CHAPTER 3

THE MMX AND OTHER SPEED OF LIGHT EXPERIMENTS

Abstract

This is the third chapter of the publication titled *The Ether*. The intent of this chapter is to revise the assumptions associated with Einstein's relativity theories, thereby postulating an alternate theory, somewhat analogous to Einstein's concepts, however, now compatible with the existence of the ether. As a result, relativity and quantum mechanics, rather than being disconnected, are then a part of one overall unified theory.

This is the most important chapter of this book for it demonstrates that the local preferred frame for the speed of light on Earth is its own gravitational field/Earth–centered inertial frame/inflow of ether. Additionally, it gives explanation as to why the Michelson–Morley Experiment (MMX), as well as other experiments, →as classically performed/interpreted←, is silent as to whether or not the ether exists. Given this presupposition, the other four chapters in this publication then have meaning, and moreover, merit.

3.1 Introduction

Chapter 3 is the quintessential subject matter of this entire publication for everything else in this book depends upon what is presented in this chapter. That is, proof of the existence of the ether. Many former scientists (Maxwell and Tesla), as well as more contemporary physicists/individuals (Ives, Lindner, and Stillwell), believed or still believe in the ether. Even so, because the vast majority of modern–day physicists presuppose there is no ether, their ideas have been ignored or alternatively dismissed. For that reason, the primary objective of this chapter is to demonstrate that there is, in fact, an ether. So, assuming it exists, all of physics, including relativity and QM, must then be reassessed, furthermore, rewritten, based upon **the ether**.

In this section, all theories are based on the assumption that the Earth–centered non–rotating inertial frame/gravitational field/inflow of space is the local preferred frame for the speed of light on Earth. Everything else depicted in this section derives from this basic assumption. Keep in mind that all three terms are synonymous. Additionally, it should be noted that the term "Inflow of Space" (ether) as defined in Chapter 2 is new and not generally accepted by mainstream physics.

Therefore, for ease of understanding, generally, although within this chapter, not exclusively, I will use the phrase "Earth–centered, nonrotating inertial frame" (ECF) or "Earth's gravitational field" (EGF).

Numerous small linear speed–of–light experiments, when performed on the Earth's rotating surface, have demonstrated only isotropy. The most well–known is the MMX. Einstein/mainstream physicists eventually used its null result as the main foundation block for validating his relativity theories.

Given that, if it can be demonstrated that even in the presence of an ether wind, the MMX still produces the same null outcome as classically performed/interpreted, then it is silent as to whether it exists. As a result, relativity collapses.

Presented below are five observations and/or experiments that together demonstrate or, perhaps, even prove, that the ECF/EGF is the local preferred frame for the speed–of–light/rate of time on Earth. First, read and comprehend them. Then, in conjunction with what is assumed to be the overlooked physics of the MMX, they will be used to reveal the reason why all second–order speed of light experiments of this type, when performed on the rotating surface of the Earth, exhibit isotropy. In other words, what Chapter 3 will establish is that, even though the ether wind exists, these kinds of small linear experiments (e.g., MMX) as classically performed/evaluated/interpreted are all inherently incapable of detecting it.

The five observations and/or experiments are listed below.

1. The Pendulum
2. Aberration
3. West–east, east–west satellite transmission
4. Hafele and Keating
5. GPS system

One–The Pendulum

As previously described in Chapter 2, a pendulum placed in motion at either of the Earth's poles is perceived by the observer to rotate (precess) 360 degrees every 24 hours. Alternatively, a pendulum sited at the equator does not rotate at all. However, at the poles, it is not the pendulum that is rotating, rather, it is the observer. What does this signify? →It indicates the EGF/ECF does not rotate along with the Earth's axial spin←. Essentially, this function is the product of the conservation of momentum within a nonrotating gravitational field. The non–rotating gravitational field also explains the Coriolis effect, for if the gravitational field rotated along with the Earth axial spin, then weather patterns, as observed, would not occur.

Two–Aberration

See Figure 3.1 below. There is a phenomenon known as stellar aberration. So, what is it? Here is an analogy. Assume that raindrops fall straight down directly to the Earth's surface. Therefore, relative to this frame, if you are located within a stationary car, from your viewpoint, the rain appears to drop perpendicular to Earth's surface.

On the other hand, if the car possesses a transverse velocity, then from your perspective, the rain appears slanted towards the motion of the car. In addition, with respect to the ground, if you have no visual reference frame, and if you cannot feel acceleration, then as you move from stationary to a velocity, rather than you, the position/angle of the rain appears to change.

What this indicates is that there is a fixed frame for the rain (preferred frame); in this case, it is the atmosphere, whereby rain falls directly straight down to Earth, as depicted below on Figure 3.1.

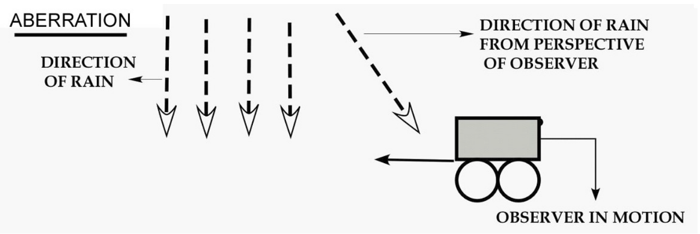


Figure 3.1 Aberration of Rain

Again, if rain falls straight down, perpendicular to the Earth's surface, and if the observer within the car possesses a transverse velocity relative to the rain, then from the perspective of the observer, the rain appears slanted towards the motion of the car. This is aberration. It indicates there is a preferred frame for the rain, in this case, the atmosphere.

Similarly, the identical phenomenon is observed with respect to starlight, called **annular** stellar aberration, as explained in the following anonymous quote from the website: *antirealitivity.com/stellaraberration.htm.*

If you watch the stars (using the necessary equipment) over the course of a year, you'll note that they move about in little ellipses. The paths of the stars over the poles (or more precisely, above the plane of the Earth's orbit) will be almost circular, while the paths of those near the equator will be flat. This effect is called annular stellar aberration. Unlike parallax, this affects all stars equally, no matter what their distance.

You'll note that annual stellar aberration affects all stars, so this effect is different from parallax. Since it equally affects stars that are at any distance from the solar system, and since the effect varies with a star's distance from the Earth's orbital plane (an imaginary plane that intersects with the Earth's orbit), then we know that this effect is somehow due to the Earth's motion as it goes around the Sun each year.

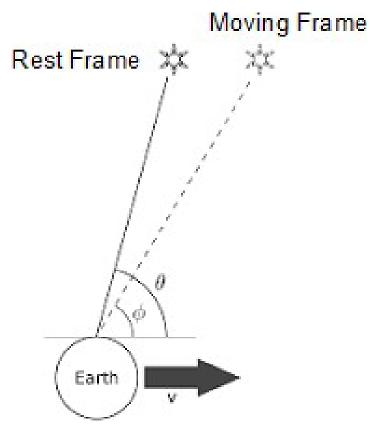
Annular stellar aberration is the effect well known by astronomers to cause stars to shift 20.5 arc seconds in their location in the sky. The amount of apparent positional change is governed by the time of year and location in the sky with regard to the Earth's orbit around the Sun. The number also mathematically correlates perfectly with the Earth's speed around the Sun compared to the speed of light.

If you understand relativity, you should have immediately picked up that light between an emitter and an observer should have no relation with some third object. Yet we find stellar aberration is perfectly related to a third object: Our speed with respect to the Sun. They have picked the Sun as the center of a preferential reference frame and have no idea why they did it.

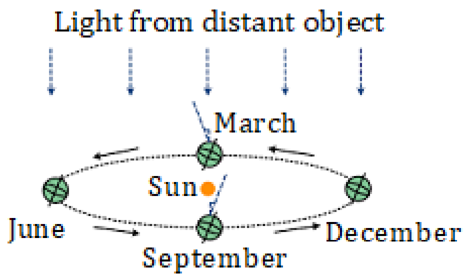
At least two forms of stellar aberration exist as observed from Earth: **annular** (Sun) stellar aberration and **diurnal** (Earth) stellar aberration. Obviously, starlight travels within the Sun's gravitational field (SGF), then later within the Earth's gravitational field (EGF). Both are local preferred frames for the speed of light as corroborated by the following observations.

Annular Stellar Aberration

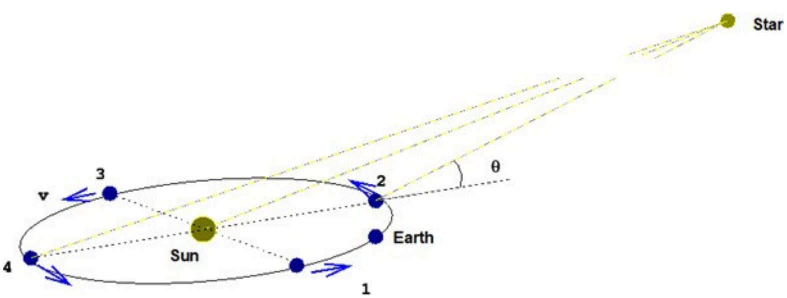
As the Earth orbits around the Sun, its velocity and angle continually change relative to starlight located within the preferred frame of the (SGF). Consequently, as observed from Earth, throughout the time frame of a year, the position and angle of the starlight also continually changes. This is not stellar parallax, which is a totally different phenomenon. Below are figures 3.2 and 3.3 which depict analogous forms of aberration.



Aberration (Astronomy) Wikipedia



Wikipedia



www.phys.uidaho.edu/~pbickers/Courses/310/Notes/book/node136.html

Figure 3.2 Stellar Aberration [Fair Use]

- *Remainder of caption below refers to the lower image above. Please apply that concept to the upper two images.*
- *The central, larger dot represents the Sun with the Earth orbiting around it, labeled 1, 2, 3, 4.*
- *The smaller dot located to the far right portrays a star.*
- *As the Earth orbits the Sun, then as a function of annular stellar aberration, the apparent position of the star changes.*
- *Note this diagram does not depict solar parallax.*

Diurnal Stellar Aberration

In the same way as the Earth revolves on its own axis every 24 hours, the observer, who is on Earth, changes his/her velocity/angle relative to the starlight located within the preferred frame of the EGF. See Figure 3.3 below. Therefore, over the time span of 24 hours, the apparent position and angle of the starlight continually changes. So what does this indicate? It signifies light is not relative to the observer (c in empty space). It means that there are fixed non–rotating frames where light travels within. What is more, they are preferred frames, identified by different names, one of which is called the gravitational field (inflow of space or ether).

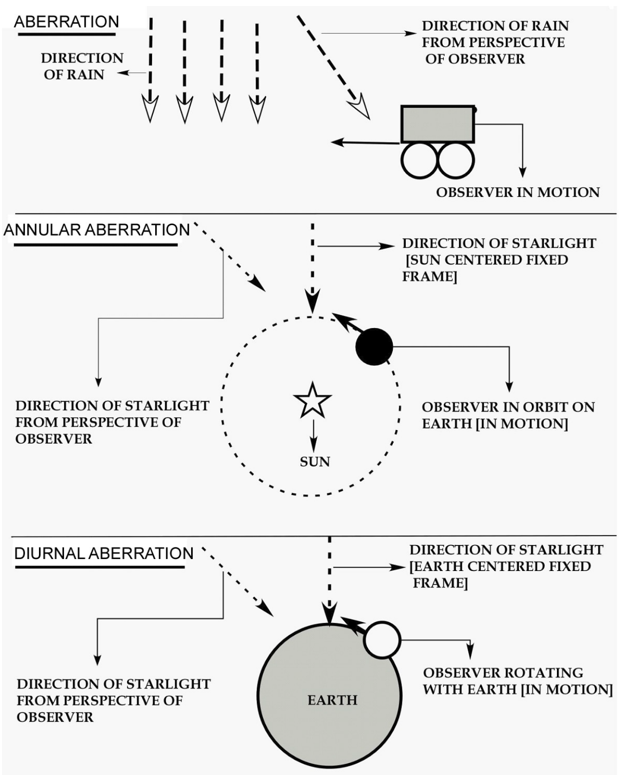


Figure 3.3 Rain, Annular and Diurnal Aberration

- *Figure 3.3 demonstrates analogous forms of aberration.*
- *Top = rain aberration with atmosphere as the preferred frame.*
- *Middle = annular stellar aberration with the Sun's gravitational field as the preferred frame.*
- *Bottom = diurnal stellar aberration with the Earth's gravitational field as the preferred frame.*

Einstein's SRT can also account for stellar aberration, but SRT assumes the magnitude of stellar aberration is a function of the relative velocities of the observer vs. emitter. But notice this fact carefully: Not all stars have the same velocity relative to the observer on Earth. So, if Einstein's SRT assumptions are germane, then different stars should possess varying amounts of aberration.

However, this is not what is actually observed. What we perceive is this: relative to the plane of the Earth's orbit around the Sun, no matter how far, and regardless of a star's velocity, with respect to the observer on Earth, all stellar aberrations are identical. Again, from the website anti–relativity.com:

The effect varies with a star's distance from the Earth's orbital plane (an imaginary plane that intersects with the Earth's orbit). You'll note that stellar aberration affects all stars, so this effect is different from parallax. Since it equally affects stars that are at any distance from the solar system, and since the effect varies with a star's distance from the Earth's orbital plane (an imaginary plane that intersects with the Earth's orbit), then we know that this effect is somehow due to the Earth's motion as it goes around the Sun each year.

The paths of the stars over the poles (or more precisely, above the plane of the Earth's orbit) will be almost circular, while the paths of those near the equator will be flat. The n umber also mathematically correlates perfectly with the Earth's speed around the Sun compared to the speed of light.

For this reason, SRT cannot be correct.

In contrast, PFGRT is consistent with actual observations, whereby annular stellar aberration is a function of the velocity/angle of the observer on Earth, relative to starlight located within the preferred frame of the SGF. So, with respect to this frame, all aberrations are the same. Again, this is called annular stellar aberration. In addition, there are two forms of stellar aberration, annular and diurnal. This duality cannot occur if the preferred frame for light of (c) is only from the perspective of the observer (SRT).

What is more, observer aberration also gives explanation why, from the frame of the observer on Earth, the apparent instantaneous, but not real, acceleration effect on the Earth towards the Sun (see Chapter 2, Speed of Gravity) does not match the visual position of the Sun. In essence, the apparent but not real, instantaneous gravitational pull position of the Sun is about 20 arc seconds east of its visible position. This is a function of observer aberration of sunlight from the frame of the Earth as it orbits about the Sun. Notice, in this case, the preferred frame for light is the Sun–centered frame/Sun's gravitational field/Sun's inflow of **the ether**. This is analogous to the fixed frame for light relative to the Earth, its gravitational field/inflowing ether.

For further clarification and from another perspective, sunlight travels outwards from the Sun in the form of a symmetrical radiating sphere, and the observer on Earth, (which is in orbit around the Sun) is moving at a transverse velocity relative to that radially outward spherical light frame, thus observer aberration.

In addition, the acceleration function of the inflow of space (ether) or as classically defined, the gravitational field has only the appearance (not real) of an instantaneous so–called "pull effect" on the Earth (again see Chapter 2, Speed of Gravity).

This action is at a radial right angle relative to the Earth as it orbits around the Sun. And so, as a result of these two different interacting factors, from the perspective of the observer on Earth, the →apparent← instantaneous gravitation–pull position (inflow of space) by the Sun exerted on Earth (right angle) does not correspond to the Sun's visual position. Observe again, in this instance, the preferred frame for light is the Sun–centered frame not the observer.

There is another factor to take into consideration, moreover, paramount in order to comprehend this aberration concept. Within the fixed frame of the SGF/EGF, light is captured or entrained by that frame, furthermore, in an inflowing nonrotating manner. So, inside that frame, if there is relative motion of the source and/or observer, then classic source vs. observer, aberration occurs as well as longitudinal and transverse Doppler effects.

Essentially,→a beam← of a given length of light located within a fixed frame (gravitational field) can move longitudinally, as well as transversely, through that frame, even though still entrained by that inflowing frame. So light leaving a star traveling towards Earth is entrained (fixed) first by the star's gravitational field, then as it travels through the galaxy by its gravitational field, then by the SGF, and finally, by the EG F. This occurs even though these separate gravitational fields (fixed frames) move at a velocity relative to one another.

In summary and for reinforcement, the gravitational field (inflow of space or ether) fixes the light within that specific frame but still allows for source and observer aberrations in that same frame. In addition, this same concept explains the transverse and longitudinal Doppler effects again within the same gravitational field frame. Bear in mind that transverse and longitudinal Doppler effects would not occur devoid of same functional process that produces source/observer aberration.

Even though in erratum, observer aberration, specifically within a single gravitational field frame (Sun), was used by Bradley as a proof of the speed of light as c, furthermore, supposedly validating SRT. See quotation below. **However, in reality, it (c) is related to the reference frame of the Sun's gravitational field (PFGRT)**. In essence, Bradley calculated (c) correctly but mistakenly posited the wrong reference frame. As British physicist Philip Gibbs wrote in 1997:

In 1728, James Bradley made another estimate by observing stellar aberration, being the apparent displacement of stars due to the motion of the Earth around the Sun. He observed a star in Draco and found that its apparent position changed throughout the year. All stellar positions are affected equally in this way. (This distinguishes stellar aberration from parallax, which is greater for nearby stars than it is for distant stars.) To understand aberration, a useful analogy is to imagine the effect of your motion on the angle at which rain falls past you, as you run through it. If you stand still in the rain when there is no wind, it falls vertically on your head. If you run through the rain, it comes at you at an angle and hits you on the front. Bradley measured this angle for starlight, and knowing the speed of the Earth around the Sun, he found a value for the speed of light of 301,000 km/s.

It should also be noted that source aberration of binary stars has never been observed from Earth. There are several possibilities for this fact now posited.

First, perhaps this is because, again as observed from Earth, different fixed frames or gravitational fields (star, galaxy, Sun, and Earth) are all moving at different velocities relative to one another. This circumstance results in observer aberration of the binary stars together, functioning as a single unit but masks the two different individual source aberrations as those stars orbit one another.

In other words, from the Earth's observer frame of reference, differential source aberration of the binary system exists. However, it is markedly reduced from what would be expected, assuming light is emitted directly from the two stars to the observer on Earth without interacting with the different intervening nonrotating gravitational fields, all of which are traveling at differing velocities relative to one another.

Second, alternatively, binary stars, which are orbiting one another, then generate a very complex single gravitational field (fixed frame) which may compensate, therefore negate, their different source aberrations.

Third, the emitted light of the source stars is in the form of a complex sphere (complex fixed frame), whereas from the observer reference frame on Earth, that light is in the same shape of a pencil beam.

Fourth, source aberration of binary stars is based upon spectral analysis of light, whereas observer aberration is based upon starlight position. As a result, there may be unaccounted factors that do not make them equivalent.

These are possible explanations for why. From the reference frame of the observer on the orbiting Earth, observer aberration is measured within a single gravitational field such as associated with our Sun or else from starlight emitted from a single star. But on the other hand, regarding binary stars, again from the reference frame of Earth, differential source aberration is not apparent.

Three–West–East, East–West Satellite Transmission

Radio waves transmitted via satellite from Japan to the United States take a longer amount of time than vice versa. Similarly, radio waves that are sent, via satellite–to–satellite, around the Earth's equator, then back to their origin, take longer traveling west to east than east to west. So what does all this indicate? It signifies that the ECF/EGF is the local preferred frame for the speed of light. Thus, as a function of the Earth's axial rotational spin, relative to within the EGF/ECF, so it then takes light a longer interval of time to travel west to east as compared to east to west.

Four–Hafele and Keating

See Figure 3.4 (Hafele and Keating).

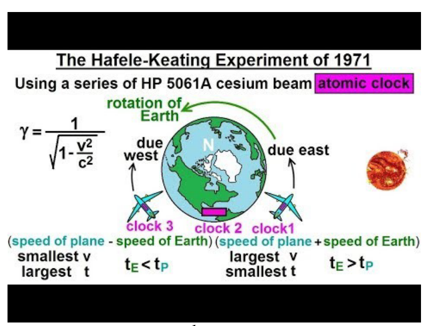
During October 1971, four cesium atomic beam clocks were flown on regularly scheduled commercial jet flights around the world twice, once eastward and once westward, to test Einstein's theory of relativity with macroscopic clocks. From the actual flight paths of each trip, the theory predicted that the flying clocks, compared with reference clocks at the U.S. Naval Observatory, should have lost 40 ± 23 *nanoseconds during the eastward trip and should have gained* 275 ± 21 *nanoseconds during the westward trip. Relative to the atomic time scale of the U.S. Naval Observatory, the flying clocks lost* 59 ± 10 *nanoseconds during the eastward trip and gained* 273 ± 7 *nanosecond during the westward trip, where the errors are the corresponding standard deviations. (Rod Nave, Department of Astronomy and Physics, University of Georgia)*

For the benefit of the nonscientist, this is the author's explanation of the Hafele and Keating experiment. Relative to the baseline clock sited on the rotating surface of the Earth, if one compares the amount of time it takes for the two atomic clocks to travel by airplane around the Earth, from west to east as compared to east to west, the west–east clock takes longer. See Figure 3.4 below.

Left Side

youtube.com
https://www.youtube.com/watch?v=r-akILbzjhc

Right Side



youtube.com
https://www.youtube.com/watch?v=flfqLgSV0iA

Figure 3.4 Hafele and Keating [Fair Use]

With respect to traveling around the Earth, it takes a longer amount of time for the clocks to travel west to east as compared to east to west (atomic clocks aboard aircraft).

What does this experiment signify? It indicates that relative to the EGF, the west–east clock possesses a higher velocity compared to the east–west clock. As a result, its ”tick rate” is slower. This consequence can only occur if there is a preferred frame, EGF/ECF.

The YouTube site below contains a video describing an experiment supporting the concept that the ”rate of time” of an atomic clock is a function of its velocity relative to the Earth–centered frame (EGF) just like the Hafele and Keating experiment.

https://www.youtube.com/watch?v=G-7ImOWnxQ8

However, it is a more precise experiment. Nonetheless, the author of the website describes the experiment as a function of frame dragging. Alternatively, it is this author's opinion that his conclusion is en erratum. The experiment actually demonstrates differential ”time dilation” of an atomic clock as a function of velocity relative to the Earth–centered frame/gravitation field/inflow of space–ether.

As a corollary, an atomic clock positioned at the equator ticks slower (1,000 mph relative to the EGF, ECF ether) compared to an identical atomic clock located at a higher latitude (<1,000 mph with respect to the ECF, EGF, ether). This measured outcome, as chronicled by single orbiting satellite, is a function of their different velocities relative to the nonrotating ether (EGF, ECF).

Five–GPS System

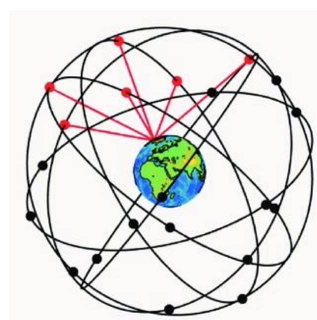
The GPS basically proves PFGRT as correct. (See figures 3.5 and 3.6 below, moreover, the following citation.)

The following YouTube figure (left), sponsored by NASA LaRC Office of Education, partially describes how the GPS functions.

Left Side

Credit: NASA

Right Side



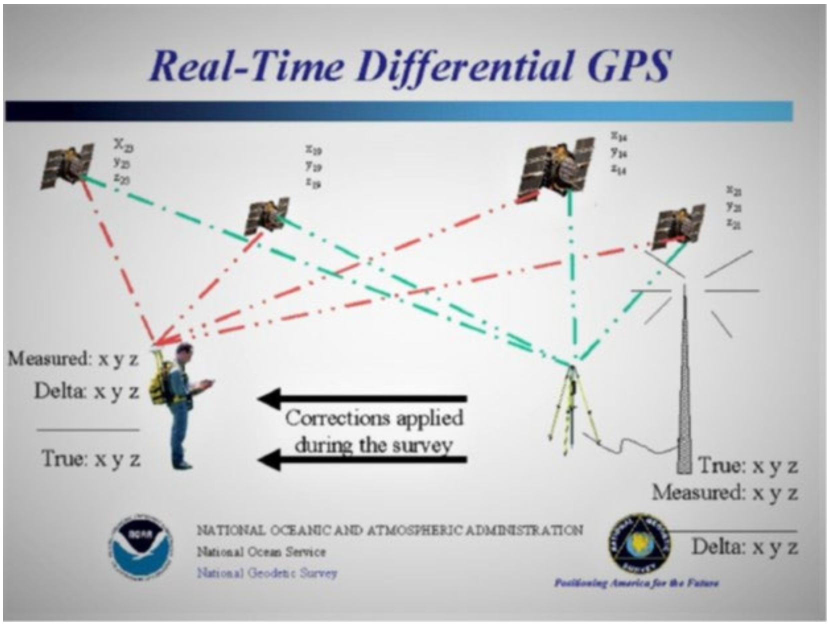
Wikimedia Commons

Figure 3.5 GPS System [Fair Use]

This is an illustration of the GPS system from NASA (left):

Each GPS satellite transmits data that indicates its location and the current time. All GPS satellites synchronize operations so that these repeating signals are transmitted at the same instant. (They are synchronized with an Earth–bound baseline clock.) The signals, moving at the speed of light, arrive at a GPS receiver at slightly different times, because some satellites are further away than others. https://www.youtube.com/watch?v=0n0T992ccik

This begs the question, by what methodology are the atomic clocks of the GPS synchronized in order for the system to function correctly? Physicists do use some of Einstein's relativity equations, nevertheless, only with reference to the ECF, not the observer. Basically, they utilize two factors for synchronizing the orbital clocks with the Earth-based baseline clock: the first is the altitude of the orbit and second, the velocity of the orbit.



National Ocean And Geographic Administration

Figure 3.6 Another Example of the GPS System [Fair Use]

The distance to the GPS satellites can be determined by estimating the amount of time it takes for their signals to reach the receiver. When the receiver estimates the distance to at least four GPS satellites, it can calculate its position in three dimensions.

There are at least 24 operational GPS satellites at all times plus a number of spares. The satellites, operated by the U.S. DoD, orbit with a period of 12 hours (two orbits per day) at a height of about 11,500 miles traveling at 9,000 mph (3.9 km/s or 14,000 kph). Ground stations are used to precisely track each satellite's orbit.

http://www.PocketGPSWorld.com

With respect to the first (altitude), the higher the orbit, the weaker the gravitational field, so the tick rate of the atomic clock increases. And for the second (velocity), the closer to Earth, the faster the orbital velocity, thus the slower is its tick rate. Once again, the adjustments are made relative to the ECF but, most importantly, not from the perspective of the observer. With reference to the new lexicology of this article as defined in chapters 1 and 2, the synchronization process can be described this way; however, first, in order to comprehend the following explanation, one must understand and accept the assumptions presented in those two chapters. The inflowing ether EGF/ECF accelerates and self-compresses as it streams in towards Earth. As a result, the closer a clock is to the Earth, the greater is the velocity/density of the inflow. Therefore, the clock's tick rate decreases. As the orbital velocity of the clock increases, the closer it is to Earth; then its transverse motion relative to the inflow also increases. And for that reason, its tick rate then again decreases.

But that is not all. The GPS system also uses the ECF as the preferred frame for the speed of light, not the observer. So, in order to determine the correct position on Earth, relative to the ECF, both the orbital velocity of the satellite, as well as the rotational velocity of the desired location on Earth, must be factored in. Once again, this is not from the perspective of the observer.

What the GPS proves is this: →The EGF/ECF is the local preferred frame for the speed of light on Earth, moreover, the frame that also determines the "rate of time."← In contrast, presuming the GPS used the observer for the preferred frame, in all likelihood, it would be too complicated to function properly. In that case, each satellite's clock would have a constantly changing velocity relative to all the other satellites, with their clocks, as well as to the Earth–based clock. Even so, theoretically, it could be made to work, nevertheless, only with the use of extremely complex mathematics. It is important to note that this would violate Occam's razor.

These five observations and/or experiments in conjunction basically prove that the ECF, EGF is the local preferred frame for both the speed of light, as well as the rate of time. Fundamentally, the local preferred frame for the speed of light on Earth is its own gravitational field. This basic assumption will now be applied to the Michelson–Morley experiment (MMX).

3.2 The Michelson–Morley Experiment (MMX)

The author has decided to make this specific section redundant, not for the sake of the physicist, for he/she will readily understand the concepts presented, but rather to underscore their significance. The author has composed it in this manner for the benefit of the apprentice. This is because, in the author's opinion, the concepts described here within are somewhat visually abstract, especially for the nonscientist.

For that reason, the same concepts are presented multiple times and from different perspectives. Hopefully, for the novice, this repetitive methodology will aid in his/her ability to grasp the ideas presented.

As already described, large global experiments/observations all involve rotation within the EGF, but more importantly, they demonstrate anisotropy. In contrast, small extremely high–quality linear experiments, performed on the Earth's rotating surface produced isotropy. Some of them were not pursuing the Earth's axial spin velocity. Nevertheless, they should have been sensitive enough to detect it. In fact, there have been so many that it is not realistic to assume that if there is a fault, it lies with poorly designed equipment or the experimenter.

Once again, with regard to the global experiments, there is irrefutable evidence that the local preferred frame for the speed of light is synonymous with the Earth's gravitational field ECF/ether inflow of space/ether. In addition, they directly measure the speed of light predominately in a vacuum. However, given that they all involve acceleration, rotation, and curvature, they are then considered Sagnac experiments (GRT), thus not contradictory to SRT.

Viewed from another perspective, if a gravitational field is the **only** preferred frame for the speed of light, furthermore, as a product of mass (matter), then all preferred frames for light must be connected with a sphere/gravitation field/acceleration of some sort. How could it be otherwise? And so given the above assumption, what other option is there?

Alternately, there is solid evidence derived from numerous small local linear experiments, when performed on the rotating surface of the Earth, that the speed of light is isotropic. But notice this fact very carefully. These second–order local experiments do not directly determine the speed of light, rather they measure (mathematically) "interval of time" as a direct function of "distance through the ether." The latter phrase is defined within this article as **geometry**.

Therefore, if one posits that there is a fundamental error related to this geometry, which has been overlooked, then this presumed fact explains the discrepancy between the global vs. local experiments. In addition, it is more likely that the fault lies with the local experiments, since the global experiments are so overwhelmingly convincing, as well as practical. Furthermore, they directly measure the speed of light. What is more, there are some local experiments (Brillet and Hall), which hint that the EGF is the local preferred frame for the speed of light on Earth.

MMX

Michelson and Morley were not searching for the Earth's axial spin velocity, rather the Earth's orbital velocity around the Sun (67,000 mph = 0.4 fringe shift). In addition, the experiment was not sensitive enough (0.04 fringe shift) to detect the Earth's axial spin velocity at the latitude of the experiment (< 1,000 mph ≤ 0.006 fringe shift). Nevertheless, many other super–sensitive high–quality second–order experiments have confirmed the MMX's null result. This segment describes "overlooked physics," that when taken into account, produce a null outcome, for all second–order experiments of this type as classically performed/interpreted, even in the presence of the ether wind. Given the fact that the MMX is so well known, moreover, considered by many as proof of relativity, it will be used as the model.

Before proceeding further, if one is not familiar with the MMX, then it will be highly helpful to peruse Appendix D, which describes the MMX in much greater detail. Only then will one be able to fully appreciate the following assumptions and conclusions. In addition, for the beginner, viewing the YouTube websites listed below will simplify one's understanding behind the physics of the MMX. It is much easier for the novice to clearly grasp its function by watching a visual presentation, rather than reading a written one.

http://www.youtube.com/watch?v=7qJoRNseyLQ

http://www.youtube.com/watch?v=uMaFB3jM2qs

http://www.youtube.com/watch?v=Z8K3gcHQiqk

On the other hand, if one already has sufficient expertise, please skip to the paragraph beginning with the *.

Classical Interpretation of the MMX

Listed below are quotes the author has modified describing the classical interpretation of the MMX written by Michael Fowler, Ph.D. (The words in parentheses are mine.) Figure 3.6 is from the original MM paper by Michelson and Morley. With respect to this adapted interpretation, it is assumed that the EGF/ECF is the preferred frame for the speed of light as demonstrated by the global experiments. For that reason, there is a relative ether wind equal to the Earth's rotational spin velocity at the latitude of the experiment.

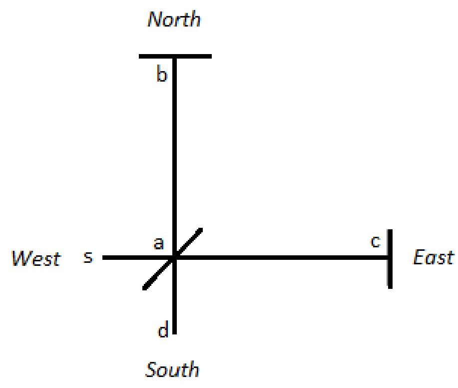


Figure 3.7 MMX Setup [Fair Use]

- *The source of light is at s.*
- *The 45-degree line is the half-silvered mirror.*
- *b and c are mirrors.*
- *d is the observer.*
- *The horizontal axis is west–east and east–west.*
- *The vertical axis is south–north and north–south.*

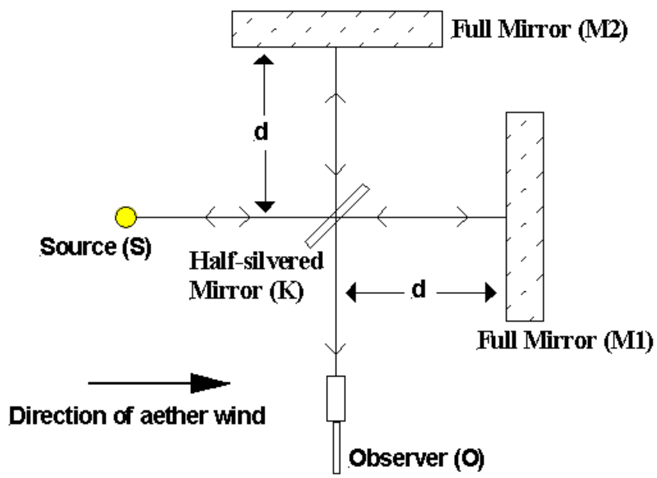
Below, find a more detailed explanation of Figure 3.7 from Michael Fowler, Department of Physics, University of Virginia:

1. The scheme of the experiment is as follows: a pulse of light is directed at an angle of 45 degrees at a half-silvered, half transparent mirror, so that half the pulse goes on through the glass, half is reflected. They both go on to distant mirrors, which reflect them back to the half-silvered mirror. At this point, they are again half–reflected and half transmitted, but a telescope is placed behind the half-silvered mirror as shown in the figure so that half of each half–pulse will arrive in this telescope. If there is an aether wind blowing, someone looking through the telescope should see the halves of the two half–pulses to arrive at slightly different times, since one would have gone more east–west and back, one more south–north and back. [The wave from east–west and back would travel a longer distance (time) than the wave from south–north and back]. To maximize the effect, the whole apparatus, including the distant mirrors, was placed on a large turntable so it could be swung around.

2. Michelson utilized a steady beam of light of a single color. This can be visualized as a sequence of ingoing waves, with a wavelength one fifty–thousandth of an inch or so. This sequence of waves is split into two and reflected back to the central receiving mirror (telescope eye where the interference pattern occurs). One set of waves goes northward and then southward (a,b then b,a). The other set of waves goes eastward and then westward (a,c then c,a). Finally, they come together into the telescope and the eye (d). If the one that took longer is half a wavelength behind, then its troughs will be on top of the crests of the first wave; thus, they will cancel, and nothing will be seen. If the delay is less than that, there will still be some dimming. However, slight errors in the placement of the mirrors would have the same effect. This is one reason why the apparatus is built to be rotated. On turning it through 90 degrees, then the north–south waves through the ether wind and the east–west waves through the ether wind will exchange places. The other one should be behind. Thus, if there is an ether wind and if you watch through the telescope while you rotate the turntable, you should expect to see variations in the brightness of the incoming light.

In addition, here is a second brief synopsis regarding the physics of the MMX found at the New South Wales Catholic Schools Physics Department website (Bob Emery):

In 1887, Albert Michelson and Edward Morley of the USA carried out a very careful experiment at the Case School of Applied Science in Cleveland. The aim of the experiment was to measure the motion of the Earth relative to the aether and thereby demonstrate that the ether existed. Their method involved using the phenomenon of the interference of light to detect small changes in the speed of light due to the Earth's motion through the aether.



Bob Emory

New South Wales Catholic Schools, Physics Department

Figure 3.8 MMX Apparatus [Fair Use]

The whole apparatus is mounted on a solid stone block for stability and is floated in a bath of mercury so that it could be rotated smoothly about a central axis. The Earth, together with the apparatus, is assumed to be traveling through the aether with a uniform velocity–u of about 30 km/s. This is equivalent to the Earth at rest with the aether streaming past it at a velocity–u.

In the experiment, a beam of light from the source S is split into two beams by a half-silvered mirror K as shown. One half of the beam travels from K to M1 and is then reflected back to K, while the other half is reflected from K to M2 and then reflected from M2 back to K. At K, part of the beam from M1 is reflected to the observer O and part of the beam from M2 is transmitted to O.

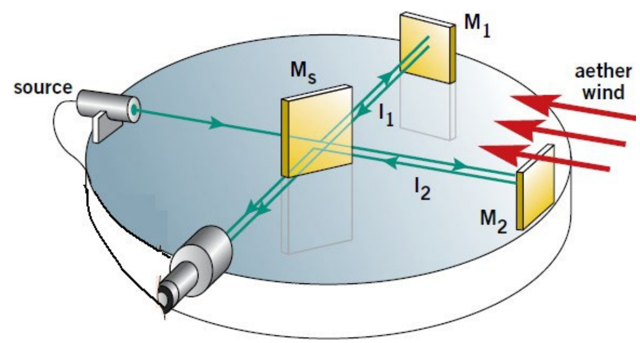
Although the mirrors M1 and M2 are the same distance from K, it is virtually impossible to have the distances traveled by each beam exactly equal, since the wavelength of light is so small compared with the dimensions of the apparatus. Thus, the two beams would arrive at O slightly out of phase and would produce an interference pattern at O.

There is also a difference in the time taken by each beam to traverse the apparatus and arrive at O, since one beam travels across the aether stream direction while the other travels parallel and then anti–parallel to the aether stream direction. This difference in time taken for each beam to arrive at O would also introduce a phase difference and would thus influence the interference pattern.

If the apparatus were to be rotated through 90°, the phase difference due to the path difference of each beam would not change. However, as the direction of the light beams varied with the direction of flow of the aether, their relative velocities would alter and thus the difference in time required for each beam *to reach O would alter. This would result in a change in the interference pattern as the apparatus was rotated.*

The Michelson–Morley apparatus was capable of detecting a phase change of as little as 1/100 of a fringe. The expected phase change was 4/10 of a fringe. However, no such change was observed.

Thus, the result of the Michelson–Morley experiment was that no motion of the Earth relative to the ether was detected. Since the experiment failed in its objective, the result is called a null result. The experiment has since been repeated many times, and the same null result has always been obtained.

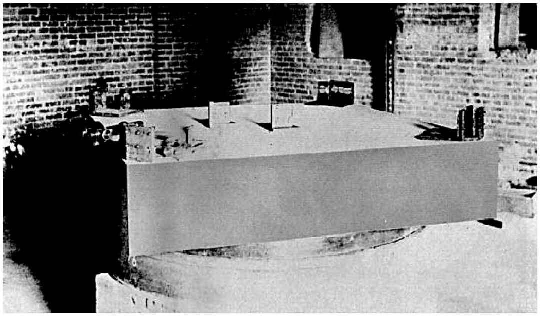


Dux College

Figure 3.9 3D–MMX Apparatus [Fair Use]

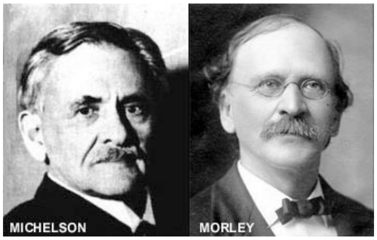
Figure 3.9 is a three–dimensional reconstruction of Figure 3.7.

Left



Wikimedia Commons

Right



Michelson and Morley

Figure 3.10 Photograph of MMX Apparatus [Fair Use]

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* Perhaps it will be considerably easier for the novice to comprehend the following classic explanation of the MMX, written by the author, since it is designed specifically for that segment of the population. Even so, for the physicist, this description will help clarify the error of the classic interpretation, since one must comprehend how the MMX actually functions, before one can understand the flaw of the overlooked physics.

→First, assume the physical lengths of the arms of the MMX are absolutely equal←. And second, presume that there is an ether wind. Therefore, the light, which travels within the to–and–fro wind arm, takes a longer transit time when compared to the crosswind arm. It is assumed the to–and–fro transit time is longer, given that light (c) travels a greater distance through the ether because of the ether wind.

Take note that "time" is a direct function of distance "traveled through the ether." In turn, distance is a function of geometry. From here on out, regarding this chapter, geometry refers to the distance traveled through the ether, not distance relative to the physical length of the arms of the MMX. **Therefore, with reference to this concept, moreover, to avoid confusion, the word distance, as such, will be labeled in parentheses and with an asterisk; (distance*) = distance through the ether.**

The MMX does not directly measure the speed of light, for relative to each arm, any potential gain or loss of the speed of light traveling in one direction is compensated by a loss or gain in the opposite direction. As a result, the speed of light is not directly measured, rather only time (mathematically) as a function of (distance*). If the preferred frame for the speed of light is the ECF (gravitational field) as proven by the GPS system, then the maximum measured anisotropy possible is located at the equator at 1,000 mph.

The following figures 3.11, 3.12, 3.13, and 3.14 describe the classic explanation of the function of the MMX. They represent four different reference frames–again, →assume equal physical length of the arms←.

Figure 3.11 assumes there is no ether or else the MMX is at rest with the ether. With reference to this frame, it is as if the observer is standing adjacent to the MMX, moreover, with no discernment of the ether. Therefore, the illustration shows his/her perception of the pathways of the light beams with respect to the frame of the MMX.

Figure 3.12 posits a stationary ether. Pertinent to this frame, it is as if the observer is a part of the ether, moreover, observing the pathways of the two light beams traveling through the ether.

Figure 3.13 postulates an ether wind. With regard to this frame, it is as if the observer is standing next to the MMX with no awareness of the ether wind. As such, the illustration shows his/her perception of the pathways of the light beams relative to the frame of the MMX.

Figure 3.14 posits an ether wind. Applicable to this frame, it is as if the observer is stationary with respect to the ether wind, furthermore, observing the pathways of the two light beams traveling through and with the ether wind.

So to begin with, refer to figures 3.11 and 3.12 below and the following dialogues. Again, assume that the physical lengths of the arms of the MMX are absolutely equal and distance refers to distance through the ether, labeled (distance*).

Figures 3.11 and 3.12 presume there is no ether or else the MMX is at rest with the ether. In this setting, relative to the two arms, the (distances*) are equal. If so, then at the location of the detector (observer), the two light streams are in phase. Consequently, no interference pattern forms (no dimming), regardless of whether or not the MMX is rotating.

Left Right

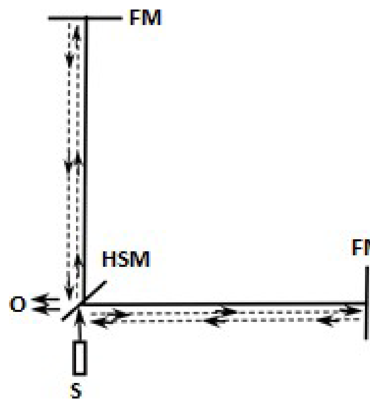


Figure 3.11 Two Paths of Light as Seen by the Observer

- *O = Observer (detector).*
- *S = Source of light.*
- *HSM = half-silvered mirror.*
- *FM = Full mirror.*
- *Dotted lines with arrows = pathways of light beams.*

Figure 3.11 above depicts the MMX in the absence of an ether or else at rest with the ether, moreover, from the reference frame of its own physical structure. The illustration shows the perceived pathways of the two light streams (denoted by the arrows) relative to an observer standing next to and observing the MMX.

Left Right

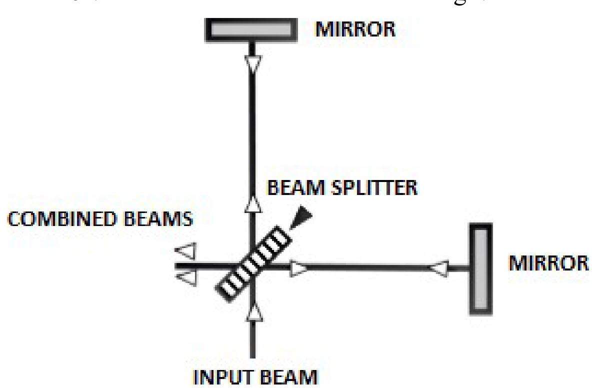


Figure 3.12 No Interference Pattern = at Rest with the Ether or no Ether [Fair Use]

Figure 3.12 above depicts the MMX at rest with the ether, moreover, from the reference frame of the ether. The illustration shows the pathways of the two light streams, depicted by the arrows, as they traverse through the ether. In this scenario, the vertical arm (distance) equals the horizontal arm (distance*). Therefore, no interference pattern forms, with or without rotation.*

See figures 3.13 and 3.14 below and the following discussions. Alternatively, if the ether wind exists, then the "interval of time" (distance*) that it takes for light to travel within the to–and–fro arm is greater than the cross-wind arm. This divergence produces an interference pattern at the location of the observer/detector (see Figure 3.15 left). Subsequently, during 360 degrees of rotation, then relative to the two arms, the (distances*) change.

Essentially, they exchange places every 90 degrees. As a result, over 360 degrees of rotation, there is a continuous alteration in the appearance of the interference pattern (alternating brightness and dimming). This takes the form of a fringe shift with a sinusoidal wave pattern. See also Figure 3.15 (left to the right), as well as Figure 3.16.

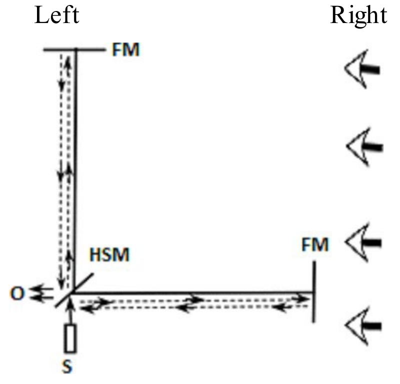


Figure 3.13 MMX with Ether Wind

Figure 3.13 above shows the MMX from the reference frame of its own physical structure but now in the presence of an ether wind. Assume the MMX possesses a translational velocity relative to the ECF/EGF, from left to right.

Therefore, the relative ether wind is oriented in the opposite direction, from right to left (arrows on the right). The schematic demonstrates the perceived pathways of two light streams from the reference frame of an observer standing next to and observing the physical structure of MMX with no awareness of the ether wind.

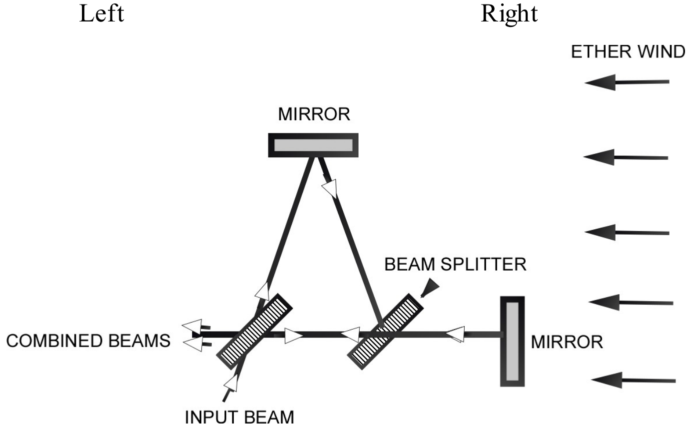
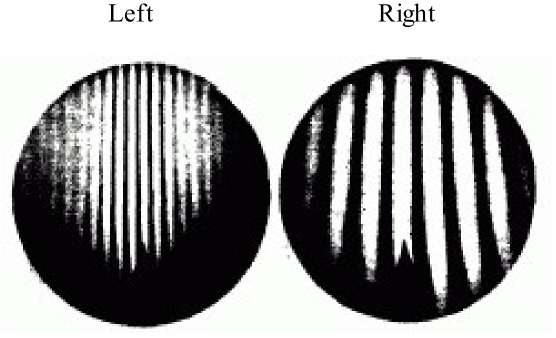


Figure 3.14 MMX with Ether Wind [Fair Use]

Figure 3.14 depicts the pathways of the two light streams as they traverse through and with the relative ether wind, moreover, from the reference frame of an observer stationary with respect to that ether wind. In this instance, the to–and–fro arm time (distance) is > than "the cross–wind arm" time (distance*).*

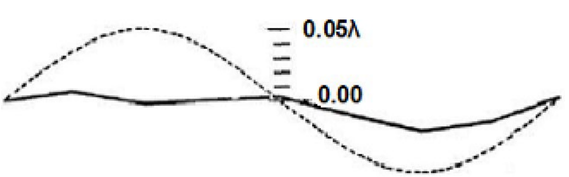
Therefore, an interference pattern forms at the location detector/observer. In addition, as a function of rotation (360 degrees), there is then a fringe shift produced in the form of sinusoidal wave pattern. See figures 3.15 and 3.16 below.



Wikipedia

Figure 3.15 Interference Pattern [Fair Use]

From left to right, the interference pattern changes which is called a fringe shift.



Wikipedia

Figure 3.16 Graph of the Sinusoidal Pattern of the Fringe Shift [Fair Use]

The graph is from the original MMX experiment paper. The expected change in the appearance of the interference pattern (fringe shift), during 360 degrees of rotation, takes on the form of a sinusoidal wave pattern as depicted above by the more pronounced dotted curved line.

The author proposes both an alternative hypothesis and alternative postulate. The hypothesis is given below, and the postulate is an epilogue. Note: The postulate, which in all probability is most likely the correct idea, is easier to understand after comprehending the hypothesis. Please evaluate both, especially the postulate.

The major concept for appreciating the overlooked physics of the MMX is this. The interference pattern is not formed at the detector (observer). Rather, it is initially formed at the location of the half-silvered mirror. This is where the two returning/reflected, moreover, opposing light waves first interface/intersect, and then interact at right angles to form the interference pattern. Subsequently, after this recombination at the half-silvered mirror, they are then fixed relative to one another. And once fixed, they travel parallel, moreover, in the identical direction, through the same ether to the detector (observer), even during rotation. See Figure 3.17 and the following discussion.

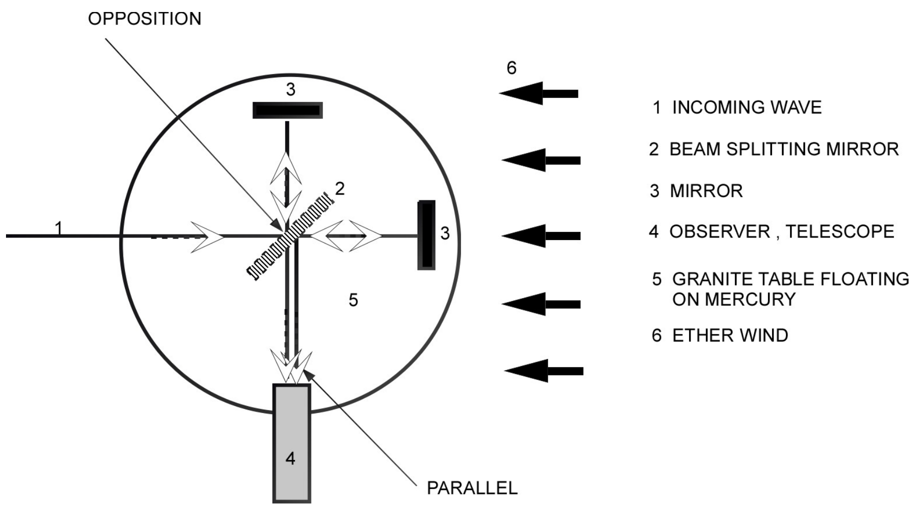


Figure 3.17 MMX with an Ether Wind [Fair Use]

- *Assume equal physical length of the arms.*
- *Presume an ether wind portrayed by the horizontal solid arrows on the right.*
- *As opposed to the prior illustrations, the source and observer have exchanged places. This has no effect on the outcome.*

Incorrect interpretation. (Classic Theory)

The observer located at the detector (telescope) falsely assumes, with respect to the two arms, that the two light waves are traveling →parallel← to one another their entire (distances*) (time). Observe, in actuality, they are not always physically in all segments traveling parallel their entire (distances*). However, mathematically expressed as a function of time with respect to the MMX equations, they are functionally parallel. In addition, he/she also incorrectly presumes the interference pattern forms at the position of the detector (observer).

Given these false postulates, then during rotation, the two light waves (distances*)(time) essentially exchange places every 90 degrees. This function is →only somewhat analogous← to two vertical metal grates shifting back and forth for every 90 degrees, with the grates representing light wavelengths. Therefore, presuming an ether wind, this assumed effect, over 360 degrees of rotation, produces a fringe shift (presenting as alternating dimming and brightness) in the form of a sinusoidal wave pattern.

Correct proposed interpretation. (Hypothesis)

However, in fact, the interference pattern actually forms as a function of two returning light waves, which have already been reflected from the peripheral mirrors to the half-silvered mirror. Therefore, from the frame of the half-silvered mirror, they are then traveling in physical →opposition← to one another (right angle).

The half-silvered mirror is the location where the interference first forms. So during rotation, from the frame of the half-silvered mirror, one arm progressively gains (x) wavelengths, while the other arm **symmetrically** and progressively loses (x) wavelengths. Consequently, the configuration of the two opposing interacting wavefronts at their interface (half-silvered mirror) does not change, even though the (distances*) have changed. This process reverses itself every 90 degrees.

Then, from the half-silvered mirror to the detector (observer), the two waves travel parallel, moreover, are fixed relative to one another, even during rotation. This is because at that interval of time, both waves are traveling physically parallel through the same ether. Therefore, overall, during rotation, there is no fringe shift even in the presence of an ether wind.

The most important facts to acknowledge are:

1. The interference pattern is observed at the detector, but not formed there. It is →initially← formed at the location of the half-silvered mirror.

2. The interference pattern is fashioned from two opposing waves, which have already been reflected from the peripheral full mirrors to the central half-silvered mirror. So, from the reference frame of the half-silvered mirror, they are physically traveling in opposition towards one another (right angle).

3. For reinforcement, the interference pattern is not a function of two interacting parallel waves traveling in the same direction their entire (distances*), though the definition of parallel is only expressed mathematically as a function of time with respect to the equations of the MMX. Rather, as above, it is a function of two physical interacting waves traveling in physical opposition at the location of the half-silvered mirror.

At this juncture, before proceeding, it would be highly helpful if one viewed figures 3.25 and 3.27. These illustrations demonstrate, that at 45 degrees, relative to the ether wind, the (distances*) within the two arms are exactly the same. This is assuming equal physical lengths of the arms. Knowing and accepting this fact/assumption is a crucial step in order to understand the following explanation and descriptions.

See figures 3.18, 3.19, 3.20, and 3.21, and assume all is oriented as shown. Here again are the crucial concepts and descriptions regarding the overlooked physics of the MMX. This first description is of the classical, nevertheless erroneous interpretation.

Incorrect interpretation. (Classic Theory)

Once again, presume an ether wind and equal physical lengths of the arms as depicted. In this instance, relative to the two arms, the intervals of time (distances*) are unequal. Consequently, at the position of the detector or observer, where it is posited that the →parallel← light beams recombine, an interference pattern then forms. Take note again, in actuality, the two light beams are not physically traveling parallel their entire (distances*). Parallel in this instance is a mathematical function of time with respect to the equations of the MMX.

In addition, as a function of rotation resulting in a gain of an interval of time (distance*) in one arm vs. loss of an interval of time (distance*) in the other arm, then over 360 degrees, a fringe shift is produced in the form of a sinusoidal wave. This fringe shift is depicted below in Figure 3.19.

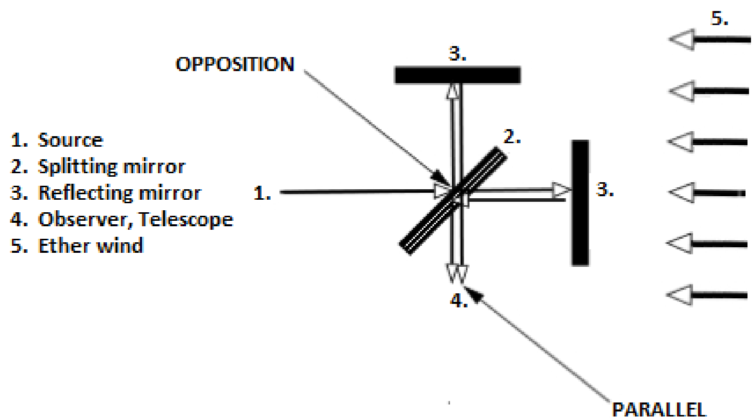


Figure 3.18 MMX with an Ether Wind

- *M1 and M2 = peripheral full mirrors.*
- *K = half-silvered mirror.*
- *Arrows within MMX = direction of light waves.*
- *Rows of hollow arrows to the right = ether wind.*

For reinforcement, the incorrect interpretation is again presented referring to figures 3.18 and 3.19.

Parallel Interacting Waves (Incorrect)

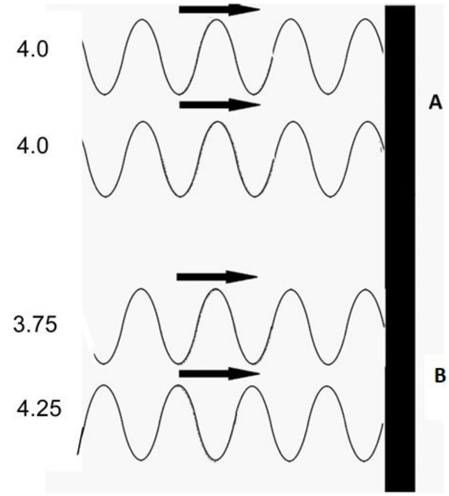


Figure 3.19 Incorrect Interpretation (Classic Theory)

There is a fringe shift between A and B.

- *The classical explanation assumes the interference pattern forms at the detector.*
- *Assume an ether wind with equal physical lengths of the arms.*
- *(Distance*) = distance of the light through the ether = interval of time.*
- *The straight vertical bar represents the detector or observer.*
- *The two sets of waves represent the (distance*) (time) within each of the two arms. A = one set. B = the second set.*
- *A = The arms are oriented 45 degrees relative to the ether wind.*
- *B = The arms are oriented at either 0 or 90 degrees relative to the ether wind.*
- *Take note, relative to 45 degrees vs (0 degrees or 90 degrees), there is anti-symmetry (gain vs loss) of the number of wavelengths. However, for simplicity of explanation, only one symmetry is shown in this figure.*
- *At the location of the detector, it is assumed the two waves travel mathematically (time) →parallel← to each other their entire (distances*).*
- *Note the illustration depicts parallel waves but only as a representation of time with respect to the equations of the MMX.*

The following is once again the classic, but erroneous, interpretation of the function of the MMX. The assumptions presented are false; therefore, the physics described below is incorrect. Refer to Figure 3.19.

Position A = 45 degrees relative to the ether wind.

At this position, with respect to the two arms, the "interval of time" (distances*) are equal. Therefore, at the location of the detector (observer), the two light waves are in phase. As a result, no interference pattern forms (no dimming).

Position B = 0 or 90 degrees with respect to the ether wind.

At these positions, after rotation from 45 degrees, relative to the two arms, the (distances*) are unequal. In this setting, the two waves are now out of phase, because during this rotation, one arm gains 0.25–wavelength(s) (distance*) (time) (A top), while the other arm symmetrically loses 0.25–wavelength(s) (distance*) (time) (B bottom). So, at the location of the detector (observer), an interference pattern forms. This process then reverses itself every 90 degrees. Therefore, as a function of 360 degrees of rotation, a fringe shift is produced in the form of a sinusoidal wave pattern (alternating dimming and brightness).

• Bear in mind that the gain versus loss of wavelength between 45 compared 0 and 90 degrees is not numerically equal, as shown in the figure above, but rather unequal. However, for simplicity of visual appreciation presented as equal (gain vs. loss). This alteration does not change the underlying principle as illustrated. The reason will be clarified/explained in the epilogue imparted later in this chapter. The author believes the postulate (anti– asymmetry) of the epilogue (not the theory/hypothesis) is probably the correct concept. Nevertheless, this assumption requires vigorous mathematical proof beyond the capability of the author. See Page 106 C.

Correct proposed interpretation. (Hypothesis)

Before proceeding, please see figures 3.20 and 3.21.

Again, assume an ether wind with absolutely equal physical length of its arms. And all is oriented as shown.

In reality, the two streams of light waves, after being reflected from the peripheral full mirrors, are then physically traveling towards one another in →opposition← at a right angle. Their wavefronts initially intersect, moreover, interact, at the half-silvered mirror to form the interference pattern. Then, from the half-silvered mirror to the detector, they are fixed physically parallel relative to one another, even during rotation.

Assume there is rotation of the MXX. If the two light waves are traveling in →opposition← (Figure 3.21) and if one wave progressively gains (x) number of wavelengths (distance*), whereas the other wave symmetrically progressively loses an equal (x) number of wavelengths (distance*), then at the true location of the interacting wavefronts (half-silvered mirror), there is no change in their interface. For the same reason, during rotation, there is no fringe shift (dimming), since this anti–symmetrical compensatory function prevents it.

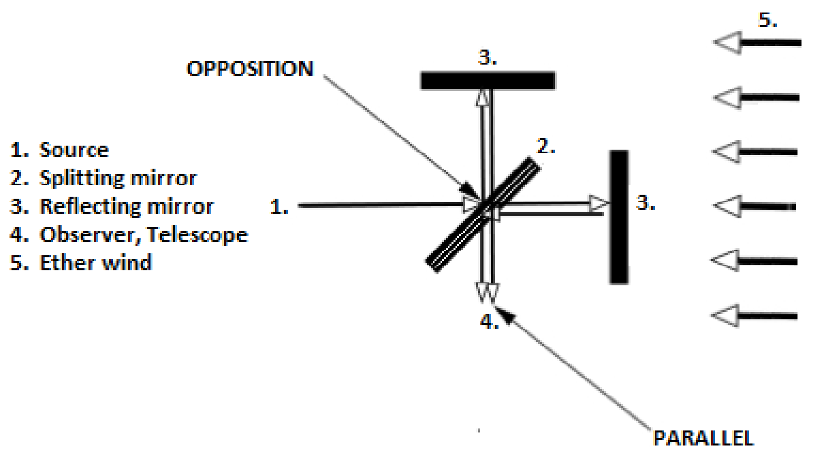


Figure 3.20 MMX with an Ether Wind

- *S = light source.*
- *M1 M2 = peripheral full mirrors.*
- *K = half-silvered mirror.*
- *Arrows within MMX = direction of light waves.*
- *Line of arrows to the right = ether wind.*

Yet again for reinforcement, the correct interpretation (proposed hypothesis) is presented now referring to Figure 3.21 below. The assumptions presented are assumed to be true. Therefore, the physics described below is only presumed to be correct.

Opposition Interacting Waves (Correct)

Left Right

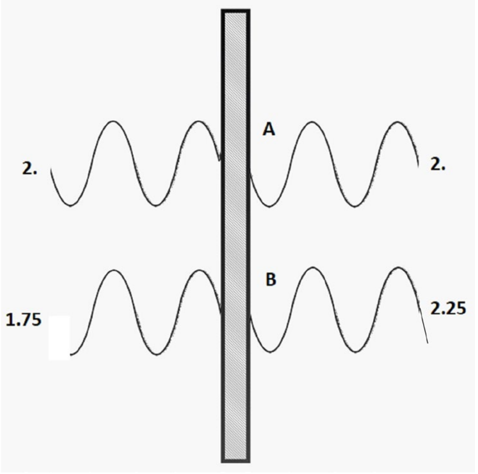


Figure 3.21 MMX with an Ether Wind – correct proposed interpretation (hypothesis)

There is no fringe shift between A and B.

- *Assume an ether wind and equal physical length of the arms.*
- *(Distance*) = distance of the light through the ether.*
- *The straight vertical bar now represents the half-silvered mirror.*
- *The two sets of waves (left and right) represent the (distance*) (time) within each of the two arms.*
- *At the location of the half-silvered mirror, the two returning waves are traveling in →opposition← relative to one another (actually at a right angle).*
- *A = The arms are oriented 45 degrees relative to the ether wind.*
- *B = The arms are orientated 0 or 90 degrees relative to the ether wind.*
- *Observe relative to 45 degrees vs. (0 degrees or 90 degrees), there is anti-symmetry (gain vs loss) of the number of wavelengths. Nevertheless, for simplicity of explanation, only one of the two anti-symmetries is shown in this figure.*
- *The correct explanation assumes the interference pattern forms at the location of the half-silvered mirror as a function of two opposing waves.*
- *The →opposing← waves, as shown above, are a function of the two light waves traveling to their respective peripheral mirrors and then both reflected back to the half-silvered mirror where the interference pattern then forms. However, with respect to this illustration, only the reflective returning segments are shown.*

Position A = 45 degrees relative to the ether wind.

At this position, relative to the two arms, the (distances*) are equal. Consequently, at the location of the half-silvered mirror, the two light waves are in phase. As a result, no interference pattern forms.

Position B = 0 or 90 degrees with respect to the ether wind.

At these positions, after rotation from 45 degrees, then relative to the two arms, the (distances*) are unequal. In this scenario, during this rotation, one arm gains 0.25–wavelength (distance*), on the right side, while the other arm →symmetrically← looses an equal 0.25–wavelength (distance*) on the left side.

As a result of this →opposing anti–symmetry←, at the location of the half-silvered mirror, where the two returning, moreover, opposing light beams, first interact (right angle), the interface of the two waves does not change, **even though the (distances*) have changed**, Therefore, they remain in phase. This same function then reverses itself in 90–degree segments, throughout 360 degrees of rotation.

In addition, from the half-silvered mirror to the detector (observer) the two interacting waves then travel physically parallel in the same direction to the detector (observer). Furthermore, they remain fixed with respect to one another, with or without rotation. This is because at that time, they are both traveling parallel through the same ether (distance*).

So given all of the above, then during rotation, no fringe shift is produced, even in the presence of an ether wind. However, in the real world, the physical lengths of the arms are not absolutely equal relative to a single wavelength of light. So, in reality, at 45 degrees, an interference pattern forms, but only as a function of the unequal physical length of the two arms. Then, during rotation the anti–symmetrical compensatory process just described prevents a fringe shift.

In summary:

- If the two streams of light waves are initially out of phase, related to only the ether wind, then during rotation, the anti–symmetrical compensatory function just described prevents a change in the interface. As a result, during rotation, there is no fringe shift.

• If the two light waves are out of phase, in this case, only as a function of unequal physical length of the arms, then again, there is no fringe shift during rotation.

• Assuming there is no ether, once again as a function of rotation, there is no fringe shift.

For all these reasons, the MMX is silent as to whether or not the ether exists. In summary, The MMX is incapable of detecting the ether wind. Voila! There you have it.

This concept is not easily visualized. For if it were, then it would not have been so easily overlooked. For that reason, a more detailed explanation is now provided as offered below in Figure 3.22 and the following dissertations.

Essentially, this re–explanation is not for the physicist, but for the benefit of the novice, the target population of this publication. Carefully, follow the pathways of the two light beams with respect to Figure 3.22, which are described in the following paragraphs.

Opposition Interacting Waves (Correct Interpretation)
Left Right

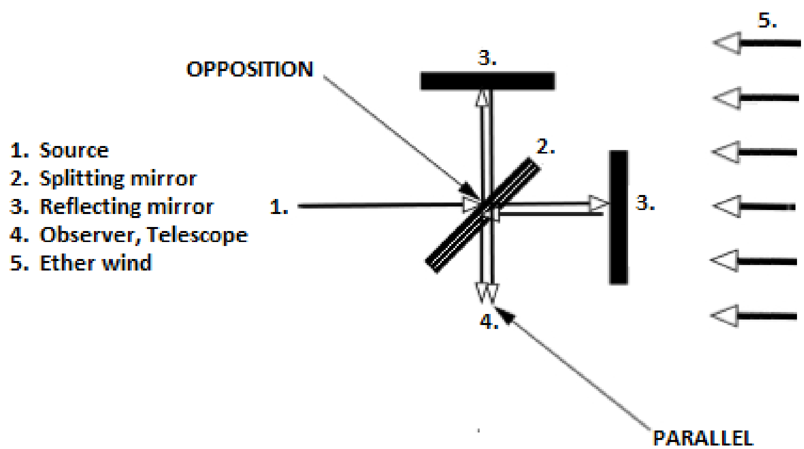


Figure 3.22 MMX with an Ether Wind

A single beam of light is emitted from the source (1). This light beam is then divided into two separate streams by the half–silvered mirror (2). They then travel to the peripheral full mirrors (3). Subsequently, the full mirrors then reflect the beams back to the half–silvered mirror.

Here is the crucial point. When the returning reflected light beams first intersect, then interact (interface), at the half-silvered mirror, moreover, at a right angle, this is where the interference pattern is first formed. This interaction is a function of two light beams traveling in physical →opposition←–not mathematically →parallel← as a function of time. So, from the reference frame of the half-silvered mirror and during rotation, as one light beam progressively gains wavelengths (distance*), while the other beam →symmetrically← progressively loses an equal number of wavelengths (distance*), then the interface of the two waves remains unchanged.

This means the interference pattern also remains unaffected. In essence, during rotation, the (distances*) change, but the interference pattern does not.

Then, from the half-silvered mirror to the detector (observer) the two beams physically travel parallel in the same direction. Moreover, they are fixed relative to one another, since at this time, they both are traveling through the same ether (distance*).

Given all of the above, then as a function of the rotation (MMX), even in the face of the ether wind, there is no fringe shift.

The next two illustrations and their captions more accurately depict the classical, although incorrect, interpretation of the MMX (Figure 3.23) versus the correct interpretation (Figure 3.24). Figure 3.24 is a more precise description compared to Figure 3.21; since the opposing wavefronts interact at a right angle relative to one another. Basically, it is easier to understand Figure 3.24 (90-degree opposition) after comprehending Figure 3.21 (180-degree opposition). This is rational for the re–explanation.

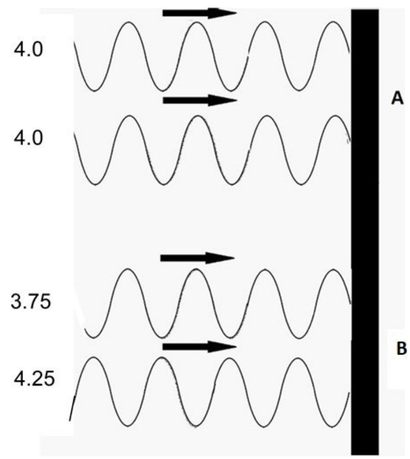


Figure 3.23 Incorrect Interpretation (Classic Theory)

Parallel *(time) interacting light waves (incorrect interpretation)*

There is a fringe shift between A and B.

- *Assume an ether wind with equal physical length of arms.*
- *(Distance*) = distance of light through the ether = interval of time.*
- *The straight vertical bar represents the detector or observer.*
- *A top: 45 degrees relative to the ether wind.*
- *B bottom: 0–90 degrees relative to the ether wind.*
- *Again, relative to 45 degrees vs (0 degrees or 90 degrees), there is anti-symmetry (gain vs loss) of the number of wavelengths. However, for simplicity of explanation, only one of two anti-symmetries is shown in this figure.*
- *Take note again: the gain versus loss of wavelength between 45 degrees compared to 0 and 90 degrees is not numerically equal as shown above but rather unequal, however, for simplicity of visual appreciation, presented as equal (gain vs. loss). This alteration does not change the underlying principle as posited.*

Figure 3.23 above is the incorrect interpretation of the function of the MMX (theory). The assumptions presented are false. Therefore, the physics described below is then incorrect.

Classically, it is assumed, relative to the two arms, that the interference pattern is formed at the detector (observer) as a function of two interacting →parallel← waves, traveling in the same direction their entire (distances*), **however, parallel only expressed mathematically as a function of time in the MMX equations.**

Position A (45 degrees). At this position, the two light waves are in–phase, since with respect to the two arms the "intervals of time" (distances*) are equal.

Position B. However, after rotation from 45 degrees, at 0 or 90 degrees (B), they are out of phase, since in this setting, relative to the two arms, the time intervals (distances*) are unequal. Therefore, an interference pattern forms. This is because during rotation, one wave gains an interval of time (distance*), while the other wave loses an interval of time (distance*).

This process then reverses itself every 90 degrees. Consequently, over 360 degrees of rotation, at the location of the detector, a fringe shift is produced in the form of a sinusoid. All of this is assuming, relative to the two arms, that the two light waves are traveling →parallel← (expressed as time in the MMX equations) in the same direction their entire (distances*), moreover, then recombine at the location of the detector (observer), both assumptions of which are incorrect.

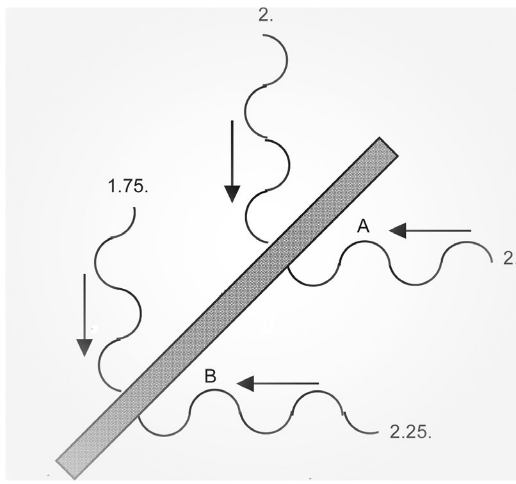


Figure 3.24 Correct Proposed Interpretation (Hypothesis)

Opposing *interacting light waves (correct interpretation)*
There is no fringe shift between A and B.

- *Assume an ether wind with equal physical lengths of the arms.*
- *Slanted rectangular gray bar is the half-silvered mirror.*
- *(Distance*) = distance of the light through the ether.*
- *Top A = 45 degrees relative to the ether wind. The two waves (vertical and horizontal) are in phase at the half-silvered splitting mirror with equal (distances*) in both arms.*
- *Bottom B = 0 or 90 degrees relative to the ether wind. The vertical wave loses a quarter of a wavelength, and the horizontal wave gains a quarter of a wavelength Therefore, at the half-silvered mirror, the two waves are still in phase even though the (distances*) in the two arms have changed.*
- *Yet again, relative to 45 degrees vs (0 degrees or 90 degrees), there is anti-symmetry (gain vs loss) of the number of wavelengths. Nonetheless, for simplicity of explanation, only one of two anti-symmetries is shown in this figure.*
- *The →opposing← waves, as shown above, are a function of the two light waves traveling to their respective peripheral mirrors and then both reflected back to the half-silvered mirror where the interference pattern then forms. However, with respect to this illustration only, the reflective returning segments are shown.*

Figure 3.24 above is the correct proposed interpretation of the function of the MMX (hypothesis). Take note, the assumptions presented are assumed to be true; therefore, the physics described below is only presumed to be correct.

In reality, the interference pattern is formed where the two returning opposing wavefronts first intersect, which is at the location of the half-silvered mirror (slanted dotted bar). These right–angled intersecting waves are traveling in **physical opposition not parallel** (time in the MMX equations). So, during rotation (top to bottom), one light wave gains 0.25–wavelength (distance*) while the other wave symmetrically loses 0.25–wavelength (distance*). As a result, the configuration of the two interacting wavefronts at the location of the half-silvered mirror remains unchanged. In essence, during rotation, the (distances*) change, but the interface of the two opposing waves does not. So, if the interface does not change, then neither does the interference pattern; therefore, there is no fringe shift. Additionally, from the half-silvered mirror to the detector (observer), the two waves travel physically parallel in the same direction, moreover, are fixed relative to one another, because at that time, both waves travel through the same ether (distance*). Overall, relative to the detector (observer), during rotation, no fringe shift is again observed.

In the real world, the physical lengths of the arms of the MMX are not absolutely equal relative to a single wavelength of light. So, in actuality, at 45 degrees an interference pattern forms but only as a function of the unequal physical length of the arms. Then, during rotation, the anti–symmetrical compensatory process just described prevents a fringe shift.

Once again for the novice, figures 3.25, 3.26, 3.27, and, 3.28 below demonstrate, in the presence of an ether wind, that during the rotation of the MMX, due to the **opposing anti–symmetrical compensatory function** just described, where a gain of the number of wavelengths (distance*) in one arm is associated with an equal loss of a number of wavelengths (distance*) in the other arm, no fringe shift is produced.

Notice, at 45 degrees, the (distances*) within both arms are the same, assuming equal physical lengths of the two arms. This explains position A in the previous illustrations. But remember in the real world, the physical lengths of the arms are unequal when compared to a single wavelength of light. As a result, in truth, at this position (45 degrees), the (distances*) are unequal, although only as a function of the different physical lengths of the arms. The underlying rationale for why the author chose to assume equal physical length of the arms is for simplicity of explanation.

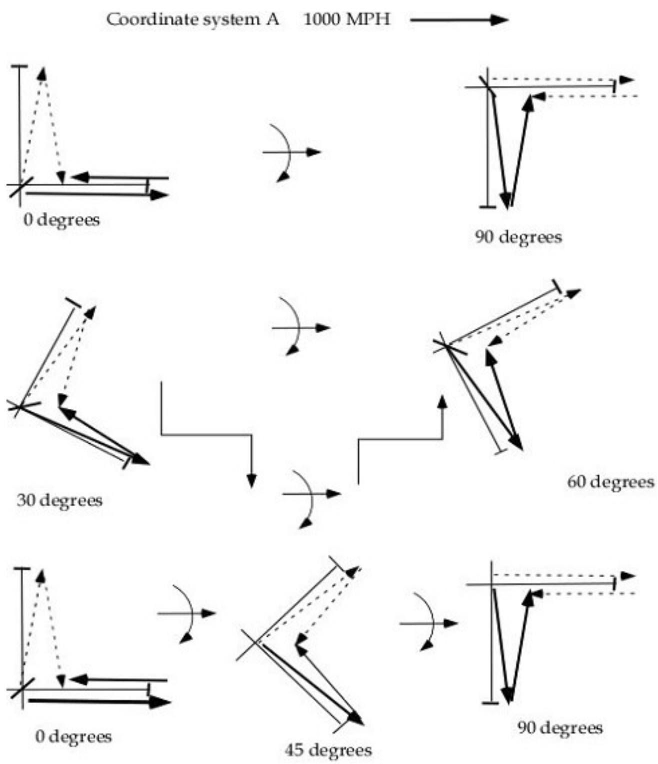


Figure 3.25 **Opposing** Interacting Light Waves (Correct Interpretation)

Assume an ether wind 1,000 mph from right to left. Presume equal physical length of the arms. So at 45 degrees, the (distances) within both arms are then equal.*

Observe during rotation of 90 degrees (from 0 to 90 degrees).

- *The dotted (distance*) exchanges places with the solid (distance*).*
- *Or the total number of wavelengths within the dotted arm exchanges places with the total number of wavelengths within the solid arm.*
- *Or the gain in the number of wavelengths within the dotted arm is symmetrical with the loss in the number of wavelengths within the solid arm.*
- *The →opposing← anti–symmetry function of number of wavelengths then produces, during rotation at the location of the half-silvered mirror, a stable interference pattern, regardless of whether or not there is an ether wind.*

One more time for the novice, this compensatory anti–symmetrical function is once again shown below in figures 3.26, 3.27, and 3.28 but now with even more clarity.

Notice: The (distances*) relative to both arms change; nevertheless, the interface still remains constant. As a result, there is no fringe shift during rotation.

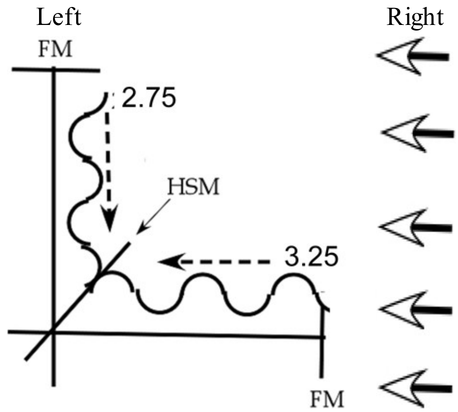


Figure 3.26 Opposing Interacting Waves
0 degrees relative to the ether wind symmetrical with figure

- *Hollow arrows = ether wind.*
- *HSM = half-silvered mirror.*
- *0 degrees relative to the ether wind.*
- *MMX is rotating clockwise——assume equal, physical length of arms.*
- *The (distance*) with respect to the to–and–fro arm is greater than the cross–wind arm.*
- ***Notice, at 0 degrees the two light beams at the interface (half-silvered mirror) are in phase. Essentially, at 0 degrees, assuming an ether wind and presuming equal physical lengths of the arms, the wavefronts at the half-silvered mirror are always in phase regardless of the angle of rotation. See explanation after Figure 3.28.***
- *The opposing waves shown are a function of the two light waves traveling to their respective peripheral mirrors and then both reflected back to the half-silvered mirror where the interference pattern then forms. However, with respect to the above illustration, only the reflective returning segments are shown.*

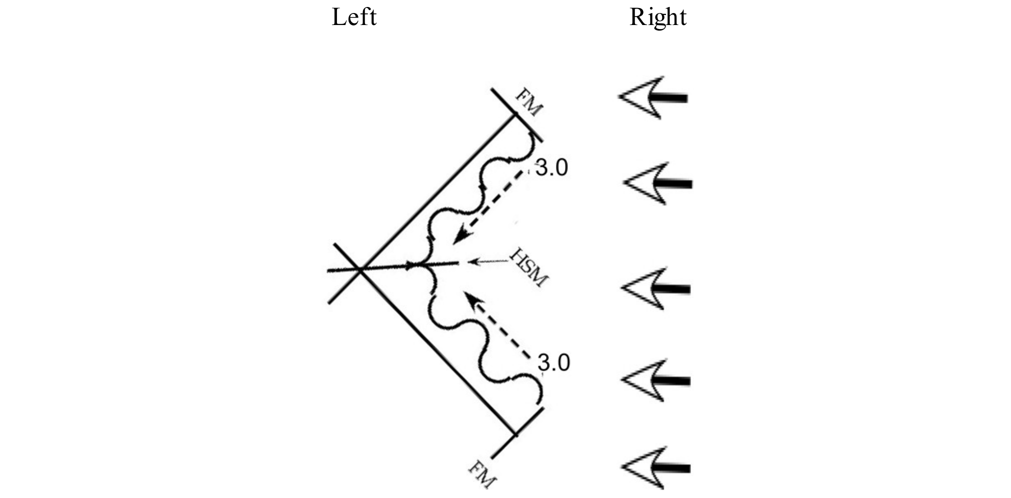


Figure 3.27 Opposing Interacting Waves
45 degrees relative to the ether wind

The (distances) within each arm are now equal to each other. Nevertheless, the two light beams at the interface, (half-silvered mirror) are still in–phase. This is a function of a gain of 0.25 wavelength in one arm and a symmetrical loss of 0.25 wavelength in the other arm. There is no fringe shift.*

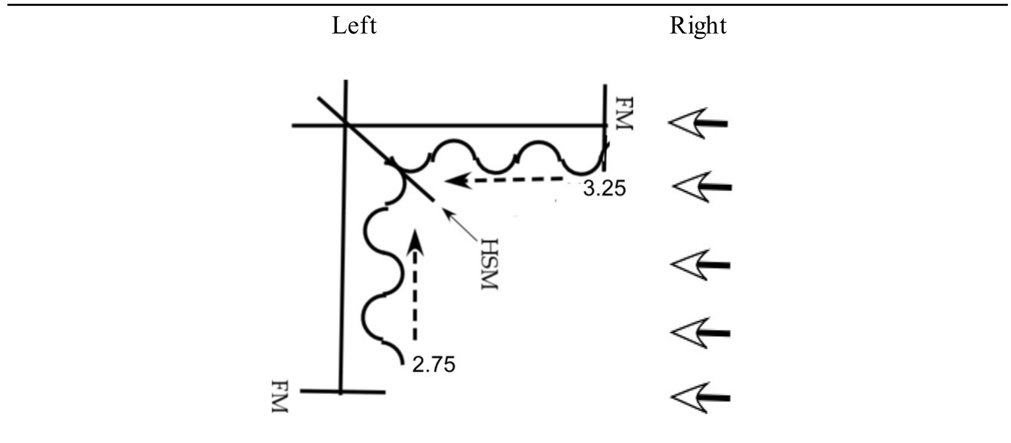


Figure 3.28 Opposing Interacting Waves
90 degrees relative to the ether wind

- *The (distance*) with respect to the to–and–fro arm is greater than the cross–wind arm. But now when compared to 0 degrees, the two arms have changed places. The two light beams at the interface (half-silvered mirror) are still in–phase. Again, this is a function of a gain of 0.25 wavelength in one arm and a symmetrical loss of 0.25 wavelength in the other arm.*
- *Therefore, even though, as a function of rotation, the (distances*) change, the interface does not. And, if the interface does not change, then neither does the interference pattern. For that reason, there is*

no fringe shift during rotation. In essence, even in the presence of an ether wind, the MMX is silent as to whether or not it exists.

Observe Figure 3.27. One can readily visualize at 45 degrees that the (distances*) with respect to both arms are identical, assuming equal physical lengths of the arms. Therefore, in this case, at the location of the half-silvered mirror, the two light waves are in–phase, so no interference pattern forms (no dimming).

However, it is somewhat more difficult to visualize at 0 and 90 degrees (figures 3.26 and 3.28) how, during rotation, counteracting **anti–symmetry** of opposing wavefronts in the two arms at the location of half-silvered mirrors, prevents any change in those in–phase opposing wavefronts, even though the (distances*) have changed. Again, there is no dimming (fringe shift) even during rotation.

What all this indicates is that if the physical lengths of the two arms are absolutely equal, there is no interference pattern independent of rotation (no dimming). The interference pattern (when present) is only/purely a function of unequal physical length of the two arms, relative to the distance of a single wave of light (wavelength) that is used, essentially a non–apparent Kennedy Thorndike interferometer.

Alternately, presuming an unequal physical–length arm scenario, at 45 degrees, there is now an interference pattern. Moreover, once more during rotation, because of the anti–symmetrical counteracting function as already described, then, at the location of half-silvered mirror, there is no change in this interference pattern.

Overall, as a result, the MMX is incapable of detecting the ether wind.

Again, the interference pattern is only a function of unequal length of the physical arms relative to a single wavelength of light used, moreover, not related to the ether wind. Observe all that depicted above is based on the assumption of counteracting opposing **anti–symmetrical (hypothesis)** changes in wavefronts (distances*) from the frame of the half-silvered mirror. **→But what happens if the opposing** wavefronts **are anti–asymmetric (postulate)**?← For that answer see the following epilogue regarding anti–asymmetry vs. anti–symmetry after the summary.

Summary

The classic interpretation of the MMX perceives the experiment from the reference frame of the detector (observer) as a function of the "amount of time" it takes for light to travel through the ether, relative to each arm. This interval of time is then mathematically correlated to the (distances*), involving two →parallel light beams←, traveling with reference to both arms in the same direction. In actuality, they are not traveling parallel their entire (distances*), but mathematically expressed as a function of time with respect to the MMX equations, they are.

The incorrect interpretation is related to the following.

1. Relative to each arm "time" is a function of (distance*) (true). However, the (distances*) could be traveling mathematically (time) parallel (false) or in physical opposition (true).

2. The origin of the interference pattern is located at the detector (observer) (false).

3. This is at the location where the two interacting waves travel physically parallel with respect to each other (true).

4. The origin of the interference pattern first forms at the half-silvered mirror (true). This is the location where the two waves travel in physical opposition with respect to each other (true).

5. During rotation, the two parallel waves (mathematical time), shift back and forth relative to one another, therefore, producing a fringe shift at the location of the detector (false).

6. During rotation, at the location of the half-silvered mirror, the interface of the opposing light waves remains fixed as a function of counteracting anti–symmetry (true).

The correct interpretation (hypothesis) perceives the MMX outcome from the reference frame of the half-silvered mirror. Therefore, relative to each arm, during rotation, as a function of two opposing, moreover, anti–symmetrical counteracting wavefronts the (distances*) change; however, the interface remains constant. Consequently, as a function of rotation, no change of the interference pattern occurs. In other words, during rotation, there is no fringe shift even in the presence of an ether wind.

There is one further consideration the author wishes to make, and it is this: The misconception with regard to the classical interpretation of the MXX belies the fact that the focus was on the mathematics of "time" as a function of (distance*). But time did not distinguish as to whether the two (distances*) are traveling parallel or in opposition.

And so, for that reason, the true visual function of the experiment was then overlooked. To somewhat paraphrase Maxwell, who believed in the ether, the main focus of physics should always relate to the true function not the math.

In conclusion, given the new hypotheses, moreover, derived conclusions as just presented, the null result of the MMX as originally preformed/interpreted does not invalidate Einstein's relativity but is silent. On the other hand, it (relativity) collapses if this alternative MMX mode is verified. See Epilogue.

As a result, by default, this leaves only the global observations and experiments, which represent true reality, whereby the speed of light is related to the gravitational field (inflow of the ether).

→Epilogue (The Postulate) = In all likelihood, the correct concept←.

The author is absolutely convinced that the interference pattern of the MMX is initially formed at the location of the half-silvered mirror and not from the frame of the telescope. It is observed at the telescope but not formed there. Nevertheless, the author does not possess the mathematical skill/knowledge to prove (rigorous mathematics) whether or not counteracting changes of the returning opposing wavefronts (distances*) from the frame of the half-silvered mirror are anti–symmetrical (hypothesis) or alternatively anti–asymmetrical (postulate). Consequently this novel theory, as just presented, is unproven.

In other words, regarding this alternative MMX hypothesis, all that was presented previously in Chapter 3 is totally dependent on the assumption of counteracting opposing **anti–symmetrical** changes of wavelength (distances*) from the frame of the half-silvered mirror; therefore, during rotation, there is no interference pattern and no fringe shift.

On the other hand, what occurs if the counteracting opposing wavelength changes (distances*) from the frame of the half-silvered mirror are **anti–asymmetric instead of anti–symmetric**? In this instance, during rotation, there would now be a fringe shift. However, it would be of a lesser magnitude compared to the parallel wave theory (classic interpretation/explanation).

For further clarification, see the comparisons below and assume equal physical length of the arms, as well as an ether wind.

A. Incorrect →classic/standard parallel wave theory← from the frame of the observer/ telescope.

At 45 degrees relative to the ether wind, the two waves are in phase. Now, during rotation to 0 or 90 degrees, one arm progressively gains wavelengths (distance*) and the other arm progressively loses wavelengths (distance*). The supposed fringe shift would be a function of the **sum of these two functions**.

B. Proposed correct original →opposing counteracting anti–symmetrical wave hypothesis← from the frame of the half-silvered mirror.

At 45 degrees relative to the ether wind, the two waves are in phase. Now, during rotation to 0 or 90 degrees, one arm progressively gains x wavelengths (distance*) and the other arm progressively **symmetrically** loses x wavelengths (distance*). In this second instance, there is no interference pattern or fringe shift.

C. Proposed new alternative correct →opposing counteracting anti–asymmetrical wave postulate← from the frame of the half-silvered mirror.

At 45 degrees relative to the ether wind, the two waves are in phase. Now, during rotation to 0 or 90 degrees, one arm progressively gains wavelengths (distance*) and the other arm **asymmetrically**, progressively loses wavelengths (distance*). In this third case, the fringe shift produced would be related to the **difference (not the sum)** between these two functions.

This is a very intricate concept to visualize as now presented. At 0 degrees the to–and–fro arm (distance*) is greater than the crosswind arm (distance*), but at 45 degrees, they are both equal. In order for this to occur, the crosswind arm must gain fewer wavelengths compared to the loss of the number of wavelengths in the to–and–fro arm up to 45 degrees. Then from 45 degrees to 90 degrees the new to–and–fro arm must gain more wavelengths than the loss of the number of wavelengths in the new cross wind arm.

Bear in mind, the different theory/hypothesis/postulate can be differentiated from another both mathematically and visually.

For review:

1. (Classic/Standard Theory)

Incorrect parallel wave theory from the frame of the observer/telescope = fringe shift during rotation.

2. (Original proposed correct alternative hypothesis of Chapter 3)

There is assumed to be counteracting **anti–symmetrical** opposing waves from the frame of half-silvered mirror = no fringe shift during rotation.

3. (Proposed new second correct alternative postulate)

There is assumed to be counteracting **anti–asymmetrical** opposing waves from the frame of the half–silvered mirror = fringe shift during rotation but less than the parallel wave theory. What this establishes is that, during rotation, the predicted fringe shift regarding the classic incorrect parallel wave theory would be greater compared to the correct anti–asymmetrical postulate. Consequently, the classic parallel wave theory would supposedly be more sensitive compared to the anti–asymmetrical postulate.

Therefore, presupposing the parallel wave theory (mathematics) is utilized to calculate the theoretical expected fringe shift, but the new proposed anti–asymmetrical postulate is actually observed, then that conflicting result might not be considered as statistically significant, thus discarded/ignored, accordingly, a presumed false null outcome.

The quandary then is this: Without the use of mathematics which theory/hypothesis/postulate most likely represents reality?

In the author's opinion, the interference pattern first forms at the half-silvered mirror from two counteracting opposing wavefronts so the →classic theory←can be discarded. This leaves the **anti–symmetrical** →hypothesis← and the **anti–asymmetrical** →postulate← as possibilities.

What is more, the author believes the **anti–asymmetrical** →postulate← is more likely correct than the **anti–symmetrical** →hypothesis.← And here is the reasoning.

(Before proceeding see figures 3.26, 3.27, and 3.28.) Assuming equal physical length of the arms, the *hypothesis* produces no fringe shift regardless of its orientation relative to the ether wind, even at 0 degrees. **However, the ether wind does, in fact, produce a fringe shift at 0 degrees as illustrated in figures 3.12 and 3.14—**the two different scenarios are incompatible.

Alternatively, the different orientations, (0 degrees vs. 45 degrees (see figures 3.14 and 3.27) are consistent with each other assuming counteracting **anti–asymmetrical** opposing wave–fronts from the frame of the half-silvered mirror. Now, there would be a fringe shift at 0 and 90 degrees as opposed to no shift at 45 degrees but of a lesser magnitude compared to the classic/standard theory. See Appendix L for a more complete explanation with figures.

For this reason, it is the author's opinion that the →postulate of counteracting asymmetrical opposing wavefronts← is more likely true than the →counteracting symmetrical hypothesis←. Nevertheless, this belief necessitates a rigorous mathematical proof for validation, moreover, experimental verification.

And so, for that latter reason, the author proposes the following two imaginary, yet less feasible, experiments as potential proof of the existence of the ether, vis–á–vis the anti–symmetrical hypothesis vs. the anti–asymmetrical postulate.

First Proposed Experiment

Assuming the relative ether wind changes velocity between two different reference frames (defined as coordinate systems B and C in Appendix D), then a fringe shift occurs as a function of moving from one frame into another one. Examples of two different fames or coordinate systems using the MMX relative to the ECF/EGF would be:

Example 1

A. At the equator, sited on the rotating surface of the Earth, with one arm fixed/oriented south/north (S/N) and the other arm →fixed←west/east (W-E), thus 1,000 mph with respect to the ECF/EGF—a relative ether wind of 1,000 mph.

B. Assume the MMX is on an airplane traveling 600 mph, west to east, sited at the latitude of the equator with one arm fixed/oriented S-N and the other arm →fixed← W-E, therefore, equal to 1,600 mph with respect to the ECF/EGF—a relative ether wind of 1,600 mph. The two coordinate systems possess different velocities relative to the ECF/EGF, as much, different relative ether winds.

If one carries out a MMX "sited" on the Earth's rotating surface, fixed in the S-N, W-E directions (A), and subsequently at the same latitude, in the same mode, on an eastward bound airplane traveling 600 mph (B), then between these two frames, a different interference pattern emerges (postulate only).

Example2

Additionally, if one performs the experiment fixed S-N, W-E, first at the equator, at rest with the Earth's rotating surface, 1,000 mph relative to the ether (ECF), and second at the South Pole, 0 mph relative to the ECF, there will again be a disparity in the shape of the interference patterns between these two frames (postulate only).

The reasoning behind the fringe shift is as follows. As the MMX increases its velocity relative to the ECF, moreover, as in Example 1 fixed and oriented S/N–W/E, there is a gain of (distances*) in both the to–and–fro arm (W-E), as well as the cross–wind arm (S-N). But it is proportionally greater in the to–and–fro arm. Consequently, there is a fringe shift as a function of an increasing velocity relative to the ECF.

1. The →anti–asymmetrical postulate← would produce a fringe shift between the two different coordinate systems = proof of the ether.
2. The →anti-symmetrical hypothesis← would not produce a fringe shift between two different coordinate systems.

Second Proposed Experiment

Regarding this second experiment, relative to the ECF, EGF, one arm is fixed vertically in the upright position perpendicular to Earth and the other arm is fixed horizontally, parallel to the Earth's surface rotating, between the cross–wind direction (S–N, N–S) and the to–and–fro wind direction (W–E, E–W).

Consequently, vis–á–vis this experiment, the vertical arm (distance*) is stationary and constant. On the other hand, regarding the horizontal arm, as a direct function of rotation between (S–N, N–S) versus (W–E, E–W) the (distance*) then changes.

This is not the classical revolving motion of the MMX, which as originally performed is parallel to the Earth's surface (both arms). Referring to this new experiment, the rotational motion is along the axis of the fixed upright vertical arm, whereas the horizontal arm is moving parallel to the surface of the Earth (E–W, N–S). So assuming the new theory is valid (PFGRT), then regarding this alternative mode of the MMX, there should be a fringe shift, as a function of this form of rotation, again proof of **the ether**.

Bear in mind that in this scenario, there is no counteracting negating **anti–symmetry or anti–asymmetry** of the wavefronts of the two arms, from the frame of the half-silvered mirror; now there will be a fringe shift as a function of this form of rotation. As an aside, an MMX located inside a satellite in a circular orbit with one arm oriented radial to the Earth's center, whereas the other arm, alternating between parallel to transverse relative to its orbital motion, should also produce a **greater** fringe shift as a function of this form of rotation—again proof of the ether.

1. The →anti-asymmetrical postulate← would produce a fringe shift during rotation = proof of the ether.

2. The →anti-symmetrical hypothesis← would also produce a fringe shift during rotation, nevertheless, a slightly different fringe shift = proof of the ether.

These imaginary tests, if carried out as actual experiments, and if confirmed, would be evidence of a relative ether wind. So, in fact, the MMX can detect the ether wind but not in context as originally performed. The author cannot emphasize this enough. These alternate experiments of the MMX, as described above, and if verified, would then invalidate relativity, furthermore, attest to the existence of The Ether.

Conclusion

Given all the above, it is the author's opinion that the **classic/standard parallel wave theory explanation of the MMX is en erratum**, because the interference pattern does not occur at the telescope/observer but rather at the half-silvered mirror relevant to two counteracting opposing wavefronts.

Additionally, regarding these two opposing counteracting wavefronts, →the anti–asymmetrical postulate← more likely represents the real function of the MMX compared to the →anti-symmetrical hypothesis←. Nevertheless, again this assumption requires a vigorous mathematical proof with experimentation for confirmation.

Please read and review Appendix L, which explains, as well as illustrates, this last topic in much greater detail; especially note the figures.

3.3 The Kennedy–Thorndike Experiment

Unlike the MMX, whereby the physical lengths of the arms are approximately equal, the arms of the Kennedy–Thorndike experiment (KTE) are significantly unequal as presented below in Figure 3.29. Again, the KTE results were null.

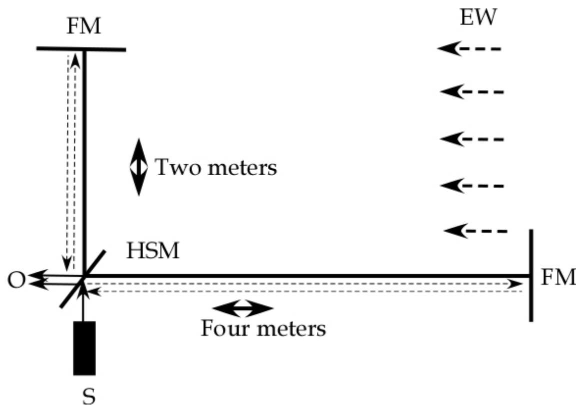


Figure 3.29 The Kennedy–Thorndike Experiment

- *O = Observer (detector).*
- *S = Source of light.*
- *HSM = half-silvered mirror.*
- *FM = Full mirror.*
- *Dotted lines with arrows = pathways of light beams.*
- *EW = Ether wind.*

Even though one arm was two meters and the other arm four meters, no fringe shift was observed.

In reality, it is virtually impossible to construct an MMX, such that the physical lengths of the arms are perfectly equal relative to a single wavelength of light. There is always a slight physical asymmetry. In principle, it is this asymmetry that makes a Kennedy–Thorndike speed of light interferometer (KTE).

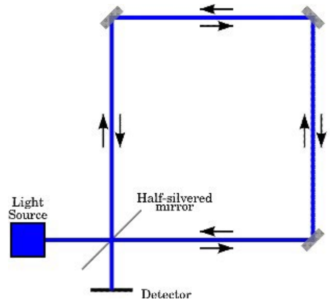
However, this is not obvious until the arms are significantly different in their physical lengths in order to be noticed, thus obvious. So, in fact, the MMX is a Kennedy–Thorndike Experiment (KTE). But what is crucial to note is this, the KTE outcome is null for the exactly same reason as just described with respect to the MMX as classically performed and interpreted.

Now, for the benefit of the novice, here is a re–explanation of this concept with perhaps more clarity. It should be realized that the classic MMX experiment is, in fact, the Kennedy–Thorndike experiment, because in practicality the physical length of the arms is always unequal relative to a single wavelength of light. It is only when the physical lengths of the arms are different enough to be noticeable that we then define it as the Kennedy–Thorndike Experiment. So, in fact, again, all MMX experiments are actually Kennedy–Thorndike experiments.

3.4 Sagnac Interferometer

The Sagnac effect is depicted below in figures 3.30, 3.31, and 3.33. Following the figure, there is an explanation. For the novice, a review of the YouTube website listed below is also recommended.

https://www.youtube.com/watch?v=nRzoiT8d9mk



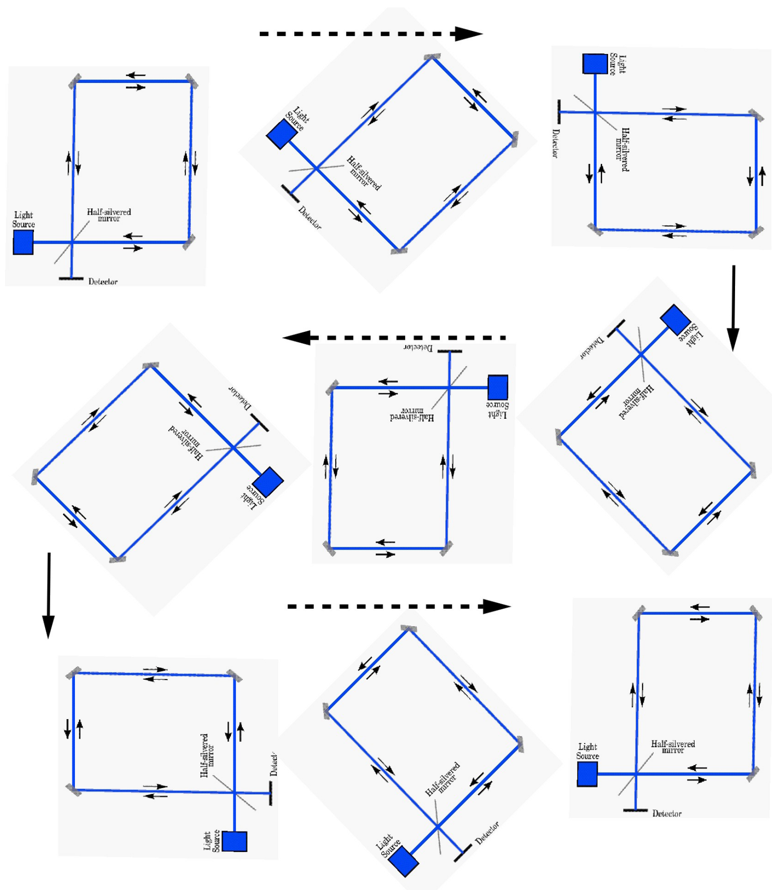
Wikipedia

George Sagnac

Figure 3.30 Sagnac Interferometer

- *Stationary scenario.*
- *Light beams travel in opposite directions.*
- *The (distances*) are equal.*

Left Right



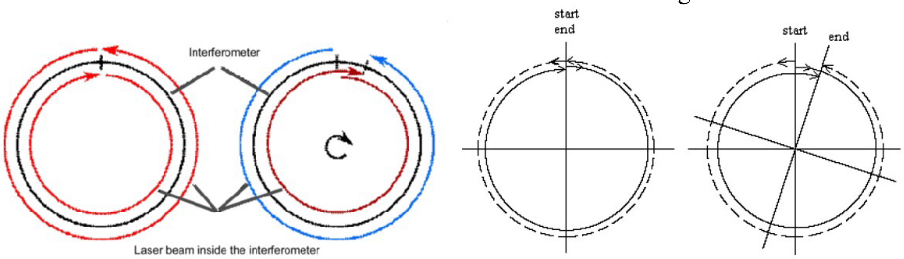
[Modification of Wikipedia drawing]

Figure 3.31 Position of SGE Throughout 360 Degrees of Rotation [Fair Use]
Labeling of graphic is the same as Figure 3.30 left.

- *(Distance*) = distance through ether.*

When rotating clockwise, left to right, it takes light longer "interval of time" (distance) to travel in the clockwise direction versus the counterclockwise direction as compared to the setting where there is no rotation whereby there is no differentiation in (distances*). For that reason, there is a fringe shift as a function of the rotational rate. This outcome can only occur if there is a preferred frame for light, which is independent of the intrinsic physical structure of the SE. The preferred frame is the EGF/ECF.*

Left | Right



Exhibition Physic & Musik
http://call4sounds.neuesatelier.org/2013/09/; sagnac-interferometer.html

Canadian Journal of Physics
sensors:gyroscope [Sensors Wiki.org]

Figure 3.32 Fiber Optic Sagnac Interferometer [Fair Use]

- *(Distance*) = distance of the light through the ether = (time).*
- *Left = no rotation.*
- *Right = rotation.*
- *The circular arrows represent the (distances*).*

When rotating clockwise, from left to right, it takes light a longer interval of time (distance) to travel in the clockwise direction versus the counterclockwise direction, as compared to the setting when there is no rotation, whereby the two intervals of time (distances*) are equal. Again, this result mandates a preferred frame.*

Once again, this book assumes the EGF/ECF/ETHER/PFGRT inflow of space is the local preferred frame for the speed of light on Earth. These expressions are for the most part synonymous. Nevertheless, in order to avoid confusion, regarding the author's explanation of the Sagnac Experiment (SE), generally, but not exclusively, the term ether will be used.

So here is the explanation. With reference to the Sagnac experiment (SE), two light beams are projected in opposite directions around a square (Figure 3.30), utilizing reflecting mirrors, or else in a circular pathway with the use of a single fiber optic ring (Figure 3.32). Subsequently, they recombine at the origin to produce an interference pattern.

If the device is stationary, then the two intervals of time (distances*) that the beams travel through the ether are theoretically equal. Therefore, no interference pattern is generated, again assuming absolutely equal paths for the two opposing light beams.

Then again, with rotation, an interference pattern appears, moreover, as a function of the rotational rate. In order for this phenomenon to occur, there must be a preferred frame (EGF, ether), for only with a preferred frame can there be such a differentiation.

Here is the clarification. Light is fixed at (c) in a vacuum (ether) and slightly less than (c) within the atmosphere or glass fiber. With respect to these experiments, these are the preferred frames. Recall, the ether (ECF/EGF) is the absolute fixed frame, but the atmosphere or glass fiber modifies that fixed frame given that light travels from atom to atom (absorbed and then re–emitted). And so, as the experiment rotates, the two light beams still travel their rotational paths through the ether (ECF/EGF) in opposite directions; nevertheless, the experiment revolves in only one direction.

Accordingly, as a function of rotation, it takes a longer interval of time (distance*) for light to complete the circuit in one direction as compared to the other direction as they both traverse through the same fixed frame (ether, EGF, ECF) in opposite directions. And so a fringe shift emerges as a consequence of the SE rotational rate.

Note, regarding the glass fiber, the absorption and then re–emission processes also have a function, since that too results in a change of the (distances*) traveled by the two opposing light pathways.

With regard to rotational motion vs. nonrotational motion, unlike the MMX, the SE produces a fringe shift, however, only as a function of angular velocity.

On the other hand, these kinds of devices are unable to detect translation motion (see Figure 3.33 below), because with reference to that scenario, all components of the (SE) posses an equal translational velocity relative the ether, ECF/EGF/PFSRT/nonrotating inflow of space. As such, there is no differentiation of the (distances*) traveled by the opposing light beams, as a consequence of no motion versus translational motion.

This holds true for vertical translational motion (inflow of the ether), horizontal translational motion (e.g., sitting on the rotating surface of the Earth) or even linear translational motion with respect to the Earth's rotating surface (i.e., on an airplane). In summary, on the surface of the rotating Earth, small Sagnac experiments can only detect axial rotation of the experiment but not translational motion whether it is vertical or horizontal, as shown below.

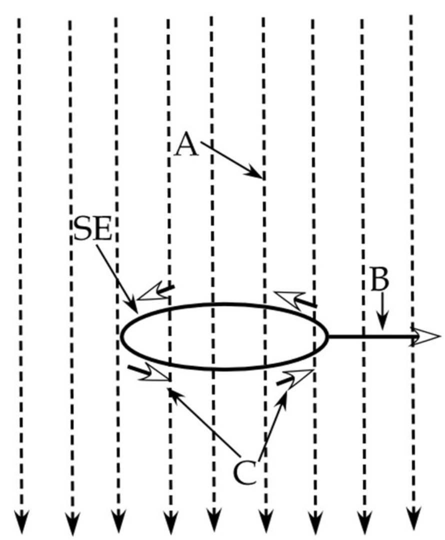


Figure 3.33 Sagnac Interferometer

- *SE = Sagnac experiment.*
- *A = Inflow of space (EGF).*
- *B = Translational horizontal motion of SE.*
- *C = Axial rotation of SE.*
- *(Distance*) = Distance through the ether = interval of time.*

With reference to the linear inflow of space (EGF) labeled A, and/or translational–horizontal velocity, labeled B, all components of the SE, possess an equal translational velocity. And so, regarding these reference frames and with respect to the opposing light waves, there is then no differentiation as to the "amounts of time" traveled through the ether (distances*).

In contrast, with internal axial rotation of the SE as depicted in C, the (distances*) traveled, for the two opposing light beams then differentiate. Consequently, there is a fringe shift as a function of that rotational rate. In effect, the SE only detects internal axial rotation of its own physical structure but not translational motion.

3.5 The Michelson–Gale Experiment

The following quote is the abstract of the Michelson–Gale Experiment from the original article Michelson, A. A. (1925).

"The Effect of the Earth's Rotation on the Velocity of Light, I."
Astrophysical Journal 61: 137.
Bibcode:1925ApJ61137M. doi:10.1086/142878.

Air was exhausted from a twelve–inch pipe laid on the surface of the ground in the form of a rectangle 2010 x 2013 ft. Light from a carbon arc was divided at one corner by a thinly coated mirror into direct and reflected beams, which were reflected around the rectangle by mirrors at the corners. The two beams returning to the original mirror produced interference fringes. The beam traversing the rectangle in the counterclockwise direction was retarded. The observed displacement of the fringes was found to be 0.230 plus or minus 0.005 agreeing with the computed value of 0.0236 plus or minus 0.002 within the limits of experimental error.

The following is from the The Sinequanon a website by Andrew D. Iraci:

"The Michelson–Gale experiment may be the most grandiose optical experiment ever conducted. On a huge track of land in Clearing, Illinois, he and lab assistant Gordon Gale molded a water pipe that was a foot in diameter and over a mile long in the form of a giant rectangle with sides running 2,010 feet east to west and 1,113 feet north to south. They removed the air from the pipes, and using mirrors, sent two light beams in different directions within the rectangle, one clockwise and the other counterclockwise.

When the beams converged again, they found a fringe shift. Although the distance the light had traveled was the same, and the giant rectangle never moved, one beam took longer to complete its path than the other. "Why?" As the Earth rotates, locations nearest the equator rotate the fastest while those nearest the poles move the slowest. The best way to comprehend this is to consider the fact that the circumference of the globe is about 25,000 miles at the equator, and so objects at the equator travel 25,000 miles in a day, or a little over 1,000 miles per hour. Conversely, objects closer to poles travel a smaller circumference in the same amount of time. Objects very near the pole may travel less than a few miles in 24 hours, or if it's directly on the pole, it will not move at all (discounting the wobble of the Earth) and only spin slowly in a circle. Thus, if the Earth is rotating through the ether, then there is an ether wind that gusts toward the west at a little over a 1,000 miles per hour at the equator; and, this wind moves slower and slower with respect to Earth bound objects that are closer to the poles. In summary, the only variation in the speed of light we can detect on Earth is relative to the rotational velocity of the Earth. As the Earth spins within its sink vortex, it causes an aether wind at the surface of the Earth varying by latitude (zero at the poles and maximum at the equator).

The author's internet research has uncovered that the aim, as first proposed by Albert A. Michelson in 1904 and then executed in 1925, was to find out whether the rotation of the Earth has an effect on the propagation of light near the Earth. "Thus, the Michelson–Gale experiment, presenting a very large ring interferometer, (a perimeter of 1.9 kilometer), big enough to detect the angular velocity of the Earth. As in the original Michelson–Morley experiment, the Michelson–Gale–Pearson version compared the light from a single source (carbon arc) after traveling in two directions. The primary change was to replace the two arms of the original

MM version with two rectangles. Light was then sent into the rectangles in opposite directions, reflecting off mirrors at the corners and returned to the starting point. Light exiting the two rectangles was compared on a screen just as the light returning from the two arms would be in a standard MM experiment. The expected fringe shift was in accordance with the stationary ether and special relativity. In other words, this experiment was aimed to detect the Sagnac effect because of the Earth's rotation." (Reference: Wikipedia)

Result

"The outcome of the experiment was that the angular velocity of the Earth as measured by astronomy was confirmed to within measuring accuracy. The ring interferometer of the Michelson–Gale experiment was not calibrated by comparison with an outside reference (which was not possible, because the setup was fixed to the Earth). From its design, it could be deduced where the central interference fringe ought to be if there would be zero shift. The measured shift was 230 parts in 1,000 with an accuracy of 5 parts in 1,000. The predicted shift was 237 parts in 1,000. According to Michelson/Gale, the experiment is compatible with both the idea of a stationary ether and special relativity." (Reference Wikipedia)

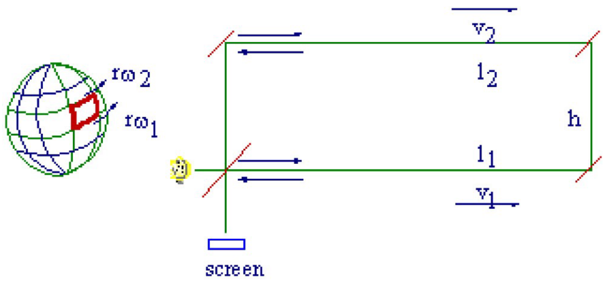
This author does not concur with the above conclusion that the Michelson–Gale Experiment (MGE) is compatible with SRT. What the author agrees with is the other deduction, which presumes the outcome of the MGE experiment is consistent with stationary ether corresponding to the ECF/EGF. (See figures 3.34 and 3.35.) Pay close attention to the following logic. The MGE square does not measure its own axial rotational motion analogous to the SE. It gauges something else.

Take note: The MGE is not the classic SE. The gravitational field of the Earth is a sphere. And the plane of the MGE is making a circular–like motion within this gravitational sphere, and the only reason it can detect the Earth's axial rotational velocity is that there are two relative ether winds. The square is not rotating on its own physical internal axis as occurs with the classic SE.

In order to explain the MGE, the author will exaggerate its dimensions. Assume a large perfect square, 500 miles per side, is placed flat on the surface of the Earth. The square consists of four single hollow vacuum tubes, whereby light can travel inside, with mirrors for reflection located at the corners. The bottom of the square is located parallel to the equator, moreover, at the equator, with a length of 500 miles. The top of the square is located 500 miles to the north, again parallel to the equator. The two sides connect the bottom and top. (The actual experiment was several kilometers per side.) In addition, assume the EGF/ECF is the preferred frame as postulated by this publication. Imagine looking at the Earth with the North Pole located at the top of the page and the South Pole at the bottom. In addition, the Earth rotates from left to right.

So, at the bottom of the square, located at the Equator, the relative velocity of the experiment with respect to EGF is 1,000 mph. And at the top of the square, 500 miles north, the relative velocity of the experiment with respect to the (EGF) is less than 1,000 mph, let's say 900 mph, as depicted in figures 3.34 and 3.35.

Left Right



Credit: Dennis McCarthy

Figure 3.34 Relative Velocity (ECF) at Different Latitudes [Fair Use]

Left Right

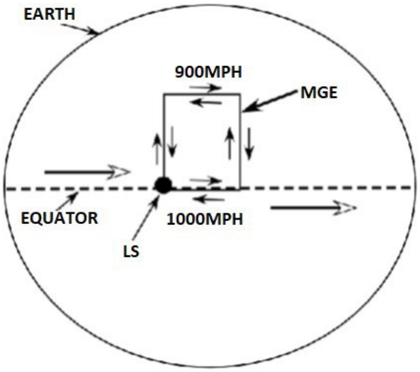


Figure 3.35 Effects of Latitude on Michelson–Gale Experiment

- *Square = Michelson–Gale experiment.*
- *Earth = The circle.*
- *Dotted line is the equator.*
- *LS = Light source.*
- *Arrows associated with the sides of the MGE represent the opposing light beams.*
- *Hollow tip arrows = direction of the Earth's rotation. The relative ether wind is in the opposite direction.*
- *Bottom of square at equator = 1,000 mph relative ether wind right to left.*
- *Top of square 500 miles north of equator = 900 mph relative ether wind right to left.*

Regarding this experiment, two beams of light are sent in opposite directions around the square within the vacuum tubes. Observe, this experiment involves two relative ether winds, one equal to 1,000 mph at the equator, the other 900 mph, 500 miles to the north, both right to left. Both relative ether winds are from east to west. The term relative is used since the experiment is plowing through the ether (EGF/ECF) rather than vice versa, the latter of which would be a true ether wind.

Given this scenario, then on one hand, the clockwise beam, depicted by arrows located outside the square, encounters a 900-mph relative wind (against) at the top of the square, as it travels west to east, and a 1,000 mph relative wind (with) at the bottom of the square, when it travels east to west.

In contrast, the counterclockwise beam, represented by arrows located inside the square, encounters a 1,000 mph relative wind (against) at the bottom of the page, when it travels west to east, and a 900 mph relative wind (with) at the top of the page, as it travels east to west. The vertical sides are equal in both directions.

If one does the mathematical calculations, given two relative ether winds, it takes a longer ”interval of time” (distance*) for light to travel counter–clockwise than clockwise. As a result, the infringement pattern produced is a function of the Earth’s axial rotational velocity relative to the EGF, moreover, at the latitude of the experiment. The Michelson–Gale experiment MGE successfully measured this velocity.

Again, the SE and the MGE measure different aspects of the EGF. The SE measures internal axial rotation of the apparatus, whereas the MGE measures two relative ether winds, given the fact that its plane is making a circular–like motion within the sphere of the EGF. Additionally, given its small size, the SE is not sensitive to detect two relative ether winds.

For example, if the original smaller MGE experiment were placed precisely straddling the equator with only one relative ether wind, it would then be incapable of identifying the Earth’s rotational velocity. Alternatively, a classic SE placed at the equator would exhibit a fringe shift when rotating rapidly on its own internal axis. However, it would also not detect the Earth’s axial rotational velocity at any latitude (small size).

Furthermore, if the MGE were placed at the North Pole, it would then be somewhat analogous to the classic SE, but its internal axis rotational velocity would be equal to 360 degrees for every 24 hours, perhaps too slow to measure. In contrast, at the pole, if one could rotate the MGE significantly faster than once every 24 hours, it would then be exactly analogous to the classic SE.

3.6 The Mössbauer Experiment

There is another classic test used as a proof for Einstein’s SRT/GRT. It is known as the spinning Mőssbauer experiment (SMoE). However, the following partial abstract written by Ronald Hatch, citing Howard Haden, explains how even that experiment is silent as to whether or not the ether exists. This topic is very complex, in fact, so elaborate that in the author’s opinion, its complete explanation would distract the reader from the main ideas presented in this chapter. Therefore, its full narrative will be left to another time and place. But suffice it to say, this experiment, →given the physical orientation as originally performed←, cannot identify the ether wind.

Nevertheless, it does demonstrate the relativistic effects of ”time dilation” as a function of acceleration/angular velocity with respect to the ECF/EGF. The quote below is a partial abstract that refutes the notion that the MoE is proof of SRT.

Partial Abstract From Hayden, Howard C. (1992) ”Rotating Mőssbauer Experiments and the Speed of Light,” Galilean Electrodynamics, Vol. 3, No. 6, Nov.

Spinning Mőssbauer experiments, with gamma ray source and detector on a spinning disk, are frequently cited as providing strong evidence in support of the special theory. However, as Hayden has shown, the claims are generally based upon two separate phenomena. The abstract suggested that one could detect the variation of the transit time across either the radius or diameter of the spinning disk if an ether wind were present. Turner and Hill looked for a change in the frequency of the gamma rays as a function of the *source velocity. If an ether wind were present, then a modulation of the frequency with the spin would presumably appear. Ruderfer, in an erratum, pointed out that the two effects would cancel and render the experiment incapable of detecting an ether wind. In spite of this erratum, the claims are repeatedly found in the literature that the spinning Mőssbauer experiments support the special theory. They do not. They are simply moot on the subject.*

The author of this publication posits a slightly different hypothesis as to the reason why the spinning Mőssbauer experiment (SMoE) is incapable of detecting the ether wind. However, just as Ruderfer postulated, it does involve compensatory counteracting functions. Nevertheless, these negating processes are somewhat different from those posited above, although the end results are almost the same. Before proceeding, some basic principles of physics are presented. The following quotes were found on the internet–most specifically, the *Encyclopedia Britannica*. The quotes explain the underlying physics of the Mőssbauer effect. Following the quotes is the author's explanation of the Mőssbauer effect, mainly for the benefit of the novice.

The Classic Explanation:

The Mőssbauer effect, or recoilless nuclear resonance fluorescence, is a physical phenomenon discovered by Rudolf Mőssbauer in 1958. It involves the resonant and recoil–free emission and absorption of gamma radiation by atomic nuclei bound in a solid. Its main application is in Mőssbauer spectroscopy.

In the Mőssbauer effect, the narrow resonance absorption for nuclear gamma absorption can be successfully attained by physically immobilizing atomic nuclei in a crystal. The immobilization of nuclei at both ends of a gamma resonance interaction is required so that no gamma energy is lost to the kinetic energy of recoiling nuclei at either the emitting or absorbing end of a gamma transition. Such loss of energy causes gamma ray resonance absorption to fail. However, when emitted gamma rays carry essentially all of the energy of the atomic nuclear de–excitation that produces them, this energy is also sufficient to excite the same energy state in a second immobilized nucleus of the same type.

The Mőssbauer effect is a process in which a nucleus emits or absorbs gamma rays with-out loss of energy from a nuclear recoil. It was discovered by the German physicist Rudolf L. Mőssbauer in 1958 and has proved to be remarkably useful for basic research in physics and chemistry. It has been used, for instance, in precisely measuring small energy changes in nuclei, atoms, and crystals induced by electrical, magnetic, or gravitational fields. In a transition of a nucleus from a higher to a lower energy state with accompanying emission of gamma rays, the emission generally causes the nucleus to recoil, and this takes energy from the emitted gamma rays. Thus, the gamma rays do not have sufficient energy to excite a target nucleus to be examined. However, Mőssbauer discovered that it is possible to have transitions in which the recoil is absorbed by a whole crystal in which the emitting nucleus is bound. "Under these circumstances, the energy that goes into the recoil is a negligible portion of the energy of the transition. Therefore, the emitted gamma rays carry virtually all of the energy liberated by the nuclear transition. The gamma rays thus are able to induce a reverse transition, under similar conditions of negligible recoil, in a target nucleus of the same material as the emitter but in a lower energy state. In general, gamma rays are produced by nuclear transitions from an unstable high–energy state, to a stable low–energy state. The energy of the emitted gamma ray corresponds to the energy of the nuclear transition, minus an amount of energy that is lost as recoil to the emitting atom. If the lost "recoil energy" is small compared with the energy line width of the nuclear transition, then the gamma ray energy still corresponds to the energy of the nuclear transition, and the gamma ray can be absorbed by a second atom of the same type as the first. This emission and subsequent absorption is called resonant fluorescence. Addi-

tional recoil energy is also lost during absorption, so for resonance to occur, the recoil energy must actually be less than half the line width for the corresponding nuclear transition.

The quotes cited above are brief classic explanations of the Mőssbauer effect as found primarily in the *Encyclopedia Britannica*.

The Author's Explanation:

With reference to a given radioactive emitting element, if one of its nuclei emits a gamma photon (source), then a recoil force is exerted on that nucleus.

In addition, regarding that emitted photon, moreover, as a function of recoil, a redshift ensues. On the other hand, if the "source nucleus" is fixed within a sold lattice, then these recoil/redshift interactions cannot transpire.

Conversely, assuming the same kind of nucleus absorbs an identical gamma photon, then for that nucleus (detector), this interaction produces momentum, furthermore, a redshift for that photon. But again, if the "detector nucleus" is part of a solid fixed lattice, then no momentum ensues and no redshift occurs.

Therefore, if one posits that the nuclei of both the source and detector are functionally identical, moreover, if both are a part of the same type of fixed solid lattice, the emission frequency (energy) is then equal to the absorption frequency. Presuming these circumstances are in effect, energy is then transferred, without loss, from the source nucleus to the detector nucleus, furthermore, recorded by the proportional counter (PC). In essence, this explanation is the Mőssbauer effect. Alternatively, if the frequencies of the source versus the detector diverge, there is either absent or else reduced absorption, so, in turn, decreased recording/counting by the PC.

There are different kinds of spinning Mőssbauer experiments. One simplified model is rendered below in Figure 3.36 followed by a written dissertation.

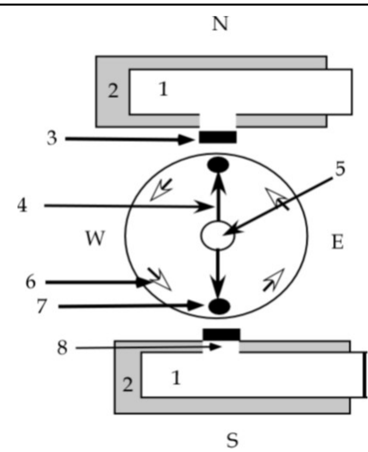


Figure 3.36 Simplified Spinning Mőssbauer Experiment

1. *Proportional counters.*
2. *Lead shielding.*
3. *Windows.*
4. *Direction of photons from source to detector.*
5. *Source.*
6. *Direction of rotation of rotor.*
7. *Detector.*

8. Pathway to the proportional counter detector through the lead shield.
9. N–S, E–W = directions.

Imagine that a source (5) and two detectors (7), made of the same radioactive–emitting and absorbing material, located within a fixed lattice, moreover, exhibiting the Mőssbauer effect, are placed on a rotor, as shown above. The source is located at the center, whereas the two detectors, which absorb the photons, are positioned, at the periphery, 180 degrees apart. In addition, the two halves of the apparatus, which counts or records the absorbed photons (1), is consigned outside the rotor, explicitly oriented along the north–south axis (EGF). The name given to this device is ”proportional counter” (PC).

It should be recognized, that the two classic renowned confirmatory spinning Mősbauer experiments (SMoE) performed by Champeney, Isaak, and Kahn and the other by Turner and Hill, acquired their measurements, using a PC, which was specifically oriented along the north–south axis relative to the (EGF). As it will be shown later, this specific orientation, as originally performed, is a crucial part of the explanation as for why the SMoE did not detect the ether wind.

Notice in Figure 3.36, the two sides of the proportional counter are positioned along the N–S axis. In addition, observe that the emitted photons from the source to detectors, when absorbed, are traveling in the N–S and S–N directions. For that reason, the measurements of the absorbed photons are acquired only when the rotating detectors are traveling directly E–W or alternatively directly W–E.

For reinforcement, presuppose the rotor with attached devices is ramped up to 36,000 rpm. Additionally, presume during rotation, photons are emitted from the central source to the peripheral detectors. And assume the measurements are obtained relative to the two detectors only when they are traveling along the E–W, W–E axes, which is at the exact time when the photons are traveling from source to the detectors in the N–S, S–N directions.

The following descriptions are extremely complex and multifaceted, so for the average reader probably difficult to decipher. In addition, the ideas presented below are also very hard to visualize, moreover, describe. Even so, the author will attempt to make the explanations as simple as possible.

Now, vis–ά–vis the following discussions, six postulates are presented representing distinct concepts that when woven together in different ways, then clarify why the SMoE is incapable of detecting the ether wind, specifically in the orientation as originally performed. To start with, the following two sections describe the SMoE relevant to two different sets of assumptions/theories.

F–1. SRT/GRT

F–2. PFSRT/PFGRT

F–1. From the Reference Frame of the Assumptions of SRT, GRT, or Alternatively Stationary Ether

Depicted in figures 3.36 and 3.37, furthermore, as delineated in the following paragraphs, is an explanation of the SMoE pertaining to the assumptions associated with Einstein’s SRT, GRT, or alternatively stationary ether.

Postulate 1

Assuming there is no ether, as postulated by Einstein or alternately stationary ether, →the source is then located at rest with the observer←. Consequently, whenever the two detectors rotate exceedingly rapidly, both acquire equal relativistic angular velocity/acceleration with respect to the source. As a result, again compared to the source, their relativistic rates of time (frequency) symmetrically decrease.

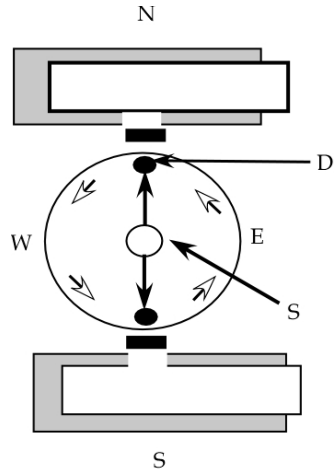


Figure 3.37

- *S with arrow = source*
- *D = detector*
- *E = east*
- *W = west*
- *Hollow arrows = direction of rotor's rotation*
- *Solid vertical arrows (N–S) = directions of photons (light) when counted.*

Consequently, the Mőssbauer frequency relationship (resonant fluorescence) between source and the two detectors then falls out of sync. Essentially, there is a diminution in the number of counts by the PC. Therefore, vis-á-vis this scenario, "time dilation" occurs as a function of the two detector's relativistic acceleration/angular velocity with respect to the source/observer.

Postulate 2

When the S–N, S–N photons are absorbed, the detectors at that time are traveling E–W, W–E, moreover, at a right angle to the photons (S–N, N–S). So, from the frame of the detectors, a classic transverse observer Doppler redshift effect occurs. Furthermore, this redshift phenomena is symmetrical with respect to both the S–N and N–S photons. As such, the Mőssbauer frequency relationship (resonant fluorescence) between the source and the two detectors again falls out of sync.

Postulate 3

In other words, vis-á-vis this experiment, the decrease in resonance is a function of:

1. **Relativistic** time "dilatation" of the detector compared to the source = redshift.

2. The **classic** transverse observer Doppler effect (CTODE), from the frame of the detectors, traveling (E–W, W–E), vs. the photons traversing (S–N, N–S) = redshift.

These two functions in combination are defined as the **relativistic** transverse observer Doppler effect and characterized in this subdivision by the letters (RTODE).

Effectively, the **classic** transverse observer Doppler effect (CTODE) transforms into the **relativistic** transverse observer Doppler effect (RTODE) with the superimposition of relativistic time dilation. So, when reading the following paragraphs, please pay attention to when each term is used and their different meanings.

For review

1. **Classic** transverse observer Doppler effect = observer redshift Doppler effect from the frame of the detector without time dilation (CTODE).

2. **Relativistic** transverse observer Doppler effect = classic transverse observer redshift Doppler effect from the frame of the detector, with superimposed relativistic time dilation (RTODE).

Postulate 4

SRT postulates there is no ether.

The first three postulates apply to SRT/GRT, but, also to a stationary ether. On the other hand, what occurs if there is a relative ether wind (ECF/EGF)? That answer is presented in the following section.

F–2. From the Reference Frame of the Assumptions of PFGRT/EGF/ECF

Portrayed below in figures 3.38 and 3.39, and subsequently explained in the following captions and paragraphs, is a limited description of the SMoE, but in this case, from the reference frame of ECF/EGF (relative ether wind). See Figure 3.38 below.

Postulate 5

Concerning the following discussion, the concept of relativistic rate of time (frequency) of detector versus source/(ECF) is employed, as well as the notion of the ether wind. Alternatively, the concept of Classic Transverse Observer Doppler Effect (CTODE) is at this time ignored.

1. Relativistic time dilation of the detectors relative to source (utilized)–Postulate 1.
2. The ether wind (utilized).
3. Classic transverse observer Doppler effect (ignored)–Postulate 2.

Therefore, presuming the scenario whereby there is a relative ether wind (ECF/EGF), then regarding the PC recordings, there should be an additional "falling out of resonance" between source and the two detectors, furthermore, superimposed upon the relativistic time dilatation effect (Postulate 1). This is because when compared to the source, as the detector rotates west to east, against the ether wind, its relative velocity with respect to the ECF/EGF then increases. So equated to the source, its "rate of time" (frequency) decreases.

And when compared to the source, while rotating east to west, along with the ether wind (A), its relative velocity with respect to the ECF/EGF then decreases.

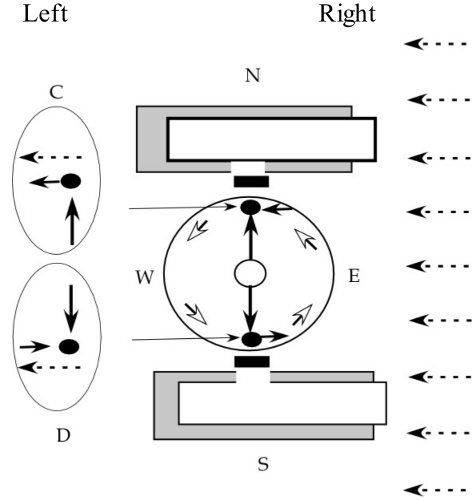


Figure 3.38

1. The direction of the relative ether wind (EGF/ECF) is depicted by the vertical series of dotted horizontal arrows, (right to left) located on the right and also by the single dotted horizontal arrow found within the circles.

2. The solid horizontal arrows associated with the black dot, sited within the circles, represent the velocity of the detector relative to the source, but only when traveling (E–W, W–E).

3. The circles C and D containing the two horizontal arrows, viewed together, represent the detector's velocity relative to the ether wind (ECF) but only specifically in the (E–W, W–E) orientations as shown (D ether wind > C ether wind).

Therefore, equated to the source, its rate of time (frequency) increases. Observe, these two scenarios are anti–symmetrical functions; nevertheless, both result in a change of resonance.

At this juncture, presume Postulate 3 is also apropos. Consequently, given all the above, whereby the detectors are specifically traveling/measuring (W–E, E–W), as opposed to the other directions, the PC recordings should then be out of sync (resonance) →compared← to Postulate 3. This expected conclusion is defined as Postulate 5. Essentially, Postulate 5 is a modification/superimposition of Postulate 3.

What is more, Postulate 5 has never been experimentally confirmed. For that reason, this null outcome is posited as proof of the absence of the ether wind, analogous to the MMX.

However, the experimenters overlooked several factors as now clarified in the figure below and in the following dialog. However, first for review, see Figure 3.39, a repeat of Figure 3.38.

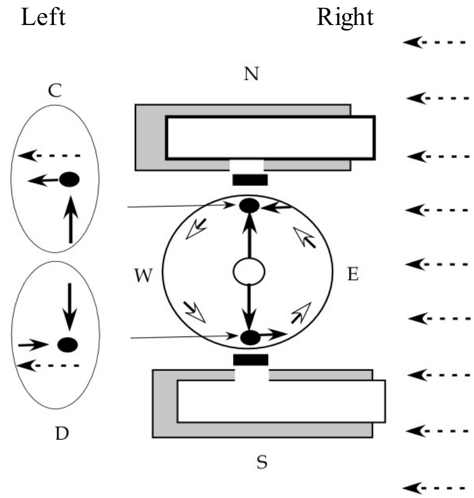


Figure 3.39 Repeat of Figure 3.38

For review, the SMoE utilizes the Mőssbauer effect to gauge a change in the rate of time (RTODE) as a function of the two detector's relativistic acceleration/angular velocity relative to the source, actually the ECF/EGF and also whether or not there is an ether wind but for the latter in–erratum.

Once again, the Mőssbauer effect is this: The source emits a gamma photon with a given frequency and without energy loss. And the detector only absorbs that photon if it possesses the same energy as the emission frequency. Alternatively, when the frequencies of the source vs. detectors diverge, there is then reduced absorption correlated to the amount of divergence. The following explanation initially overlooks the ether wind (relative ether wind); however, that topic will be dealt with later in the following passages. Relative to the ECF/EGF, when the two detectors rotate with relativistic angular velocity/acceleration, then compared to the nonrotating source, their rates of time (frequency) symmetrically decrease (Postulate 3).

Consequently, in this setting, there is a decline in the number of recorded/absorbed photons (resonance). In other words, the experiment proves (time dilation) is a function of the detector's relativistic acceleration/angular velocity with respect to the ECF/EGF, but more importantly, even though not readily apparent, not relative to the source/observer (SRT/GRT).

The only difference between Einstein's SRT/GRT and this postulate ECF/EGF is that in this scenario, all is relative to the EGF/ECF, rather than from the frame of only the observer. But notice, regarding these two different theories, the final measured results are almost identical. Nevertheless, the underlying principles of physics are different.

The word "almost" is used because the above two scenarios are not quite the same. This is **partially** because the source frequency/rate of time is faster, assuming the SMoE exists at rest with the ECF compared to if there is a relative ether wind. For instance, presupposing the existence of the ECF (relative ether wind) the source frequency/rate of time, located at the equator, would then be slower (1,000 mph relative ether wind) compared to at the Earth's poles (0 mph relative ether wind). In contrast, using Einstein's assumptions (SRT GRT), this source divergence is, by definition, not possible, since all is relative to only the observer. One can now visualize why these two different theories are almost, but not precisely, identical.

Postulate 6

(For the novice, before proceeding further, please see Figure 3.40 below.) The following explanation relates specifically **to only the ether wind** or more precisely the relative ether wind (EGF). Postulate 6 describes how the two detector's (W–E, E–W) changing rates of time (change in frequency), as a function of the E–W ether wind, are then counteracted (stable resonance), again from the frame of the detectors by the Doppler function of that same E–W ether wind. This is because it carries the N–S, S–N photons along with its own motion.

And so, with respect to the ether wind, whenever the detector rotates directly against it (west to east), then compared to the source, its velocity relative to the ECF/EGF increases. As a result, again compared to the source, its rate of time/frequency decreases.

Simultaneously, with respect to this specific geometry, photons emitted from the source to the detector, moreover, from the frame of the detector, are redshifted to a lower frequency.

This is due to the E–W ether wind effect exerted on the N–S photons, thus producing a red-shift ether Doppler effect of those photons. Alternately stated, there is observer aberration/redshift Doppler from the frame of the W–E detector as a function of the deflection of the N–S photons, because they are carried along with the motion of that ether wind (essentially, an ether wind aberration/Doppler effect).

Therefore, overall, combining both functions then from the perspective of the detector, these counteracting effects negate one another.

In other words, as a product of the E–W ether wind, regarding only these two specific counteracting functions of decreased **rate of time of** the **detector versus the redshift Doppler effect produced by the same ether wind on the N–S photons (again from the frame to the detector), then the interaction of the photons with respect to the source and detector remain in sync (resonance)**. Now pertinent to this supposition, one key concept to recognize (regarding physics in general) is not only is there source and observer aberration/Doppler effects, but there is also an ether wind aberration/Doppler effect.

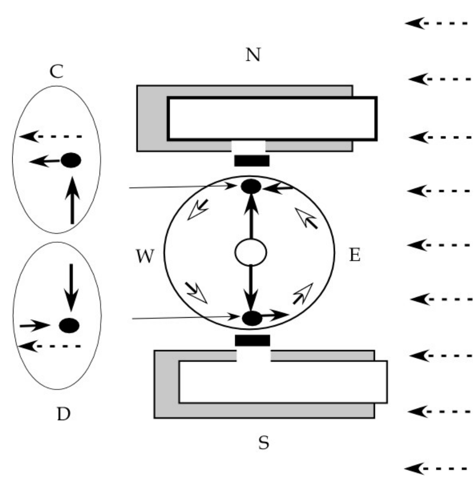


Figure 3.40
C = Blueshift, D = Redshift

- *The horizontal series of dotted arrows on the right and also the single horizontal dotted arrow located within each oval represent the direction of the ether wind relative to ECF/EGF.*

- *The solid vertical arrows depict the direction of the photons from source to detector (N–S, S–N) when the absorbed photons are measured.*
- *The solid horizontal arrows associated with the black dot, located within the ovals, portray the direction of the rotating detector when the absorbed photons are measured (E–W, W–E).*
- *The ovals (C and D) containing the two horizontal internal arrows, moreover, viewed together, represent the detector's relative velocity with respect to the ether wind (ECF) but only specifically in the (E–W, W–E) orientations as shown.*
- *The ovals (C and D) also demonstrate, from the frame of the detector, when the photons are counted E–W, W–E, the frequency changes produced by effect of the ether wind on the (N–S, S–N) photons (a form of aberration/Doppler shift of light).*
- *For D, there is a redshift and for C a blueshift. See below.*
- *Again, for reinforcement, the ovals labeled C and D symbolize the change in frequency of received photons, from the perspective of the detector, when the photons are measured. The Doppler frequency change is a function of the transverse velocity of the detector (E–W, W–E) relative to the vertical directions of the emitted photons from source to the detectors (S–N, N–S), the latter which are carried along with the ether wind. This is a form of light aberration/Doppler shift.*

Note: for both positions C and D, which is the frame of the detector, the relativistic changes in the "rate of time" of the detector vs. the effect of the ether wind on the N–S, S–N photons, counteract one another.

Conversely, whenever the detector rotates directly with the ether wind (E–W) then compared to the source, its velocity relative to the **ECF/EGF** decreases. So, in this setting, versus the source, its rate of time/frequency then increases.

Simultaneously, relevant to this specific geometry, photons emitted from the source to the detector, moreover, from the frame of the detector, are blueshifted to a higher frequency.

This is due to the E–W ether wind effect exerted on the S–N photons, thus producing a blueshift ether Doppler effect on those photons (essentially an ether wind aberration/Doppler effect). That is to say, as a function of the deflection of the S–N photons, because those photons are carried along with the motion of the ether wind, there is then an observer blueshift Doppler from the frame of the E–W detector.

Therefore, overall, combining both functions from the perspective of the detector, these counteracting effects negate one another.

In other words, as a product of the ether wind, regarding only these two specific counteracting functions of increased rate of time of the detector versus the blueshift Doppler effect exerted on the S–N photons from that same ether wind (again from the frame of the detector), then the interaction of the photons with respect to the source and detector remain in sync (resonance).

Again, pertinent to this supposition, one key concept to recognize (regarding physics in general) is not only is there source and observer aberration/Doppler effects, but there is also an ether wind aberration/Doppler effects.

For reinforcement, Postulate 6 refers specifically to the detectors (E–W, W–E) and the photons (N–S, S–N) and how they are both affected by the same E–W ether wind. Therefore, **from the frame of the detectors**, moreover, as a function of only the E–W ether wind, then the changing rates of time (**change in frequency**) is counteracted by the Doppler effects produced by that same ether wind relevant to the (N–S, S–N) photons (**change in frequency**). Take note: The changes in frequency regarding these two separate functions are symmetrical. As such, no alteration in resonance occurs from the frame of the detector specifically as a function of only the ether wind.

So, overall, for both the above E–W and W–E scenarios, even though the ether wind exists, it is undetectable using this specific orientational mode of the spinning MoE. Observe, "time dilatation" (RTODE) of the detectors still remains as a function of their acceleration/angular velocity with respect to the source (actually the ECF/EGF).

In summary, the Mőssbauer experiment proves the relativistic effects of time dilation as a function of angular velocity/acceleration of the detector relative to the ECF/EGF. On the other hand, as a separate function, it is silent as to whether or not the ether exists (ether wind) but only as classically performed–specifically, when measured by the detectors as they travel along the east–west/west–east axis of the ECF.

Again, recall that the two classically renowned confirmatory Mőssbauer experiments performed by Champeney, Isaak, Kahn, and the other by Turner and Hill, acquired their measurements by the detectors only along the (E–W, W–E) axis. In other words, the PC was oriented in the N–S axis.

So, given that, reflect this: The experimental outcome would be different, assuming the two sides of the proportional counter are sited along the E–W axis rather than S–N, as shown below in Figure 3.40.

In this scenario, as presented below in Figure 3.41, the photons from the source to the detectors when measured/absorbed are traveling E–W and W–E. For that reason, as a function of the ether wind, the photons emitted traveling east are redshifted, and the photons traveling west are blueshifted.

Consequently, from **only the frame of the two detectors**, at this time traveling/measuring/absorbing in the S–N, N–S orientations, the counteracting relativistic rate of time changes vs. the Doppler effect exerted on the photons, (blueshift/redshift), both functions of the ether wind previously present with reference to the E–W, W–E scenarios are now, in this setting, absent.

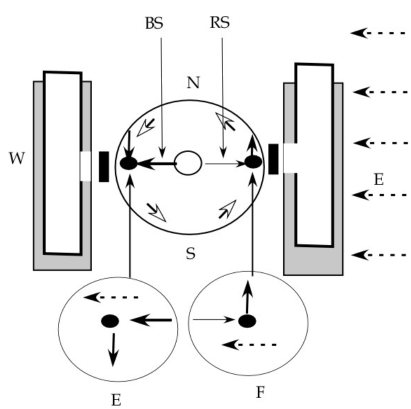


Figure 3.41 Figure 3.36 but Rotated 90 Degrees

1. Figure 3.40 rotates the classic alignment of the MoE 90 degrees counterclockwise. Therefore, the PC is then located along the E–W axis.

2. The vertical series of dotted horizontal arrows on the right and also the single horizontal dotted arrow located within the circles represent the direction of the ether wind.

3. The vertical solid arrows portray the directional velocity of the detectors (S–N, N–S) when the photons are measured.

4. The horizontal solid arrows within the ovals show the direction of the photons from source to detector, when measured, (E–W W–E) with the thin arrow representing a redshift and the thicker arrow symbolizing a blueshift, both as a function of the ether wind.

5. Again, as a function of the ether wind, the photons traveling east are redshifted, and the photons traveling west are blueshifted.

6. So in this setting, the recordings by the PC are performed along the N–S axis rather than the E–W axis.

7. As a result, from the frame of the detector, the counteracting symmetry between relativistic changes in the rate of time of the detector vs. the effect of the ether wind on the N–S, S–N photons, which occur when the measurements are acquired in the E–W, W–E axis, now, as in this setting are absent, as demonstrated in ovals (E and F).

Essentially, there will be a different result (number of PC recordings) depending upon whether the PC is oriented E–W vs. S–N.

With reference to this specific experimental orientation, this alternate mode of the spinning Mőssbauer experiment (PC orientation of E–W, rather than N–S) is a true test of the anisotropy of the speed of light relative to the (EGF/ECF). Basically, the reason why the experimenters failed to detect the ether wind is because of their choice of the axis of the PC along the N–S direction.

Alternately, in the future, if the experimenters were to change the measuring axis of the PC from N–S to E–W, furthermore, as postulated as above, if those specific different experimental results are observed, then this alternate mode of the SMoE, rather than being evidence of the absence of the ether wind, will instead then be a proof of its existence.

3.7 SRT–The Simultaneity Problem

Recall the quote as given below from Chapter 2 regarding simultaneity. After reading chapters 1 and 3, the alternative explanation previously given by the author should now be much clearer.

In special relativity the relativity of simultaneity is explained with the following example. We have one frame of reference, a train moving from left to right with constant speed v relative to the embankment, and second frame of reference, the embankment itself. On the embankment, there are points A and B and their midpoint M. On the train, there is the point M'. When M and M' meet each other, two lightning strikes at both A and B. The observer on the embankment sees that the two flashes of light meet at the midpoint M. But since the train is moving and the point M' with it, M' moves towards B, and, therefore, the observer on the train will see that the beam from B will arrive first at point M' and after that will arrive the beam from A. And so simultaneity is relative for one observer; the two events are simultaneous, but for the other, they are not. (Physics Forum online)

So as presented above (SRT), referring to various diverse inertial frames, the perceived timing of events is different. On the other hand, if there is a preferred frame (not the observer), with an ether wind, then the above classic example can be explained by another methodology.

For instance, in the scenario where there is an ether wind with respect to the Earth–centered frame ECF/Earth's gravitational field EGF/ether, then as a result, neither the observer of reference frame M or M' receives the flashes simultaneously. This is because the observer of frame M and the two lightning bolts possess the same velocity relative to the ECF/EGF/ether as a consequence of all three rotating synchronously along with the spinning Earth at its surface.

This is assuming the train is traveling west–east and the flashes of lightning are in front of and behind the train; then it takes light longer to travel west–east compared to east–west.

In contrast, the observer of frame M' possesses a different velocity with respect to the ECF/EGF/ether given the fact that while riding on the train, M' is then traveling at a greater velocity with respect to the rotating surface of the Earth. As a result, M' velocity relative to the ECF/EGF/ether is greater than M. Therefore, the time interval of the asynchrony of the observed lightning bolts is greater for M' compared to M. →Observe, this alternative explanation of simultaneity as a function of the ether wind is now much clearer compared to when first explained in Chapter 1←.

3.8 Summary

A gravitational field, such as the one associated with Earth, is the local preferred frame for the speed of light on Earth. Global Earth experiments, which by necessity must be performed in an accelerated field, with curvature and rotation, are assumed to be consistent with relativity (GRT), just not SRT. Essentially, they are assumed to be Sagnac experiments (GRT). One key point to remember is that they directly measure the speed of light; moreover, they demonstrate anisotropy. In contrast, small local linear experiments, such as the MMX, do not directly determine the speed of light, what is more, they produce isotropy.

These two categories of experiments contradict one another. The divergence is assumed to be related to linear/inertial motion as opposed to accelerated motion (SRT vs. GRT). So the author asks, intuitively, where does the truth lie?

To the author, it is obvious. The fault lies in the fact that other than pure mathematics; relativity is artificially divided into SRT and GRT. It is not logical to assume that both types of experiments measure the same reality with differing results given that all of the experiments occur within the Earth's one gravitational field.

In addition, GRT and SRT are mathematically functional/compatible, though not always logical given contradictions, such as the twin paradox problem and the quandary of simultaneity. And as a corollary, SRT and GRT are abstract mathematical constructs and just like the Ptolemaic theory, not always compatible with actual reality, therefore, at times, confusing.

But as demonstrated by this chapter, if the MMX null result as originally performed/interpreted is, in fact, silent as to whether or not the ether exists, then these two categories of experiments are compatible with one another, moreover, connected by the ether.

The most important concept to take home is this: In discarding the MMX (second–order experiment) by proving it incapable of detecting the ether wind **as classically performed/interpreted**, then, by default, the preferred frame for the speed of light is related to only the gravitational field (PFGRT).

Now, if the ether is proven as real, then modern–day physicists need to advance new theories of relativity, as well as QM, but now based upon the ether's existence rather than its absence, such as those posited in chapters 1, 2, and 4 of this publication.

Relativity buried the ether at the beginning of the 20th century; however, if this book's postulates are correct, at the dawn of the 21st century, the ether is resurrected, and all of physics changes.