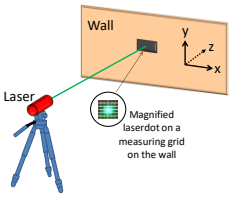

On the flawed Michelson and Morley experiment null-result paradigm.

Private communication/publication

Etienne Brauns[a]

1.0

Keywords: Michelson, Morley, null-result, location, anomaly, paradigm, light, ray of light, laser, laser pulse, laser beam, photon, real space, real velocity, real location

Abbreviations: MM (Michelson and Morley), CS (contemporary science), CPBD (contemporary paradigms believer and defender), RS (real space), RV (real velocity), MWF# (My Website Figure ; reference to a dynamic Figure through an internet web link since it is not possible to directly implement dynamic/animated time stamp type of Figures in a Word or PDF format based static publication/document)

Dynamic figures in this publication are referred to as e.g. MWF2 (see *Abbreviations*). By clicking the link in Table 1 those dynamic figures will automatically open in your web browser.

Table 1 : dynamic MWF figures and their link

MWF#	Link
MWF2	www.absolute-relativity.be/images2/G6_Animation.gif
MWF24	www.absolute-relativity.be/figures/Figure24_Animation.gif
MWF25	www.absolute-relativity.be/figures/Figure25_Animation.gif
MWF26	www.absolute-relativity.be/figures/Figure26_Animation.gif
MWF27	www.absolute-relativity.be/figures/Figure27_Animation.gif

a) Private research contact : all contacts should go through the Contact facility at the Home page of www.absolute-relativity.be

1. Abstract

In this shortened publication the core information about the Michelson and Morley experiment "null-result" paradigm was specifically extracted from section 8 (p.162-233) within the extended publication (1). It is shown that this paradigm is flawed and should be re-evaluated. As a result of the extraction from section 8: please note that a figure number indication such as e.g. Figure 8.1 within this publication means that such a Figure index corresponds to the very same Figure within section 8 of the extended publication (1). There are two additional Figures (Figure A and Figure B) in this publication. See also the note above on the dynamic figures of the MWF type. Also Table 8.1 at the end of this publication corresponds to the Table 8.1 within section 8 of (1).

(1) Etienne Brauns, *A shattered Equivalence Principle in Physics and a future History of multiple Paradigm Big Bangs in "exact" science ?* ; this extended (notary registered) publication can be downloaded at http://www.absolute-relativity.be

(2) Etienne Brauns, *On multiple anomalies and inconsistencies regarding the description of light phenomena in contemporary science*
Website : http://www.absolute-relativity.be/pdf/MultipleAnomalies_EBrauns.pdf (version including the Annex)
Researchgate :
https://www.researchgate.net/publication/312190993_On_multiple_anomalies_and_inconsistencies_regarding_the_description_of_light_phenomena_in_contemporary_science
https://www.researchgate.net/publication/312591154_Annex_1_to_On_multiple_anomalies_and_inconsistencies_regarding_the_description_of_light_phenomena_in_contemporary_science

(3) Etienne Brauns, *On a massive anomaly through a straightforward laser experiment falsifying the equivalence principle for light.*
Website : http://www.absolute-relativity.be/pdf/ExperAnomLaser_EBrauns.pdf
Researchgate :
https://www.researchgate.net/publication/313030370_On_a_massive_anomaly_through_a_straightforward_laser_experiment_falsifying_the_equivalence_principle_for_light

Note : A detailed discussion can be found within the extended publication (1) of over 400 pages which is downloadable at the indicated website. The extended publication is informing in more detail about the existence/proofs of multiple flawed paradigms within CS as well as about important applications (on our planet and in space) resulting from those views. All information and contents related to (1), (2), (3) and the website were registered in front of a notary and, in combination with the patent text, thus ensuring an author's copy right protection. The principle and result of the laser experiment was already published in a (notary registered) patent text and also already published at www.absolute-relativity.be.

2. The flawed Michelson and Morley experiment null-result paradigm

2.1 The Michelson and Morley experiment publication and their "model"

Albert A. Michelson and Edward W. Morley published their findings in November 1887 in the American Journal of Science as Art. XXXVI with the title "*On the Relative Motion of the Earth and the Luminiferous Ether*". The term "Luminiferous" means "light carrying". The Michelson and Morley paper can be downloaded here :

www.absolute-relativity.be/pdf/MichelsonAndMorleyPaper1887.pdf
(or at the internet : http://history.aip.org/history/exhibits/gap/PDF/michelson.pdf)

At that time the hypothesis that space (vacuum) was some kind of fluidum (the “ether”) was under investigation. This can be somewhat linked to the early mechanistic view of Descartes in the history of science who supported the theory that space was corpuscular. This view survived at that time several decades. It was considered in the MM “ether” experiment that the earth moves at a high velocity in its orbit around the sun through the ether and that such relative motion should enable to measure an effect of an "ether-wind" on a ray of light. MM thus write in their paper :

"*On the undulatory theory, according to Fresnel, first the ether is supposed to be at rest except in the interior of transparent media, in which secondly, it is supposed to move with a velocity less than the velocity of the medium in the ratio* $(n^2-1)/n^2$ *where n is the index of refraction. These two hypotheses give a complete and satisfactory explanation of aberration. The second hypothesis, notwithstanding its seeming improbability, must be considered as fully proved, first, by the celebrated experiment of Fizeau, and secondly, by the ample confirmation of our own work. The experimental trial of the first hypothesis forms the subject of the present paper. If the earth were a transparent body, it might perhaps be conceded, in view of the experiments just cited, that the intermolecular ether was at rest in space, notwithstanding the motion of the earth in its orbit ; but we have no right to extend the conclusion from these experiments to opaque bodies. But there can be hardly be question that the ether can and does pass through metals. Lorentz cites the illustration of a metallic barometer tube. When the tube is inclined the ether in the space above the mercury is certainly forced out, for it is incompressible. But again we have no right to assume that it makes this escape with perfect freedom, and if there be any resistance, however slight, we certainly could not assume an opaque body such as the whole earth to offer free passage through its entire mass. But as Lorentz aptly remarks : “quoi qu’il en soit, en fera bien, a mon avis, de ne pas se laisser guider dans une question aussi importante, par de considérations sur le degré de probabilité ou de simplicité de l’une ou de l’autre hypothèse, mais de s’adresser a l’expérience pour apprendre a connaitre l’état, de repos ou de mouvement, dans lequel se trouve l’éther à la surface terrestre*”.

Translation of Lorentz’ remarks in French : “*Whatever the case, one should best, in my mind, not being guided in such an important matter, by reflections on the degree of probability or simplicity of either hypothesis, but by experimental facts in order to determine the characteristics, rest or movement, in which the ether presents itself on the surface of the earth*.” Please note the fact that Lorentz was cited in the paper of MM, thus indicating the importance of Lorentz at that time.

It is thus clear from the preceding text that the “ether” indeed was reflected upon as some kind of fluid (moreover present “in space”) which is influenced (hindered, as if the ether shows some kind of “viscosity”) by material objects. The description “*But there can be hardly the*

question that the ether can and does pass through metals. Lorentz cites the illustration of a metallic barometer tube. When the tube is inclined the ether in the space above the mercury is certainly forced out, for it is incompressible." is extremely striking. There is thus no doubt that the scientific image by Michelson, Morley and Lorentz in the publication is of an "ether in space which can be forced out of the metallic barometer tube"...

Also the flawed indication "*and if there be any resistance, however slight, we certainly could not assume an opaque body such as the whole earth to offer free passage through its entire mass"* points to a certain belief in an ether wind around our planet since the earth "*would not offer a free passage*"... In the context of the contemporary view of atoms: any material object is build from atoms, showing electrons which revolve around the atom nucleus. Electrons are considered to have a completely negligible volume, so the electrons themselves can be regarded, from a geometrical volume point of view, as occupying space to a total negligible extent. Even the atom nucleus, while consisting of neutrons and protons as the nucleons, also occupies (from a geometrical volume point of view) a negligible amount of space. The nucleus radius (in femtometer ; fm) is about equal to the third root of the number of the total number of nucleons. As an example, 56Fe has 56 nucleons and the nucleus radius is then about 5 fm. The atom radius of Fe is however about 150000 fm which is thus a factor 30000 larger than the nucleus diameter, which means that the geometrical volume of the atom is even a factor $(30000)^3$ larger than its nucleus volume! It is thus very obvious that an atom, on a geometric volume basis, in fact is overwhelmingly space.

The image at that time of an "ether" as "*If the earth were a transparent body, it might perhaps be conceded, in view of the experiments just cited, that the intermolecular ether was at rest in space*" and "*and if there be any resistance, however slight, we certainly could not assume an opaque body such as the whole earth to offer free passage through its entire mass"* is from the perspective of the build of an atom not a very scientific one. In fact they made in this way a distinction between the "ether" and "space" as if the "ether" is present in "space". A more consistent image now is that the electrons and nucleons are located in RS (real space) and that a material object which moves through RS (the mercury in the metallic barometer tube, that tube itself or even our planet itself) simply constitutes of the movement of their individual atoms, thus ultimately the electrons and nucleons of each individual atom of the material object through that, from the atoms viewpoint, overwhelming amount/volume of space. It is then completely irrelevant to consider an ether which is "*forced out of a metallic barometer tube"* or an *"intermolecular ether at rest in space*" including the statement *we certainly could not assume an opaque body such as the whole earth to offer free passage through its entire mass*.

The remark of Lorentz at that time "*but by experimental facts in order to determine the characteristics, rest or movement, in which the ether presents itself on the surface of the earth*" is also striking since such implies also the possibility of "an ether in space" (as a "medium" in "space") which thus eventually could manifest itself also as an ether "wind" (caused by the movement of the earth in its orbit around the sun) at the surface of the earth; an ether "wind" which then eventually could hinder the travel of light.

The notion of an “ether” (or ether-wind in space) as some kind of viscous fluidum or medium “in space” which influences the transport of light in space was/is evidently absurd. The null-result of the MM experiment triggered the specific "Lorentz contraction" view by Lorentz (also thereby influencing Einstein). It can however be mentioned that Michelson in fact himself never accepted the null-result and the conclusions. He continued (seemingly in vain) for a very long time to search for a flaw in his experiment. However, a plausible explanation for a flawed MM experiment null-result result was reported in (1,2,3) since with respect to CS paradigms based on light:

- a straightforward laser experiment showed a massive experimental anomaly clearly proving several CS paradigms, based on photon (light) phenomena, to be flawed
- on a theoretical basis also severe anomalies and inconsistencies were demonstrated in the CS paradigms based on photon (light) phenomena, also showing those to be flawed

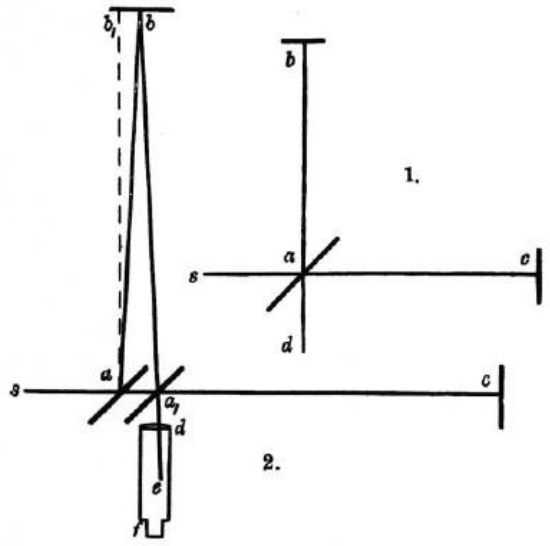

Figure 8.1 MM: copy of their original figure 1 showing part 1 and part 2 (paper 1887)

MM introduced in their paper a (still up to now by CS accepted) two-dimensional “graphical representation” (Figure 8.1 is a copy of the figure part 1 & part 2 in their publication) by which MM modelled their experiment. MM assumed in the upper right part 1 of their original drawing a reference frame "at perfect" rest. Light is modelled by MM as “rays of light”, thus by using simple straight lines to graphically represent such "rays of light".

Therefore two "rays of light" (RayA and RayB) are considered to be "sent" by the source “s” towards point “a” on the 45° inclined mirror (Mirror1). RayA is reflected by Mirror1 towards point “b” of the upper horizontal mirror (Mirror2) and is then reflected back towards point “a” of Mirror1. RayA then travels through Mirror1 towards the point “d” where the detector is situated. RayB travels through Mirror1 in point “a” and travels in the horizontal direction towards point “c” of the mirror on the right (Mirror3). RayB is then reflected by Mirror3 in point “c” and then returns to point “a” of Mirror1. RayB is then reflected in point “a” by Mirror1 downward towards point “d”.

It is trivial that part 1 (upward right part) of the original drawing by MM would be correct if their definition/assumption “at perfect rest” would be totally correct. The latter is important: MM consider in part 1 of their original drawing an experimental set-up which is “at perfect rest in space”. The question then again arises : which “space” do they mean in this case ? What are exactly the definitions by MM of “space” and more specifically "at perfect rest" within part 1 of their original drawing? Both MM definitions regarding part 1 of their drawing indeed need to be confronted with the reality of our planet travelling in RS at already an orbit speed of about 30000 m/sec (108000 km/hour ; 173800 miles/hour) around the sun. That evident reality cannot be denied by any CPBD and thus first as an important remark: a MM experimental set-up in a laboratory on the surface of our planet thus in reality will never be in perfect rest in RS. An "at rest" reference frame that would be linked to a laboratory on the surface of our planet and would be then linked to a situation as depicted in part 1 of Figure 8.1 is merely a virtual/mathematical representation of a situation in a virtual/mathematical space only existing in our mind. Of course the modeling approach based on mathematical reference frames (thus the virtual "space" approach) by the human mind has shown to be very powerful and very useful. Countless mathematical models have been produced by the human mind in order to describe and/or graphically represent/mimic real phenomena. I myself as a user of that useful modeling approach and as an arbitrary example can e.g. refer to some of my own mathematical modeling approaches in other domains (4,5):

References for (4) and (5):

(4) E. Brauns, *Finite elements-based 2D theoretical analysis of the effect of IEX membrane thickness and salt solution residence time on the ion transport within a salinity gradient power reverse electrodialysis half cell pair*, Desalination and Water Treatment, 51 (2013) 6429–6443
https://www.researchgate.net/publication/257414176_Finite_elements-based_2D_theoretical_analysis_of_the_effect_of_IEX_membrane_thickness_and_salt_solution_residence_time_on_the_ion_transport_within_a_salinity_gradient_power_reverse_electrodialysis_hal

(5) E. Brauns, *Critique on the Mercury perihelion "anomaly"*, section 12.9 in (1), p298-322
My extended (notary registered) publication (1) can be downloaded at http://www.absolute-relativity.be

I am also very well aware of the meaning of relativity (and relative velocities and the different types of virtual reference frames (mathematical "space") as invented by the human mind but therefore also only existing in our minds for modeling purposes). I am also even very well aware of the meaning of special relativity and general relativity (including the Minkowski-Einstein space-time concept (x,y,z,t)) but I am at the same time also very well aware of the simple fact that in reality our planet indeed travels at a very high velocity through RS.

In this respect it would be interesting for a CPBD to reconsider in the history of science the very first mathematical approach which was introduced by Descartes when drawing a graph including an abscissa axis (x) and an ordinate axis (y) in order to produce a graphical

representation of mathematical functions of e.g. the type y=f(x) or s=f(t). That approach by Descartes was indeed ingenious. The extension thereafter by adding a third axis (z) to that Cartesian coordinate grid (x,y) concept into a Cartesian coordinates three dimensional mathematical (x,y,z) format was evidently also extremely useful. However, such an artificial three-dimensional geometric construction, only existing in the human's mind, was never intended at any point in the history of science to e.g. "equal" in an one-to-one correlation the single and unique RS existing outside our minds. The three-dimensional (x,y,z) construct (and therefore any kind of virtual and mathematical/model reference frame) is a pure artificial construction of the human mind which is merely intended to be used as a mathematical model/tool. It is simply a fiction to think that a mathematical (x,y,z) "space" or even the Minkowski-Einstein mathematical (x,y,z,t) "space-time" model would show a one-to-one correspondence with RS.

Nevertheless, in my opinion it even seems that a considerable number of CPBDs are locked into a mathematical status in a way that they even consider the CS mathematical space(-time) paradigm approach, as totally representing RS. It thus seems that in the minds of those CPBDs the virtual space(-time) model even has superseded the reality of RS outside their minds. It is therefore important to stress that, when a CPBD would define his/her artificial mathematical reference frame (x,y(,z)) in a laboratory "at rest", such virtual reference frame thus needs, even so, to be considered as also "moving through the RS", as a result of our planet moving at high velocity through RS. An "at rest" claim from a CPBD of such mathematical reference frame (x,y(,z)) within a laboratory on our planet is simply a fiction which nevertheless seems to have evolved in the minds of those CPBDs as (the) "reality". A good example of a fictitious "at rest" approach is the observer on the platform in Einstein's relativity of simultaneity train-and-platform thought experiment. Einstein's thought experiment is flawed in several ways. One of those flaws is the fact that an observer so-called "at rest" on the platform along the train track on the surface of our planet of course in reality would never be really in an "at rest" status in such a situation. An observer on a real platform would travel in reality through RS at a very high velocity as a result of our planet's high orbit velocity in RS around the sun. In this respect details can be found in ((1) ; section 12.6 p288-296) including a model calculation of the thought experiment for a "perfect at rest" situation of an observer in RS in the midpoint of a trajectory AB and an observer moving in a fast space ship along that trajectory AB in RS, thereby showing the multiple flaws in the thought experiment. Reference can also be made to the video - *Einstein's totally flawed "relativity of simultaneity" thought experiment* - at https://www.youtube.com/watch?v=Ex0bATIFg3M which already points to the fact that in Einstein's thought experiment the observer Obs2 in the train carriage will not observe the two light signals in the location M (midpoint between locations A and B on the train track) but in two different locations C and D to the right of M. Notwithstanding the remark above about the observer on a real platform, in that video the hidden assumption was made that Obs1 and the platform are "at rest" in order to focus in a first step on the situation of the travelling Obs2 and to not already complicate things further in the video. Therefore, in the example within section 12.6 of (1) even the problem of having Obs1 in a real at rest status in RS is addressed, as a second step in the analysis.

Also, a CPBD considering (her)(him)self and the experimental set-up in the case of part 1 in Figure 8.1 to be "at rest" in a laboratory, thus when that CPBD considers (her)(him)self not to move through "space" since (s)he and the components within the laboratory are not moving relative to one another, that CPBD is obviously not realistic and thus is making a severely flawed statement with respect to the validity of the representation by MM within part 1 in Figure 8.1. That CPBD must realize that her/his statement "*all is at rest in the laboratory*" is a theoretical statement and only existing in her/his mind. That statement only supports her/his mind in coping in a virtual way with the (graphical) description/modelling of the situation in the laboratory, but in fact not conform to the reality of our planet's high velocity in RS.

Such CPBD must also realize that if (s)he would insist on stating that:

> a) (s)he and the set-up within the laboratory is not moving in “space” (as a basis of the MM part 1 graphical representation in Figure 8.1)
>
> b) (s)he at the same time would accept the fact that the earth is moving at 30000 m/sec through "space"

(s)he then also must admit that both combined statements are in conflict with logic and thus basically are an irrational combination. Since there can be only one single valid rational, that CPBD will obviously need to conclude that the only truth is that the laboratory indeed travels in RS at high velocity from the trivial reality that our planet itself is moving at high velocity through RS. But then those CPBDs still will be triggered to start turning in never ending circles within their paradigms while invoking their notions of e.g. relativity (relative position and relative velocities in "space") without noticing these are only existing in their minds, thus virtual and only to be used as handy descriptive mathematical tools. Such notions however can lead to flawed CS paradigms as discussed and demonstrated in (1,2,3). Moreover, the laser experiment discussed in (1,2,3) indeed proved that the laser set-up in the laboratory is not at all "at rest" in RS!

MM's part 1 in Figure 8.1 was thus intended by MM to represent the trajectories of RayA and RayB in a frame at perfect rest. MM were not aware of the existence of photons at that time. When switching their "ray of light model" into a model based on photons (photons travelling in RS) it is possible to represent the trajectory of a photon in a graphical (x,y) representation (mathematical model) of the type such as in part 1 in Figure 8.1. Assuming therefore indeed an MM experimental set-up and an observer Obs1 at perfect rest in RS, then the representation within MM's part 1 in Figure 8.1 cannot be questioned. In this very special case of a real "perfect at rest" situation in RS it would be correct to state that there would indeed be a one-to-one link between the real photon phenomena in the RS and the virtual representation in MM's part 1 of Figure 8.1. In that extra-ordinary specific case of "at perfect rest" MM's part 1 of Figure 8.1 would be valid. But the MM experimental set-up then certainly should not be considered to be present in a laboratory on the surface of our planet as a result of the reality of our planet travelling in RS, thus not being at perfect rest.

In part 2 of Figure 8.1 MM made an attempt to graphically represent in one single figure the time sequence situations (t_0, t_1, t_2, …) as seen by the observer Obs1 at perfect rest when the set-up is moving at a specific velocity through RS in order to depict the behaviour of RayA and RayB. Indeed, the representation should be conform to what Obs1 observes since MM have e.g. drawn two successive positions of Mirror1, including the intermediate position of Mirror2. By drawing these successive positions, the only possibility is that the schematic representation in MM's part 2 of Figure 8.1 is drawn by them to correspond to the observations by Obs1 at perfect rest. However, no further precise indications are given with respect to the classic position-in-time approach in CS. There is in fact no full representation nor time analysis of the :

- departure of light (photon) from the source at t_0 and the position of the complete set-up at time t_1 of arrival of the light (photon) at Mirror1
- position of the complete set-up and the point of arrival of light (photon) at Mirror2 at time t_2
- position of the complete set-up and the point of arrival of light (photon) at Mirror3 at time t_3
- position of the complete set-up and the point of arrival of light (photon) at Mirror1 at time t_4
- position of the complete set-up and the point of arrival of light (photon) at the detector at time t_5

In the schematic graphical representation in MM's part 2 of Figure 8.1, there is thus a mix-up of those time sequences and positions of the set-up and the light (photon) events. The modeling is on the basis of simple “rays of light”. It will be moreover demonstrated in this publication that the modelling by MM is flawed. By introducing photons in the modeling a more consistent representation is possible, in the end resulting in the conclusion that the MM experiment null-result paradigm is flawed.

2.2. The flaws in the Michelson and Morley "model"

It was already demonstrated in (1,2,3) that CS claims an extraordinary and extremely peculiar direction selective velocity inheritance principle with respect to the description/modelling of a photon's movement/trajectory in space when such photon is launched from a light/laser source (or while being reflected upward by the 45° inclined Mirrror1 in the case of the MM experiment). In the discussions within (1,2) the examples within the CS based figures MWF24, MWF25, MWF26 and MWF27 are very illustrative about the, by CS claimed, direction selective velocity inheritance principle. Direction selective since CS claims that only the light source's velocity vector component perpendicular to the light's travelling direction is inherited. From the findings within (1,2,3) it must then be very clear that such principle within CS must be totally flawed as a consequence of the multiple inconsistencies/anomalies resulting from that principle. Moreover, the straightforward laser experiment discussed within (1,2,3) proves experimentally that this CS principle is flawed. Since the CS supported direction selective velocity inheritance paradigm was also applied within the MM modelling in part 2 of Figure 8.1 that means that MM applied a wrong graphical representation of the

light/photon phenomena. Indeed, the image part of RayA is drawn from point "a" of Mirror1 at time "t_1" to the midpoint "b" of Mirror2 "at time t_2", thus under a slope angle larger than 90° according to MM's part 2 of Figure 8.1. MM (/CS) thus state that such should be the observation made by Obs1 and that Obs1 will not observe RayA to arrive in location b_1.

In addition and moreover, from that very same CS inheritance paradigm the following then also should be true according to the CS views.

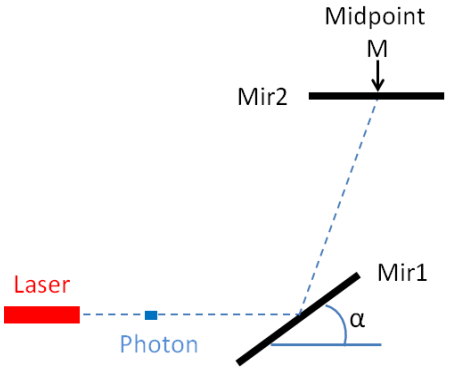

Figure A The reflection by a mirror Mir1 which shows an inclination angle α

Consider a set-up with a laser in Figure A which fires a photon Phot1 towards the inclined mirror Mir1. The inclination angle of Mir1 is α ; α can be of any value (thus α is not 45°). In the set-up there is a second mirror Mir2 which is perfectly horizontal. The set-up is assumed to be in perfect rest (the same assumption as made by MM within part 1 of Figure 8.1). Mir2 is located in a tuned position (the tuning is corresponding to the value of α) in the set-up in a way that the launched Phot1 will precisely hit the midpoint M of Mir2 after its reflection at Mir1.

Consider now the case that the complete set-up (after the tuning of the position of Mir2 with respect to the value of α, during an at-perfect-rest status of the set-up) will move at a horizontal velocity v_x. The laser, Mir1 and Mir2 thus move all at the same horizontal velocity v_x. Another photon Phot2 is then launched in the horizontal direction by the laser. CS and all CPBDs will claim in the very same way as in the case for part 2 in Figure 8.1 that Phot2 will inherit v_x from Mir1 in order to still precisely hit Mir2 in its midpoint M. Since, if this would not be the case then CS would have an enormous problem with their paradigms about light. Indeed, if Phot2 would not hit the midpoint M of Mir2 but would hit another point P at Mir2 then the location shift MP from point M to point P could be registered [$MP=f(v_x)$]and used as a measure for the **real** velocity (RV) v_x (in that respect: see my suggested concept of a RV measuring device which is described in detail in my patent text, also in (1) and also at my website). Thus, in the case that CS and all the CPBSs indeed keep claiming that Phot2 must inherit the velocity v_x in order to still arrive at the midpoint M of Mir2 then the conclusion must also be very clear that CS thus claims that the inheritance principle of v_x by a photon being reflected by a mirror of type Mir1 is valid for any value of v_x but moreover also valid for any value of the inclination angle α in Figure A. What must then be the conclusion for the limit $\alpha \rightarrow 0°$ or for the limit $\alpha \rightarrow 90°$? Correct...! CS and all CPBDs thus face, next to the

already demonstrated inconsistencies and anomalies in (1,2,3), another additional inconsistency within their paradigms based on light. I consider the CS claim of the photon to always hit the midpoint of Mirror2 (Figure 8.1) or to always hit the midpoint of Mir2 (Figure A) merely based on an "expectation pattern within the human mind". Since the expectation pattern by the CPBDs is that Obs2 who is travelling along with the set-up should observe Phot2 to always hit the midpoint of Mirror2 (or Mir2). In the book by Thomas Kuhn about the history of science numerous examples are presented about flawed views in science being caused by flawed "expectation patterns" in the human mind.

As a result, the challenge remains for the CPBDs to:

a) prove on the basis of photons the correctness of the graphical model within MM's part 2 of Figure 8.1 as representative for the MM set-up which is illustrated in Figure 8.6, thereby showing moreover multiple (!) mirrors of type Mirror2 and Mirror3. Those mirrors were individually at different inclinations to create a sufficient path length in the MM set-up, geometrically restricted in size. See further the eventual additional amplification effect of those inclinations with respect to an erroneous measurement.

b) fully counter the theoretical inconsistencies/anomalies/falsifications within (1,2,3) from the CS inheritance principle, on the basis of photons

c) fully counter the experimental anomaly as proven by a laser experiment (also explained in (1,2,3) and of which the result is shown in MWF2.

d) additionally prove that the inheritance principle of v_x by a photon being reflected by a mirror of type Mir1 in Figure A is valid for any value of v_x but moreover also valid for any value of the inclination angle α in Figure A. Thus not only for the 45° inclined Mirror1 in part 2 of Figure 8.1. This is even an additional question to be answered by the CPBDs.

e) show, in all of this, a proof through a photon based model which demonstrates the validity of the peculiar direction selective CS velocity inheritance

CPBDs cannot refuse a modeling based on photons since CS accepts the notion of photons. CS even claims to be able to produce in a controlled way single photons (as published in Nature).

Note : it should be stressed that the laser experiment linked to MWF2 is extremely straightforward (moreover a significant signal of the order of 1 mm for a distance of 10 m) and can easily replace as an alternative experiment the complicated MM set-up concept. The laser experiment shows that an observer Obs2 in the laboratory (thus travelling along with the set-up through RS) does not observe during the 24 h duration of the experiment a fixed and non-moving laser dot at the measuring grid but indeed a moving laser dot, thereby contradicting CS paradigms which claim that such is impossible.

If a CPBD would still insist and accept the CS principle of the:

- "ab" trajectory of light as depicted by MM's in their part 2 of Figure 8.1
- slope larger than 90° to be observed by Obs1

then the CPBD thus should also be able to answer without problems the straightforward and very clear questions raised in (1,2,3) and above on the mechanism of the peculiar direction selective velocity inheritance principle in the case of photons. Up to now however no CPBD did or could answer those questions nor the inconsistencies and anomalies explained in (1,2,3). Those questions remained open, now already for many years ((1), section 13). Nor did any CBPD re-perform in the mean time the straightforward type of laser experiment discussed in the indicated patent text (first report on the matter), the website, (1) and (3).

2.3. Switching to the use of photons in a simulation model for the MM experiment

It is thus clearly essential to switch in the analysis of the MM experiment towards the photon characteristics of light and to totally abandon the "ray of light" (as simple straight lines) type of representation of the light phenomena. While thus continuing with the MM experiment and producing an analysis on the basis of photons: it is very obvious that the starting point “a” of the line, “representing” RayA, needs to represent a photon which was just reflected by Mirror1 at time t_1 in order to travel towards Mirror2. It is also very obvious that the ending point “b” of the line needs to represent a photon which was reflected at time t_1 by Mirror1 and which arrives at time $t_2 > t_1$ at Mirror2. Is this reasoning by MM (thus CS) then correct ? Does a photon, being reflected at time t_1 by Mirror1 indeed arrive in "b" at time t_2 ?

From my concerns at that time (2005) about the graphical representation by MM in part 2 within Figure 8.1 and about the reflection and inheritance situation in point "a" at the 45° inclined Mirror1 I started to compare such situation with an alternative set-up where a laser is launching a photon in a perfect direction y from the position x=0 (thus in a direction fully perpendicular to x). If the laser would be at perfect rest in RS, then the photon will travel perfectly along the line y (axis y "at perfect rest") and will stay locked at the horizontal position x=0 (axis x "at perfect rest"). However and at that time, in the case of the very same laser being mounted perpendicular to x while moving sideways along the direction of x and while launching a photon precisely at position x=0 I challenged the CS view about the trajectory of the photon: according to my view the photon would still travel perfectly in the direction of y while still being locked for its horizontal abscissa position x=0 whereas the (material) laser will change its position “x” along the abscissa. That view evidently conflicted with the very peculiar CS inheritance principle but the latter is shown in the mean time in (1,2,3) to be indeed inconsistent and to result in severe paradigm anomalies.

Moreover, several people (university degree) who I first explained my views and then asked specifically for their opinion, totally agreed with my views. They thus also fully agreed with my view that a velocity inheritance principle is only valid for materials objects. It is indeed classic knowledge in physics that a material object A being launched from a moving material object B will evidently take over, in addition, the full velocity vector of object B. The launching velocity vector of object A therefore needs to be added to the velocity vector of object B in a way that the resulting velocity vector of the material object A is the sum of both velocity vectors. In the case of material objects there is however certainly no direction selective velocity inheritance mechanism between object A and object B. In the case of a

photon (which has no mass and cannot be compared with a material object) that photon shows an immediate launching velocity in RS of about 300 000 000 meters per second in its direction of travel. It is trivial that the extremely high "launching" velocity of the photon certainly has nothing to do at all with the velocity vector of the material source of the photon. All persons who I explained and presented my views also agreed that the by CS defended extremely peculiar principle of the direction selective velocity inheritance in the case of a photon is a flawed CS principle. They all supported my view that a photon (a non-material object) is not inheriting at all any mechanical velocity vector component in whatever direction from the source (a material object).

Nevertheless CPBDs and CS for the moment (2017) still continue to claim (1,2,3) (MWF24, MWF25, MWF26, MWF27) that the photon will not be locked to x=0 for its abscissa location but will show at any time instance the very same x-value as the moving laser, simply being based on the CS inheritance principle of the horizontal velocity v_x of the laser during the launching of the photon in the y-direction. As already indicated and again, CS nor the CPBDs could present up to now a fundamental and quantitative answer about the mechanism how that peculiar direction selective inheritance by the photon of the horizontal velocity v_x of the laser functions, at the moment that the laser launches the photon. From a phenomenon point of view: a photon can e.g. be created at the moment that an electron jumps from a higher energy level (electron orbit) within an atom to a lower energy level. Please note that during such electron energy level jump the photon is launched in RS instantly at the speed of light, which is about 300000000 meters per second! CS and CPBDs are thus again challenged to prove, on the basis of the photon (quantum) approach, the phenomenological principles of their extremely peculiar direction selective inheriting principle of the horizontal v_x velocity component of the source by the photon...

2.4. A mathematical simulation and calculation of the MM experiment on the basis of photons

A mathematical simulation based on photons of the MM experiment is presented, while using TK-Solver as a mathematical solver software in order to calculate the location versus time of the photons in the case of the invalidity of the CS inheritance principle. The result of such simulation then also directly points to a extremely plausible explanation of the so-called null-result of the MM experiment.

A specific set-up as illustrated in Figure 8.3 is introduced, as well as two photons. Consider now first the set-up within Figure 8.3 to be at perfect rest (corresponding to the very same "at perfect rest" approach as used by MM in part 1 of Figure 8.1 representing their experiment). An observer Obs1 is also at perfect rest in the reference frame (x,y) at perfect rest (see again the MM paper with respect to their “at rest” description). There is one inclined (45°) semi-transparent splitting mirror (Mirror 1), one upper mirror (Mirror 2) and one mirror at the right (Mirror 3). The source which sends the photons to Mirror1 is here arbitrarily at 2 m, left from Mirror1 and the detector is here arbitrarily at 2 m below Mirror1. The horizontal direction corresponds to the abscissa (x-) direction while the vertical direction corresponds to the ordinate (y-) direction. The situation which is depicted in Figure 8.3 is for a set-up at perfect

rest as seen by an observer in perfect rest. The trajectories of two photons (called PhotonA and PhotonB here) are shown:

- PhotonA and PhotonB are emitted by the source (extreme left) and both travel horizontally towards Mirror1
- When arriving at Mirror1, PhotonA is reflected upward by Mirror1, then arrives at Mirror2 whereafter PhotonA is reflected downward to Mirror1. PhotonA then travels through Mirror1 and arrives at the detector
- PhotonB travels through the Mirror1 towards Mirror3, is reflected by Mirror3 towards Mirror1, arrives at Mirror1 and is reflected downwards to the detector

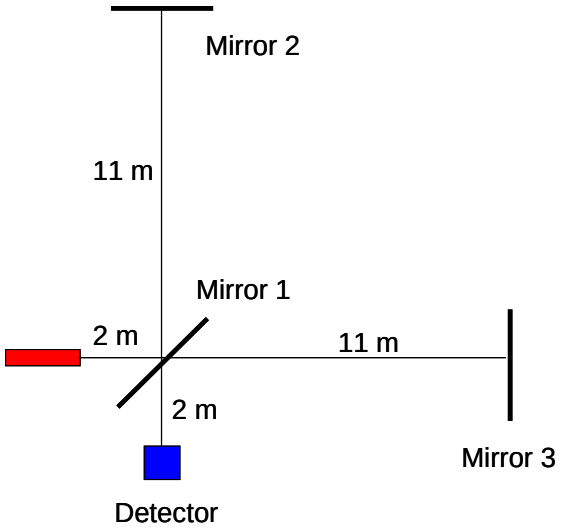

Figure 8.3 Specific set-up

In this case at perfect rest it is trivial that PhotonA and PhotonB arrive at the same moment at the location of the detector.

However, consider now the case that the set-up within Figure 8.3 is not at rest and has a velocity in the x-direction. The MM representation in part 2 of Figure 8.1 is based on the observation of the observer Obs1 at rest, as already explained. When introducing in the same way the observer Obs1 at rest in Figure 8.3 the photon phenomena, as observed by Obs1, can be simulated in the solver software. For the set-up which travels at a specific horizontal velocity, such simulation calculates the travelling sequence of two photons which depart at t_0 from the source in the horizontal direction towards Mirror1. A "location in time" analysis of the travelling of the two photons, can be performed.

So, first for the observation by Obs1 of PhotonA :

- t_0 : PhotonA departs towards Mirror1
- t_1 : PhotonA arrives at the inclined Mirror1
- as supported by the result of the laser experiment (1,3 and MWF2): PhotonA does not inherit the horizontal velocity of Mirror1 and is still reflected upwards in a perfectly vertical direction (yObs1 direction) by Mirror1 and travels to the moving Mirror2

- t_2 : PhotonA is reflected by Mirror2 downward in a perfectly vertical direction (yObs1 direction) and travels downward in a perfectly vertical direction back to Mirror1.
- PhotonA travels further through Mirror1 downward in a perfectly vertical direction
- t_5 : PhotonA arrives at some specific point at the moving detector position

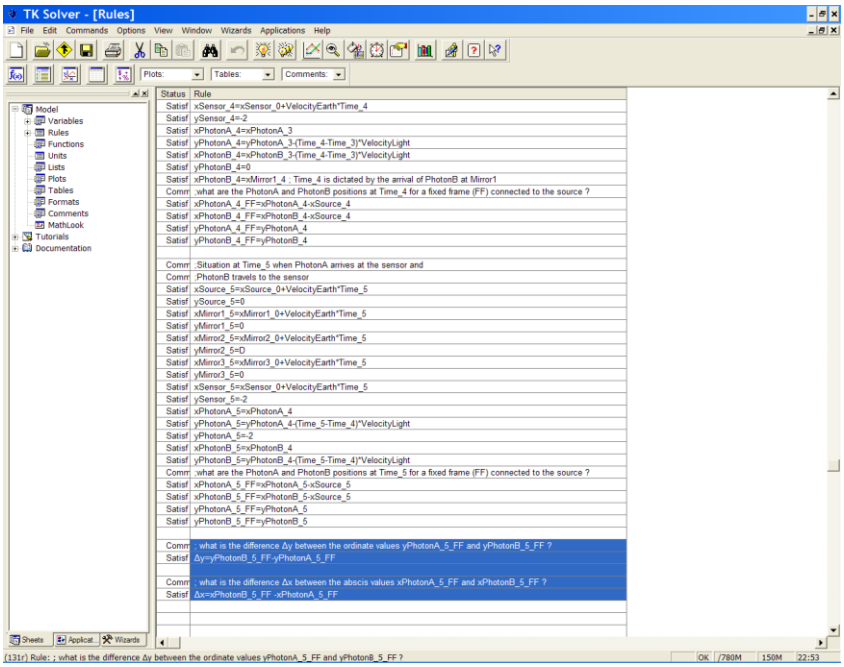

Figure 8.4a Example of some simulation equations within TK-Solver

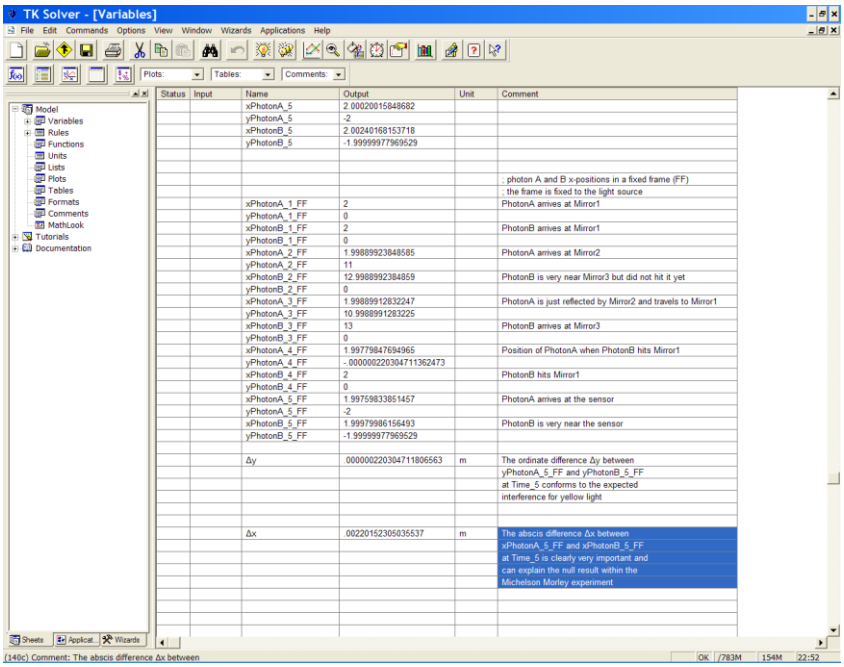

Figure 8.4b Example of some of the simulation results within TK-Solver

So, secondly for the observation by Obs1 (Obs1 is at rest) of PhotonB:

- t_0 : PhotonB departs towards Mirror1
- t_1 : PhotonB arrives at the inclined Mirror1
- PhotonB travels through the moving Mirror1
- PhotonB travels to the moving Mirror3
- t_3 : PhotonB is reflected by Mirror3 and travels back to Mirror1
- t_4 : PhotonB is reflected downward in a perfectly vertical direction (yObs1 direction) by Mirror 1 towards the moving detector

Figure 8.4a and Figure 8.4b show the implementation of the simulation within TK-Solver. Figure 8.4a shows the dialog window "Rules" where the model equations can be written. Figure 8.4b shows the "Variables" window where the simulation results are displayed by TK-Solver (input and output parameter values). The model equations are straightforward and the simulation results are shown in Table 8.1 (at the end of this publication). The set-up velocity of 30000 m/sec was introduced, as to simulate the effect of the earth's orbit velocity in space.

The codes are explained here by example :

- xMirror1_1 and yMirror1_1 respectively indicate the abscissa (x) value and the ordinate (y) value of the position of Mirror1 at time t_1, within the frame at rest, as observed by Obs1
- xPhotonB_2_FF and yPhotonB_2_FF respectively indicate the abscissa (x_FF) value and the ordinate (y_FF) value of the position of the laser pulse PhotonB at time t_2 within the frame (FF) linked to the moving set-up ; thus as perceived by Obs2 who travels along with the set-up.

The simulation clearly shows the difference in the observations between Obs1 and Obs2. The difference between the ordinates of both laser pulses at time t_5 (time of arrival of PhotonA at the detector) is 220 nanometer which indeed is 40 % of a fringe of yellow light (being used by MM, as reported in the literature). However, what is of extreme importance, is that the simulation clearly shows that the difference between the abscissa values as observed by Obs2 in her/his reference frame FF (FF is the reference frame linked to the moving set-up and Obs2 moving along with the set-up), is then an impressive 2.2 mm! This is clearly a first indication of a plausible explanation of the null-result obtained in the MM experiment. The simulation indicates that both signals did not arrive at the same location at the detector, thus questioning the observation of sufficient interference by MM after turning their set-up in the second step of the experiment (in that second step there was evidently no calibration since the calibration has to be done by MM in the first step of the experiment before turning their set-up in the second step). Please note that in the literature it was mentioned that there was indeed interference detected in the MM experiment, according to the expected trend but too faint (Figure B = Figure 6 in the MM paper at page 340). So it was also surely no full "null-result".

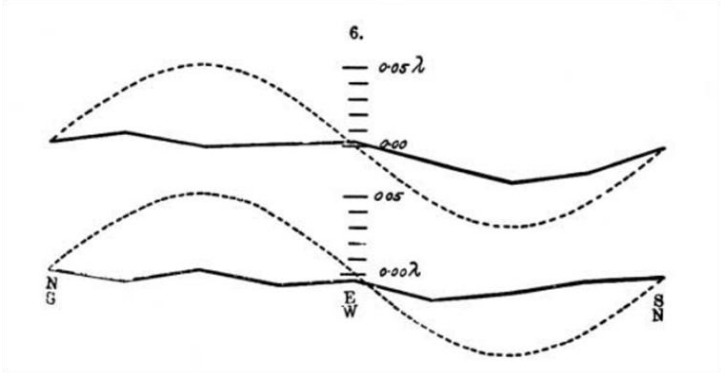

Figure B Copy of Figure 6 in the MM publication at page 340

A first plausible reason for the interference being too faint is the effect of the 2.2 mm lateral difference in location of arrival at the detector of both signals. That effect is already a very significant parameter but moreover there is a second plausible reason which could have triggered an important amplifying effect of the lateral shift of the signal and which could well have totally ruined MM's experiment. With respect to this very important remark, the practical set-up of MM is depicted in more detail in Figure 8.6 (as originally presented in their paper). The ideal situation of only three mirrors as depicted in Figure 8.1 was not present in the actual MM set-up: Figure 8.6 clearly shows the multiple mirrors at the corners of the set-up which were needed by MM in order to obtain a sufficient value regarding the path length of their “rays of light”. It is obvious that those multiple mirrors needed to be inclined to one another (!) in order to reflect the light from one end to the other of the set-up forth and back, multiple times through the set of mirrors. These mirrors were tuned once at the overall "starting angle" of 0° of the complete set-up whereafter the complete set-up (large granite stone while floating in mercury) was rotated by 90° in order to put somehow the system "perpendicular" from "parallel" to the direction of movement of the earth through space, in its orbit around the sun.

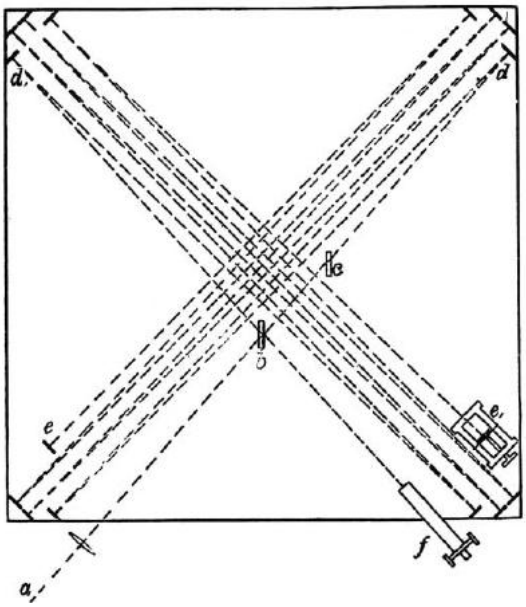

Figure 8.6 Experimental set-up of MM

The difference of about 2 mm, as calculated in the simulation for a perfect set-up of only three mirrors (as depicted in Figure 8.1), could well have got additionally out of control in the case of the set-up as depicted in Figure 8.6 from the amplification effect by the multiple mirrors at the corners of the set-up, being inclined to one another. Whatever the small value of the mutual inclination of those mirrors (situated in the corners), the rotation of the set-up over 90° by MM (of course without further touching of the complete set-up at the "starting angle" of 0°, mirrors were only tuned in that starting angle situation of the complete set-up), in combination with the difference effect of about 2 mm at that 90° rotation position could have ruined the original alignment/tuning of the set of mirrors. The combination of both effects could well have been the cause of a mismatch of "RayA" and "RayB" with respect to a sufficient detection of the inference signal at the detector. Probably even the 2 mm difference alone could have caused such a mismatch and thus caused the so-called null-result; but certainly a strong additional "RayA" signal run-away, resulting from the additional amplification (accumulations) of the mismatch from the inclination of the multiple mirrors during the rotation over 90° of the set-up. The signal obtained by MM was as expected (thus not a complete null-result) but too faint when compared to the expected signal amplitude. These aspects evidently need a thorough re-investigation, which was still not done up to now after many years, even not as a result from the website information at www.absolute-relativity.be or from (1). I challenge thus again CS and all CPBDs to have a detailed look at this all.

3. Conclusions

In this publication the Michelson and Morley (MM) experimental null-result paradigm is shown to be flawed. Contemporary science (CS) should therefore urgently reconsider and re-evaluate the MM experiment. However, an alternative straightforward laser experiment was suggested and performed many years ago but still not re-performed by CS up to now. A confirmation of the result of such type of laser experiment (result shown in MWF2) will eradicate multiple and specific CS paradigms based on light.

Table 8.1 Simulation results

Input	Name	Output	Comment
30000	VelocityEarth		Velocity of earth (m/sec)
299792458	VelocityLight		Velocity of light (m/sec)
11	D		Michelson&Morley's "D" (= ab) or ac)
			Situation at time Time_0
	xSource_0	0	
	ySource_0	0	
	xMirror1_0	2	
	yMirror1_0	0	
	xMirror2_0	2	
	yMirror2_0	11	
	xMirror3_0	13	
	yMirror3_0	0	
	xSensor_0	2	
	ySensor_0	-2	
	xPhotonA_0	0	
	yPhotonA_0	0	
	xPhotonB_0	0	
	yPhotonB_0	0	
			Situation at time Time_1
			Photons A,B arrive at Mirror1
	Time_1	6.67194956080858E-9	Guess needed ; exact 6.671949560808578E-9
	xSource_1	.000200158486824257	
	ySource_1	0	
	xMirror1_1	2.00020015848682	
	yMirror1_1	0	
	xMirror2_1	2.00020015848682	
	yMirror2_1	11	
	xMirror3_1	13.0002001584868	
	yMirror3_1	0	
	xSensor_1	2.00020015848682	
	ySensor_1	-2	
	xPhotonA_1	2.00020015848683	
	yPhotonA_1	0	
	xPhotonB_1	2.00020015848683	
	yPhotonB_1	0	
			Situation at time Time_2
			Photon A arrives at Mirror2
			Photon B travels to Mirror3
	Time_2	4.33640000326053E-8	
	xSource_2	.00130092000097816	
	ySource_2	0	
	xMirror1_2	2.00130092000098	
	yMirror1_2	0	
	xMirror2_2	2.00130092000098	

	yMirror2_2	11	
	xMirror3_2	13.001300920001	Mirror3 is still further than PhotonB
	yMirror3_2	0	
	xSensor_2	2.00130092000098	
	ySensor_2	-2	
	xPhotonA_2	2.00020015848683	
	yPhotonA_2	11	PhotonA has arrived at Mirror2
	xPhotonB_2	13.0002001584868	PhotonB has not arrived yet at Mirror3
	yPhotonB_2	0	
			Situation at time Time_3 only a fraction later than Time_2
			Photon A has just departed from Mirror2 towards Mirror1
			Photon B arrives at Mirror3
	Time_3	4.33676721452558E-8	Guess needed ; exact 4.336767214525576E-8
	xSource_3	.00130103016435767	
	ySource_3	0	
	xMirror1_3	2.00130103016436	
	yMirror1_3	0	
	xMirror2_3	2.00130103016436	
	yMirror2_3	11	
	xMirror3_3	13.0013010301644	Position of Mirror 3
	yMirror3_3	0	
	xSensor_3	2.00130103016436	
	ySensor_3	-2	
	xPhotonA_3	2.00020015848683	
	yPhotonA_3	10.9988991283225	
	xPhotonB_3	13.0013010301644	PhotonB arrives at Mirror3
	yPhotonB_3	0	
			Situation at Time4 when
			PhotonA is travelling through Mirror1
			and PhotonB hits Mirror1
	Time_4	8.00560512392595E-8	Guess needed ; exact 8.005605123925945E-8
	xSource_4	.00240168153717778	
	ySource_4	0	
	xMirror1_4	2.00240168153718	Position of Mirror1
	yMirror1_4	0	
	xMirror2_4	2.00240168153718	
	yMirror2_4	11	
	xMirror3_4	13.0024016815372	
	yMirror3_4	0	
	xSensor_4	2.00240168153718	
	ySensor_4	-2	
	xPhotonA_4	2.00020015848683	
	yPhotonA_4	-.000000220304711362473	PhotonA just went through Mirror1
	xPhotonB_4	2.00240168153718	PhotonB hits Mirror1

	yPhotonB_4	0	
			Situation at Time5 when
			PhotonA is arriving at the sensor
			and PhotonB travels to the sensor
	Time_5	8.67273324083651E-8	Guess needed ; exact 8.672733240836507E-8
	xSource_5	.00260181997225095	
	ySource_5	0	
	xMirror1_5	2.00260181997225	
	yMirror1_5	0	
	xMirror2_5	2.00260181997225	
	yMirror2_5	11	
	xMirror3_5	13.0026018199723	
	yMirror3_5	0	
	xSensor_5	2.00260181997225	
	ySensor_5	-2	
	xPhotonA_5	2.00020015848683	
	yPhotonA_5	-2	
	xPhotonB_5	2.00240168153718	
	yPhotonB_5	-1.99999977969529	
			; photon A and B x-positions in a fixed frame (FF)
			; the frame is fixed to the light source
	xPhotonA_1_FF	2	PhotonA arrives at Mirror1
	yPhotonA_1_FF	0	Time_1=6.671949560809E-9
	xPhotonB_1_FF	2	PhotonB arrives at Mirror1
	yPhotonB_1_FF	0	
	xPhotonA_2_FF	1.99889923848585	PhotonA arrives at Mirror2
	yPhotonA_2_FF	11	Time_2=4.33640000326E-8
	xPhotonB_2_FF	12.9988992384859	PhotonB is very near Mirror3 but did not hit it yet
	yPhotonB_2_FF	0	
	xPhotonA_3_FF	1.99889912832247	PhotonA is just reflected by Mirror2 and travels to Mirror1
	yPhotonA_3_FF	10.9988991283225	
	xPhotonB_3_FF	13	PhotonB arrives at Mirror3
	yPhotonB_3_FF	0	Time_3=4.336767214526E-8
	xPhotonA_4_FF	1.99779847694965	Position of PhotonA when PhotonB hits Mirror1
	yPhotonA_4_FF	-.000000220304711362473	
	xPhotonB_4_FF	2	PhotonB hits Mirror1
	yPhotonB_4_FF	0	Time_4=8.00560512393E-8
	xPhotonA_5_FF	1.99759833851457	PhotonA arrives at the sensor
	yPhotonA_5_FF	-2	Time_5=8.67273324084E-8
	xPhotonB_5_FF	1.99979986156493	PhotonB is very near the sensor
	yPhotonB_5_FF	-1.99999977969529	

	Δy	.000000220304711806563	The ordinate difference Δy between
			yPhotonA_5_FF and yPhotonB_5_FF
			at Time_5 conforms to the expected
			interference for yellow light
	Δx	.00220152305035137	**The abscis difference Δx between**
			xPhotonA_5_FF and xPhotonB_5_FF
			It is 2 mm which can definitely be measured