A
SHORT TREATISE
ON
AETHER PHYSICS

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(Newton, 1687)   Absolute Space in its own nature, without relation to anything external always remains similar and immovable.

(Faraday, 1830)   I cannot conceive curved lines of force without the conditions of a physical existance in that intermediate space.

(Maxwell, 1876)   In speaking of the energy of the field, however, I wish to be understood literally. All energy is the same as mechanical energy, whether it exists in the form of motion or in that of elasticity, or in any other form. The energy in electromagnetic phenomena is mechanical energy.

(Lorentz, 1906)   I cannot but regard the ether, which can be the seat of an electromagnetic field with its energy and its vibrations, as endowed with a certain degree of substantiality, however different it may be from ordinary matter.

(Einstein, 1928)   According to the general theory of relativity space without ether is unthinkable, for in such space there not only would be no propagation of light but also no possibility of existance for standards of space and time.

Chapter 1

Foreword

The hypothesis that Space is a special substance, called the Aether, has existed in one form or another for many centuries. The hypothesis states that every aspect, every phenomenon, every law of physics of the Universe stems from the properties of the Aether.

The difficulty with this hypothesis lies in the determination of the Aether properties. Many have attempted the task and all to date have failed. This book describes a radical change to the previously accepted Aether properties and also gives some major laws of physics derived directly from these new properties. These Aether derived laws are different to the currently accepted laws of physics – in some cases radically different.

Modern Physics does not accept the Aether hypothesis. In fact it goes beyond mere non-acceptance. Modern Physics refuses even to listen to the arguments. It has closed its eyes and ears to the Aether. Aether papers are not accepted for publication in scientific journals, learned professors do not reply to correspondence on the subject, yet there are many important questions easily answered by the Aether hypothesis which Modern Physics still cannot answer.

The problem with the Aether is that it is undetectable by any common means. This leads Modern physicists to argue that if we can't detect it then it cannot exist. They also point out that the Universe is Lorentz invariant. This means that every inertial observer sees the laws

of physics identical to every other observer, irrespective of their relative velocities. Physicists argue that, if Space were an Aether, the universal Laws of Physics would appear different to observers according to their particular Aether velocity. In this they assume that an Aether Universe cannot be Lorentz invariant. This book demonstrates otherwise.

So what are the benefits of the Aether?
Well, to start with, the Universe is much simpler with only three dimensions and two forces.

The Aether also answers many otherwise unanswered questions such as:-

What determines distance in Space?
What is Time?
What determines the speed of light?
How does light travel through Space?
What determines the velocity of a matter body?
How are bodies caused to accelerate?
How do forces act across Space?

Modern Physicists also firmly believe that the predictions of Special Relativity of length contraction, time dilation and mass increase as functions of relative velocity could never be predicted by Aether physics. The actual truth is quite the opposite. Aether physics easily generates an Aether theory of Relativity. But the Aether theory applies to real matter bodies whilst Special Relativity applies only to theoretical inertial bodies of which none exist.

Over the years here have been many objections raised against the Aether hypothesis. This book demonstrates that none are valid.
The author has developed several important laws of physics from the New Aether model. Hopefully others may wish to extend this work further. The Universe has become more understandable.

Chapter 2

A History of the Aether

The Aether proper was originally described by Rene Descartes (1596 - 1650). He conjectured that Space was filled with an invisible substance which he called the Aether fluid after the name given to the upper atmosphere by the ancient Greeks.

Since then the expected properties of this Aether substance have been modified over the centuries as attempts were made to explain the unsolved scientific problems of the day. For example, the invention of the telescope led to measures of the distances between the planets and, hence, to our realisation of the great distances involved. The stars were so far away that their great distance could not yet be ascertained. For the first time Space was seen to be vast and the stars and planets minute in comparison.

This knowledge immediately led to a very important question. What caused the stars to be separated in Space, and to their various degrees? It seemed to many that Space must be a physical substance – albeit invisible and non-tangible - which filled the entire Universe. The Space substance was expected to be formed of a solid matrix which determined distance in all directions throughout Space. The heavenly bodies were positioned at various points within this matrix, like currants in a fruit cake. Modern Physics still has no satisfactory answer to this question.

In 1687 Sir Isaac Newton published his seminal work Principia Mathematica in which he proposed that gravity was a universal force operat-

ing between all masses, big or small, across the vast distances of empty
Space. The huge success of his theory immediately raised the question
as to exactly how gravity could act across empty Space. One solution
was that the gravitational potential was some physical property of the
Aether substance. Thus the gravitational potential would be supported
at each and every point in Space – but to a diminishing degree with
distance from its source. The transmission of the potential through
Space was expected to occur by physical contact between the elements
of the Aether substance. So here was a further reason supporting the
hypothesis of the Aether.

At about the same time Ole Roemer fortuitously managed to measure
the speed of light through Space (the modern figure is 299,792,458 meters
per second). So what determines this very precise velocity? It was only
natural to think that the speed of light was the intrinsic propagation
velocity of the Aether substance, just as material substances each exhibit
their own particular propagation velocity.

In the 19th century Michael Faraday and others investigated the
properties of the electric and magnetic effects. These two effects, like
gravity, also caused action at a distance across empty Space. The electric
effect acted between charges and the magnetic effect between magnetic
poles. The obvious explanation for the mediation and support of these
effects was that they too were certain intrinsic properties of the Aether,
but different to each other and also to the property that caused the
gravitation effect.

In 1803 Thomas Young determined that light was a wave phenomenon.
Now waves are merely the regularly changing levels of some character-
istic of a substance. That substance must be the Aether as light passes
through Space. But which particular Aether property would it be? In
1869 James Clerk Maxwell proposed that the physical characteristic that
constituted light and other radiation was a combination of the electric
and the magnetic forces. Both of these forces were already considered
to be properties of the Aether.

It can be seen that by the latter half of the 19th century there existed
a great deal of argument to support the Aether hypothesis – but no direct
evidence for it. Thus it was determined to obtain direct evidence by an

experiment. It was generally accepted within the hypothesis that the speed of light was determined by the intrinsic propagation velocity of the Aether. This velocity would therefore be identical every where and for all directions. But if the Earth was moving through the Aether, as expected, then the one-way speed of light as measured on Earth, would *not* be identical in all directions.

In the direction to which the Earth was moving the velocity of the incoming light would be at a maximum. And in the opposite direction the measured velocity would be a minimum. Hence measurements of the one-way speed of light in all directions would eventually uncover the maximum and minimum and their directions. From these measurements Earth's Aether velocity could be calculated. A positive Aether velocity would prove the existence of the Aether without doubt.

Two American gentlemen, Albert Michelson and Edward Morley, determined to undertake this experiment. They realised that it was impossible to measure the one-way speed of light, but a two-way out and return measurement would still uncover Earth's Aether velocity if the measurements were undertaken at 90 degs to each other. Unfortunately the effect was now only of the second order and was expected to be very small. Consequently the apparatus had to be extremely accurate. The experiment was undertaken at the Case Western Reserve University in 1887. The result was most unexpected. Irrespective of which direction they pointed their apparatus Michelson and Morley found no evidence of Earth's Aether velocity.

Many different explanations were proposed for the null result – the most obvious being that the Aether did not exist. But an alternative explanation was suggested simultaneously by George Fitzgerald and Hendrick Lorentz. They proposed that all material bodies contract in their direction of Aether velocity as a specific function of that velocity. This effect is called the Fitzgerald-Lorentz contraction effect after its inventors. Neither originator could explain the underlying mechanism of this effect.

The MM apparatus consisted of two equal length measuring arms placed at 90 degs to each other. Thus the arm of the apparatus in line with Aether velocity was contracted while the other arm, at 90 degs to

it, was contracted in width but not in length – a change in arm width being immaterial to the experiment result. The relative change to the length of the arms predicted a null result for any Aether velocity of the apparatus. It may not be immediately obvious but this result is actually independent of the orientation of the apparatus to its Aether velocity.

There were several criticisms of Fitzgerald and Lorentz's proposal. Firstly it was a purely ad-hoc suggestion not based upon any physics theory or calculation. Also the FL contraction effect predicted that the solid substance of matter would be contracted in the absence of any force. Furthermore, at the velocity of light, matter would be contracted to zero length. At that time matter was considered to be solid and substantial so it did not seem at all credible that matter could be contracted in this way.

But there were several other objections to the Aether hypothesis other than the Michelson-Morley null result. For instance, how was it possible that the substance of matter could freely move through the substance of Space without loss of energy - as is observed. And how is it that the velocity effects predicted by Albert Einstein's 1905 theory of Special Relativity, are all functions of velocity measured relative to the observer and never functions of absolute Aether velocity. It also didn't seem possible that a theory of relativity could be generated from a physics based upon a privileged Aether frame.

And then there was the problem of the Aether substance itself. Its properties and construction could not be described to any universal satisfaction. Maxwell, a firm believer in the Aether, invented a model of the Aether which purported to exhibit the required characteristics of the electric and the magnetic forces. George Fitzgerald actually constructed a physical model of Maxwell's Aether. But the model was ridiculously complicated with many gears and wheels. It was unreasonable to believe that Space was so complex.

Slowly but remorselessly opinion scientific swung against the Aether hypothesis. Today Modern Physics totally denies the existence of the Aether. Nevertheless, many phenomena, the explanation for which the Aether hypothesis was proposed, remain unexplained by Modern Physics. We still do not know what separates the stars, what transmits the grav-

itational effect across Space, what determines the speed of light.

Chapter 3

The New Aether Model

The Aether is merely the name for a general Space substance.
Without knowledge of its precise properties the Aether is almost meaningless. And there lies the difficulty. The Aether is remote from our material world and is utterly intangible to us. Thus we can only make guesses as to its particular properties. These guesses are naturally based upon our current knowledge of the physical Universe but sometime, perhaps more often than we would like to believe, we misunderstand the construction of the Universe. Consequently it is no easy task to arrive at the correct Aether properties. There are infinite combinations where one or more properties are incorrect, but there is only one correct set of properties. The test of these properties is whether a viable physics can be generated from them. By viable I mean either as successful as non-Aether physics or an improvement upon it.

The reason for the failure of the Aether hypothesis in the 19th and early 20th centuries was simply due to the fact that the physicists of the day had one Aether property wrong. Consequently they failed to generate a viable Aether physics. And without an Aether physics they could not combat the criticisms that were levelled at the Aether.

That false property has now been corrected. The error was due to the great Maxwell himself. Maxwell believed the relationships that he described in his equations of electromagnetism between the electric and the magnetic forces applied down to the Aether level. Thus he considered

magnetism to be a property of the Aether. In fact only the electric and gravitational potentials are physical properties of the Aether. The electric potential being the internal Aether 'pressure' and the gravitational potential being the propagation velocity of the Aether substance. The Aether substance is therefore much simpler than Maxwell had believed.

But if magnetism does not originate from within the Aether then from where does it originate? In fact it is a derivative of the electric field which occurs only with movement relative to the field. A later chapter gives a the explanation.

The properties of the New Aether are:-

1. *Space is a solid matrix of a physical substance such that distance is determined in all directions.*

2. *Aether density is a variable with respect to a reference frame determined by a more fundamental sub-Aether.*

3. *No other substance exists other than the Aether and sub-Aether*

4. *Aether density is a function of internal 'pressure' and vice versa.*

5. *The propagation velocity of the Aether is determined by its physical characteristics.*

6. *Local pressure differences are passed on via physical contact within the Aether substance.*

7. *The Aether substance exhibits inertia.*

Due to the innate difficulty of describing a substance so far removed from the material world this list of Aether properties is neither definitive nor exhaustive. The properties of the Aether are more precisely defined in their application to specific theories.

Some Immediate Benefits of the Aether Hypothesis
The New Aether properties have immediate effects upon our understanding of matter and Time.

As the Aether properties deny the existence of a special matter substance it follows that matter must be constructed of the Aether itself - of necessity of some form of complex and unknown geometry of elevated electric and gravitational potentials. The objection put forward of the difficulty of the movement of the matter substance through the Aether substance now disappears as matter is not a special substance but of the Aether, in the same way as light is of the Aether.

It also follows that the velocity of matter through the Aether must be determined solely by the internal geometry of each matter particle, for no other means exists which could determine matter velocity. It therefore follows that a change in that velocity requires a change in the internal geometry of the particle. As changes of particle velocity are caused by external fields it follows that the field must somehow operate upon the internal geometry so as to modify it. Here lies the seeds of the explanation of the action of potential fields upon matter.

The New Aether properties also have a profound effect upon our understanding of Time. The essence of Time is embedded within movement. The difficulty of our understanding of Time results from the greatly varying velocities of matter bodies. It can now be seen that the fundamental components of both matter and energy are the electric and the gravitational potentials and these all move at the local propagation velocity of the Aether. Thus Time is merely a description of the Aether distance moved by a potential transient. The path shape of that movement is immaterial. Thus, what we call Time, is merely Aether distance divided by the local propagation velocity – or d/c. Consequently, Time is not a dimension but merely a derivative of Aether distance.

The Aether Universe has just three dimensions.

Chapter 4

The New Electric Field

It is assumed that a fundamental mass particle generates a pressure difference with respect to ambient.

The pressure difference acts upon the Aether directly in contact with the boundaries of the particle and thereby increases the pressure within the adjacent shell of Aether (centred on the particle). In turn the elevated pressure within that shell acts upon the next adjacent shell outwards and so on. Thus the elevated pressure caused by a particle spreads outwards through the Aether at its propagation velocity, the speed of light.

The condition for stability is that the total force is equal on both sides of each Aether shell. But the area of the outer surface of the shell is greater than that of the inner surface by the ratio of $(1+2dr/r)$. Thus, for stability, the pressure must be greater on the inner surface than the outer by that same ratio. Consequently the pressure diminishes outwards with distance from the source particle. Appendix 1 calculates that the pressure diminishes with the inverse of the distance.

Factors which diminish with inverse distance from a mass particle are the electric and gravitational potentials. The assumption here is that Aether pressure is the electric potential and therefore the source of this pressure difference is a charged particle.

As the force exerted by a charge upon another charge is a function

of the inverse square of the separation distance it can be seen that the acceleration of a test charge positioned within an electric potential field is a function of the local gradient of that field. This is in keeping with the matter acceleration mechanism suggested in the previous chapter.

The properties of the Aether operate to equalise the force acting upon any chosen volume of the Aether as exampled in the theoretical shells surrounding a single charge. Where there are two or more charges this same mechanism acts to super-position the separate potential fields upon each other at all points in Space. Thus the electric potential at each and every point in Space is the arithmetic super-position of the fields of every charge in the Universe - but delayed by the time to cross the intervening Space at the speed of light.

As both positive and negative charges exist (elevated and diminished pressures), opposite potential fields subtract through the super-position process. Because most charges occur within atoms, within which there is equal and opposite charge, the effects of distant charges are nullified by their inclusion in atoms.

The Electric Field of a Moving Charge

The determinations made above of the electric potential field were all made with the source stationary within the Aether. Once the pressure difference is created by the charge it propagates outwards through the Aether with respect to the Aether and not to the charge. Thus, if the charge is moving through the Aether, as is most likely, the charge moves through its own expanding field. This effect is described in Appendix 2. The consequence is that the field is not symmetric about the y and the z axes (the origin of these axes is the charge, the x axis lies in the direction of charge movement).

However, the moving charge will eventually, by means of its electric field, accelerate a second charge. The field of the second charge will, in return, affect the first charge. This two way out and return operation takes place at the speed of light. By this means a charge *observes* its own field. It can be seen from Appendix 2 that the observed field of a charge is symmetric. It is the observed field that we are normally concerned with.

The Lorentz Transforms
For this consideration it is necessary to introduce the concept of inertial reference frames (IRF).
IRFs have three distance dimensions while time s given as IRF distance traversed by a light wave, ie. d/c. For matter time the path travelled is out and return.
The Aether is the only physical IRF. Other IRFs are theoretical concepts of Space moving at velocity with respect to the Aether.
The dimensions of an IRF can be related to those of the Aether by the Lorentz Transform equations.

It can be seen from the observed field equation in Appendix 2 that the dimensions of the field are increased in all directions equally by the factor $1/\sqrt{(1 - v^2/c^2)}$ – called the Lorentz factor. This dilation relates to the unit of Time in the inertial reference frame (IRF) of the moving charge – the unit of Time being the time for the charge to observe a specific electric potential contour of its own field. Thus Time slows for moving charges.

It can be seen the x axis is also contracted by a further Lorentz factor. The full Lorentz Transform equations for the three distance dimensions and for time are derived from the equations of the electric field in Appendix 3. The Lorentz Transform equations were originally derived by Einstein, but from entirely different and questionable postulates.

At this point the Lorentz Transforms derived from the electric field only transform the dimensions of the field of a static charge to that of a moving charge.

The Effect of Aether Movement on Atomic Matter
Atoms are constructed of a heavy nucleus orbited by electrons accelerated towards the positive charge of the nucleus. The electrons are positioned in a number of shells – the outer shell effectively determines the size and volume of the atom. It follows that the electron orbits, and hence the size of the atom, must be modified when the electric field of the nucleus is affected by its movement through the Aether according to the Lorentz transforms.

J. S. Bell, of quantum mechanics fame, calculated this effect upon a hydrogen atom moving relative to the observer's frame. This frame may be the Aether and so Bell's calculations equally apply to Aether movement. Bell calculated the separate effects of the electric and the magnetic forces, but as the total force must be independent of any theory of the origins of the force his calculations are equally applicable to the Aether hypothesis where the magnetic force does not exist in these particular circumstances. Thus Bell's conclusions are equally true for the Aether scenario.

Bell found that the electron orbit was contracted in the direction of movement to exactly the same extent as the contraction of the electric field. As all matter is constructed of atoms it follows that the dimension of all matter contracts in the direction of Aether movement to exactly the same extent as determined by the Lorenz Transform eqns. This is the Fitzgerald-Lorentz Contraction Effect met with in an earlier chapter. At the time it was an ad-hoc proposal but it can now be seen that it is properly founded upon the new Aether model.

Bell also found that the electron orbital period dilated in exact accordance with the time dilation effect occurring in the moving electric field. As the orbital period of an electron is one example of a matter time unit generator it follows that all matter time unit generators, however constructed, must obey this effect identically. Thus time in matter systems in general dilates in accordance with the Lorenz Transform effect for the electric field.

Thus matter moving through the Aether experiences the real effects of length contraction and time dilation as a function of its Aether velocity. By means of a standard application of the Lorenz Transforms for length and time it is also determined that the mass of an Aether moving body increases to the same degree as time dilation and, from this result, that $E = mc^2$.

These effects are identical in form to the predictions of Special Relativity except that they are functions of instantaneous Aether velocity rather than relative velocity between IRFs.

These results constitute the Theory of Aether Velocity Effects (TAVE).

Chapter 5

Lorentz Invariance

The previous chapter demonstrates that matter suffers real length contraction, time dilation and mass increase, all as Lorentz functions of its Aether velocity. These effects apply equally to atomic particles as to galaxies.

As a consequence the measuring rods and clocks of an observer are length contracted and time dilated. Thus an observer's measure of the Universe is distorted due to the necessary employment of his distorted measuring instruments. This distorted measure of the Universe is the observer's inertial reference frame.

An observer cannot tell from his surroundings that his world is distorted for the reason that every thing is equally distorted. Thus, if he wishes to measure the length of an iron bar in order to discover in which direction the velocity contraction is at a maximum and the degree of that contraction, he is unable to do so as his measuring rod is as equally affected as the iron bar which he wishes to measure. If the iron bar is contracted to one half of its stationary length then his measuring rod is also contracted to one half. Thus the iron bar will always measure the same number of meters long.

It is the same with Time. All clocks, of whatever construction, and all time dependant processes of a body are equally time dilated. Thus one clock can never detect the effect of Aether velocity in any other clock or time dependant system stationary with respect to it.

It is the case that, no matter what is being measured, or how complex the measurement or how complex the apparatus, the effects of Aether velocity can never be experienced as a consequence of this principle. The Michelson-Morley experiment is just one example of a more complex but misguided experiment intended to detect an effect of Earth's Aether velocity. The more complex the experiment, the greater the opportunity for the experimenter to fool himself into believing that an effect of Earth's Aether velocity will be observed.

As no effect of an observer's Aether velocity can ever be detected the Laws of Physics appear identical to all observers in the Universe. This fact is called Lorentz Invariance.
However, it is not yet obvious that Aether physics predicts the effects observed of bodies moving through the IRF of an observer which are purely functions of relative velocity.

Detecting the Aether
However, it is possible to measure Aether velocity by astronomical means.

In 1965 Amo Penzias and Robert Wilson detected micro-wave radiation of a precise frequency band coming from every direction of Space. The origin of this cosmic micro-wave background radiation, or CMBR for short, seemed to be Space itself. Careful measurement and analysis showed that the frequency of the CMBR band was slightly higher in one direction in Space and slightly lower in the opposite direction. The explanation of this frequency shift is that it is a Doppler effect due to the velocity of the Earth relative to the source of the radiation. The velocity calculates to be 370km/s for our galaxy.

So what is the source of the CMBR radiation? It must originate from matter, but possibly billions of years ago such that it has suffered considerable redshift since. Matter moves through the Aether at greatly varying velocities but, on average, equally in all directions. Thus the average Aether velocity over much matter and huge volumes is zero. Hence the source of the CMBR is effectively the Aether itself. Consequently the Doppler shifted CMBR give us a direct measure of our Aether velocity.

Chapter 6

Aether Relativity

The velocity effects of observed length contraction, time dilation and mass increase are found to be all functions of relative velocity – that is velocity through the inertial reference frame (IRF) of the observer. It is often questioned how the Aether hypothesis, which predicts the effect of absolute Aether velocity, could simultaneously predict the effects of IRF velocity. In fact, the generation of an Aether theory of Relativity is a relatively simple operation.

The measure of the length, time or mass units of a body at distance and passing at relative velocity through the IRF of the observer presents a certain practical problem. This problem may be overcome in all three cases by making two observations of the observed body separated by a known time interval. The observations must be of the two-way, out and return, type. The communication may be made either by light ray or by physical movement of the observed body, or indeed by any combination of the two. If the observations are made by a light ray or equivalent the outward journey time t_o, which delays the reading of the observed body, can be allowed for. However there is an unavoidable error in the calculation of t_o which is important to the theory. See Appendix 4.

Now observer A measures the equivalent unit of the observed body B in terms of his own unit. Thus he obtains the ratio of the two units. This happens to be the ratio of the two Lorentz functions of the observer

and the observed body and is given by:-

$$\gamma_B/\gamma_A$$

where the Lorentz function is denoted by the Greek letter gamma.

Now the gamma ratio γ_B/γ_A occurs in a standard Lorentz Transform equation which derives from the transformation of the velocity of a body through one IRF to that through a second IRF. In the present case one of these IRFs is the Aether. The other IRF, which contains the observer A, is moving at velocity V_A with respect to the Aether. The observed body, *which need not be inertial*, is moving at instantaneous velocity V_B through the Aether and velocity V_R through the IRF. The velocity transform equation states that the gamma ratio, after the two readings and taking into account the observation effect, is given by:-

$$\gamma_R(1 + V_d^2/c^2)$$

where V_d is the velocity of the observer at the second reading through his IRF which existed at the first reading. Hence V_d is the change of velocity of an accelerating observer during the measurement period. The full calculation is given in Appendix 4.

This is the Aether Theory of Relativity.

This function modifies the observed length in the direction of velocity and inversely modifies the observed time unit and mass.

For a theoretical inertial observer V_d is zero. Under these circumstances the Aether relative velocity function γ_R is identical to that of Special Relativity. I say identical but in fact there is a subtle difference for the observed body may be accelerating where-as in Special Relativity the observed body must be inertial.

It is a justification of the Aether hypothesis and the New Aether model that it produces an Aether theory of Relativity. It is even greater justification that the Aether Theory of Relativity is applicable to real

accelerating bodies when its competitor theory, the Theory of Special Relativity, is not.

The Aether Theory of Relativity, together with the Theory of Aether Velocity Effects, conclusively demonstrate that the Aether Universe is Lorentz Invariant. This is an important statement as deniers of the Aether generally believe this to be impossible.

The Absurdities of Special Relativity.

The postulates of Special Relativity specify that the laws of physics *are* identical within each and every inertial reference frame (IRF). In particular the speed of light *is* identical in each and every IRF. (Aether physics states the laws of physics are *observed* to be identical.)

Also Special Relativity maintains that no IRF is more special or more privileged than any other. As the Aether is a physical substance it is a privileged IRF and hence is denied by Special Relativity.

IRFs are theoretical representations of Space within which the observer is stationary and inertial. They represent Space in co-ordinates of three distance dimensions stretching to infinity and, for Special Relativity only, one dimension of time. Thus in Special Relativity Space is four dimensional. An observer may be any material body however large or small. As material observers move with respect to each other at velocities between zero and just below the speed of light then IRFs also move relative to each other at these velocities.

The concept of theoretical IRFs is perfectly acceptable in Aether physics as they are employed merely as a mathematical tool to mirror the characteristics of the Aether at some relative velocity to it. But in Special Relativity IRFs are elevated to the construction of Space itself. Matter bodies exist – so a theoretical IRF is attached to them. The IRF determines the dimensions of distance and time which, in turn, determines the dimensions of the included matter body which originated the IRF. Thus the Special Relativity argument for IRFs is a circular one.

A further absurdity is that IRFs cannot exist, simply because inertial bodies do not exist. Inertial means having zero acceleration which, like Absolute Zero temperature, is impossible to attain. If by some means IRFs could exist in the absence of a material body they could then not

be detected and so would be entirely pointless.

But if we temporarily ignore these absurdities and limitations but decide to continue into Einstein's fantasy world by falsely attaching IRFs to non-inertial real bodies then we would have an infinity of IRFs within the Universe all moving at different velocities to each other yet overlapping each other at each and every point. A Universe of this description is surely impossible to imagine or to believe in.

It is also impossible to accept that a light ray, moving through the infinity of IRFs simultaneously, would move through them at an identical velocity, as required by Einstein's postulate, when these IRFs may be moving at high velocity relative to each other.

The Two Clock problem

Nevertheless, and despite restrictions to the contrary, physicists employ Special Relativity on non-inertial bodies - or think they do. But of course, they are actually unwittingly using the Aether Theory of Relativity - which does apply to non-inertial bodies. However, when the acceleration of the bodies is large, particularly that of the observer, they experience difficulties. This is because they are not employing the full Aether theory, which includes the correction factor for non-inertial observers.

The Two Clock experiment epitomises this problem.

Two identical and synchronised clocks are stationary adjacent to each other. Clock B starts the experiment by accelerating away from clock A, which remains inertial throughout. Clock B goes on a journey, of any direction, shape, length, velocity or duration. Eventually clock B re-units with clock A, which ends the experiment. The two clocks then observe each others reading. Clock A observes clock B to be slow and, naturally, clock B observes clock A to be fast. Special Relativity cannot predict the fast running of clock A. The Aether Theory of Relativity can predict the fast running of a clock A.

The Two Clock experiment can be refined some what in order to simplify calculation by making the periods of the acceleration of clock B very short relative to longer periods of constant velocity. Thus clock B rapidly accelerates away from clock A and then recedes at a constant

velocity V. After a duration of T clock B rapidly accelerates towards A and returns at a constant velocity of V. A final short deceleration brings clocks A and B together again. This version of the journey is called the Twins or the Clock Paradox - but there is no paradox, simply a failure of Special Relativity.

In this case $V_d = -2V$. If this factor is applied in the Aether theory for the return half of the journey clock B will predict that clock A is fast by the correct degree. The calculations are given in appendix 5.

Chapter 7

Magnetism

Having decreed that magnetism is not a separate and distinct force it is encumbent upon Aether physics to explain the true origins of the magnetic effect.

The most straightforward example of the magnetic phenomenon is found in a current carrying wire. A nearby test charge is unaffected by the wire except when moving relative to it. Then it experiences a force at 90degs to its velocity. This force, called the magnetic force, is proportional to the relative velocity and the wire current. It is given a different name as it appears to have a different origin to the electric force.

In order to simplify the explanation and the calculations involved we consider a straight wire of infinite length. It is found that the electric force on a stationary unit test charge positioned at distance d from the wire is given by:-

$$F = 2kq_L/d$$

where $k = 1/4\pi e_0$ and q_L is the charge per unit length of the wire. The calculations are given in appendix 6.

As the current electrons exhibit an equal and opposite force to the ions when no current flows the net force on the test charge is zero.

It can be seen that the equation for force F is identical to the equation for the electric potential field generated by a charge of value $2q_L$ positioned at distance d from the test charge. Thus we now need only consider the movement of the test charge relative to the electric potential field of a single charge.

The mechanism of action of the field upon the test charge depends upon the orientation of its velocity to the line between the two charges.

The first case is when the test charge moves in the line directly joining the two charges, ie. towards or away from the wire. Because the test charge is moving relative to charge $2q_L$ its electric field is effectively contracted to an ellipsoid by the relativity effect of length contraction. But in addition the field of charge $2q_L$ is also contracted in the direction of its current velocity along the wire. The result is that the electric field is both contracted and rotated. Thus the contours of the field are now not at exactly 90degs to the line joining the two charges and there now exists a small component of force upon the test charge at 90degs to its relative velocity in addition to the major force component at 0degs. But the 0 deg component is cancelled by the electric field of the wire ions. The 90deg effect we call magnetism.
This force is given by:-

$$F = VIu_0/2\pi d$$

The calculations are given in appendix 8.
The second case occurs when the test charge is moving parallel to the wire. We now have the relativistic addition of two velocities - that of the current electrons along the wire and that of the test charge along the wire. The result is a modified field of the current electron charge $2q_L$ which is no longer cancelled exactly by the field of the wire ions. The net field creates a force on the test charge at 90degs to its velocity. The force is identical (for low current velocities) to the first case. The calculations are given in appendix 7.

So irrespective of the direction of movement to the wire, the test charges experiences a force at 90degs to that movement. Although the

origin is electric its unusual circumstances have earned it the special name of magnetism.

Chapter 8

Wave Transmission through Space

In Modern Physics the transmission, reflection, refraction and diffraction of radiant waves through Space is explained by the theories of Augustin-Jean Fresnell and Gustav Kirchoff.

FK wave theory postulates that every point of a plane wave advancing through Space acts as a separate wavelet generator which radiates in all directions, but forwards only, with an intensity which diminishes with inverse distance. The amplitude of these separate wavelets superposition upon each other at all points in Space causing constructive or destructive interference according to the relative phases of the waves. The combined effect is to create a new wave front, similar to the old and at a set distance in advance of the old, which in turn acts like the old and continues to propagate the wave forwards at the speed of light.

Thus Modern Physics requires Space to be constructed of an infinity of elements which support a changing potential and pass that potential on to adjacent Space elements. The fact that this transfer acts only in the forward direction also indicates that these elements possess inertia. These requirements describe a physical reality to Space which is only possible if Space is an Aether. It is the case that the properties of the New Aether Model operate in precisely the manner required by FK wave theory.

Thus Modern Physics requires the properties of the Aether and yet denies its existence.

Chapter 9

Gravity

There are five things we need to know in order to fully understand gravity.

1. How mass causes the gravitational effect?

2. How the effect acts across Space?

3. How is mass caused to accelerate in a gravitational field?

4. How is light affected in a gravitational field?

5. To what extent is mass and light affected?

Newton explained number 5 but with respect to mass only.
Einstein's General Relativity gives an explanation of why light is affected and also makes an attempt to explain the gravitational field in Space.
But it is a fair judgement to say that non-Aether physics has not been very successful in explaining gravity.

Aether Physics proposes that the gravitational potential is a physical property of the Aether - in fact its propagation velocity, the speed of light. The speed of light is not affected by the gravitational field - it IS the gravitational field.
Thus the gravitational potential is physically supported every where in Space.

It is the case that the speed of light is slower close to a mass. At the surface of the Sun the speed of light is slower than on the surface of the Earth by roughly two parts in a million. This may seem hardly enough to cause an acceleration of matter of 28 times that on Earth, but be assured that it does.

The difference in the speed of light (with respect to that at infinity) decreases with inverse distance from the source centre in the same manner as with the electric potential. Thus the potential gradient decreases with the inverse square of the distance.

The speed of light gradient has a particular effect upon a light ray crossing the gradient. We may assume that a light ray has a certain thickness - the actual thickness is of no consequence. Thus the speed of that part of the light ray nearest the source mass will move slightly slower than the opposite part furthest away from the mass. The effect is to bend the light ray towards the mass. This bending is exactly equivalent to an acceleration towards the mass centre, but at twice the rate experienced by a test mass at the same point. See Appendix 9.

When a light ray grazes the surface of the Sun this bending effect may be observed. The angle that the light is bent through is very small despite the fact that the gravitational acceleration at the Sun's surface is the greatest to be found in the solar system. This small degree of bending is simply due to the fact that the light ray is only close to the Sun for approximately 5secs before it zooms off into Space. If, however, a light ray could be confined to a spot close to the Sun by some means - possibly by bending it through 360degs by mirrors in a plane parallel to the Sun's surface - then the circling light ray would fall continuously towards the Sun at 56g.

The effect of a local speed of light gradient upon mass is impossible to describe fully as Aether physics argues that the effect acts to modify the internal geometry of a mass particle which determines its velocity - and that geometry is not known. However it is likely that the geometry is constructed of electric potentials moving at the local speed of light within the confines of the particle. Thus the underlying speed of light gradient – the gravitational field – must modify the paths of these rotating potentials and thus the internal geometry of the particle – and

hence its velocity.

It is interesting to note, that if these rotating electric transients constitute a sphere, around which the moving potentials were equally distributed, only those transients crossing the gradient (one half of the total) would be affected by it. Possibly this is why matter accelerates at one half the rate of a tangential light ray.

Now for the big question – How does mass create the gravitational field? Non-Aether physics has no answer and, furthermore, not even a reasonable suggestion.
But Aether physics does at least have a suggestion.

In a material substance the intrinsic propagation velocity is a function of the internal pressure relative to a change of density such that $v^2 = dp/d\rho$. If it may be assumed that a similar equation applies to the Aether substance then the gravitational field might be produced by an increase of Aether density, caused by the source mass, which diminishes with inverse distance by a similar mechanism to Aether pressure. We would then have:-

$$c_L^2 = c^2/(1 + \rho_r/\rho_\infty)$$

where c_L is the speed of light at distance d from the source mass centre and c is the speed of light at an infinite distance.
ρ_r is the increase in Aether density. It is proportional to the source mass and the inverse of distance from it.

This equation is interesting as, no matter how large the source mass, the local speed of light cannot go to zero. This is contrary to the prediction of General Relativity. It implies that Black Holes either do not exist or at least are not created by the current accepted mechanism.

When the ratio ρ_r/ρ_∞ is small, as it is for most stars, then the Aether equation is identical to those of General Relativity and of Newton.

Chapter 10

Cosmic Redshift

Hubble's Law states that the frequency of the emissions of a distant source, such as a galaxy, is redshifted by an amount proportional to the distance to that source. The frequency shift is called cosmic redshift as, when applied to visible light, the frequency is lowered towards the red end of the visible spectrum.

The accepted interpretation of cosmic redshift is that the Universe is constantly expanding everywhere. Thus the wavelength of the emitted radiation is lengthened in its passage through Space and Time from the distant galaxy to Earth – an increase in wavelength equals a diminution in frequency. The constant expansion of the Universe implies that, going backwards in Time, the Universe is shrinking. Thus at some point the Universe was of pinpoint size and prior to that it did not exist at all. The creation of the Universe from nothing is called the Big Bang.

The fundamental fallacy of these conclusions is that they are based upon the assumption that we know the frequency of the radiation at the time of its emission. For without this knowledge how can we know that the received radiation has changed in frequency.

So why do physicists think they know the emission frequency of a star in a galaxy ten billion light years distant and ten billion years ago. The answer is this. If, for instance, the emission is accepted by its particular signature to come from a hydrogen atom in a distant star ten billion years ago it is assumed that the emission is identical in frequency to

that of a hydrogen atom in our Sun emitted some eight minutes ago.

Physicists therefore assume that, over the aeons of Time, Space distance is changing but the rate of passage of time has remained constant. There is no justification for this assumption. It is equally likely that Space distance remains constant and Time runs continuously faster. In that case the frequency of the emissions of a hydrogen atom in a distant galaxy would have been less then than it is today from our Sun. The lower emission frequency would then be maintained constant throughout its long journey to Earth.

In fact it is impossible to make either assumption. All that can be said with certainty is that the ratio of Space distance to time unit is constantly increasing. In other words the speed of light is constantly increasing throughout Space.

As we cannot now say that Space is expanding, we also cannot say that the Universe started with a Big Bang.

Newtonian Anomalies
A further interesting consequence stems from the conclusion that the speed of light is constantly increasing.

In the previous chapter it was seen that the speed of light is the gravitational potential. Close to a mass the speed of light is relatively low and increases with distance from the mass centre. But moving outwards from the source mass at the speed of propagation of the gravitational field generates a time delay during which the speed of light has additionally increased due to the cosmic redshift effect. Thus the gravitational potential (taking it to be high at the source mass) diminishes with distance at a slightly greater rate than predicted by the inverse square law. Consequently the gradient is slightly greater by the amount $H_0 c/2$ (where H_0 is Hubble's constant) and the acceleration of matter is slightly increased.

This anomaly is only noticeable at a great distance from the source mass with low levels of acceleration such as are found in the outer regions of galaxies or the solar system. It has been noticed that the rotational velocities of stars in the outer regions of galactic spiral arms are higher

than expected due to a higher gravitational acceleration than expected from the inverse square law. The current explanation is that a special form of matter exists, called Dark Matter, which is unseen despite being many time more abundant than ordinary matter. This Dark Matter is expected to be fortuitously positioned around galaxies such that it causes the observed effect.

In fact cosmic redshift almost exactly accounts for the observed anomalies. There is no need for the hypothesis of Dark Matter.

Chapter 11

Appendices

Appendix 1
The Generation of the Electric Field

A matter body is taken to exert a constant pressure difference to that of the Aether at infinite distance.
The body is taken to be stationary in the Aether.

A nominal Aether shell of thickness dr centred upon the body at distance r is considered.
The requirement for a field in equilibrium is that the total force on either side of each shell is equal. Thus, if the shell surface area is termed a we have:-

$$p_2 a_2 = (p_1 a_1 + p_3 a_3)/2$$

where p is Aether pressure and shell 2 is sandwiched between shells 1 and 3. Thus:-

$$p_2 r^2 = [p_1 (r - dr)^2 + p_3 (r + dr)^2]/2$$

Putting p_1 to unity it is found that $p_2 = (1 - dr^2/r^2)$.
Thus the pressure diminishes by dr^2/r^2 for each shell moving outwards.
The gradient of the drop is dr/r^2.
The integration of the gradient is $-1/r$.

Thus the magnitude of Aether pressure diminishes with inverse distance from the source centre out to infinity.

Hence Aether pressure p is considered to be the electric potential ϕ and the body is a charge.

Appendix 2
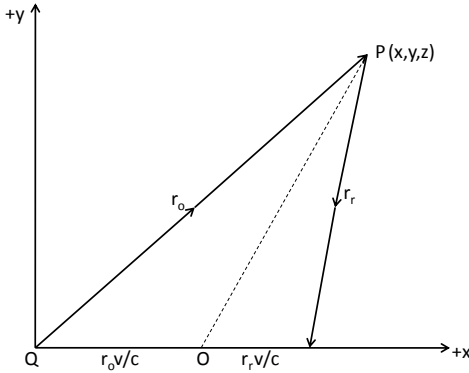## The Electric Field of a Moving Charge.

Figure 11.1: The Electric Field

When a charge moves through the Aether the electric potential field, initially generated by the charge, is constantly changing but with respect to adjacent Aether potentials, not to the charge. Differences in the field potential are propagated outward at the speed of light from the Aether point at which the charge existed when it originated the potentials. Thus the charge moves through its own field.

In Fig(11.1) the potential at point P arose from the source when the source was at point Q, but which is now at point O (defined as the origin).

The distance from point Q to point P is r_o and from point Q to point O it is $r_o v/c$, where v is the Aether velocity of the charge in the x direction. From Pythagorous we have:-

$$r_o^2 = [(r_o v/c + x)^2 + y^2 + z^2] \tag{11.1}$$

Hence:-

$$r_o = \gamma[\gamma x v/c + \sqrt{\gamma^2 x^2 + y^2 + z^2}] \tag{11.2}$$

where $\gamma = 1/\sqrt{1 - v^2/c^2}$, the Lorentz factor.

As the equation for the field of a stationary charge is $\phi = q/4\pi e_0 r_o$ then the field of a moving charge is given by:-

$$\phi = q/4\pi e_0 \gamma [\gamma x v/c + \sqrt{\gamma^2 x^2 + y^2 + z^2}]$$

Thus the electric field is not symmetric about the y and z axes of the frame of the charge.

However, electric fields which do not affect another body might as well not exist.

A test charge located at point P and accelerated by the field will communicate its movement back to the originating charge via its own potential field at the speed of light. Thus the *observed* field of a charge is delayed by the communication back from point P to the charge - now moved on to point R.

The equation for the return distance r_r is given as :-

$$r_r = \gamma[-\gamma x v/c + \sqrt{\gamma^2 x^2 + y^2 + z^2}] \tag{11.3}$$

From the point of view of the charge, as the observer of its own field, the distance $+\gamma x v/c$ in eqn(11.2) and $-\gamma x v/c$ in eqn.(11.3) cancel each other.

Thus the *observed* field is:-

$$\phi = q/4\pi e_0 \gamma \sqrt{\gamma^2 x^2 + y^2 + z^2} \tag{11.4}$$

which is symmetric about the y and z axes.

Eqn(11.4) is different to the Maxwell-Heaviside equation as its gradient must generate the combined accelerating effects of both the Maxwell electric field and the associated magnetic field.

It can be seen that all three dimensions of the field diminish equally by γ. The x dimension diminishes by an additional factor of γ (length contraction).

Appendix 3
The Lorenz Transforms

The dimensions of the Aether frame S are given as x, y, z and t.

The dimensions of the IRF S' in which the Aether moving charge is stationary are ξ, η, ζ and τ.

In these two frames time is taken to be d/c where d is distance in any direction in the frame in question.

From eqn.(11.4) $r = \gamma\sqrt{\gamma^2 x^2 + y^2 + z^2}$ in frame S'.

Dividing by c gives:-

$$\tau = r/c = \gamma d/c = \gamma t \tag{11.5}$$

where d is distance in frame S' as determined by the square root function.

This equation describes the ratio of the time unit, eg. the second, between the Aether and the IRF as the out and return journey to point P from the charge acts as a time unit. The ratio of time measurements is the inverse of eqn.(11.5).

Within the square brackets of eqn.(11.3) by definition $\eta = y$ and $\zeta = z$. Within the square brackets both y and z are zero when considering the x co-ordinate only, thus:-

$$\xi = \gamma(x - vt) \tag{11.6}$$

where t is taken to be x/c.

This is the Lorentz transform equation for the x co-ordinate.

After dividing eqn.(11.6) by c and employing $t = x/c$ and $\tau = \xi/c$ we have:-

$$\tau = \gamma(t - xv/c^2) \tag{11.7}$$

which is the Lorenz transform equation for time.

At this stage the Lorentz Transform equations only to the transformation of the dimensions between the electric fields of a stationary charge to one moving through the Aether

Appendix 4
The Aether Theory of Relativity

An inertial observer body A (Aether velocity v_A) wishing to measure the units of length, time or mass of object body B (Aether velocity v_B) moving through his IRF must measure them at a separation distance and at a relative velocity. This may be achieved by interrogating the object body with a two way transmission by light ray or equivalent. The returning ray holds the information required. The communication may also be effected by the transport of the object body either alone or in any combination with a light ray.
The measure of either length, time or mass requires two communications separated by a known time interval.

The measure of the units of the object body is made in terms of the observer's equivalent own unit. Thus he obtains the ratio of the two units. As these units are different due to the Aether velocity effects upon each body the ratio of the two units is the ratio of the two velocity effects.
This ratio is called the Gamma Ratio and is given by γ_B/γ_A for time and mass - and inverted for length contraction.
The Gamma Ratio may be obtained from the standard Lorenz velocity transform equation, eg. Rindler, for the three axes combined.
Thus:-

$$\gamma_B/\gamma_A = \gamma_R(1 + v_{Rx}v_A/c^2) \tag{11.8}$$

R is the velocity of body B through the IRF of observer A (the relative velocity) and v_{Rx} is the component of velocity R in the direction of the Aether velocity of the observer. The factor $v_{Rx}v_A/c^2$ is called the Matter Movement factor, MMF.
It is important to realise that the Lorentz Transform equation does not require the object body B to be inertial.

The duration of the outward interrogation pulse t_o delays the reading of the observed body and so must be allowed for. t_o cannot be separately ascertained and so is assumed to equal $(t_o + t_r)/2$. This assumption

generates an observation error OE of $(t_o - t_r)/2$ given by:-

$$[d/1 + V_A/c) - d/(1 - V_A/c)]/2c = -dV_A/c^2 = -Tv_{Ax}V_A/c^2$$

for small values of V_A/c. This is acceptable as accurate calculations of velocity effects are usually confined to time measurements and even the fastest clocks have small V_A/c.

The vector subtraction of the MMF and the OE gives the factor V_d^2/c^2 where V_d is the velocity of the observer at the second measurement through his own IRF existing at the first measurement.

Thus the final Aether Relativity factor is:-

$$\gamma_r(1 + V_d^2/c^2)$$

Appendix 5
The Two Clock Paradox

This is an example of a relative velocity effect which Special Relativity cannot explain.

Two identical and accurate clocks, A and B, are synchronised and stationary side by side.
Clock B starts the experiment by accelerating away from A, which remains inertial throughout, up to a recession velocity of V_R.
After time T/2 clock B accelerates towards clock A and returns at an approach velocity of V_R.
Clock B then comes to a halt next to clock A after time T has elapsed. Both clocks then compare readings.

Expanding the Aether Relativity function with low values of inter-clock velocity relative to the speed of light gives a prediction of:-

$$T - d_1 V_R / 2c^2 + d_2 V_d / c^2$$

for the measurement of each clock by the other over the period T.
d_1 is the total distance travelled by clock B while d_2 is the return journey length only. Thus $d_2 = d_1 / 2$.

For clock A velocity $V_d = 0$, thus his prediction of the reading of clock B is $T(1 - V_R^2 / 2c^2)$. Thus B is observed by A to be *slow* by $T V_R^2 / 2c^2$.

For clock B velocity $V_d = 0$ for the outward journey but $V_d = -2V_R$ for the return journey.
Thus the prediction by B of clock A is
$T(1 - d_1 V_R / 2c^2 + 2d_1 V_R / 2c^2) = T(1 + V_R^2 / 2c^2)$.
Thus A is observed by B to be *fast* by $T V_R^2 / 2c^2$.
Both clocks are now in agreement.

Special Relativity cannot predict the fast running of a clock.

Appendix 6
The Single Charge Equivalence of a Wire

The wire is straight and infinitely long.
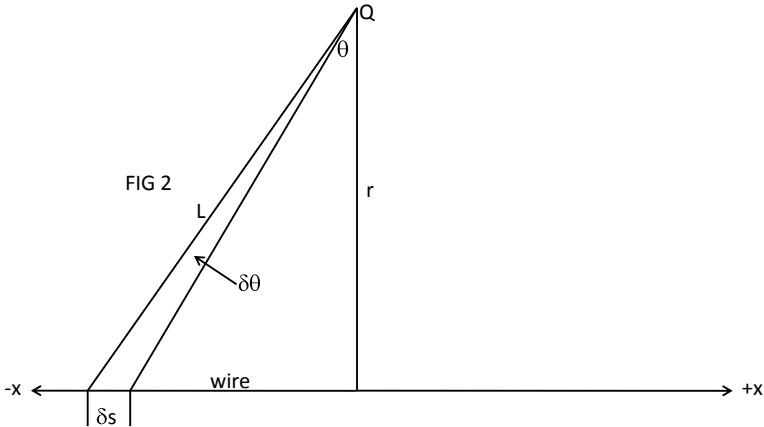A unit test charge is placed at distance r from the wire.

Figure 11.2: The Single Charge Equivalence

The total force on the unit test charge Q in Fig.(11.2) is the integration of the separate forces from every individual charge - electron and ion - within the wire, as far as infinity in both directions. The total force from the positive ions and the negative current electrons are calculated separately but are identical for zero current.
Rather than considering individual charged particles we may instead employ an arbitrary unit linear charge density, q_L, along the wire.

In Fig. (11.2) the wire segment $ds = d\theta L/cos\theta$ as a consequence of the angle θ of the wire to the direction of the test charge Q.
The component of the force dF on the unit test charge in the L direction due to the segment ds obeys the inverse square law rule and is given by:-

$$dF = kq_L cos\theta ds/L^2$$

where $k = 1/4\pi e_0$.
Substituting for ds gives:-

$$dF = kq_L d\theta / L$$

Now $L = r/cos\theta$ thus:-

$$dF = kq_L cos\theta . d\theta / r$$

Integrating between $\theta = 0$ and 90deg gives

$$F = kq_L / r$$

The total force in the r direction from the wire on both sides of the test charge is:-

$$F = 2kq_L / r \qquad\qquad (11.9)$$

Now this happens to be the equation for the electric potential field of a single charge of magnitude $2q_L$ positioned at the wire at $x = 0$.

Thus in subsequent calculations, to obtain the effect of relative velocity by all the like charges in the wire upon the test charge Q we need only consider velocity effects on the electric potential field of a single theoretical charge of $2q_L$ positioned at $x = z = 0$.

Appendix 7
The Wire inline with Test Charge Velocity

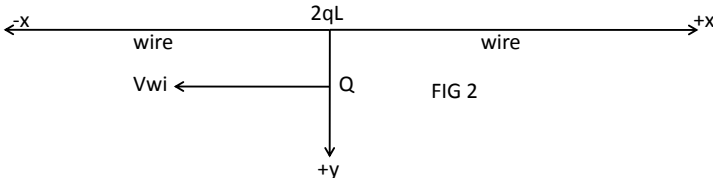In the following calculations velocities are given as fractions of the speed of light.

Figure 11.3: Charge Velocity Parallel to Wire

In Fig (11.3) the wire is taken to lie in the direction of relative movement (the x direction). The origin of all three axes is at the observer test charge.

The electric field of the current electrons, as seen by the observer, is a function of their velocity V_{oi} through the observer's IRF. Now V_{oi} is the relativistic addition of the wire velocity, V_{ow}, (with respect to the observer's IRF) and the current velocity, V_{wi}, (with respect to the wire). These three velocities create three different Lorenz Functions, γ_{oi}, γ_{wi} and γ_{ow}, to be employed in the observed electric potential field equation. These three functions can be inter-related via the standard Lorenz Velocity Function Transform equation:-

$$\gamma_{oi} = \gamma_{ow}\gamma_{wi}(1 + V_{wi}V_{ow}) \tag{11.10}$$

where V_{wi} lies in the x direction - which is indeed the case.

Applying the single charge equivalence, q_L, positioned at $x = z = 0$ and employing the observed potential field eqn.(11.4) gives a force field at Q of:-

$$F_y = 2kq_L/\gamma y$$

where $k = 1/4\pi e_0$.

Subtracting the field of the current electrons from that of the ions at the position of the observer we obtain:-

$$F_y = 2kq_L/y\gamma_{oi} - 2kq_L/y\gamma_{ow}$$

As the velocity of the current electrons is very small relative to c (of the order of one millimeter per second) then γ_{wi} can be taken to be unity. Employing the conversion eqn. (11.10), gives the net potential at the observer of:-

$$F_y = -2kq_L V_{wi}(V_{wi}/2 + V_{ow})/\gamma_{ow}y$$

As V_{ow} is usually a small fraction of c and V_{wi} is small relative to V_{ow} we have:-

$$F_y = 2kq_L V_{ow} V_{wi}/y \tag{11.11}$$

The net electric force F_y arises from all the current electrons and all the ions in the wire and acts upon a unit observer charge in the direction y normal to the relative velocity of the test charge.

Appendix 8
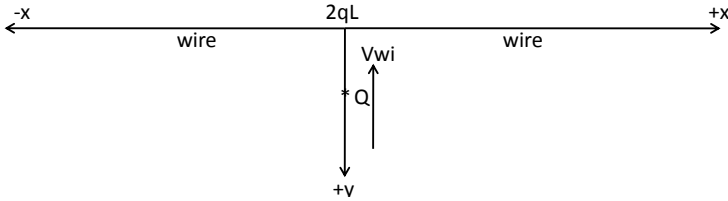## The Wire at 90deg to Relative Velocity

Figure 11.4: Charge Velocity normal to Wire

The effect which occurs when the wire lies in the direction of relative velocity no longer occurs in this case as the current electron velocity has no component in line with the velocity of the wire. The wire lies along the x axis but moves in the y direction relative to the observer. The equivalent theoretical single charge q_L is again employed positioned at $x = z = 0$ and distance y from the observer charge Q.

The relative velocity (V_{ow}) effect (wire to observer charge) combines with the velocity (V_{iw}) effect (current velocity) on the electric field of the current electrons, but now at right angles to each other.

The effect is to produce an elliptical shape $(z = 0)$ of the observed (by Q) electric potential field of the current electrons. The ellipse is rotated relative to the x and the y axes through the angle θ, where $tan\theta = V_{iw}/V_{ow}$, and is also contracted in the direction of motion by the factor $(1 - V_{iw}^2 - V_{ow}^2)$.

For velocities very much smaller than c we have:-

$$\phi_y = 2kq_L/y \qquad (11.12)$$

A tangent to the ellipse of the electric field at the position of the observer Q is not normal to the y axis due to the rotation of the ellipse described

above. Hence there is a component of the electric field which produces a force in the x direction.

The tangent of the angle ψ to the ellipse at $x = 0$ is given by:-

$$tan\psi = (tan\theta - tan\sigma)/(1 + tan\theta.tan\sigma)$$

where σ is the angle of the ellipse to its major axis.

The tangent to a non-rotated ellipse is $tan\sigma = tan\theta.b^2/a^2$ where $a^2 = 1$ and $b^2 = (1 - V_{iw}^2 - V_{ow}^2)$.

Taking both V_{iw}^2 and V_{ow}^2 to be small relative to c we obtain the x direction component fraction to be:-

$$tan\psi = V_{iw}V_{ow} \tag{11.13}$$

Multiplying eqn. (11.12) by eqn. (11.13), gives the component of the charge acting in the x direction, normal to the relative velocity of the wire and the observer charge. There is no component of the field of the wire ions in the x direction for their field is not rotated as they are affected by only a single velocity.
Therefore:-

$$F_x = 2kq_LV_{iw}V_{ow}/y$$

Combining the Two Effects
It can be seen that the force at right angles to the movement of the charged observer relative to the current carrying wire is identical for both inline (eqn. 11.11) and orthogonal movement, and therefore is entirely independent of the direction of relative movement of the test charge through the plane of the wire. Thus:-

$$F_n = 2kq_LV_{iw}V_{ow}/r$$

where r is the normal distance from the wire to the observer and F_n is the force normal to the velocity V_{ow} of the test charge.
Changing the direction of either V_{iw} or V_{ow} reverses the direction of the

force on the test charge.

Substituting the current I for $q_L V_{iw}$, replacing the factor k by $1/4\pi e_0$, renaming V_{ow} as V and returning to normal velocities gives:-

$$F = IV/2\pi e_0 c^2 r \tag{11.14}$$

Converting to the terminology of magnetics where $\mu_0 e_0 = 1/c^2$ we have:-

$$F = VI\mu_0/2\pi r$$

which is the recognised formula for this magnetic effect.

So from the initial assumption that magnetism is not a fundamental force at the level of the Aether the 'magnetic' phenomena are still obtained, but now as derivatives of the electric potential field.

Appendix 9
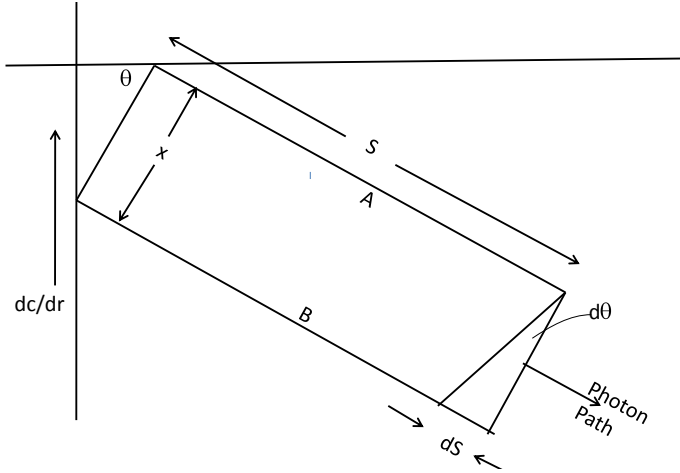**The Bending of a Light Ray crossing a Speed of Light Gradient**

Figure 11.5: Refraction

Fig. 11.5 describes a photon of unknown width x crossing a speed of light gradient at an angle θ to the gradient.

Due to the speed of light gradient the upper side A of the photon moves a greater distance in an equal time dt to the lower side B by an amount dS. Thus:-

$$d\theta = dS/x = \frac{dc_L}{dr}x\sin\theta dt/x = \frac{dc_L}{dr}\sin\theta dt \tag{11.15}$$

The bending effect $d\theta/dt$ is an example of refraction.

As acceleration equals $vd\theta/dt$ generally, then the acceleration of the light ray in a direction at right angles to its path is given by:-

$$acc = c\sin\theta\frac{dc_L}{dr} \tag{11.16}$$

The acceleration down the speed of light gradient is given by:-

$$acc_r = c sin\theta^2 \frac{dc_L}{dr} \tag{11.17}$$

When the light ray path is normal to the speed of light gradient ($sin\theta = 1$) the acceleration is:-

$$\mathbf{c}dc_L/dr$$

Now the presence of a matter body increases the immediate Aethon density by an unknown amount ρ_e.
Thus:-

$$c_L^2 = p/(\rho_\infty + \rho_e)$$

where c_L is the local speed of light.
Now employing an identical Aether shell to Aether shell diffusion process over increasing distance from the mass body to that employed in the diffusion of the electric potential we obtain, $\rho_e = \rho_1/r$ where ρ_1 is the increased density at an arbitrary distance from the mass, on the theoretical assumption that the entirety of the mass is situated at a single point. Thus:-

$$c_L^2 = C_e/(\rho_\infty + \rho_1/r) = c_\infty^2/(1 + \rho_1/\rho_\infty r)$$

When the ratio $\rho_1/r\rho_\infty$ is very much less than unity, as it is at the surface of most celestial bodies, we may write:-

$$c_L = c(1 - \rho_1/2r\rho_\infty)$$

c is the speed of light at an infinite distance from the source mass.

We now take $\rho_1/2\rho_\infty$ to equal Am where m is the gravitational radius of the mass ($m = GM/c^2$) and A is an unknown factor. The acceleration of mass in a gravitational field is found to be one half that of light at the same point in a gravitational field, thus $A = 2$.
This can be said as the ratio ρ_1/ρ_∞ is postulated to be a function of mass M. The gravitational constant G incorporates the other factors.

For values of $2m/r \ll 1$ we now have:-

$$c_L = c(1 - 2m/r) \tag{11.18}$$

or alternatively

$$c(c_L - c) = \Phi = -2mc^2/r \tag{11.19}$$

Differentiating eqn.(11.18) gives:-

$$acc_r = cdc_L/dr = 2mc^2/r^2 = GM/r^2 \tag{11.20}$$