field* published in 1865 using twenty of Hamilton's *quaternions*, but these were later replaced by Heaviside with four simpler equations in the notation of vector algebra. The latter have since been used in formal introductions to the subject.

Thus the mathematics; but what of reality? Let us consider, for a moment, that there *is* such a thing as a gravitational field; what does it mean? It requires that, at every point in space, there is an invisible, mass-less 'something' that responds to the presence and motion of all mass in the entire universe by creating a gravitational potential; and that, if a massive object moves into the point, it exerts a force on the object proportional to its potential. This is, surely, a remarkable proposal.

Next comes the perennial question as to whether the field is continuous or discrete: that is, does it remain unchanged at ever smaller scales, or is there a minimum 'point size' beyond which it cannot further be subdivided? MWS has postulated the 'graviton' as part of the answer to this, and 'gravitational waves' as its complement, but they remain theoretical and undiscovered other than speculatively.

The boundary of belief is passed when we imagine the gravitational field extended to the entire universe, since gravity obeys the inverse square law and its field extends to infinity in all directions. Imagine a region of space far beyond our Sun; in fact, far beyond our Milky Way galaxy. If a gravitational field does exist throughout space, then each atom-sized part of this remote region in the empty vastness of intergalactic space must contain this invisible, mass-less 'something' that sits there, through all of eternity, varying slightly in potential as nearby galaxies drift endlessly through the void, patiently awaiting the arrival of a chance hydrogen atom, a stray proton, perhaps a passing rock, in order to give it a nudge. How often does this happen? Once in a billion years? A lonely existence, to be sure, and highly inefficient: all of that vast, empty field doing nothing for most of eternity.

Now add to this the many other fields postulated by MWS - the electromagnetic field and the many particle fields - and 'empty space' takes on quite a different meaning. It becomes, in fact, something so wondrous as to be quite incredible. Such fields cannot be real, physically manifest phenomena. A more credible explanation is surely required.

It is likely that thoughtful Readers will by now be feeling somewhat uneasy. It is obvious that electric current, being a mere invention, should never have been used in teaching students about electricity since it introduces confusion at the critical early stage of forming ones ideas about phenomena that, being invisible, are inherently mysterious. But force and energy are obvious, everyday experiences, and to have them brought into question is an unexpected, perhaps unwanted intellectual challenge. The further suggestion that force fields do not exist may leave the Reader wondering just what is left of the reality in which he has believed for so long.

Another discomfort will arise from the lack of alternative explanations offered here; but as explained in the the first chapter, that is not the purpose of this monograph. Nor can it be, since such explanations are necessarily so long and involved as to require a book of their own, as will be explained in the last chapter. In spite of this, a few hints will now be presented as to the grounds for those explanations, and a beginning will be made by identifying a crucial historical turning-point.

The history of MWS can be divided into three major periods: the Aristotelian, the Newtonian, and the modern. The European rediscovery of Greek ideas in the twelfth century produced a renaissance of thought that, after a period of

debate and reinterpretation, led to the acceptance of Greek teachings that had been adapted to accord with Christian doctrine. These formed the basis of such science as was then practised. By the seventeenth century the ideas had become almost as rigid as religious doctrines, and many countries enforced severe penalties for disputing them; as, for example, Galileo's astronomical disputes with Church authorities. Other countries were more liberal. Philosophical discourse and dispute were not only tolerated, but encouraged as being essential for furthering the understanding of the natural world; and so emerged the *Natural Philosophers* of whom Newton was one. Although his *Principia* is taken to mark the beginning of modern science, it is better to name it as the beginning of the Newtonian period, since many of its fundamental ideas are no longer accepted by academic science. They are still accepted by the general public, however, a dichotomy of which few are aware, and still fewer understand.

The modern period began in October 1927, a date unknown to laymen, and even to many scientists. At the Fifth Solvay Conference of that month, the so-called *Copenhagen Interpretation* of QM was accepted by the world's leading physicists after a famous debate headed by Bohr and Einstein. The Copenhagen Interpretation itself is a matter of science, but it had numerous inescapable consequences of far greater significance. Three are of great importance for those interested in philosophy, science, and their social effects.

The main philosophical consequence of *Copenhagen*, as it is commonly called, was to discredit philosophy itself as an authority on Physical Reality. Henceforth, only the empirical evidence of scientific experiments was admissible in such discourse, and this was founded in physicalism, an extreme form of materialism. As logical as this may sound to non-scientists, it overlooks the fact that many phenomena accepted as essential components of everyday reality - emotions and consciousness, for example - are not directly amenable to physical experiments; only their epiphenomena (or results) can be examined. This began the transition of MWS into the religion of Scientism.

The Copenhagen Interpretation also marks the point at which Western Science became inaccessible to laymen. Until that time, all important scientific ideas could be explained to any thoughtful person with a high-school education, albeit simplistically, and debate about them could be followed by the general public, at least in broad outline. After Copenhagen, scientific ideas not only became increasingly abstract, but were couched in complex mathematical formalisms unknown to all but specialist Physicists, who struggled to explain them to anyone other than their colleagues. Following the development of atomic energy and the rise to supremacy of QM, a simple solution to this difficulty was found. Enquirers were told that, in order to understand the ideas, they should study the mathematics in which they were expressed. Those areas of maths had become so abstract and complex as to require many years of specialized study; the enquiries had been answered, all

but trained specialists were incapable of the time and effort needed to comprehend them, and the gulf between Physicists and laymen widened into a chasm that is today unbridgeable.

The third consequence is never explained publicly, and only in carefully-worded rhetoric to to students, but is fundamental to the material presented here. Physicists had, in fact, not only abandoned the search for a Physical Theory, but denied that one was possible. In their view, all that could ever be achieved was a mathematical analogue (or model) of physical phenomena. Thus was born Mathematical Physics, the symbolic scripture of today's Scientism; and along with it the death of philosophy and true science.

In modern scientific discourse it is inadmissible to say that two massive bodies attract each other, since bodies are not sentient: they cannot 'feel' an attraction. In the case of oppositely charged electrical bodies, one speaks of an exchange of photons between them as resulting in an attraction, not the bodies themselves. In the case of gravitation, laymen will speak of the 'force of gravity' acting between two bodies, and 'know' that they are correct. Since the 1920s, however, MWS has abjured this explanation for a number of reasons, amongst them those just stated: that both gravity and inertia are too obviously mere concepts, and unlikely to be real in a physical sense. An alternative explanation was required, and to that we now turn.

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Chapter 6

General Relativity is a delusion

Physics today is founded on two fundamental theoretical frameworks: Quantum Mechanics and General Relativity. The former describes phenomena at the smallest of physical scales - elementary subatomic particles - and the latter at the largest - stars and galaxies. Both can be applied at larger and smaller scales.

Groups of elementary particles can form composite particles: for example, a neutron consists of one up and two down quarks; neutrons combine with protons to create atomic nuclei. The addition of electrons forms atoms; these combine to form molecules, thence cells and living beings. At the large end of the scale, galaxies take various forms, the best known being the rotating spirals like our own, in which long, curved arms of stars rotate around a central core. Most stars have planets in orbit around them, and many planets have moons. QM describes the former to very high accuracy; GR describes the latter, less satisfactorily but still acceptably. However, when QM is applied at galactic scales, the results are nonsensical, and the application of GR to atomic scales yields intractable problems.

Attempts to resolve these anomalies constitute the leading edge of theoretical development today: either to reconcile and unite QM and GR, or to replace them with a more general theory that subsumes both. The favourite candidate is *string theory*; more correctly, string theories, since each variant yields not a single solution, but a range of solutions supposedly describing all possible universes. In fact, it has been said of string theory that it successfully describes every kind of universe that could possibly exist, with a single exception, that being the one we inhabit. There are, you see, a number of problems . . .

It is important to realize that all of these are mathematical theories. Their purpose is to predict results. What they cannot and will never provide are what laymen naturally expect: explanations. Questions such as "Why does this happen?" or "How does this work?" are no longer admissible in today's scientific discourse, other than in the context of a set of mathematical expressions. Mere words have long since been *passé*. This is one result of the Copenhagen Interpretation, something that laymen neither know nor comprehend, and Physicists are loth to explain. Trained and qualified Scientists do not ask such questions: to do so is proof of professional boorishness, or at least indecorum.

Whilst many proponents of QM anticipate conquering GR in the near future and bringing its adherents within their own church, its fundamentals are still regarded as sound. Here we take the opposing view: that GR is fundamentally

flawed, and must be replaced by a quite different theory. This is, of course, Scientistic heresy of the most heinous kind, an iniquity that no qualified Physicist would dare contemplate. Fortunately, this monograph is written for laymen, not Scientists, so the ensuing threats of expulsion, excommunication and loss of reputation are without consequence for Readers, who may gleefully indulge their most sinful whims.

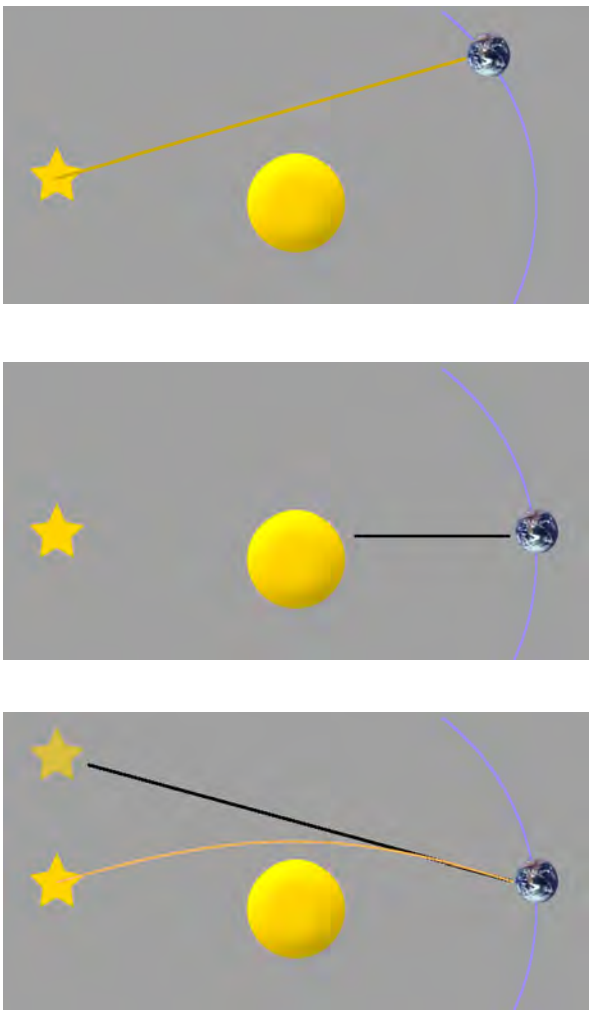
The easiest introduction to GR for newcomers is by way of Special Relativity (SR) which appeared as one of three papers by Einstein in his *annus mirabilis* of 1905. Entitled *On the electrodynamics of moving bodies*, it reconciled Newtonian mechanical dynamics and Maxwell's electrodynamics without recourse to the properties of a transmitting medium. This last point is crucial. The existence of 'something' that fills all of space has been a recurring postulate since antiquity, and is still covertly entertained today. Named the *aether*, it was assumed to be a tenuous fluid whose vibration constituted light and other types of radiation. Not only was Maxwell a firm believer in it, his equations were a carefully constructed mathematical description of his understanding of it. Unfortunately for its proponents, the brilliantly simple Michelson-Morley experiment of 1887 cast grave doubts on its existence, and the fact that Einstein's new theory simply did not need it was a major factor in the aether's demise and the rapid acceptance of SR.

A better name for it might be 'restricted' or 'limited relativity' since it does not include gravity: it is a special case of a more comprehensive or general theory that would do so, and Einstein quickly moved to a consideration of this. Opinions vary as to his mathematical abilities: some claim that he was initially an indifferent and unenthusiastic mathematician, others that he was a genius from an early age. It is certain, however, that he initially disliked an elegant and insightful formulation of relativistic dynamics devised by his old teacher at the Zurich Gymnasium, Hermann Minkowski: $s^2 = x^2 + y^2 + z^2 + ct^2$. This united space and time in a single four-dimensional mathematical entity called *space-time*, and is still used today in introducing the subject.

Most crucial, however, is the inclusion of the speed of light, which had been assumed infinite until the seventeenth century, when Ole Romer used the eclipsing of Jupiter's moons to calculate a velocity of 200,000km/s. This was soon confirmed and corrected by other experiments to around 300,000km/s. There was no such evidence in the case of gravity: it acted instantaneously over any distance. Throughout his life, Einstein expressed a strong dislike for what he called "spooky action at a distance", and the success of SR prompted him to declare that the 'speed of light' was a fundamental limitation throughout the universe: "Nothing can travel faster than light". Despite the success of Newton's gravitational laws, Einstein held that instantaneous action was impossible, and set about finding an alternative.

After reconciling himself to Minkowski's ideas and recognizing the power of abstract mathematics, he was introduced to Riemannian geometry by a close friend, and sought to explain gravity geometrically. This he did in 1915, although it was not until after the war ended that experimental proof was forthcoming. Among its successes was to predict that starlight will bend around a massive object, which Newton had anticipated in 1704. For those so inclined, an excellent reference text entitled *A most incomprehensible thing* provides a very accessible explanation of the mathematics of GR. Few are so inclined; and, despite the contrary insistence of Scientists, knowledge of the mathematics is unnecessary. Instead, a simple explanation of the geometry suffices quite well, and clearly shows the second crucial assumption on which GR is based.

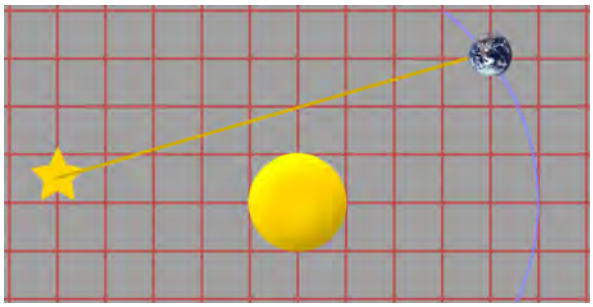
Consider what happens when light passes near the Sun. The top diagram shows light from a star passing to Earth some distance from it. In the second diagram, the Earth has moved so that the Sun should block the light, rendering the star invisible; but as the third diagram shows, the light follows a curved path that keeps the star visible when it should have disappeared. Moreover, its apparent position changes because we assume that light travels in a straight line, causing the star to appear relocated at the upper position. This is simple enough to imagine and to understand. How should we interpret these facts within an explanatory theory?

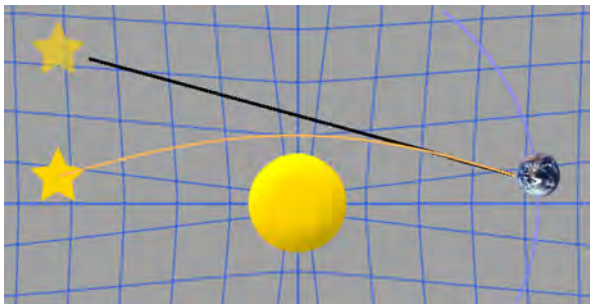


Let us first explain it in terms of standard Newtonian dynamics. We treat the light as a stream of particles - Newton's 'corpuscles' and today's photons - each having a finite mass. The Sun's gravity acts on each to draw them closer so that the path followed by the light curves more tightly as it approaches the Sun, then less tightly as it moves away. At each instant, the force acting on each particle can be calculated along with its direction: that is, a vector can be defined as a line with specific length and direction, and these can be used to plot a graph that accurately predicts the path followed by the light: its trajectory. The calculus can be employed to the same end.

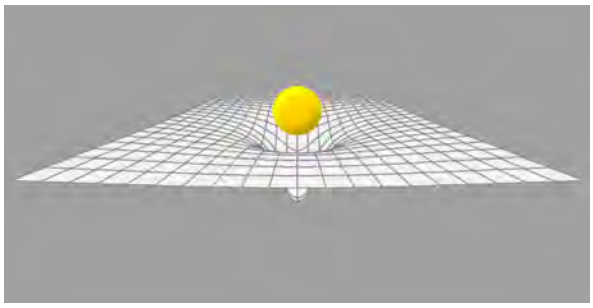
We now add a reference frame to the diagram consisting of a set of

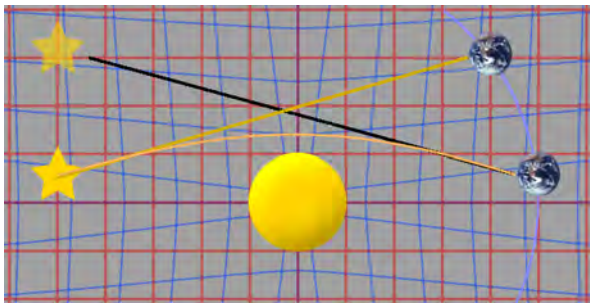
coordinate lines, the red lines in the fourth diagram. They are those of normal - sc. Euclidean - space and are thus equidistant, orthogonal and isotropic: that is, they are at right angles, and symmetrical in all directions. The light's trajectory appears initially as a straight line, but curves near the Sun before resuming its straight path.





Now comes the clever part. Using mathematics, we can 'bend' the curved trajectory into a straight line; but if we are to maintain the same relationship between the trajectory and the coordinate lines, then the lines must also 'bend'. When the trajectory is bent back to a curve, the result is shown by the blue lines in the fifth diagram. Technically, the lines are no longer coordinates but *geodesics*: lines defining a 'curved space' in which light again travels in a straight line. This is normally shown in three dimensions as in the sixth diagram.





This curved space is obviously non-Euclidean since it is *anisotropic* - that is, asymmetrical according to direction - whereas real space is Euclidean - symmetrical in all directions. In other words, it is a mathematical invention that has the single purpose of rectifying the light's trajectory, but *it is not a part of Physical Reality*. The equations of GR describe this fictional space using advanced mathematics, but are not derived from philosophical principles: in other words, they are not *a priori* - not derived from an understanding of the phenomenon. Rather are they *a posteriori* - adjusted to correspond with observation. Here, then is the second crucial assumption of GR:

> General Relativity insists that the curved space invented to define the geodesics of the path of light in a gravitational field is physically real. It is yet another example of reification: of believing that an imagined mathematical device is physically real.

Two sets of relations are clearly evident:

1. The Sun, Earth and stars relate to the red coordinates, as also do their motions. As the Earth moves to obscure the star, no change occurs in any of these things, so there is no change in the 'red space' and it is therefore Euclidean.
2. Light from the star bends ever more sharply as it passes nearer the Sun, following a geodesic (shortest path) through the blue coordinates. Thus there is also a 'blue space' that is non-Euclidean. The curvature in the blue coordinates represent curvature of space-time - a mathematical invention - not curvature of space - a physical reality.

According to GR, we are here required to choose between two alternatives: either the 'red space' of Euclidean metrics is the One True Reality, or the 'blue space' of Einsteinian curved space-time is so. A thoughtful Reader will surely ask,

> "Why must we choose? Surely it is obvious that there are two separate and distinct realities interpenetrating each other, and our theory must recognize and describe this."

Einstein, like most of his contemporaries, was an Abrahamic. His ideas were deeply imbued with monotheistic assumptions, so he could not conceive of reality as being a duality, much less a multiplicity. He was committed to Mach's ideals embodying Ockham's principle and the traditional reductionism of mathematical analysis. MWS today still labours under these century-old errors.

We may now summarize the discussion to understand why GR is a delusion.

- GR assumes that "nothing can travel faster than light". This is now known to be wrong: the phenomenon of quantum entanglement proves that instantaneous (or at least super-luminal) action over distance does occur.
- Space-time is a mathematical concept: it can bend or twist or dance about without any consequence for Physical Reality. Space, on the other hand, is a manifest reality and does not bend.
- The denial of real, Euclidean, physical space to insist that curved light proves the existence of curved space is philosophically invalid and physically wrong.
- The prediction of dark matter and dark energy, both of which are now held to constitute 96% of the mass in the universe, results from insisting on the accuracy of GR throughout the cosmos. It is so fantastic as be highly dubious, and proves that GR is at best incomplete.
- Gravity is a monopolar force, whereas electricity and magnetism are both bipolar. There is no evidence that the two are related, and much

evidence that they derive from different aspects of reality, if not from different realities.

In spite of the enormous amounts of time, money and effort expended in developing GR, it has yielded nothing whatever of practical benefit to Mankind. Even worse, it has fostered a complete misunderstanding of what gravity and inertia truly are. It has obviously passed its 'use-by date' and is well overdue for replacement.

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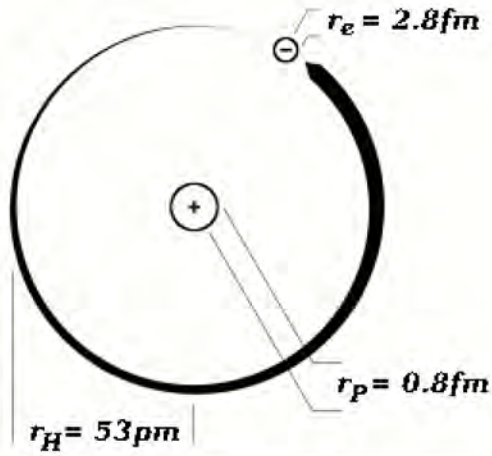
The 'empty atom' fallacy

"The atom is mostly empty space." This statement has been repeated so many times by so many scholars and experts that it is accepted without question by nearly all educated people in the modern world. It is advanced as proof of the puzzling nature of atomic structure, and of the uselessness of common sense as a guide to truth and reality. It has become central to all elementary science courses from high school through university and beyond.



Prefix	A	Ratio
atto	a	10^{-18}
femto	f	10^{-15}
pico	p	10^{-12}
nano	n	10^{-9}
micro	µ	10^{-6}
milli	m	10^{-3}
centi	c	10^{-2}
deci	d	10^{-1}

Prefix	A	Ratio
exa	E	10^{18}
peta	P	10^{15}
tera	T	10^{12}
giga	G	10^{9}
mega	M	10^{6}
kilo	k	10^{3}
centa	h	10^{2}
deca	da	10^{1}

And it is nonsense.

To understand why requires little more than a thoughtful exercise of high school mathematics. The statement is based on the elementary model of atomic structure proposed by Rutherford, and derives from the relative dimensions of atoms and their constituent particles. The major components of atomic structure - electrons, protons and neutrons - have a radius of about a femtometre - 10^{-15} m - whereas atoms themselves are some 50,000 times larger at about 50 picometres or more. The volume of a hydrogen atom is about 6 x 10^{-31} m^3 whereas that of a proton is 3 x 10^{-45} m^3, a ratio of around 10^{14}:1.

At first glance, these dimensions appear to justify the statement. What will be unfamiliar to laymen, however, are their magnitudes: they are so very tiny that few will have any reference with which to compare them, and this is why they initially seem mysterious and incomprehensible: they are so minuscule in comparison to everyday objects as to be meaningless. To understand their significance it is necessary to place them in a suitable perspective.

Let us compare atomic dimensions with those of a room measuring, say, 6 x 5 x 4 metres with a volume of 120 cubic metres. This is about 10^{32} times larger than that of an atom; a very large number, but not of any immediate significance. What is significant is that the interior of an atom is filled with a dynamic electromagnetic field - that is, electric and magnetic energy in a state of motion or oscillation. The amount of this energy is also very tiny, and because energy measurement is not a commonplace of everyday life, a few examples are needed to clarify the situation. Energy is measured in electron-

volts in atomic studies (abbreviated eV) since it is a convenient unit for very small quantities; but common measurements require a much larger unit, the joule. This also is seldom used in daily life, but one joule per second is a watt, and there are 746 watts in one horsepower, something to which all motorcar aficionados can easily relate. One electron-volt is about 1.6 x 10^{-19} joule.

However, a better example for our present purpose is a stick of dynamite. A typical stick weighs about 200g and has an energy equivalent of about a million joules - that is, one megajoule. Five sticks weigh a kilogram, and have a combined energy of five megajoules. A thousand kilograms equal a metric ton; this amount of dynamite has an energy equivalent of around five gigajoules. The atom bomb dropped on Nagasaki in 1945 yielded energy equivalent to around 20,000 tons of high explosive, or 84 terajoules.

Energy source	**Energy Density** J/m^3
Lead acid battery	560 x 10^6
Wood	2,500 x 10^6
Ethanol	21,200 x 10^6
Petrol	34,600 x 10^6
Bituminous coal	24,000 x 10^6
Dynamite	6,217 x 10^6
Fission of U-235	1.5 x 10^{12}
Hydrogen atom	3.5 x 10^{12}

The quantity which is of interest to us here is not energy, but *energy density*, commonly designated by the letter *w*. Energy density is simply the amount of energy per unit volume and is measured in joules per cubic metre. If we assume that our stick of dynamite is 32mm in diameter and 200mm long, its volume and energy density can easily be calculated at about six gigajoules per cubic metre. As can be seen from the table above left, this is not exceptional, but when released almost instantaneously it creates a sudden explosion instead of a gradual burning.

Item		**Energy** J	**w** J/m^3
Energy within H atom		2.18 x 10^{-18}	
Energy density of H			3.49 x 10^{12}
Item	**Radius** m	**Length** m	**Volume** m^3
Dynamite	16 x 10^{-3}	200 x 10^{-3}	161 x 10^{-6}
Item		**Energy** J	**w J/m^3**
Dynamite		1 x 106	6.2 x 10^9
Item		**Size** m	**Volume** m^3
Room		6x5x4	120
Item			**w** J/m^3
Room filled with E density of H			419 x 10^{12}

The single electron in hydrogen is bound to the nucleus with an energy of 13.6 electron-volts or 2.18 x 10^{-18} joule, giving an energy density in the body of a hydrogen atom of a few terajoules per cubic metre, far greater than the energy density of dynamite. This is true for hydrogen, the simplest of all atoms. An atom of lead is about three times the diameter of an atom of hydrogen, but has eighty-two electrons bound within it, most of them carrying far more energy than the loosely-bound electron in hydrogen. The innermost electrons in lead have binding energies of about 88keV, some six thousand times more than the single electron in hydrogen.

Here we can return to the thread of our argument. If our example room of 6 x 5 x 4 metres were filled with energy at the same density as in hydrogen, the total energy in the room would be around 400 terajoules - about five times the energy of the Nagasaki bomb. If this energy were quiescent - still and unmoving - it might be of little consequence; but the presence of magnetism within atoms proves that the energy is contained within a dynamic electromagnetic field, since magnetism results from moving electric charges. In other words, the energy is in flux - moving and changing in space - and whilst only a small volume of energy, it is extremely intense.

> **Physical matter cannot withstand the huge energy flux within atoms - any physical object in a room filled with a similar energy density would be torn to shreds.**

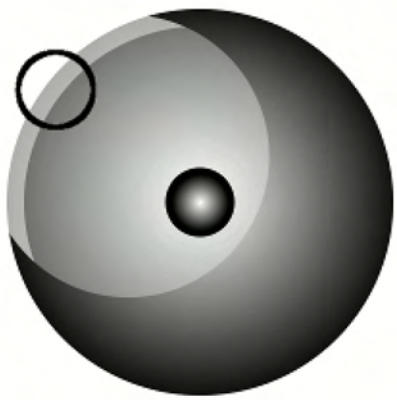
Thus the space within an atom is only 'empty' in the sense that there are no discernible material structures within it; it is certainly not empty in any real sense, being filled with an extraordinary concentration of energy. It is quite unlike anything we encounter in the everyday world: a different type of space. As simple as it sounds, this statement has profound implications, especially when the conclusion of Chapter Three is recalled: "there is no such 'thing' as energy". in other words, there is a potential of some sort within an atom that is electromagnetic in origin, but cannot be solely electromagnetic since it is dynamic yet stable. This quandary was 'solved' by the Copenhagen Interpretation by insisting that the truth of the matter can never be known, and questions about it are therefore meaningless. However:

> **All physical objects and events have three spatial dimensions and exist within time. They can therefore be visualized by the human mind.**

But what if the interior of the atom is not physical? Can it still be visualized?

Let us imagine ourselves shrunk to a size smaller than an atom. We move in close to the atomic shell or boundary, and then slowly pass through it. What do we observe? We know that at macroscopic - real-world - scales the atomic boundary is a hard, impenetrable shell; quite literally as hard as steel. What is it made of? Were the atom a macroscopic object, we might suggest the finest

spring steel, given its perfect elasticity; or perhaps a new alloy or type of plastic; but at the atomic scale this cannot be. There is no substance or material that we know of that is not itself comprised of atoms; and here is a most important point:



> **The atomic shell or boundary can have no thickness.**

Were the boundary a rigid shell with finite thickness it would possess resonances - modes of vibration determined by the shell's thickness, diameter and material - just as with ordinary physical objects. There is no experimental evidence for anything like this. Only one conclusion is possible:

> **The atomic shell is a boundary between two different types of space.**

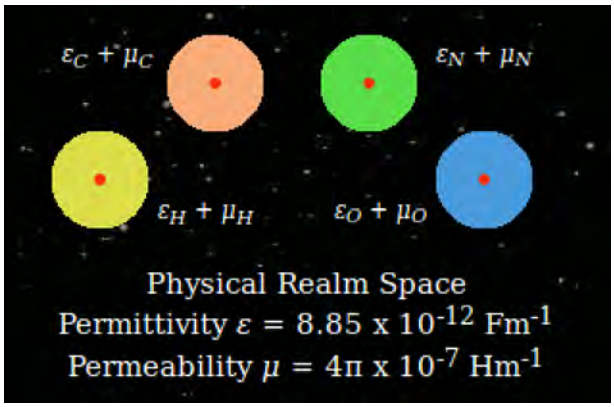
But how can one space differ from another? The answer lies in two fundamental properties of space: electrical permittivity ε_0 and magnetic permeability μ_0. The first determines how much electrical energy space can absorb; the second how much magnetic flux it can sustain. Together they determine the speed of light:

$c = (\varepsilon_0 \mu_0) - ½$

When light passes through a piece of glass it slows down to a velocity determined by the material of the glass; that is, by the types of atoms in it.

> **All atoms have values of ε and μ characteristic of each chemical element, different from each other and from the ε_0 and μ_0 of empty space.**

Thus the atomic boundary is not material - it has no substance - but is *a division in and of space itself*. The crucial importance of this is never mentioned in MWS. Scientists readily admit that interactions at subatomic scale obey very different laws from those at macroscopic scales, which is why QM had to be invented; but they fail to draw the obvious conclusion that they are dealing with a different type of space: *a space that is not physical*. This recognition forces the acceptance of space as a construct: sc. something created, not just something that 'is'. The question as to what created and sustains it must then be the focus of attention. Furthermore, if one type of space can be created, then so can others. We are faced with the



probability that what we call 'space' is but one of a number of 'spaces', and that the same almost certainly applies to time. These statements can be combined to suggest:

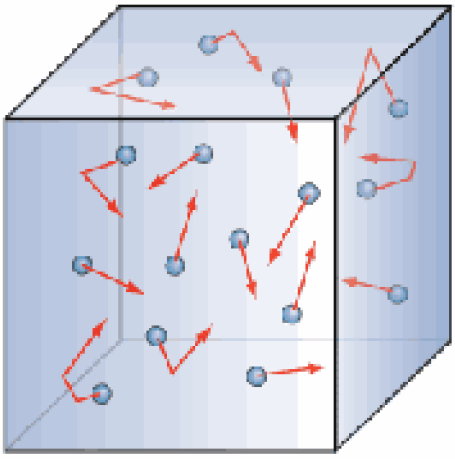
> **The space-time continuum we inhabit is undoubtedly one of several.**

Close consideration of atomic-scale phenomena quickly identifies the atom as a boundary of the physical realm for a reason that never appears in Physics textbooks:

> **The Second Law of Thermodynamics does not apply to processes within atoms. There is no entropy within them, so they cannot be physical.**

Most Readers will remember the Second Law from high-school days, and perhaps the related concept of entropy, but a more detailed understanding is necessary to clarify this vital point. The First Law of Thermodynamics states that the amount of energy in a closed system does not change. The most general closed system is the entire Universe, and the energy equivalence of mass is included in its broadest interpretation. Here we need only consider the mundane phenomena of daily life. A starting approximation can be made by proposing that no physical process is perfectly efficient. In practical terms this means that some energy is always 'lost' to heat in any physical event. Heat thus occupies a special place in Physical Theory as the ultimate product of all physical activity, conveniently exemplified in the idea of the eventual 'heat-death' of the Universe as its final fate. More precisely, the equations of thermodynamics identify the energy inputs and outputs of any process, including an inevitable term expressing the amount converted to 'waste heat'. These phenomena are most clearly evident in such macroscopic daily events as the operation of vehicles, or just the heat lost to friction when we push a chair across the room. A more relevant example is the tiny amount of heat lost every time we bounce a rubber ball on the floor. As the ball distorts, friction between the rubber fibres creates heat and the ball grows warmer.

Now take the example of molecules of a gas enclosed in a container. If the gas is hotter than the container, innumerable collisions between the gas molecules and those of the container wall will cool the gas and heat the container until both are at the same temperature. After a longer time both will have cooled still further to the same temperature as their surroundings; but there the cooling stops. Even though millions of collisions are occurring each second between gas and other molecules, all



of them are perfectly elastic. Not a single iota of energy is lost in any of the collisions, in complete contrast to all other physical processes. Note that the energy turned to heat within the rubber ball is not lost within its molecules; it merely sets them vibrating faster. Similarly, the molecules of the gas maintain a fixed average rate of motion so long as the temperature remains constant. This simple, obvious fact sets atomic collisions apart from all other physical processes and leads to the conclusion that:

> **The perfectly elastic collisions between atoms identifies them as boundaries of the Physical Realm at the scale of smallest size.**

Imagine a scene in Nature. The wind rustling the leaves of a tree; ocean waves rolling onto a beach; a rock dislodged on a cliff-face rolls into the valley. All are generating small amounts of heat that is 'lost' to the environment as a source of further activity in what can be pictured as a 'trickling-down of energy' that came originally from the Sun, energizes innumerable natural processes, and ends up as low-grade heat: atoms and molecules vibrating. There it stops. Atoms are the 'end of the line' - a fundamental boundary of physical processes, and thus of the Physical Realm.

The intense concentration of energy within atoms results from the juxtaposition and interaction of two different 'types' of space. An important function of atoms is therefore to act as an interface between these two 'spaces' by means of which influences can pass between them. The implications of this are profound, but are completely ignored by MWS.

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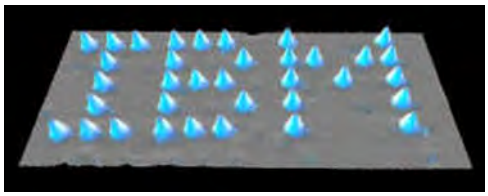
Quantum dimensions

Having shown that General Relativity is fundamentally flawed, and that descriptions by Modern Western Science about the fundamental unit of physical reality - the atom - are meaningless, we turn now to the remaining theory that claims to reveal the nature of Physical Reality: Quantum Mechanics.

Perhaps the first observation should be that 'the quantum', too, is often reified. One comes across mention or discussions about 'the quantum' as if it were a mysterious particle of some sort, a complete misunderstanding of the term. The word simply means *a quantity*, and is used in reference to a very ancient dilemma: the question as to whether a particular phenomenon is continuous or discrete. An easy example is water. We can buy drinking water in bottles of 250ml, 500ml etc, so in shops water is a 'quantized' substance: it is only available in discrete units of fixed size. But if we turn on a tap, we can obtain as much or as little as we want, so water from a tap is a 'continuous' substance. Of course, if we move down to the atomic scale, water is ultimately quantized: the smallest available amount is a single molecule of dihydrogen oxide or H_2O.



The ancient Greeks had schools of thought claiming both in regard to various aspects of Physical Reality. The atom is the 'quantum' of physical matter; some Greeks were atomists, others were not, and the same is true in the Vedic and other traditions. John Dalton was the first Western scientist in modern times to propose a viable atomic theory of matter based on empirical evidence, although debate persisted through the nineteenth century. Today we can detect and manipulate individual atoms, as in the famous IBM logo above left, so there is little cause for doubt.

Debate about QM and the nature of light arose from close study of radiation interacting with atoms. Newton held firmly to a particulate theory, that light consisted of a 'stream of corpuscles', whereas his contemporary, Huygens, argued for wave motion. Young's double slit experiment of 1803 demonstrated the interference of light waves most convincingly; and, along with the calculations of Fresnel, moved wave theory to the fore. This was further confirmed by Maxwell's brilliant work, and by the end of the nineteenth century the confident consensus was that light was definitely a wave phenomenon.

To his own alarm and bemusement, Max Planck published a paper in 1900 providing an answer to the long-standing problem of black-body radiation; but

in doing so he was forced to assume that the frequency of radiation only took on discrete values; in short, that is was quantized. This is a characteristic of particles, not waves, and created an uncomfortable stir.

Further proof arrived with another of Einstein's *annus mirabilis* papers on the photoelectric effect, and confirmed the existence of what are now called photons. It gained him a Nobel Prize and was eventually accepted; as was, albeit reluctantly, the fact that light was both a particle and a wave, its manifestation depending on the phenomenon under observation. Thus were born the 'dual nature of light' and the 'quantum of energy' or radiation.

Among the difficulties that this produced was one that had never been encountered before: the need for a mathematical description of discontinuous motion. The most common example is that of electron transitions within atoms. When an electron 'jumps' from one orbit to another, the transition itself cannot be described: at one moment it is in the first orbit, the next moment it is in the second. Details of the change are invisible and indescribable unlike all other forms of motion, in which graphs can show the smooth (sc. continuous) changes in location, velocity and so on. Thus QM is not a description of the motion of quanta *per se*, but of a sequence of discontinuous events rather than of traditional mechanical motion or kinematics.

What QM does not explain is why these phenomena are quantized; it merely describes the outcome of a given set of conditions. Nor does it provide deterministic answers; in other words, that *these* conditions produce *this* result, whist *those* conditions produce *that* result. Instead it provides probabilities for a range of outcomes for any given set of conditions. This is the *uncertainty* for which QM is famous, though more correctly called *indeterminism*, and was a major factor in prompting acceptance of the Copenhagen Interpretation. The lack of explanation as to why quantization occurs is a result of that acceptance: in the view of Copenhagen, no such explanation is possible, and questions of the sort are meaningless.

The previous chapter explained why a better understanding of atomic structure can only be obtained from a better understanding of space itself. A correct understanding of quantization requires both this and a better understanding of time. If we define Physical Reality as that which is revealed to us by our physical senses, then Physical Reality is an entirely electromagnetic construct. Atoms are 'electromagnetic bubbles' in space; light is an electromagnetic wave travelling through space in 'packets' or quanta. Other phenomena that are not electromagnetic are therefore not part of Physical Reality, but of one or more coexisting, coterminous realities, a requirement we have now met for the third time. Interactions between these separate realities can only be recognized and explained by admitting their existence and distinction. The reason why MWS is unable to explain so much of fundamental importance is because it denies their existence; and, in trying

to explain Nature as a single, all-embracing reality, it naturally finds insurmountable mysteries.

What QM fails to recognize is that the fundamental quantum of Physical Reality is the unit electric charge. Unlike space, time and mass, it remains completely invariant under translation: that is, when electrically charged particles are accelerated to near-light speed, their mass increases, their lifetimes increase due to time dilation, but their charge remains unchanged. This immediately raises questions as to the nature of electric charge which also require a correct understanding of space and time, as also does the nature of magnetism. Once these and the role of the unit charge in atomic interactions are understood, the reason why all such interactions are quantized is self-evident.

What, then, of the 'particle zoo' of the Standard Model that is a centrepiece of QM? The best explanation is an example. Remember the Higgs boson? It was predicted in the 1960s by Peter Higgs as the particle responsible for giving mass to other particles, and so was nicknamed the 'God particle'. Once discovered, Physicists avowed, they would then know the answer to life, the Universe, and everything! The rest of us have long known that the answer is forty-two, but Physicists remained unconvinced.

At the time, the highest energies available from particle colliders were in the low GeV range, far too small to produce it. What was needed was a Super Duper Particle Collider; and, in 1998 construction started on "the world's largest and most powerful particle collider, the most complex experimental facility ever built, and the largest single machine in the world", the Large Hadron Collider at CERN. It started operation in 2010 in the low TeV range - a thousand times higher than the previous generation of colliders - and, sure enough, in 2012 an announcement was made that the Higgs boson had been discovered. The din of self-congratulation was deafening, publicity spread worldwide, speeches were made, awards handed out, Peter Higgs was canonized, and a marvellous time was had by all.

Some months later, when journalists started calling back to check on progress, they were bemused at the response. Yes, the Scientists were fairly certain that the Higgs had been identified. "Fairly certain? But I thought . . . " Oh, there's always a degree of uncertainty in these things. What's more, some are now claiming that there's not just one Higgs, but maybe two or more. A few are suggesting that there may be a whole family of them, and that they may be composite. "Ah, I see! And . . . umm . . . just what does that mean?" Well, we'll definitely need a new round of experiments to test the ideas. Unfortunately the present machine is just not powerful enough to do the job. What's needed is a Super *Humungous* Particle Collider - the Ultimate Beavertron - one capable of detecting the newly-predicted Biggs scroton, ginormous particles thought to have been ejected from God's bodkin during

the first few yuktoseconds of the Big Bang (known to insiders as the Giant Fornication).

Particle Physicists, you see, are onto a Very Good Thing. It began in the late 1920s with the construction of the first linear accelerators and cyclotrons, accelerated rapidly during the Hitler War for the production of enriched uranium, and continued thereafter due to the strategic importance of atomic weapons. A Bigger Machine is guaranteed to produce exciting new particles, and these inevitably prove to consist of still smaller particles. Eventually the Bigger Machine runs out of steam and cannot split them, so a Still Bigger Machine is needed, along with another round of funding and, of course, a new round of salary increases to make sure of retaining the best minds. Sure enough, the Still Bigger Machine creates a host of even more exciting particles; and, would you believe it, *these* are also composite, hiding whole families of still smaller particles which the Still Bigger Machine cannot quite resolve. The only solution is . . . yep, you guessed it. This work is. of course, absolutely crucial to the well-being of Mankind, and must press on no matter how great the difficulties or the costs involved. Particle Physicists are the sole experts in their own field; no-one else is competent to hold opinions in it, and the papers they publish can only be understood by experts like themselves; but there's no question of their accuracy and infallibility. A lot like investment banking, really.

The key to understanding the Standard Model is that quarks also possess that most convenient property of being quite undetectable in isolation. Physicists 'know' they exist because their Mathematical Bibles prove it. Everything subsequent to quarks must therefore depend, not on empirical evidence but on mathematical theory. Imagine a shop with a large glass display window on a busy city street. A passing truck tosses up a stone that shatters the window, leaving glass shards strewn across the footpath. A naif might suggest that the window can be restored by gluing the shards back together, but this is not so. A pane of glass does not consist of many glass shards stuck together: it is a unique whole. Similarly, whilst the shower of smaller particles produced by colliding protons and other large particles is assumed to consist of their components, there is no evidence whatever that they exist in Nature other than as short-lived fragments of the collision, whether in cosmic ray showers or in particle accelerators.

In other words, most of the particles of the Standard Model are almost certainly artefacts of the machines that create and detect them, and play no part in the economy of Nature. One recalls some of the wisest words spoken by Gandalf in Tolkien's *Lord of the Rings*, ". . . he who breaks a thing to learn what it is has left the path of wisdom." That path was abandoned in 1927.

This is why, in spite of the billions of dollars and man-hours spent on particle physics research, it has yielded nothing whatever of practical value, only years

of increasing delusion. David Gross proved himself one of the few honest scientists when he stated, "We don't know what we are talking about" at the 2005 Solvay Conference, although he was forced into a retraction by colleagues. He said that the field is in "a period of utter confusion" comparable to that of 1911: "They were missing something absolutely fundamental. We are missing perhaps something as profound as they were back then."

The refusal of MWS to acknowledge the existence of multiple realities is made all the more puzzling by the postulates of QM concerning the existence of multiple 'dimensions', typically ten, but perhaps up to twenty-six. However, these additional dimensions are presumed to be 'rolled up' into tiny 'loops' so that they are - most conveniently - quite invisible; and - even more conveniently - can never be detected, except by the superior intelligence of modern Scientists.

The word *dimension* is one of several that are commonly misused in a pseudo-scientific context. In the vernacular we speak of the *dimensions* of a block of wood, meaning its measurements: length, breadth and depth. In Dimensional Analysis we speak of mass, length and time as being *dimensions*, referring to aspects of reality; in mathematics we refer to a line as a projection in one *dimension*, a plane as a surface of two, and a solid as a volume of three. Time is popularly held to be a fourth dimension in this sense.

This concept, as proposed and developed by Physicists, was first popularized by Edwin Abbott in *Flatland: a romance of many dimensions* published in 1884. It presents a two-dimensional world inhabited by beings who are two-dimensional geometrical creatures, describes their daily interactions and experiences, then goes on to describe their mystification at encountering three-dimensional objects penetrating and passing through the surface of their world. This is used as an analogy to explain the possibility of a fourth spatial dimension, and perhaps more, and soon gave rise to claims of the ability to visualize four-dimensional objects by uniquely gifted individuals. Unfortunately, none were able to offer proof of this faculty, nor of any superior insights gained by its exercise. The fad persisted for a few decades, but eventually died out, except amongst Physicists.

The extra dimensions of QM provide yet another example of reification. The mathematical speculations of Physicists are held to be accurate models of Physical Reality; therefore, any mathematical device essential to the model must have a physical counterpart. String theory requires ten dimensions: *ergo*, ten dimensions must exist. The fact of their being invisible and quite undetectable may be thought something of a problem in what is supposed to be an evidenced-based discipline of 'observation, analysis and deduction', but Physicists have for so long been accustomed to inventing clever 'explanations' of their absurdities that such difficulties are now easily taken in stride whilst

missing nary a step. To anyone with commonsense, their extra dimensions are as meaningless as the title of this chapter.

Here we take a simpler and more rational view. Physical Reality presents itself as a space-time continuum: a construct having three dimensions of space and one of time that obeys what can be called Physical Laws. It is, truly, an amazing creation; but need there be only one of them?

The assumption of places or 'spaces' other than the physical is not only historically ubiquitous; it is accepted as real by many people today, but for varied reasons. As previously noted, Physicists insist that there are ten or more 'dimensions' including the three of space and one of time we all experience. New Age advocates believe in an 'astral plane' or something similar, and perhaps other 'planes' as well. Spiritualists teach that we are surrounded by a 'spirit world' inhabited by the souls of the departed. The concept is so common that something of the sort must surely exist. Our purpose here is to develop a more rigorous understanding of these other *Realms*, as we will name them, using capitalization to differentiate from the general case. An important preliminary activity of the New Physical Theory will be to investigate their relation to the everyday world revealed by our senses.

Nature is everywhere fecund; if she creates something such as a fish, she does so most generously. Not just one fish, nor even many of the same type, but many different species and sub-species evolve over countless millennia, each slowly changing and evolving, gradually mutating into entirely new species. So too with plants, animals humans, planets and stars. Nature is not monogenetic but polygenetic. The Earth was once thought to be the only planet in the whole universe, and Earth humanity the only race of men. The discovery of other stars - other Suns - suggested that there may be other Earths, but this was resisted right up to the 1990s when the first *exoplanets*, those outside the Solar System, were proved to exist. It is now amply evident that planets are extremely common throughout the galaxy, and that millions of potentially habitable planets have always existed within it. Panspermia is just one reason why Earth-like life must also be ubiquitous.

MWS still insists that there is only a single space-time continuum; but why should this be so? Polygenesis should surely apply to space-time continua just as to all else in creation. We can make use of this concept to propose that the one we inhabit is not singular and unique, but just one, albeit vast and impressive, of many. If one exists, then others most certainly do. We therefore postulate that our ordinary physical surroundings constitute one space-time continuum that is permeated by at least one other. That is, they are coterminous: they occupy the same 'space', yet maintain their autonomy.

These coexisting continua cannot be detected by direct physical means because our physical senses only respond to stimuli within the Physical Realm, and even our electronic instruments are similarly limited. Yet not only are we aware of them: many gifted individuals can both sense them, and make practical use of them by means of what are commonly called 'psychic faculties'. The bridge between Realms must therefore be consciousness utilizing biological organs within living creatures adapted to specific modes of interaction.

In the simplest case we now have two distinct, interacting Realms as we have designated them. These Realms are coterminous, a word designating a concept that most people have entertained without thinking critically about it. This other Realm is imagined as being 'all around us' but invisible, intangible, apparently 'not there' but occasionally able to influence events in the Physical Realm. It occupies the same 'space' at the same time, but not the same 'reality'. Each Realm must also be *causally closed*. This simply means that every purely physical event has purely physical causes and purely physical effects. There is no 'leakage' beyond physical boundaries, and the same is true of other Realms.

In order for the Realms to interact, there must exist some sort of interface which allows events in one Realm to produce effects in another. This appears to violate the requirement of being 'causally closed'. The apparent contradiction is resolved by the existence of *stochastic* (or random) phenomena. If certain repetitive events appear to have no cause - that is, to occur by chance or to be non-deterministic - then their outcomes can only be estimated as probabilities. Influences from a coterminous Realm can act so as to 'bias' a series of events in favour of a preferred outcome. If this 'bias' operates over multiple minuscule events, the result at macroscopic scale is for a preferred outcome to result without there being an evident cause.

> **The reason and purpose of 'quantum indeterminacy' is to transmit influences between Realms indirectly, without allowing one to assert direct control over another. MWS can never arrive at this conclusion.**

Thus the brain must have one or more psychophysical interfaces within it that permit communication between the realm of consciousness proper, and the patterns of electrical activity within it by which control over the physical organism is exercized. Where and what these interfaces are, and how they operate, cannot yet be stated with clarity or precision, and are challenges for a newly-emerging psychophysical science.

What we need to understand is how these Realms can exist coterminously and semi-autonomously. This requires that each has well-defined boundaries, and that certain phenomena are able to act or exert influence across those boundaries. We therefore ask: what are the limits of Physical Reality. Here begins the study of Physical Theory.

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Chapter 9

The New Physical Theory

We have now examined the major ideas on which Modern Western Science is based, and touched briefly on some at the leading edge of research; yet at no stage has mathematics been important to our discussion. Other than a few simple equations known to all high-school students, plain language and a few specialized terms have sufficed. This is in marked contrast to the orthodox assertion that an understanding of science requires an understanding of advanced mathematics, something that will undoubtedly puzzle the thoughtful Reader. A brief explanation is warranted.

The simple fact is that mathematics is not necessary to understanding, only to application. Those wanting proof of this are well served by Richard Feynman's *QED: the strange theory of light and matter.* This slim volume explains QM in terms easily comprehensible by laymen, and begins with the explanation that the complex maths taught in university courses are only needed by those preparing for active work in the field, whereas explanation does not require it. The remainder of the book proves this, and most successfully.

The importance of this point requires emphasis. In the hagiology of MWS, Newton and Einstein are undoubtedly the most famous. Newton spent much of his life in academia, but the greatest portion of his writing was on religious topics. He also sat in parliament, and was Warden and Master of the Royal Mint. In other words, science and mathematics were just a part of his life, not the whole. Einstein was working as a patent clerk in a Bern patent office at the time his first and most insightful papers were published, and these relied more on lucid argument than on mathematics. This should be compared with modern scientific education, in which specialization is essential even before undergraduate studies, and becomes ever narrower through post-graduate and doctoral work, with mathematics becoming ever more essential until, in Physics especially, it soon becomes the whole of it, just as science becomes the whole life of its practitioners. Anything less can only lead to mediocrity in today's highly competitive world.

Most of the foundations of advanced mathematics were laid in the nineteenth century, at the beginning of which many scientific discussions included a great deal of religious and quasi-philosophical interpretation and debate, little of which was productive. As the power and scope of purely mathematical ideas became evident, many scientists not only sought ways of adapting them to scientific use, but began to experiment with mathematical formulations in the hope of discovering correlations purely by accident. Men like Hamilton and Maxwell sternly censured such activities, maintaining that clear conceptual understanding was paramount, since the role of mathematics was to describe the concepts, not merely to provide answers without insight. This dichotomy

persisted through the twentieth century until the end of the Hitler War, when Mathematical Physics was accepted as the only way forward, and understanding was relegated to a secondary role, or worse.

The point at issue here is less the role of mathematics in science, as the type of thinking - the intellectual skills - which it develops in the practitioner. These can obviously be very powerful, but they come at a very real cost. If the mind is continually trained in certain patterns of activity, these eventually come to dominate, and other modes of activity not only decline, but eventually become impossible. This can be contrasted with another discipline, that of meditation. In this the mind is brought into a state of quiescence. This is initially the goal of practice, and it is also as much as many practitioners know of it. However, once this state can be comfortably maintained for a time, other possibilities can be explored. One of these is to introduce a 'seed thought' or image into the mind, perhaps of a living thing such as a plant. The mind then responds by modifying the image to correspond with the intent of the practitioner, and in this way new insights about the object under focus become visually clear in the mind of the observer.

A second aspect of this practice reveals a new path of scientific investigation. It was stated in Chapter 2 that spiritual love is "the most fundamental relationship between life, consciousness and the manifestations through which they find expression." The spiritual aspect of consciousness does not communicate directly with the mind. Instead, it arouses emotions in the heart that stimulate images in the mind. The faculty of intuition is simply the harmonious interaction between emotions and mind. In *The Metaphoric Mind: A Celebration of Creative Consciousness*, Bob Samples states, "Albert Einstein called the intuitive or metaphoric mind a sacred gift. He added that the rational mind was a faithful servant. It is paradoxical that in the context of modern life we have begun to worship the servant and defile the divine." Immanuel Kant agreed: "All human knowledge begins with intuitions, proceeds from thence to concepts, and ends with ideas." Many similar statements can be found.

Excessive training in mathematics develops the purely rational at the expense of the intuitive. At the same time, increasing commitment to materialist philosophies gradually atrophies the ability to experience spiritual love in the heart. The end result of this is ubiquitous in the modern world, most plainly evident in the personae of leading scientists, academics, businessmen, politicians and bureaucrats. Young students should first be trained in the correct use of the mind and techniques for disciplining emotion in order to develop a balance suited to the arousing of intuition. Geometry and arithmetic can be combined with story-telling to encourage clear visualization. Music, especially singing, should be used for harmonious emotional development. Only when these abilities are confidently established should training in higher mathematics be attempted.

Chapter 1 explored the social role of science. Of equal importance is that society provides the context in which science develops and acts. This is nowhere more important than in education: in the social environment in which young intending scientists live and learn. Schools in the modern West emphasize competition to the point of obsession; intimidation and bullying are endemic in the schoolyard; harsh authoritarianism is rife in the classroom; and, despite the efforts of many devoted and humane teachers, and the healthy atmospheres of some carefully-managed schools, emotional toxicity is the norm in most Western educational establishments. Violence, even murder, is now a regular occurrence.

It is obvious that a new scientific tradition must avoid all of this, as also that it should be founded in a culture and traditions that respect and train the emotions as well as the mind. Such traditions can still be found in the East, although they are increasingly being poisoned by Western influences. Moreover, true science is essentially the study of Nature: of oneself, of Mankind, of the natural world, and of the relationships between them. This is best done by direct contact with Nature, not by reading about it in books. If young scientists are to be taught to love and respect Nature before learning to manipulate it, their training should be done in close contact with it, not in the air-conditioned alienation of glass and concrete.

Such the context; now to content. Few are aware that the Vedic literature of India contains remnants of an ancient science of consciousness. It is fragmentary, buried beneath a mountain of irrelevance, and couched in obscure language; but with patience and persistence it can be unearthed. Furthermore, it is not Indian, but was inherited by them from much older races. It is, however, deeply insightful when correctly understood. Few today know it for what it is; still fewer understand it. Parts of it have been carried forward into Buddhist literature, where it has since been further obscured. Nonetheless, it can surely serve as a beginning for developing ideas and practices as part of a new scientific tradition.

It also contains terms that have no parallel in Western lexicons describing concepts similarly wanting. A brief example will show the importance of this. Chapter 2 named consciousness as one of the five fundamental components of Physical Reality. In order to incorporate consciousness within a New Physical Theory, some understanding of its operation must exist. The most elementary is described by the *Gunas*, of which there are three: *Tamas*, *Rajas* and *Sattva*. These are normally interpreted in terms of morality, emotion, or religious ideas, but at the most fundamental level are the primary requirements for the material manifestation of consciousness. In order to create 'something from nothing', as it appears to us, a balance must be maintained such that both the appearance and disappearance of objects and events do not disturb those already existing. Every manifestation of consciousness within a space-time continuum accords with these three aspects in order to fulfil this requirement.

In very simplistic terms, a solar system demonstrates the Gunas: the star or sun is Tamas, the planets are Rajas, and gravity Sattva. Similarly in an atom, the nucleus is Tamas, the electrons Rajas, the electromagnetic field Sattva. The Gunas are always mixed in manifestation, and because of the presence of multiple coterminous realities or Realms, the roles are different in each. In terms of life within a solar system, planets are Tamas, being the fixed ground upon which life manifests; the sun is Rajas, providing the 'life-energy' which sustains it; and consciousness is Sattva, being the product of interaction between psychospiritual energy from the Sun acting within the organisms of matter. These very simple ideas can be developed to yield detailed understanding of the entities and processes under examination.

The Abrahamic traditions lost what little understanding of spiritual reality they had many centuries ago, and are now completely bereft of it. What they call 'spiritual' is merely psychic, and the little psychic knowledge they now possess is fragmentary, largely ineffective, and relates only to the lower aspects of psychism. The situation in Asia and the Orient is marginally better, but at least it rests upon a foundation of tradition and ongoing practice that could easily be reawakened, combined with modern scientific insights, and developed along lines that could benefit humanity instead of further debauching and demoralizing it.

This small monograph consists of extracts from an unpublished manuscript by the same Author that have been edited to present a brief but coherent critique of MWS. At about 160,000 words, the manuscript enlarges considerably on what has been presented here, including brief selected histories, alternative theories to replace those rejected as fallacious, application to broader topics, and suggestions for initial experiments to test, validate and further develop what is hoped can become the beginnings of a new scientific tradition. Its title is:

The Living Atom: Fundamentals of psychophysical theory

Those wanting more information can register their interest on the Contact page of the website.

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