

**Chapter 1 : History and Philosophy of Science – My Albert Einstein Posts**

*Einstein and Ether Drift Experiments Recently discovered letters, written at the turn of the century to his fiancée, shed new light on the origin of the special theory of relativity. John Stachel.*

As far as observable things were concerned, the physics Newton developed in the seventeenth century satisfied this principle. For example, he associated forces with acceleration and not simply motion. So, no matter how fast a body moved, as long as it was not accelerating, no force acted on it. Light Newton splits light into its component colors. What altered this happy arrangement in the nineteenth century were advances in the theory of light. Newton has supposed that light consisted of rapidly moving corpuscles; they obeyed the principle of relativity as much as anything else in his universe. Following work of Fresnel and others early in the nineteenth century, this account was replaced by one of light as a propagating wave. Two light sources produce the characteristic interference patterns familiar to anyone who has thrown two pebbles into a calm pond. If light was a wave, it was assumed that the wave must be carried by some medium, just as sound waves are carried by air and water waves are carried by water. How else could the peak and the trough of two waves annihilate one another to produce the interference patterns if the wave was not a displacement in some medium? The moving earth was now supposed to be moving through a medium that must stream past the earth, much as water streams past a boat moving through the ocean. All we had to do was to seek to see the current of ether flowing past. It proved quite easy to devise experiments to do this. Recall that the ether carries light waves, much as air carries sound waves or water, water waves. So if the ether is flowing past us, that flow ought to be revealed in measurements on light. A series of experiments were devised in the 19th century to detect this ether current. They were experiments on light. Typically they involved the passing of light through a combination of prisms, lenses and the like, creating interference fringes and then looking for an effect in these fringes. The striking result of all these experiments was that the flow of ether had no effect on optical experiments. In that sense, all the experiments failed. Curiously, it was as though the earth just happened to be at perfect rest in the ether. In retrospect, this is a puzzling outcome. At the time, however, there was nothing like the sense of crisis you might expect. Rather it had become a simple regularity of experiment that the ether drift was invisible to us. In some ways the attitude was not so different from what we now take to be a reasonable attitude to atoms. We know that they are there. Yet at the same time we know that they are so small that no 19th century instrument will allow us to see them individually. The experiments could be catalogued according to the size of the effect they hoped to detect and, as a result, the sensitivity of the instruments needed. The largest effects were "first order" effects. They needed the least sensitive instruments and were easiest to conduct. Many of these first order experiments were undertaken and all failed to demonstrate an ether current. Note for the techies who have to know what "first order" means: First order effects are proportional in size to the speed of the ether, as a fraction of the speed of light. Second order effects are proportional to the square of this fractional quantity. Since this fraction is very small, its square is smaller still. That means that second order effects are very much harder to detect than first order effects. Why look at first, then second, then third order effects, and so on? What makes the sequence natural is consider the effect as a function of the fractional speed of the ether wind. After a constant, the first term in the series expansion is the first order effect, the second term is the second order effect, and so on; so that considering these orders exhausts all the possibilities. However it soon ceased to be mysterious. It could be explained by a single hypothesis, the Fresnel "ether drag" hypothesis. It turned out that amount could be selected so that it would exactly cancel out any possible first order effect of an ether current. What is the refractive index? When light enters a dense optical medium like glass, it slows down. The refractive index measures the amount of slowing. A refractive index of 1. The greater the refractive index, the more the light is slowed and, as a result, the more the light is bent when it enters the medium. Light waves are carried by the medium of the ether, just as water waves are carried by water and sound waves by air. If the water or the air is moved at some speed, then that speed will be added to the speed of the water or sound waves. The same would be expected in the case of light if the ether is moved. The motion of the ether must be added to the motion of the light it carried. But what

does it take to move the ether? Consider a glass block. Since light waves pass through it, there must be ether inside it to carry the waves. If the block moves, does the ether move with it? The simplest case is that it does not. Then, it is as if the glass block is perfectly porous sieve that lets the ether flow freely through it. This is the case of no ether drag illustrated opposite. A light wave propagates in the ether of empty space horizontally from the left towards the block, which is moving vertically. The light passes through the block without any deflection from the vertical motion of the block. Now take the opposite case. It arises when the ether is fully trapped by the glass block and moves with it, much as air trapped inside a closed car moves with the car. In this case, the ether moves vertically with the glass block, with the same speed as the glass block. As result, the horizontal lightwave is deflected vertically with the full motion of the glass block. This is full ether drag. Finally, there are a myriad of intermediate cases, in which the ether is only partially dragged by the glass block. In these cases, the glass block acts as a more or less porous sieve communicating less or more of its motion to the ether. These are the cases of partial ether drag. In these cases, the light wave is only partially deflected from its horizontal motion. Tuning the Fresnel Ether Drag But what is just the right amount of partial drag? And why should it be tuned so precisely to the refractive index of the optical medium? It is just one experiment. However things work out the same in many other experiments. To begin, imagine that we are on an earth that is perfectly at rest in the ether and that we receive light from a distant star that is exactly overhead. That starlight would penetrate a glass block as shown in the figure. The light would descend vertically and keep moving vertically in the block. Now take the same case but add the fact that the earth we are standing on moves horizontally. In the ether frame of reference, the light will continue to descend vertically towards the block. But what happens to the light when it enters the moving block? The possible effects of the motion of the block on the propagation of the light in the block are shown in the figure. The light in the block may be either undragged, partially dragged or fully dragged. Which trajectory the light follows depends on the amount of ether drag. Now transform our viewpoint to that of the observer moving with block. The figure shows the same system, just redescribed by the moving observer. There is a second effect. If we change our point of view to one that moves with the block, there is a corresponding alteration in the light ray outside the block. The vertically propagating light acquires an extra motion opposite to that of our motion. The light that descended vertically in the ether, is now found to descending obliquely as a result of this acquired horizontal motion. This effect is widely recognized in astronomy and was observed in starlight in the 18th century. The effect is familiar. Imagine rain falling vertically. If you drive through the rain in a car, the vertically falling rain will acquire a component of horizontal motion towards you and splash onto the windscreen. The pressing question is whether we can use this effect of stellar aberration to determine that we on earth are moving in the ether. That is, can we distinguish this case from one in which we are at rest in the ether and the star is moving towards us with the same relative velocity? We could use this effect to determine our absolute motion in the ether if the incident ray of light differed in any behavior from a ray of light arriving obliquely at the glass block when the block is at rest in the ether. The behavior of a light ray obliquely incident onto a glass block is well understood from the study of refraction in elementary optics. The greater the refractive index, the greater the deflection. We cannot infer our motion through the ether from the light striking a moving glass block, as long as the light incident on the moving block bends in just the same way as incident light is refracted by a block at rest in the ether. That means that the partial drag of the ether must simulate this refractive effect exactly, so that the partially dragged ray above must be bent through just the same angle as it is in ordinary refraction. This is the how the Fresnel drag has to be tuned exactly to the refractive index of the optical medium.

**Chapter 2 : Dayton Miller Research Papers - calendrierdelascience.com**

*Volume 1 of The Collected Papers of Albert Einstein, to be published on 22 May, contains a number of previously unpublished lecture notes, examination papers and letters by Einstein.*

Aether research[ edit ] In , he began work with Edward Morley on the detection of aether drift , [5] at the time one of the "hot" areas of fundamental physics. Following on with the basic apparatus as the earlier Michelson-Morley experiment , Miller and Morley published another null result in Miller continued to work on refining his experimental techniques after , conducting millions of measurements on aether drift, and eventually developing the most sensitive interferometer in the world at that time. Dayton Miller performed over , turns of interferometer [6] [7] [8] [9] [10] with 16 readings each one, more than 5,, measurements. A shift amplitude of 0. A shift phase which points to an apex in the constellation Dorado. The amplitude analysis suggests a drag of aether. These results were presented by Miller as a positive indication of the existence of an aether drift. However, the effect Miller saw was tiny " much smaller than would be expected for a stationary aether. In order for these results to be consistent with an aether, it had to be assumed that the aether was dragged along with the earth to a much greater extent than aether theories typically predicted. Values that high could be eliminated due to other physical phenomenon like stellar aberration , which put upper limits on the amount of dragging. Furthermore, the measurement was statistically far from any other measurements being carried on at the time. Fringe shifts of about 0. However, Miller continued to defend his results, claiming that the probable reason for the so-called null results were that they were not being done at high locations such as mountain tops where the ether wind drift was supposedly much higher due to less ether drag. The trouble with Professor Einstein is that he knows nothing about my results. He wrote to me in November suggesting this. I am not so simple as to make no allowance for temperature. Shankland , who led the report, noted that the "signal" that Miller observed in is actually composed of points that are an average of several hundred measurements each, and the magnitude of the signal is more than 10 times smaller than the resolution with which the measurements were recorded. In particular he felt that Miller did not take enough care in guarding against thermal gradients in the room where the experiment took place, as, unlike most interferometry experiments, Miller conducted his in a room where the apparatus was deliberately left open to the elements to some degree. In addition, some mainstream scientists today have argued that any signal that Miller observed was the result of the experimenter effect , i. This error analysis is related to the averaging Miller performed, and is unassailable. It is also shown why Miller thought his result was valid: Miller published manuals designed to be student handbooks for the performance of experimental problems in physics. He used the machine to compare the waveforms produced by flutes crafted from different materials. During World War I , Miller worked with the physical characteristics of pressure waves of large guns at the request of the government. Dayton Miller was elected to the National Academy of Science in

**Chapter 3 : Einstein's theory of relativity " My Albert Einstein Posts**

*Intimate with Einstein, in a interview Shankland claimed Miller's work on ether-drift had probably cost Einstein the Nobel Prize for relativity theory (Einstein did later get a Nobel Prize, but for his other theoretical work).*

Possible Readings The fine print. Participants in this seminar are expected to attend regularly, read the assigned readings and take their turn in presenting material. The final grade is based on these presentations and on an essay to be submitted on Friday April 23 in CL by 4: My policy is NOT to issue incomplete grades, excepting in extraordinary circumstances. I really do want your essays completed and submitted by the end of term. I do not want them to linger on like an overdue dental checkup, filling your lives with unnecessary worry and guilt. In return for the rigidity of the deadline, the seminar will not meet in the final week of term Tuesday April The essay may be on any subject of relevance to the seminar. To assist you in commencing work, I ask you submit an essay proposal to me by Tuesday March The proposal need only be brief. It should contain a short paragraph describing the topic to be investigated and give a brief indication of the sources you intend to use. Do talk to me about possible topics! The papers comprising the corpus are: Annalen der Physik, 19 , pp. The analysis makes the kinetic theory of heat more definite, in so far as it provides a measure of the real size of molecules, so that they cannot be dismissed as easily as useful fictions. In this paper Einstein reports that the kinetic theory of heat predicts that small particles suspended in water must execute a random motion visible under the microscope. He suspects this motion is Brownian motion but has insufficient data to affirm it. The prediction is a powerful test of the truth of the kinetic theory of heat. A failure to observe the effect would refute the theory. The domain in which the effect is observed is one in which the second law of thermodynamics no longer holds, a disturbing result for the energeticists of the time. Einstein develops the special theory of relativity in this paper. His concern, as he makes clear in the introduction, is that then current electrodynamics harbors a state of rest, the ether state of rest, and the theory gives very different accounts of electrodynamic processes at rest or moving in the ether. But experiments in electrodynamics and optic have provided no way to determine which is the ether state of rest of all inertial state of motion. Einstein shows that Maxwell-Lorentz electrodynamics has in fact always obeyed a principle of relativity of inertial motion. We just failed to notice it since we tacitly thought that space and time had Newtonian properties, not those of special relativity. Written as a brief follow-up to the special relativity paper, this short note derives the inertial of energy: The theory gives incorrect results for the analysis of heat radiation. He proceeds to show how this quantum view of light makes sense of several experiments in electrodynamics and optics, the best know being the photoelectric effect. He then described the paper as "revolutionary. Here is what I want you to do prior to my presentation on each of these papers. One might have hoped that data on diffusion of sugar alone might be sufficient. But it turns out to give an expression for NP only. Einstein needs a second relation between N and P to recover individual values. He arrives at it from his analysis of the effect of solutes on the viscosity of a solution. The analysis is in Sections It is very tough going and should be skimmed on a first read. The conclusion that matters is stated in the last paragraph of Section 2. Under what conditions does it obtain? What is osmotic pressure? What law relates osmotic pressure to temperature? How is the coefficient of diffusion defined? Find two approximations used in his calculations. Are the approximations licit? The central results of the paper are in Sections In Section 4, a stochastic model of Brownian motion is used to generate the expression for the root mean square displacement of particles. The analysis of Section 2 is independently noteworthy in that it reveal the extremely general statistical mechanical basis of the ideal gas law and its reappearance as the law governing partial pressures in dilue solutions. The analysis is very similar to the core argument of the light quantum paper. What is Brownian motion? What is free energy? How is it used to express the condition of thermal equilibrium for a system maintained at constant temperature? How can it be used to recover an expression for the pressure of a thermodynamic system? What is the diffusion equation? What are its typical solutions? The first "kinematical" part contains the developement of the special theory of relativity as a new theory of space and time. It is the most celebrated part of the most celebrated scientific paper of the 20th century and should be studied closely. It is mathematically easy, excepting a somewhat

overcomplicated derivation of the Lorentz transformation in Section 3. Almost any other development will give a simpler derivation. The second "electrodynamical" part is tougher going. The principal goal is to show that the theory already conforms to the principle of relativity, once we recognize that space and time behave according to special relativity. The key to special relativity is the relativity of simultaneity. Make sure you understand the notion, as laid out in Sections 1 and 2 and how Einstein shows that attending to the relativity of simultaneity in our measurement operations leads to the relativity of lengths. If you have the math, reconstruct the proof. In Section 10, Einstein talks of transverse and longitudinal mass. Why do they cause him trouble and what should he have used? The main thing to see is that the goal is a relation between inertia and energy for all forms of matter, not just electromagnetic. The use of electromagnetic theory is merely the path Einstein takes to the general result. How does Einstein manage to have his result apply to all forms of matter? The core arguments are in Sections 5 and 6. In Section 5, Einstein gives an especially lucid demonstration of this result: In section 6, Einstein notes that the entropy of high frequency radiation does vary logarithmically with volume so that it has the characteristic fingerprint of a system of many independent energy elements. The remaining Sections give three experimental demonstrations of the localization of energy in radiation; the photoelectric effect is the best known. Earlier sections provide supporting results, including the expression for the entropy of high frequency radiation. Section 1 contains a lucid demonstration of the failure of classical physics to accommodate black body radiation. Note how it is carefully hedged. Why does Einstein restrict his analysis to high frequency radiation? Does this mean low frequency radiation is not quantized? Planck, the lore holds, quantized energy in Is there any evidence in this paper that Einstein knows this? To what does "quanta" in the title of Section 2 refer? Writings, Princeton University Press, This is the standard source, with extensive editorial headnotes introducing the material and footnotes that correct minor errors in the text and develop background materials. Anna Beck, translator; Peter Havas, consultant. The Collected Papers of Albert Einstein: Translation volume does not have any editorial apparatus. Five Papers that Changed the Face of Physics. Princeton University Press, English translations of the Einstein corpus. Editorial material follows Papers, Vol. Albert Einstein et al. Long introductory historical essay. The Science and Life of Albert Einstein. Albrecht Foelsing, Albert Einstein: One of the best of the many Einstein biographies. Wolfgang Pauli, Theory of Relativity. It is both an introduction to relativity theory and a survey of the literature. An invaluable historical resource. It is a popular exposition but gives much of the historical background in a very accessible form. The exposition is not always helpful. Has a translation of the special relativity paper.

**Chapter 4 : Electrical Engineer Overturns Einstein's Theory After 97 Years – Aether Force**

*It was entitled "The Ether-Drift Experiment and the Determination of the Absolute Motion of the Earth" and appeared in the Reviews of Modern Physics (original here, and subsequently reprinted.*

This way, the scientific establishment will slowly but surely be forced to return to reality, the reality of the existence of a real, physical ether with fluid-like properties. This eventually lead to the erroneous relativity theory, as is proven in this article. I hold that space cannot be curved, for the simple reason that it can have no properties. It might as well be said that God has properties. He has not, but only attributes and these are of our own making. Of properties we can only speak when dealing with matter filling the space. To say that in the presence of large bodies space becomes curved, is equivalent to stating that something can act upon nothing. I, for one, refuse to subscribe to such a view. Space is literally no thing, nothing. It is the emptiness, the void, wherein physical stuff exists, but space in and of itself is not part of anything physical. And the way we describe it is nothing more and nothing less than an abstract definition, a mere thought construct to track what is where at any given time. Just like a treasure map: Saying that space becomes curved by large bodies is the same as saying that a street map becomes curved because the cities and villages that are printed on it are so heavy. The theory wraps all these errors and fallacies and clothes them in magnificent mathematical garb which fascinates, dazzles and makes people blind to the underlying errors. The theory is like a beggar clothed in purple whom ignorant people take for a king. Its exponents are very brilliant men, but they are metaphysicists rather than scientists. Not a single one of the relativity propositions has been proved. His system based on that observation is not understood by many. Given that the propagation speed of longitudinal electric waves which according to the current theory cannot propagate through a vacuum is about  $1/c$ . If Tesla is right, we would see an Earth-Moon-Earth round-trip time of in the order of 1. These equations describe the phenomenon of electro-magnetism, or the electromagnetic field, mathematically. A fundamental mistake has been made in the formulation of these equations. Make up your mind, folks! It may be clear by now that quantum mechanics is correct in this respect and that the Maxwell equations are therefore incorrect or at least incomplete. Both the electric and the magnetic field can exist on and by themselves and can also propagate through space. When the Maxwell equations are corrected for this omission, as Prof. Because Maxwell assumed that charge carriers were the causes of the fields, implicitly a certain reference frame is linked to the description of the fields. That leads to the Maxwell equations being not invariant to the so-called Galilean transform. This sounds complicated, but if you want to describe a ripple in a glass of water in a passing train, you have to take into account the speed difference between observer and train. Galileo Galilei first described this principle in his Dialogue Concerning the Two Chief World Systems using the example of a ship traveling at constant velocity, without rocking, on a smooth sea; any observer doing experiments below the deck would not be able to tell whether the ship was moving or stationary. At the low relative velocities characteristic of everyday life, Lorentz invariance and Galilean invariance are nearly the same, but for relative velocities close to that of light they are very different. In other words, the Maxwell equations are not invariant to the Galilean transform. After all, within different materials, different media, the speed of light differs and is less than that in free space. This is what causes light rays to break in the transition from air to glass. The claim that the speed of light is constant in the Universe is therefore absolutely untenable. Staunch relativists take note: Here is a clear case, for both satellites, where classical theory gives the correct answer, but relativistic corrections lead to the wrong results. Alarmed and intrigued by these results, he noticed systematic variations in the data with diurnal and lunar-synodic components. To say that Wallace was less than tactful would be something of an understatement. He made heated claims that NASA had noticed the very same results and was using non-relativistic correction factors to calculate signal transit times. One day you prove theoretically that the speed of light cannot be fixed across the Universe and just two days later you find the experimental evidence just like that. Space itself is the emptiness, the void, in which physical tangible entities exist and thus space in and of itself cannot have physical properties. When this error is corrected, the normal Galilean transform applies, which does not demand a fixed speed of light. The speed of light is not constant within the

Universe, and therefore the Lorentz transform cannot be applied in the real physical Universe, even if it would have had any physical relevance. And that means the bottom drops from underneath the whole relativity theory. He published a number of breathtaking videos which show what you can do with sound waves, e. He shows that many kinds of geometric shapes can be formed using standing sound waves in the fluid, whereby matter flows together naturally to certain areas and stays away from other areas. Everything is connected to everything through these standing waves. The reported Pioneer anomaly is simply due to the distribution of ether pressure, the same kind of ether pressure that keeps our planet in orbit. And for those who are still looking for the ether wind that they could never find: And to be honest, that seems relatively easy to me.

Arend Lammertink, MSc, September 26, We have created a society that honors the servant and has forgotten the gift. But an inner voice tells me that it is not yet the real thing. He experiences himself, His thoughts and feelings as something separated from the rest – a kind of optical delusion of His consciousness. This delusion is a kind of prison for us, restrict us to our personal desires and to affection for a few persons nearest to us. Our task must be to free Ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty. So, if one wants to take a stand against this, one has unfortunately little choice but to be blunt. Arend can be contacted by email at lamare at the gmail dot com domain. We discuss some of its logical inconsistencies and offer alternatives for your consideration. As always, our goal is to bring you viable, plausible alternatives to the cherished and protected dogma of mainstream physics – areas where theory does not agree with experimental facts. These fields, electric, magnetic, gravitational – etc, have been the nemesis of physicists since the birth of modern science, and continues unresolved by quantum mechanics. This case results in the equations of quantum mechanics diverging to infinity. It has been known for some time that such virtual entities necessitate the existence of energy in this virtual realm Field , giving rise to the concept of quantum zero point energy. By eliminating the vortices from the academic theory, it ensured our handlers, that those who dedicate themselves to the system of mind control in place would never question the extreme motive force of the vortex and apply it to solving our energy needs and freeing us from the polluting fuels sold at extreme cost by energy barons, then wasted by explosion, heat and pollution, extracting a fraction of its value in the form of usable motive energy. Is our universe really that strange? The Special and General Theory, published in A closer look at this derivation shows a large leap of logic that cannot be properly followed unless several missing lines are filled in. There is only one mathematically viable way to fill in these missing lines, which is shown below in simplified form: The above improper mathematical operations are the only way to add it back in, yet do not actually add the speed of light back at all, but only the meaningless letter C from the alphabet. Any letter from A to Z could have been chosen, showing how meaningless and arbitrary it was to choose the letter C, which was used to represent the speed of light earlier in the derivation before it dropped out completely. Henderson in his thought-provoking new book. Henderson suggests that the reason for this is because the theories simply are not true. While Einstein proposed that time could affect both light and gravity, Henderson instead argues for the Universal Energy Field UEF as the medium which transmits light waves and generates gravitational forces. In addition, since space consists of nothingness, it is not possible for it to exert forces of any kind. Paul Marmet, Professor of Physics Deceased: The velocity of light is equal to c with respect to an absolute frame in space. This is now an experimental fact. Finally, we have seen how it is apparently constant in all frames using proper values and a correct clock synchronization. We can consider the velocity of light with respect to a group of stars around the Sun. However, there is nothing that says that that star cluster is at an absolute rest. It probably moves around our galaxy which itself moves around the local cluster of galaxies. Of the vast body of theoretical work reported to date, only the development of the theory of relativity omitted steps in this procedure because the basic mathematics defining the principle of the constant velocity of light were mental arithmetic, and therefore not recorded. The theory of relativity is a rare example of a theory that came to fruition as a result of mistakes in the mathematical process but which has had far reaching consequences in the field of physics and the modern history of mankind. Hence there has been no acceptance of the aether as a possible new energy source, needed as our oil reserves are eroded. It is timely, therefore, to review the claim made by Nikola Tesla that he had devised and constructed an automobile that was powered on aether energy.

We know that the Lorentz transformations and special relativity are unable to provide a realistic physical explanation of the behavior of matter and light. We have seen previously that the principle of mass-energy conservation requires that clocks run at a slower rate in a moving frame, and physical bodies become longer because of the increase of the Bohr radius. These results allow us to answer the question: With respect to what, does light travel? For example, when we move away at velocity  $v$ , from a source emitting light at velocity  $c$ , the relative motion of the radiation is observed from the Doppler shift. The conventional explanation relies on special relativity, but it implies an esoteric space-time distortion, which is not compatible with logic. This apparent constant velocity of light with respect to a moving frame is the most fascinating illusion in science. Without them, there would be a fatal contradiction between the observations made by astronomers and the predictions of the big bang theory. In no other field of physics would this continual recourse to new hypothetical objects be accepted as a way of bridging the gap between theory and observation. It would, at the least, raise serious questions about the validity of the underlying theory. Arbab and Zeinab A. We have found that the Maxwell equations are derived from just one quaternion equation. Generalizing the continuity equation resulted in obtaining three equations defining the charge and current densities.

**Chapter 5 : Dayton Miller's Ether-Drift Experiments**

*D C Miller asserts he has found ether and its drift through earth, in contradiction to A Einstein.*

After considering all the possible sources of error, there always remained a positive effect. Should the positive result be confirmed, then the special theory of relativity and with it the general theory of relativity, in its current form, would be invalid. Only the equivalence of inertia and gravitation would remain, however, they would have to lead to a significantly different theory. See citations below for Silberstein and Einstein. Otherwise, the whole relativity theory collapses like a house of cards. But from nearby it looks quite different. There is not a single concept of which I am convinced that it will stand firm, and I feel uncertain whether I am in general on the right track. Creator and Rebel , p. It was used in a definitive set of ether-drift experiments on Mt. Protective insulation is removed in this photograph, and windows were present all around the shelter at the level of the interferometer light-path see below. The history of science records the ether-drift experiment of Albert Michelson and Edward Morley as a pivotal turning point, where the energetic ether of space was discarded by mainstream physics. The now famous Michelson-Morley experiment is widely cited, in nearly every physics textbook, for its claimed "null" or "negative" results. Less known, however, is the far more significant and detailed work of Dayton Miller. Modern physics today points instead to the much earlier and less significant work of Michelson-Morley, as having "proved the ether did not exist". While Miller had a rough time convincing some of his contemporaries about the reality of his ether-measurements, he clearly could not be ignored in this regard. While he was alive, he produced a series of papers presenting solid data on the existence of a measurable ether-drift, and he successfully defended his findings to not a small number of critics, including Einstein. His work employed light-beam interferometers of the same type used by Michelson-Morley, but of a more sensitive construction, with a significantly longer light-beam path. He periodically took the device high atop Mt. Those experiments, conducted with so much care, merit, of course, a very careful statistical investigation. This is more so as the existence of a not trivial positive effect would affect very deeply the fundament of theoretical physics as it is presently accepted. The basic principles of light-beam interferometry for detection of ether-drift are described in most textbooks, albeit with typical factual errors ie, the slight positive result of the Michelson-Morley experiment is nearly always misrepresented as a "null" or "zero" result and so will not be repeated here. The original Michelson-Morley interferometer with an approximate meter round-trip light-beam path, mounted on a concrete platform in the basement of the old Case School Physics building today, Case-Western Reserve University. This interferometer was about one-third as sensitive as the meter interferometer constructed later by Miller. A protective wood cover over the light-beam paths is removed for this photograph. Such dense coverings and stone-basement shielding, as Miller showed, slowed down the movement of the ether. These problems, along with a relatively short light-path, and placement at a relatively low altitude basement location, virtually guaranteed only a small but never "null" measured result. In later years, from through , Miller made additional refinements for sensitivity in his interferometer, obtaining increasingly significant positive results. His interferometer was the most massive and sensitive ever constructed, with iron cross-arms 4. Four sets of mirrors were mounted on the end of each cross-arm to reflect light beams back and forth 16 times horizontally with a total round-trip light path of 64 meters, starting from the same light-source, and finally recombined to form interference fringes whose movement relative to a pointer was read through a magnifying telescope. The large apparatus was floated inside a circular tank of liquid mercury, providing a frictionless base for rotation. An assistant then noted the readings on paper. The readings, from consecutive turns of the apparatus were then organized into "sets", which were made at different times of day and at different seasons of year. Data sets were then averaged according to a sidereal time clock, which was correlated with external celestial coordinates. Miller became convinced of an ether Earth-entrainment effect, which necessitated using the apparatus at higher altitudes to reduce the anticipated entrainment-effect of sea-level environments , and he additionally undertook the experiments in structures where the walls at the level of the light-path were open to the air, covered with canvas. Only glass, or glass and light paper covers were used along the light-beam paths, with all wood or

metal shielding removed. By contrast, the original Michelson-Morley interferometer had a round-trip light-path of around 22 meters Michelson , p. Source S generates light which passes through lens L and is then split by half-silvered mirror D. Beams then reflect back and forth along beams I and II to mirrors numbered before finally being recombined by half-silvered mirror D and reflected to small telescope eyepiece T where interference fringes are observed. Light-interference fringes as seen in the interferometer telescope. Magnified by an eyepiece with precise graduated markings, one could observe the lateral movement or shifting of fringes as the instrument was rotated. In his paper, Miller published the most comprehensive summary of his work, and the large quantity of data which supported his conclusions. A total of over , individual readings were made, from over 12, individual turns of the interferometer, undertaken at different months of the year, starting in with Edward Morley at Case School in Cleveland, and ending in with his Mt. These data do not include many rigorous control experiments undertaken at Case School Physics Department from to Wilson using the most sophisticated and controlled procedures, with the most telling set of experiments in and By contrast, we can mention here, the original Michelson-Morley experiment of involved only six hours of data collection over four days July 8, 9, 11 and 12 of , with a grand total of only 36 turns of their interferometer. Even so, as shown below, Michelson-Morley originally obtained a slight positive result which has been systematically ignored or misrepresented by modern physics. As stated by Michelson-Morley: The experiment will therefore be repeated at intervals of three months, and thus all uncertainty will be avoided. Over many years, he developed increasingly sensitive apparatus, using them at higher altitudes and in open structures, making clear and positive detection of the ether. His experiments yielded systematic periodic effects which pointed to a similar identifiable axis of cosmic ether-drift, though of a variable magnitude, depending upon the season, time of day, density of materials shielding or surrounding the apparatus, and altitude at which the experiment was undertaken. He argued that basement locations, or interferometers shielded with opaque wood or metal housings, yielded the most tiny and insignificant effects, while those undertaken at higher altitudes and in less dense structures yielded more readily observable effects. The Michelson-Morley experiment, by comparison, was undertaken in the basement of a stone building closer to sea-level. He noted, when his data were plotted on sidereal time, they produced " The observed effect is dependent upon sidereal time and is independent of diurnal and seasonal changes of temperature and other terrestrial causes, and Over of these data sheets were recorded by Miller at Mt. Wilson alone, covering more than turns of the interferometer. Debates with Einstein There are several newspaper accounts indicating a certain tension between Albert Einstein and Dayton Miller, since the early s at least. In June of , Einstein wrote to the physicist Robert Millikan: Einstein Discounts Experiments Speaking before scientists at the University of Berlin, Einstein said the ether drift experiments at Cleveland showed zero results, while on Mount Wilson they showed positive results. Therefore, altitude influences results. In addition, temperature differences have provided a source of error. Einstein is that he knows nothing about my results. We never said they gave negative results, and they did not in fact give negative results. He ought to give me credit for knowing that temperature differences would affect the results. He wrote to me in November suggesting this. I am not so simple as to make no allowance for temperature. Given its large size and sensitivity, it required a careful set-up procedure prior to each use. Even this was insufficient for the final adjustment, which was made by adding small weights of around gram to the ends of cross-beam, which was sufficient to cause a micro-flexing of the iron supports by only a few wavelengths. Only then would the interference fringes come into view. And once in view, additional care had to be taken to prevent distortions from mechanical vibrations. Consequently, from the very beginning of the ether-drift experiments, Miller undertook extensive control experiments and procedures to guard against laboratory artifacts, and to objectively determine just how sensitive his apparatus was to external influences. A special interferometer of aluminum and brass was constructed, to guard against the possible effects of magnetoconstriction the measured periodic ether-drifting was the same as with the original iron interferometer. Bases made of wood, metal or concrete were floated in the mercury tank, to judge and correct for the effects of strain and deformation. The apparatus was not touched when operating, but rather gently pulled in a circle by a thin string, slowly accelerated to the desired velocity of rotation while floating in the mercury tank. Different light sources were tried, mounted on different locations on the apparatus. Light

sources outside the structure were also tried, including Sunlight, but finally an artificial light source located above the central axis of the instrument was used. A wooden platform has been supplied for the mirrors and optics of the interferometer, inside a building at Case School. A concrete platform supports the mirrors and optics of the interferometer, inside a small shelter on the grounds at Case School. Possible temperature effects were evaluated by using radiant parabolic heaters to artificially heat the apparatus and the air through which the light-beam passed. These experiments showed the interferometer clearly was sensitive to artificial heating, and so steps were taken to eliminate the effect. Strong radiant heat sources, it was learned, would badly skew the apparatus if focused upon only one arm or pair of arms of the iron cross-beams. Equal heating of the apparatus had no such effect, but the metal arms were nevertheless covered with a one-inch cork insulation to guard against radiant thermal effects. The light-path was given a glass housing, which stabilized the temperature inside, and later, a light corrugated paper cover was added over the glass cover, which did not affect the ether-drift, but further protected against possible temperature variations. Low-level thermal effects were also evaluated, as from human body heat, by having the recording assistant stand in different locations while the apparatus was turned and operated. Temperature effects from the larger environment were evaluated as well. Early ether-drift experiments, including those of Michelson-Morley and Morley-Miller, were undertaken inside basement locations with relatively stabilized temperatures, but shielded from the ether-drift as well due to heavy and dense building materials. Wilson required a different approach, and a special house was constructed to shelter the interferometer. It had a floor, walls and roof, and canvas-covered windows all around at the level of the interferometer light-beam. During his last set of Mt. Wilson experiments in , a tent-like covering was erected over the roof and walls to provide additional shielding from direct Sunlight, to diminish thermal variations or radiant heating effects from the walls. These steps eliminated any significant influences of ambient temperature differences upon the apparatus and the air within the light-beam path, but still allowed the movement of ether-drift. Wilson at arrow at a place later known as "Ether Rocks". Wilson, only a memorial plaque dedicated to Michelson and Einstein. Miller noted, at no time during his entire work on the question did he ever observe any periodic effects expressing themselves according to civil time coordinates, as would be present if a thermal effect was radiating from a specific wall, related to solar heating. Since the measurements were made at different times of day, and at different seasons, their amplitude would vary, but the direction of the ether-drift would shift only to the same average points along a sidereal azimuth. This is graphically demonstrated in Figures 1, 2 and 3. The figure captions are re-drafted from the originals in Miller, , p. The Top Graph above plots data from four separate months or epochs, measured at different times of the year and organized by sidereal time, showing a definite periodic curve. The heavy line is the mean of all four epochs.

**Chapter 6 : Luminiferous aether - Wikipedia**

*John Stachel, "Einstein and Ether Drift Experiments," pp. in John Stachel, Einstein from 'B' to 'Z'. Boston: Birkhaeuser, Michel Janssen and John Stachel, "The Optics and Electrodynamics of Moving Bodies," in John Stachel, Going Critical.*

He began to set up an experiment for measuring the speed of light. But what Albert A. Michelson, then 26, achieved was nothing short of revolutionary. Michelson, who had graduated from the academy only five years earlier, set up a revolving mirror at one end of the sea wall and a stationary mirror feet away, along with a heliostat, a lens and a tuning fork. The experiment and later ones "led the physicists into new paths and through experimental work paved the way for the development of the theory of relativity," Einstein told Michelson at a dinner at the California Institute of Technology in 1921. It spurred other experiments and discoveries, including the diameter of a star and the "ether drift" experiment, the other block on which Einstein built his theory of relativity. That experiment was considered a flop at first. Most 19th century scientists, including Michelson, believed that light traveled along the "luminiferous ether" -- much as sound travels on airwaves -- and that its speed could vary by going against the ether. Michelson considered it a failure, suffered a nervous breakdown and refused for nearly a year to discuss the findings with his colleagues. Eventually, the tests left little doubt that the "ether drift" did not exist and that the speed of light was a constant. For that and other work, Michelson became the first American to win the Nobel Prize in physics, in 1907. On a practical level, the discovery led to the new physics that would one day usher in a world of computers, lasers and biotechnology. But he lost out in zTC to the son of a Civil War amputee. In an effort to gain an at-large appointment from President Ulysses S. Grant, the year-old traveled by train to Washington. He got an interview with the president, who added one more appointment, even though all 10 slots were filled. Known as "Mike" at the academy, the midshipman with the jet black hair and piercing eyes excelled in science. By his senior year he was first in his class in optics and acoustics and second in heat and climatology. He got up at the blackboard and figured it out his own way," Mrs. He concentrated on such problems at the expense of his naval courses. Midshipman Michelson compiled demerits at the academy, from "laughing on guard" on Dec. 1846. He graduated ninth of 29 in the Class of 1846. He remained there until 1848, leaving for a variety of teaching posts and experiments that soon brought him world fame. Besides the celebrated "ether drift" experiment, he also determined the exact length of an international meter and, during World War I, helped make battleship guns more accurate with his range finder. After the war, Michelson determined that the star Betelgeuse was million miles in diameter. That landed him on the front page of the New York Times in December with the headline:

**Chapter 7 : Show me any experiment proving Aether**

*Einstein Chases a Light Beam Galina Weinstein Written while I was at The Center for Einstein Studies, Boston University This is a prelude to a book which I intend to publish.*

December 11, , Yuri Galaev are flawless. There is no such thing as space-time geometry. Here is the step by step demonstration. Supposing that the bodies act upon the surrounding space causing curving of the same, it appears to my simple mind that the curved spaces must react on the bodies, and producing the opposite effects, straightening out the curves. Since action and reaction are coexistent, it follows that the supposed curvature of space is entirely impossible - But even if it existed it would not explain the motions of the bodies as observed. Only the existence of a field of force can account for the motions of the bodies as observed, and its assumption dispenses with space curvature. All literature on this subject is futile and destined to oblivion. So are all attempts to explain the workings of the universe without recognizing the existence of the ether and the indispensable function it plays in the phenomena. Riemann introduced the additional variables as a supporting theory for his logarithm branch cuts, NOT ever to present time as a new variable. How was this done? In fact, Minkowski never meant it to be used in curved space. His 4th dimension was meant to be Euclidean dimensions straight , because it was well before the introduction of General Relativity. In fact, if there was an explanation Einstein would have given it. The special theory of relativity can be said to be, in essence, a sum of deceptions. However, there are plausible alternative explanations for all the experimental data and astronomical observations cited in support of the special and general theories of relativity, and the internal inconsistencies and unwarranted assumptions of standard relativity theory have been pointed out by dozens of scientists. They are encouraged right at the beginning of their careers to forsake science in favor of dogma. First, the alternative theories have never been given much attention nor taught at any university. Second, the establishmentarians have invested a lifetime of learning in maintaining the status quo, and they will act to protect their investment. Fourth, to admit a fundamental mistake in such a hyped-up theory would be an embarrassment, not only to the physics community at large, but also to the memory of a man whose portrait hangs in nearly every physics department around the world. In Einstein wisely remarked: This statement applies especially to the baseless assumption that the speed of light is a constant. There is no real evidence for the curvature of space. We can speak of curved lines, paths, and surfaces in space, but the idea that space itself can be curved is meaningless unless we conjure up a fourth dimension of space for it to be curved in. It should not be used to create a new physical science based on hypothetical equations. For how long can nonsense stave off common sense?

**Chapter 8 : Michelson-Morley Experiment - The Flat Earth Wiki**

*Introduction Course Structure Topics Special Relativity Principle of Relativity Historical Background Ether Drift Objectives Appreciate Einstein's contributions to science.*

This implied that there must be a separate aether for each of the infinitely many frequencies. Under a Galilean transformation the equations of Newtonian dynamics are invariant, whereas those of electromagnetism are not. Basically this means that while physics should remain the same in non-accelerated experiments, light would not follow the same rules because it is travelling in the universal "aether frame". Some effect caused by this difference should be detectable. A simple example concerns the model on which aether was originally built: The speed of propagation for mechanical waves, the speed of sound, is defined by the mechanical properties of the medium. This explains why a person hearing an explosion underwater and quickly surfacing can hear it again as the slower travelling sound arrives through the air. Similarly, a traveller on an airliner can still carry on a conversation with another traveller because the sound of words is travelling along with the air inside the aircraft. This effect is basic to all Newtonian dynamics, which says that everything from sound to the trajectory of a thrown baseball should all remain the same in the aircraft flying at least at a constant speed as if still sitting on the ground. This is the basis of the Galilean transformation, and the concept of frame of reference. If these numbers did change, there should be noticeable effects in the sky; stars in different directions would have different colours, for instance. Maxwell noted in the late 1800s that detecting motion relative to this aether should be easy enough—"light travelling along with the motion of the Earth would have a different speed than light travelling backward, as they would both be moving against the unmoving aether. This was confirmed by the following first-order experiments, which all gave negative results. The following list is based on the description of Wilhelm Wien, with changes and additional experiments according to the descriptions of Edmund Taylor Whittaker and Jakob Laub. He obtained a positive result, but Lorentz could show that the results have been contradictory. DeWitt Bristol Brace and Strasser repeated the experiment with improved accuracy, and obtained negative results. This experiment is a more precise variation of the famous Fizeau experiment. Two light rays were sent in opposite directions—one of them traverses a path filled with resting water, the other one follows a path through air. He obtained a positive result, but this was shown to be an experimental error, because a repetition of the experiment by Haga gave a negative result. No change of the interference fringes occurred. Later, Mascart showed that the interference fringes of polarized light in calcite remained uninfluenced as well. Lord Rayleigh conducted similar experiments with improved accuracy, and obtained a negative result as well. The plates of a condenser are located in the field of a strong electromagnet. No such effect was observed. Lorentz could also show, that the sensitivity of the apparatus was much too low to observe such an effect. While the first-order experiments could be explained by a modified stationary aether, more precise second-order experiments were expected to give positive results, however, no such results could be found. The famous Michelson—"Morley experiment compared the source light with itself after being sent in different directions, looking for changes in phase in a manner that could be measured with extremely high accuracy. In this experiment, their goal was to determine the velocity of the Earth through the aether. In this case the MM experiment yielded a shift of the fringing pattern of about 0. Therefore, the null hypothesis, the hypothesis that there was no aether wind, could not be rejected. It is obvious from what has gone before that it would be hopeless to attempt to solve the question of the motion of the solar system by observations of optical phenomena at the surface of the earth. However, all of them obtained a null result, like Michelson—"Morley MM previously did. These "aether-wind" experiments led to a flurry of efforts to "save" aether by assigning to it ever more complex properties, while only few scientists, like Emil Cohn or Alfred Bucherer, considered the possibility of the abandonment of the aether concept. Of particular interest was the possibility of "aether entrainment" or "aether drag", which would lower the magnitude of the measurement, perhaps enough to explain the results of the Michelson-Morley experiment. However, as noted earlier, aether dragging already had problems of its own, notably aberration. In addition, the interference experiments of Lodge, and Ludwig Zehnder, aimed to show whether the aether is dragged by various, rotating masses,

showed no aether drag. The theory was again modified, this time to suggest that the entrainment only worked for very large masses or those masses with large magnetic fields. Another, completely different attempt to save "absolute" aether was made in the Lorentz-FitzGerald contraction hypothesis, which posited that everything was affected by travel through the aether. In this theory the reason the Michelson-Morley experiment "failed" was that the apparatus contracted in length in the direction of travel. That is, the light was being affected in the "natural" manner by its travel through the aether as predicted, but so was the apparatus itself, cancelling out any difference when measured. FitzGerald had inferred this hypothesis from a paper by Oliver Heaviside. Sagnac in 1913, was immediately seen to be fully consistent with special relativity. Over the years the experimental accuracy of such measurements has been raised by many orders of magnitude, and no trace of any violations of Lorentz invariance has been seen. Since the Miller experiment and its unclear results there have been many more experimental attempts to detect the aether. Many experimenters have claimed positive results. These results have not gained much attention from mainstream science, since they contradict a large quantity of high-precision measurements, all the results of which were consistent with special relativity.

Lorentz ether theory Between 1892 and 1904, Hendrik Lorentz developed an electron-aether theory, in which he introduced a strict separation between matter electrons and aether. Contrary to earlier electron models, the electromagnetic field of the aether appears as a mediator between the electrons, and changes in this field cannot propagate faster than the speed of light. Lorentz noticed that it was necessary to change the space-time variables when changing frames and introduced concepts like physical length contraction [A 7] to explain the Michelson-Morley experiment, and the mathematical concept of local time to explain the aberration of light and the Fizeau experiment. This resulted in the formulation of the so-called Lorentz transformation by Joseph Larmor [A 8] [A 9] and Lorentz [A 10] [A 11] whereby it was noted by Larmor the complete formulation of local time is accompanied by some sort of time dilation of electrons moving in the aether. As Lorentz later noted [A 12], he considered the time indicated by clocks resting in the aether as "true" time, while local time was seen by him as a heuristic working hypothesis and a mathematical artifice. He declared simultaneity only a convenient convention which depends on the speed of light, whereby the constancy of the speed of light would be a useful postulate for making the laws of nature as simple as possible. In June and July [A 16] [A 17] he declared the relativity principle a general law of nature, including gravitation. He corrected some mistakes of Lorentz and proved the Lorentz covariance of the electromagnetic equations. However, he used the notion of an aether as a perfectly undetectable medium and distinguished between apparent and real time, so most historians of science argue that he failed to invent special relativity. Instead of suggesting that the mechanical properties of objects changed with their constant-velocity motion through an undetectable aether, Einstein proposed to deduce the characteristics that any successful theory must possess in order to be consistent with the most basic and firmly established principles, independent of the existence of a hypothetical aether. In this way he demonstrated that the laws of physics remained invariant as they had with the Galilean transformation, but that light was now invariant as well. With the development of the special theory of relativity, the need to account for a single universal frame of reference had disappeared and acceptance of the 19th century theory of a luminiferous aether disappeared with it. For Einstein, the Lorentz transformation implied a conceptual change: Moreover, in another paper published the same month in 1905, Einstein made several observations on a then-thorny problem, the photoelectric effect. In this work he demonstrated that light can be considered as particles that have a "wave-like nature". Particles obviously do not need a medium to travel, and thus, neither did light. This was the first step that would lead to the full development of quantum mechanics, in which the wave-like nature and the particle-like nature of light are both considered as valid descriptions of light. In his lectures of around 1917 he pointed out that what "the theory of relativity has to say He concluded that "one cannot deny the bearer of these concepts a certain substantiality". Aether theories In later years there have been a few individuals who advocated a neo-Lorentzian approach to physics, which is Lorentzian in the sense of positing an absolute true state of rest that is undetectable and which plays no role in the predictions of the theory. No violations of Lorentz covariance have ever been detected, despite strenuous efforts. Hence these theories resemble the 19th century aether theories in name only. For example, the founder of quantum field theory, Paul Dirac, stated in an article in Nature, titled "Is there an Aether? His initial proposal of

research thesis was to do an experiment to measure how fast the Earth was moving through the aether. In his response Einstein wrote that one can actually speak about a "new aether", but one may not speak of motion in relation to that aether. This was further elaborated by Einstein in some semi-popular articles , , , In this lecture Einstein stressed that special relativity took away the last mechanical property of the aether: However, he continued that special relativity does not necessarily rule out the aether, because the latter can be used to give physical reality to acceleration and rotation. This concept was fully elaborated within general relativity , in which physical properties which are partially determined by matter are attributed to space, but no substance or state of motion can be attributed to that "aether" by which he meant curved space-time. And within the electromagnetic theory of Maxwell and Lorentz one can speak of the "Aether of Electrodynamics", in which the aether possesses an absolute state of motion. However, the difference from the electromagnetic aether of Maxwell and Lorentz lies in the fact, that "because it was no longer possible to speak, in any absolute sense, of simultaneous states at different locations in the aether, the aether became, as it were, four dimensional, since there was no objective way of ordering its states by time alone". Now the "aether of special relativity" is still "absolute", because matter is affected by the properties of the aether, but the aether is not affected by the presence of matter. This asymmetry was solved within general relativity. Einstein explained that the "aether of general relativity" is not absolute, because matter is influenced by the aether, just as matter influences the structure of the aether. As Einstein himself pointed out, no "substance" and no state of motion can be attributed to that new aether.

## Chapter 9 : Dayton Miller - Wikipedia

*My new book Einstein's Pathway to the Special Theory of Relativity (2nd Edition) is coming out in August My new book is a comprehensive monograph on Albert Einstein's Odyssey to Special and General Relativity.*