The MM Theory - The Theory of Everything
Part (1)
Fundamentals

(V3)

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Summary: This paper briefly explains some physics phenomena, including motion, thermal wave, electricity, magnetism, radio wave, bending of light near massive objects, redshift and blueshift, dark matter, and presenting a novel vision of the universe while answering one of the most mysterious questions of all time, "what is light?"

Abstract

The nature of matter and the universe and their behaviors have been discussed for many years, and based on these discussions, many unanswered questions have been arisen. The current scientific theory holds that light has a dual wave-particle nature, and its speed is limited to a constant, c. There are two contradictory views of behavior of light - and separately, neither of these views thoroughly explains the phenomena of light. In this paper, a new particle called "M Particle" is presented. Based on this theory and an experiment conducted by the author, in this part, brief explanations for a number of phenomena, including motion, light, thermal wave, electricity, magnetism, radio wave, bending of light near massive objects, redshift and blueshift, photoelectric effect, and dark matter are presented. It is concluded that the laws of motion need to be defined based on the concept of the motion of momentum and not in reference to the motion of an object as Newton defined. In addition, it also concluded that light is a wave of motion of momenta which are conveyed by an ensemble of M particles that acts harmonically and propagates throughout space. Light waves are longitudinal waves similar to sound waves. Furthermore, the experimental results indicate that the speed of light, c, is not constant. Thus, the theories of Special and General relativity are denied.

Keywords

Theory of Everything, M particle, MM Theory, Motion, Light, Radio waves, Redshift, Bending of light, Electricity, Magnetism, Heat, Dark matter, Universe, Astronomy, Cosmology

Preface

In the context of this article and for the purposes of this study, certain concepts from classical and modern physics listed here are foremost excluded, while mathematics and selective other theories are acknowledged and accepted. To allow for a novel vision of understanding of nature and for new concepts to take form, the excluded physics theories are not to be considered as given facts or accepted ideas for evaluating this paper (as per the times circa Copernicus, Kepler, and Galileo). Historically, Nicolaus Copernicus, Johannes Kepler, Galileo Galilei all faced hardship in publishing their ideas due to considerable backlash against commonly perceived ideas and beliefs at the time [1, 2, 3, 4]. Similarly, this article unveils new concepts and ideas that may seem against commonly held theories about physics. As such, this article appeals to an open-mindedness about considering new ideas and logically evaluating and applying them to form a new theory. The excluded physics ideas, concepts, and theories are listed as such: multi-dimensions above 3D space, wave-particle duality of light, light as transverse waves, special and general relativity, magnetic and electric charges of particles, and all common fields including magnetic, electric, and gravitational fields. Above all, the idea of any field in physics is refuted as an intangible, ghostly manifestation commonly referred to as "action at a distance." The development of the concept of a field in physics was historically a direct result of the failure to explain certain phenomena. However, this article will introduce the initial fundamentals for MM theory in physics and find the basis to explain in detail these ideas and observations in modern physics in this and future publications. This theory is fundamentally based on a deep analysis of the motions of objects and mechanical concepts.

1. Introduction

"M Particle" and the Basic Fundamental of the "MM Theory":

M Particles fill all of the space and universe, including vacuum. The only exceptions are specific regions of space in the universe. The M particles have mass, shape, angular momentum, and may also possess, gain, or lose linear momentum. The particles do not possess magnetic poles or electrical charges. Classical interpretations of magnetic poles and electric charges are abandoned for M particles and there is no friction in-between them. These particles are continually spinning, jiggling, bouncing, turning, and twisting about one another. They can move about one another, and they can each have vibrations.

It should be noted here that the "vibration" of particles, meaning "inter-particle vibration" of M particles, refers to the multi-dimensional movement of M particles from a given point of reference, and where this does not mean there are any internal particle vibrations.

Based on mechanical concepts, the particles act and react to one another through vibrations and collisions – in a mechanism called "M interactions." The "M interactions" can change the quantities and directions of linear momentums of M particles as well as their angular momentums.

M interactions can be categorized into two types: linear motion interactions and angular motion interactions. In regards to linear motion interactions, these are simply defined as collisions resulting from the impacts of M particles via their linear momentums. A brief explanation and analysis of linear motion interactions of M particles is presented in Section (2). Additionally, it is important to note that linear motions and angular motions interactions of M particles can be interrelated and affect the quantities and directions of one another. In short, the linear motions and vibrations cause the particles to collide with each other. When an initial M particle with linear momentum impacts another particle (via collision), this will always affect the linear momentums of both and also cause torques on both particles, consequently changing the quantity and direction of their angular momentums as well. A future article will present a detailed explanation of this mechanism of linear momentum interaction and how it can affect the angular momentums of M particles.

M particles behave only in a repulsive manner and it occurs where the particles are spinning to any degree of opposing directions and the particles are in contact with each other. When these conditions are met, this repulsive action occurs because there are mechanical interactions in the particles' angular momentums. When two M particles spin to any degree opposite to one another and come into contact, the resulting interaction causes repulsion. If, on the other hand, M particles' angular momentums are in the same direction, in this situation, the particles will not be repulsively interacting and this does not cause any repulsive action. Repulsion here then is the repulsing of the particles from one another through the mechanical interactions of linear and angular momentums. The detailed mechanisms for these collisions and their angular momentum interactions will be described in a separate future article.

Now based on the above brief explanations of the fundamentals of M interactions, one can begin analyzing an ensemble of these particles together in a given space. The M particles can have angular momentums in any direction. As the M particles are continually colliding to each other via a high degree of vibrations, they can, in effect, be considered to be on average uniformly spaced from one another in any given region. These vibrations originate from the nuclear vibrations of particles inside atoms. The nuclear particles are highly excited particles that mechanically impact M particles at the surface of atoms. As such, M particles are continuously in collision through these impacts of nuclear particles.

To clarify how M particles behave in a given space under such conditions, a given packed box filled with

M particles is considered. It can be imagined in such a scenario that, on average, the particles will collide with each other so much so that they re-arrange themselves to have the least amount of repulsive interaction. To do so, M particles will thus re-arrange themselves as much as possible such that their angular momentum directions with respect to each other are not in opposite directions. In this most idealistic case, they would be uniformly spaced from one another. This idea would be analogous to the behavior of M particles in any given space [Fig. 1 (a)].

Furthermore, if this idea of M particles in a given space is extrapolated to the whole of the universe, then the distance between the particles would depend on their level of vibrations and the amount of space pressure of the surrounding region. The space pressure, as defined here by MM theory, is caused by the vibrations and interactions of M particles themselves via nuclear particles' impacts and depends on the spread of M particles at any point in the universe. This space pressure is what prevents M particles at the inner regions of the universe from spreading too rapidly. As a result of continuous vibrations, all particles within the universe distance themselves from one another. At any location in the universe that the particles can more readily spread to, there the space pressure would be less. Consequently, the space pressure is always less at the very edges of the universe, and on the inside, it varies according to the universe's expansion and the level of vibrations in the M particles at that location.

As a whole, the universe operates due to the interactions of these particles. As the distance between particles is not the same at all points in the universe, particle density (ρ) is defined at any point in the universe as a sum number of M particles within a given unit volume.

$$\rho = \frac{N}{V} \tag{1.1}$$

At what is classically known as the atom, [Fig. 1 (b)] is presented as the proposed model from the perspective of MM theory. This Figure shows that the atom can be viewed as a specific arrangement of M particles. First, it is noted from this figure there is a space inside the atom which is due to the continuous nuclear inter-particles' mechanical impacts that thrust and push the M particles away from the nucleus. Next, the surface of the atom is described as an ensemble of M particles with angular momentums directions that are roughly parallel to its boundary. As seen in [Fig. 1 (b)] at the surface boundary and along subsequent layers of the atom, the M particles' angular momentum directions are generally oriented parallel to the surface. This is due to vibrations of the highly excited nuclear particles in the atom continuously colliding with M particles at the surface level. Via the mechanism referred to earlier for angular momentum interactions, these nuclear particles collide with the M particles at the atom's surface and cause their angular momentums to be re-directed along the atomic surface. Along the outer layers, the particles are not as rigidly oriented parallel to the surface as the inner layers. This is because the effects from the nuclear particles are inversely proportional to the square of the distance from the nucleus. The inverse-square relationship is a result of a greater number of M particles at the outer layers of the atom, where the number of M particles is proportional to the square of the distance of M particles from the nucleus. As there are more particles at the outer layers, these particles are less affected in their angular momentums by any effects from the nuclear particles.

Based on the above discussions, it may be questioned on why the nuclear particles do not lose all of their vibrational energies during these impacts. The reason is simply that they, in turn, simultaneously recoup their vibrational energies incoming from the vibrations of the nuclear particles of surrounding atoms in the universe. However, after a certain period of time, all these nuclear particles lose their energy and all the atoms eventually decay and evaporate. The mechanism for the recouping of vibrational nuclear energies and that of the decays will also be detailed in a future article.

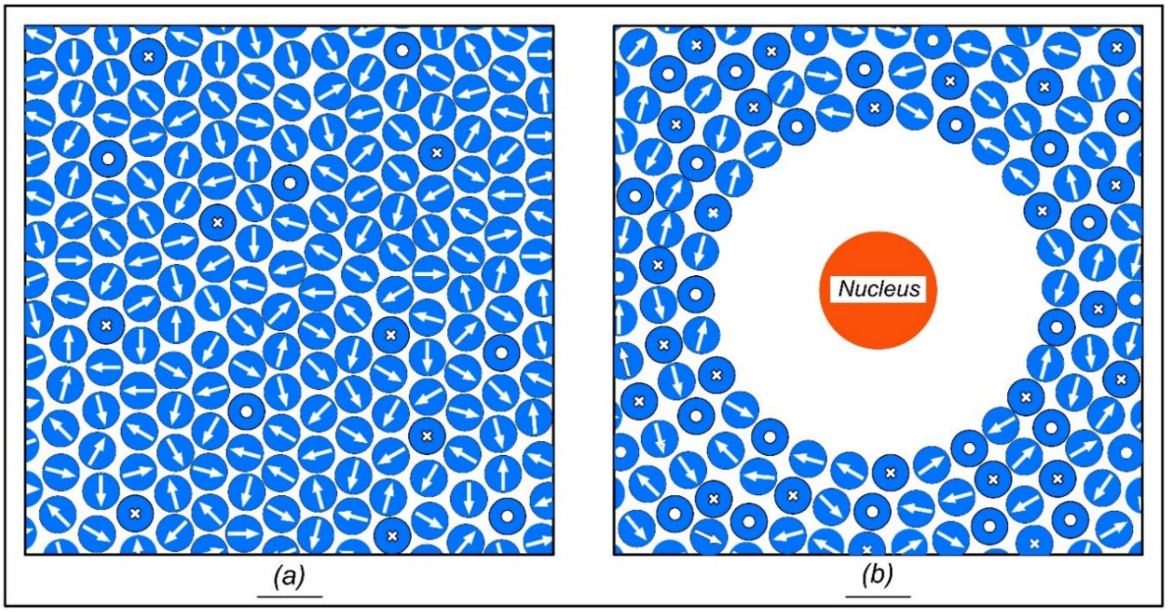

Fig. 1. a) Ensemble of M particles together in a given space. The particles collide with each other so much so that they re-arrange themselves to have the least amount of repulsive interaction. The M particles have angular momentums in various directions. **b)** At the outer boundary and along subsequent layers of the atom as per the MM theory, the M particles' angular momentums directions are roughly oriented parallel to the surface. There is space between the M particles at the surface and the nucleus. The nuclear particles are the highly excited causative source for all of the vibrations of M particles.

2. Theory

Law of Motion of Momentum and the Definition of the Velocity of Motion of Momentum ($\overrightarrow{v_p}$):

To state and define the law of motion of momentum based on MM Theory and to investigate and define the velocity of motion of momentum (i.e., the velocity of momentum), two conceptual scenarios based on classical physics are considered.

First scenario (1):

In the first scenario, one body, body (a), with velocity ($\vec{v}$), with linear momentum ($\overrightarrow{mv}$), travels a distance *(d)* for a duration of time *(t_1)*, from point (1) to point (2), as shown in [Fig. 2].

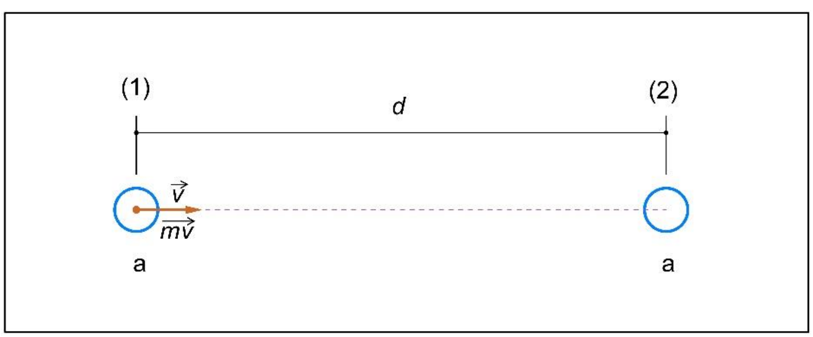

Fig. 2 Diagram of a body from point (1) traveling along path (*d*) to reach point (2)

For this case, the momentum of the body from the beginning to the end of the path has travelled with a speed of (v_{p1}) and with a velocity which is denoted here as: ($\overrightarrow{v_{p1}}$). In fact, in this scenario, the speed of motion of momentum (v_{p1}) is exactly equal to the speed of the body. The speed of motion of momentum for this scenario is calculated as:

$$v_{p1} = v = \frac{d}{t_1} \quad (2.1)$$

Second scenario (2):

In this scenario, it is assumed that a number of uniform rigid bodies with equal mass (*m*) are oriented in a line in such a way that there is no space between them, as shown in [Fig. 3]. A rigid body (a) with the same velocity ($\vec{v}$) as scenario (1) and with linear momentum ($\overrightarrow{mv}$) collides with a second rigid body (b). The distance from the body (b) to the body (c) is the same as in scenario (1), *d*. Then, the body (a) comes to a stop while the rigid body (c) begins to move with the same ($\overrightarrow{mv}$). Body (a), after the collision, loses its linear momentum while the last body, in this case, body (c), gains the same linear momentum and it moves with the same velocity ($\vec{v}$). However, in comparison to the previous scenario, at a time after rigid body impact, body (c) will have motion at a location point farther away than where the body (a) would be moving unimpeded.

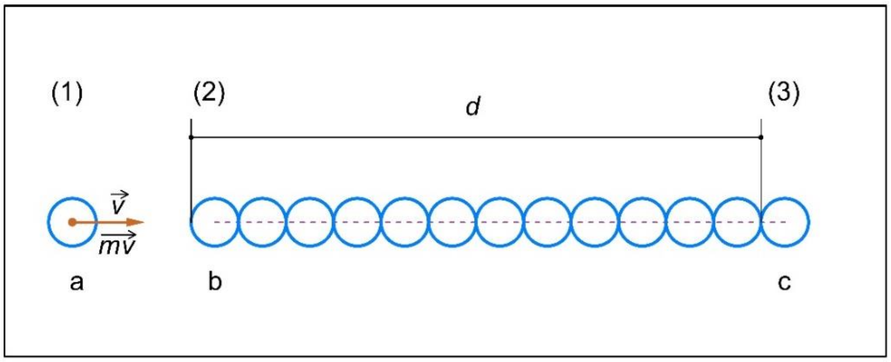

Fig. 3 Diagram of a body colliding at point (2) with rigid bodies

For this scenario (2), the body (c) does not move instantaneously. The question of how long it takes for the initial body (a), upon collision, to cause the last body to move is dependent on the rigidity of the colliding bodies, the distance between (b) to (c), and also is dependent on the initial velocity of the body (a). The greater the rigidity of the bodies, the less the time for the final body to move. If all the bodies are 100% rigid, the last body moves instantly. In reality, it is impossible for a body to be fully rigid.

In this second scenario, the time between the collision and when the final body begins to move is designated as *(t_2)*. The times *(t_2)* and *(t_1)* (from scenario (1)) are not equivalent. Motion of the body (a) from scenario (1) can be explained by Newton's laws of motion, whereas motion of the body (c) resulting from body (b) in scenario (2) cannot be explained by Newton's laws of motion [5]. By comparing the two scenarios described, it comes to the conclusion that we must define a new law of motion which here is presented as the "Law of Motion of Momentum" based on the concept of motion of momentum, and not based on the motion of an object, and to also designate a new term in physics called the "Velocity of Motion of Momentum ($\overrightarrow{v_p}$)."

2.1. Velocity of Motion of Momentum $\overrightarrow{v_p}$

Velocity of Motion of Momentum is here defined as the directional speed of momentum. This term has the two properties of magnitude and direction. The magnitude (speed) of this term is equal to the distance the linear momentum travels divided by the time taken.

2.2. Law of Motion of Momentum

This law states that for any considered initial momentum, the magnitude of the momentum is always constant. When momentum is conveyed by a body without any external action on the body, the direction and the speed of momentum always remain constant.

When the initial momentum is partially or totally transferred to or through another body, and assuming that the other body was at rest, the direction of summation vector of the final momentum vector(s) is always the same as that of the initial momentum and the speed of the subsequent momentum(s) varies and is dependent on,

a) the direction and the speed of the initial momentum, and

b) the directions of motions of the two bodies following collision, and

c) the mass and rigidity of the two bodies.

Even though momentum is a property of moving object(s) and is dependent on the mass, the momentum can be considered as an independent entity that always moves or is transferred from one or more bodies to another or to other bodies. This is while the sum of the transferred momenta plus the momentum which remains in the initial body remains constant. We can imagine any considered momentum as an entity that always moves in space with a magnitude equal to its initial value, either being conveyed by a body(s) or transferred from one body(s) to other(s), where the sum of its constituent vector(s) remaining identical to the initial momentum's direction, and where its constituent speed(s) may not always remain constant.

Because the magnitude and direction of the summation of momentum's vector(s) are always constant, so,

$$\sum \vec{p}_{initial} = \sum \vec{p}_{final} = \sum \overrightarrow{mv} = Constant \qquad (2.2)$$

Here, *(m)* is the mass of object(s) that convey the momentum(s). The mass, *(m)*, can be variable while the momentum is always constant.

2.3. Study of the Speed of Momentum (v_p), for the condition that the bodies are apart at distances

Third scenario (3):

For scenario (3), here it is considered the same scenario as scenario (2) but with the only difference being that the bodies are spaced apart [Fig. 4].

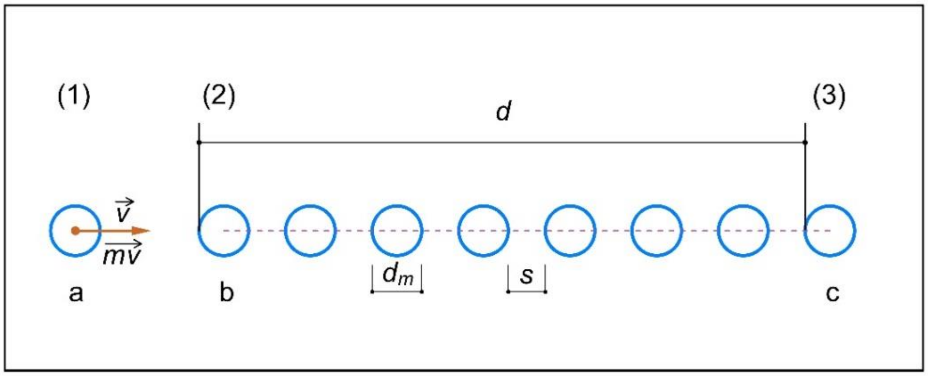

Fig. 4 Diagram depicting of body (a) colliding with (b) and causing collision of subsequent bodies

It is assumed that the diameter of each body is (d_m), the empty space between each two adjacent bodies is *(s)*, the number of bodies is *(n)*, the mean speed of each body that moves the empty distance between bodies is (v_s), and the speed of momentum for within the body itself is (v_{pi}). The distance between the first body that collides and the last body that moves is *(d)*. Then, the length of the path of momentum within all bodies would be ($n \times d_m$) which totals (L). In other words, (L) equates to the total of the diameters of all bodies. The length that linear momentum moves in empty space (sum of *(s)* between all bodies) would be equal to the total space between all bodies ($S = n \times s$). Thus,

$$d = L + S = n \times d_m + n \times s \tag{2.3}$$

The total time for the motion of momentum from body (b) to body (c) would be equal to the total time taken for the motion of momentum within the bodies themselves and the sum of the times taken for each body to collide with the next,

$$t = t_1 + t_2 = \frac{L}{v_{pi}} + \frac{S}{v_s} \tag{2.4}$$

and, therefore, the speed of motion of momentum from body (b) to body (c) is,

$$v_p = \frac{d}{t} = \frac{d}{\left(\frac{L}{v_{pi}} + \frac{S}{v_s}\right)} \tag{2.5}$$

Since $L = d - S$,

$$v_p = \frac{d}{\left(\frac{d - S}{v_{pi}} + \frac{S}{v_s}\right)} \tag{2.6}$$

$$v_p = \frac{d}{\left(\frac{(d - S)v_s + Sv_{pi}}{v_{pi}v_s}\right)} \tag{2.7}$$

$$v_p = \frac{d(v_{pi}v_s)}{dv_s + S(v_{pi} - v_s)} \tag{2.8}$$

3. Light

Light is a wave of motion of momenta which are conveyed by an ensemble of M particles that acts harmonically and propagates throughout space. The direction of these motions is along the path of travel. Light as an emission is the propagation of longitudinal waves similar to sound waves as per [Fig. 5].

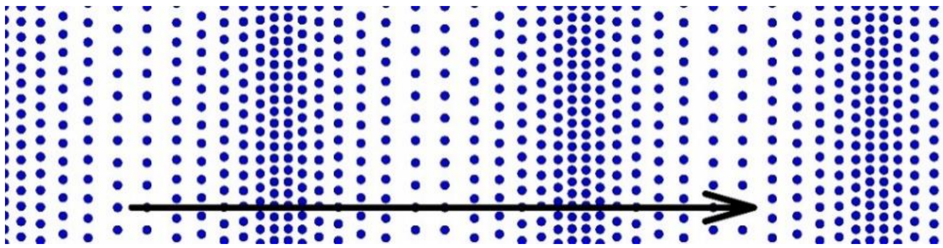

Fig. 5 Light as a longitudinal wave similar to a sound wave

If M particles are envisioned as per the bodies discussed above under "Study of (v_p) for the condition of bodies apart at distances," then the speed of light is dependent on the spacing of the M particles from one another (i.e., particle density). Thus, the speed of light in the universe varies due to the spacing of the M particles at any point in space. If the distance between M particles increases, the speed of light decreases and vice versa.

The M Particles are located throughout the universe and are generally without any arrangement(s). As these particles gain frequent and abundant vibrations from the universe, they are practically considered in continuous contact with one another. This is so much so that they are virtually transferring their momenta to one another all of the time.

For a better explanation of the propagation of light, one particle, particle (a) from a crest of a wave which has the maximum momentum at time $t = t_0$ is considered [Fig. 6]. After a certain time at $t = T$, the initial momentum of the particle (a) is moved and transferred to other particles. At any time, the total momenta of particles that gained the initial momentum of the particle (a) is equivalent to the momentum of the initial particle (a). As it is seen from [Fig. 6], the spread of momentum from any particle through other particles in space is spherical when being directed towards the direction of initial momentum (assuming particle densities are uniform), and the total momentum remains conserved at any point in time.

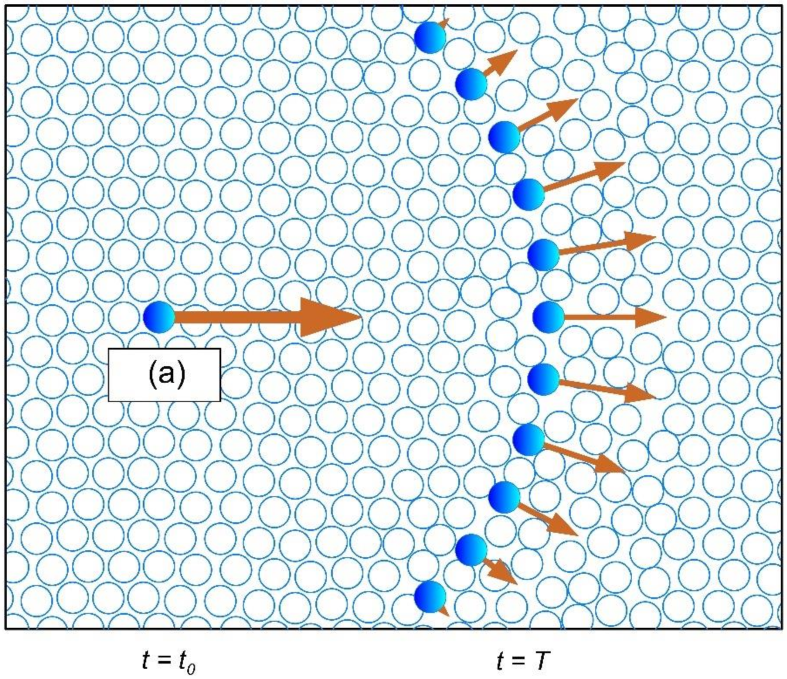

Fig. 6 The motion and transfer of momentum from an initial particle (a) to other particles, demonstrating that momenta at any point in time is spherical in shape (assuming uniform particle density) and remains conserved

When considering the advance of light, there is a wave crest, whereby particles similar to (a), forming an ensemble of M particles simultaneously transfer their momenta to other particles in the direction of travel of light being considered as in [Fig. 7].

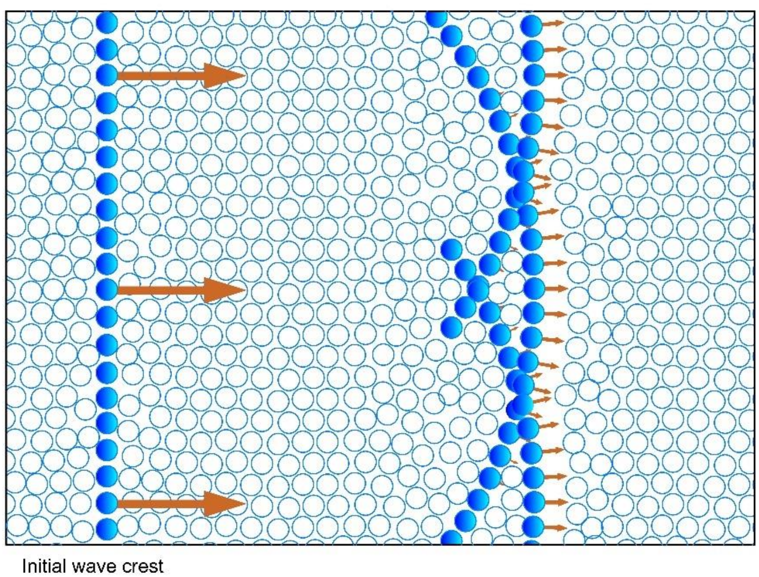

Fig. 7 Demonstrating forming a crest at a wave-front and transferring momenta in space with the direction of momenta, that total momentum remains conserved

Here, the momentum of three particles from an ensemble of M particles at a crest are shown. The momenta are transferred spherically particle by particle. Each particle ahead gains a part of the momenta of initial particles. If all particles at the crest are considered, then the momenta sum up together at a location farther away at a wave-front, producing a new crest vibrating a new ensemble of initial particles once more. This is such that the speed of the advancement of the crest is as per the speed of light.

“In 1678, Huygens proposed that every point reached by a luminous disturbance becomes a source of a spherical wave; the sum of these secondary waves determines the form of the wave at any subsequent time [6, 7]. He assumed that the secondary waves travelled only in the "forward" direction and it is not explained in the theory why this is the case” [8].

The above statement of "Christiaan Huygens's proposal" is confirmed by the "MM theory." In addition, the MM Theory is able to answer what has not been explained in the Huygens's principle. Per the MM theory, as discussed, and noting that all M particles are unfirm in shape and equal in mass, then the waves travel only in the forward direction because only in such a case does the momenta remain conserved.

To prove the MM theory and to provide evidence of M particles' existence, an experiment was designed and conducted. The goal was to vibrate the M particles by rapid changes to the orientations of angular momentums of M particles whilst studying the speed of light as it propagates via these particles. The experiment was designed to compare the speed of light at a state where the particles were vibrationally unaltered to a state where they were vibrationally excited.

4. Experiment

4.1. Experiment Set Up

The experimental setup below consisted of a longitudinal electrical magnet [Fig. 8] and a laser beam system. The electrical magnet is designed so that if the electrical current flows in a direction on one side of a wire coil, the current on the other side is in the opposite direction [Fig. 9]. By this, the force generated by the current acting on the M particles inside the electrical magnet is directed to a single direction. If the direction of the current changes, the force acting on the M particles also flips.

Fig. 8 Longitudinal electrical magnet with two parallel rows of a coiled wire

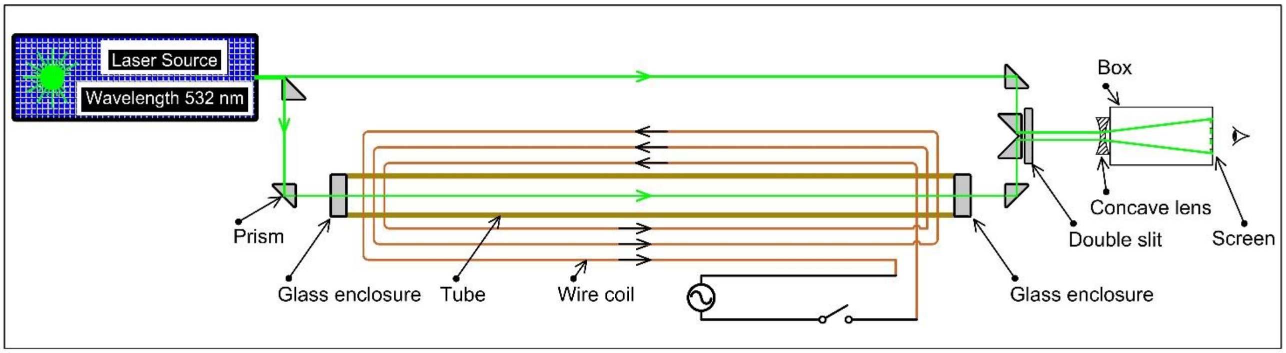

Fig. 9 Experimental apparatus design setup with an electrical magnet using a laser source, with two glass tube enclosures, prisms, and double slit directing the light beams to a concave lens amplifying the interference pattern on a screen.

The electrical wire coil of the magnet had 110 turns, and the magnet was 460 mm in length and with 20 mm of spacing in-between two parallel rows across from each other. An electrical switch was connected to the circuit of the wire coil to connect and disconnect the power at any time as needed.

An enclosed tube of a selected material type with glass enclosures to seal the tube at its ends was placed in-between and parallel to the two rows of the wire coil. The pressure inside the tube was adjusted anywhere from the ambient pressure down to 6 - 8 mmHg. In this experiment, two light beams were simultaneously generated using a single laser source [Fig. 9]. One of the beam rays was directed towards a set of two prisms directing the ray into a slit, amplified by a concave lens, and onto a screen. The other ray was directed by a prism towards a second prism, which then directed the ray into the tube. The ray exiting from the tube was then directed by a third prism and fourth prism to a second slit with the ray ultimately directed past the same concave lens and onto the same screen as the first ray, producing an interference pattern [9]. The shift of the fringes of interference on the screen was studied.

The support structures of the ray system (the laser source, hollow tube, and the prisms) were set up to be independent of that set up for the electrical magnet and the electrical current system. A solid surface supported the electrical magnet and current system with a damping system below. The damping system and the solid surface were independent of the support structures for the prisms, tube, and laser source so as to avoid the effects of any vibration caused by the electrical magnet unto the tube and the ray system. The resulting interference pattern of the two rays was observed and measured at a distance of 5 meters.

4.2. Methods and Results

The first experiment conducted used a copper tube and connected 220 V, AC power with 50 Hz to the circuit with the electrical magnet oriented horizontally [Fig. 10 (a)]. Under all circumstances and all pressure values, it was observed that the fringes of the interference pattern shifted upon connection of the power to the circuit of electrical magnet. And conversely, it was seen that fringes of the interference pattern shifted back to their original pattern upon disconnection. Upon connection to the power source, the fringes of the pattern on the screen were such that it was shifted towards the direction of the ray exiting from the tube. The degree of shift in the pattern was in the order of ½ to ¾ of a fringe. Considering that the wavelength of the laser was 532 nm and the degrees of shift were ½ to ¾ of a fringe, thus the ray exiting from the tube has delayed by anywhere from 266 nm to 399 nm. Based on this, calculations show that the speed of light in the tube has decreased anywhere from 173 m s^{-1} to 260 m s^{-1}, and the delay in the time for the light was between 8.8×10^{-16} to 1.3×10^{-15}sec.

In the second experiment conducted, a light polarizer was placed at the forefront of the ray system to polarize the light prior to it entering the identical setup as per the first experiment. The results obtained here were identical to the first experiment.

In the third experiment, the electrical magnet was oriented vertically, and the same exact setup as the first experiment was conducted as in [Fig. 10 (b)]. Again, the results obtained were identical to the first experiment.

In the fourth experiment, an aluminum tube was utilized under similar setups as the previous three experiments. The direction of shift of the fringes was the same as the previous experimental setups.

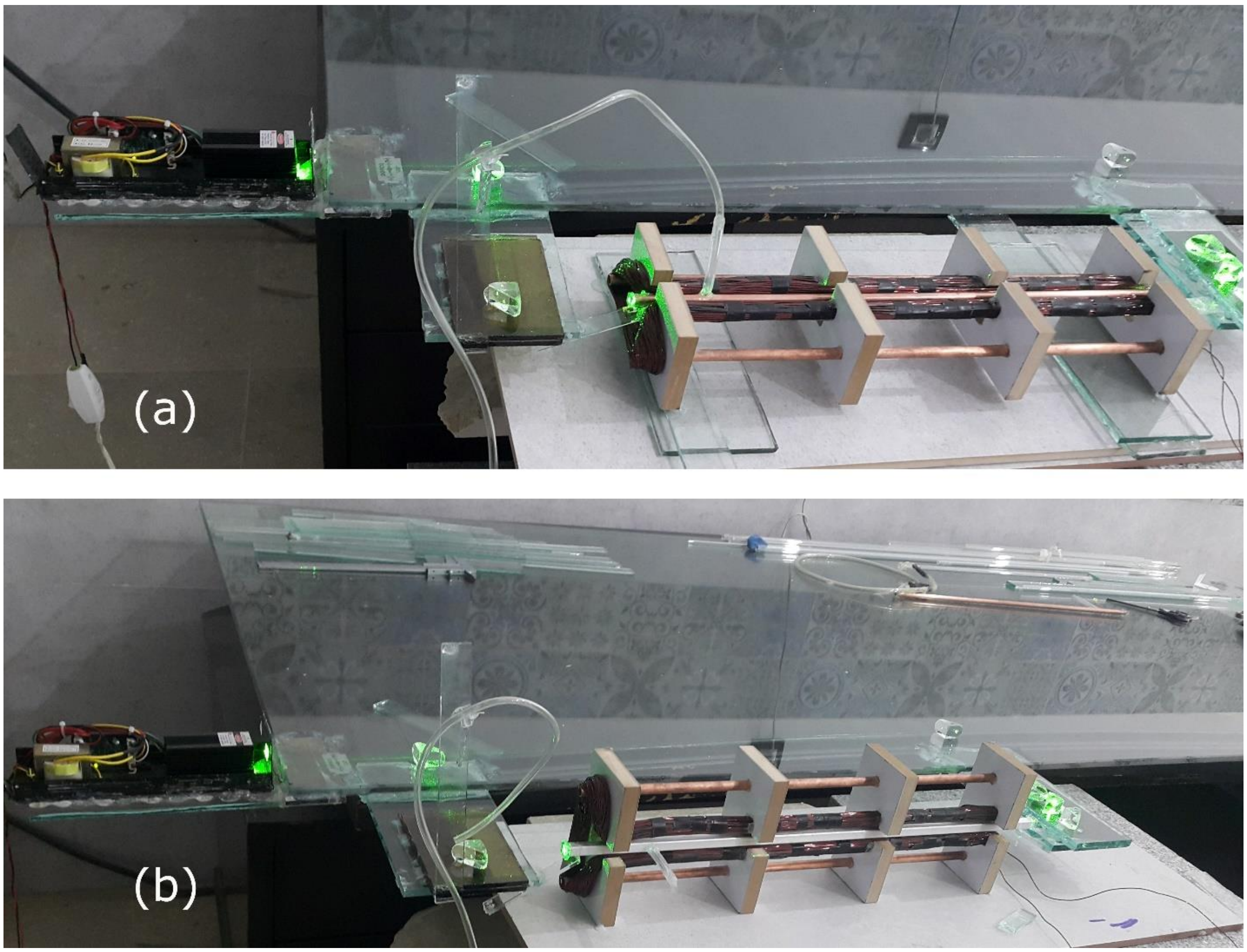

Fig. 10. a) Experimental apparatus setup with horizontal electrical magnet**.**
b) Experimental apparatus setup with vertical electrical magnet.

In the fifth experiment, all the previous experiments were conducted using DC current varying from zero up to 220 V. However, no shifting of the fringes was seen here in the interference patterns.

4.3. Analysis

Under all circumstances and all pressure values inside the tubes, upon connection of the AC power to the electrical magnet, experiments signify a decrease in the speed of light inside the tubes as demonstrated by the shifting of the fringes on the screen. The reason can be attributed to the connection of the AC power to the electrical magnet causing the corresponding rapid fluctuations in the orientations of angular momentums of the M particles. As a result of the consequent vibrations of M particles, the distances between them increases. By referring to the "Study of (v_p) for the condition of bodies apart at distances", (2.3), and considering Eq. (2.8) for tubes of a given length (d), the increase in distances between the M particles results in the increase in (S) and the simultaneous decrease in (L) (the numbers of particles inside the tube decreases resulting in decreasing (L)). All terms on the right-hand side of Eq. (2.8), except *(S)*, are constant, and hence, v_p is only variable via changes in *(S)*. Logically, v_s cannot be greater than v_{pi}. This is because each M particle can be considered as infinitesimally smaller divided sections for consideration of the transfer of momentum. Then as each section is rigid, then the momentum can be transferred over across any of the infinitesimally-divided sections of the particle during collision much faster than the speed of motion of M particles themselves which move in the empty space between particles (v_s), in the same manner as if each of these sections were the bodies detailed in Scenario (2) of the Theory. Thus $(v_{pi} - v_s) > 0$ and therefore, if *(S)* increases then the speed of motion of momentum (e.g., in these experiments being the speed of light) decreases and vice versa.

As mentioned, experiments showed a decrease in the speed of light, and this is what is exactly theoretically expected by the MM Theory. In addition, it can be concluded that v_{pi}, the speed of momentum transfer within M particles, is greater than the speed of light. This is because as per the previous discussion in the preceding paragraph $v_{pi} > v_s$, and noting that the speed of light is a culmination of v_{pi} and v_s, in passing the tube. In my opinion, the speed of momentum transfer within particles is extremely high, and thus, the speed of light is virtually related to the distance between M particles.

I have to emphasize that (v_s), denoting the speed of motion of momentum between particles for the study of light here that is under consideration, is distinguished from the speed of motions of momenta of the M particles that would be associated with any of their other vibrations.

In the experiments that utilized DC current, the current direction does not change, so the orientation of the M particles also remains constant. Thus, the speed of light also remains constant for the DC setups. In this manner, orientation of angular momentums of M particles is simply directed towards a single direction after DC connection.

Heat can have a significant influence on the system and air and consequently, the speed of light. However, in these experiments, the generated heat of the electrical current could not have caused the shifting of the fringes. Under all circumstances, whether at the moment of connection or the moment of disconnection, the shift of the fringes happened instantaneously. If this shift had occurred because of generated heat, it should have happened with a delay. In addition, if the heat causes the shift, the DC current should also have caused the shift as it would have also generated heat.

5. Light is a Longitudinal Wave

Polarization of light:

One of the reasons why it has been classically thought that light can be viewed as a transverse wave and not a longitudinal wave is because light has been experimentally shown to be polarized. However, to show that light when modelled as longitudinal waves can in fact be polarized, [Fig. 11] is considered. As mentioned, light is a wave of motion of momenta which are conveyed by an initial ensemble of M particles that acts harmonically and then propagates via other M particles in space.

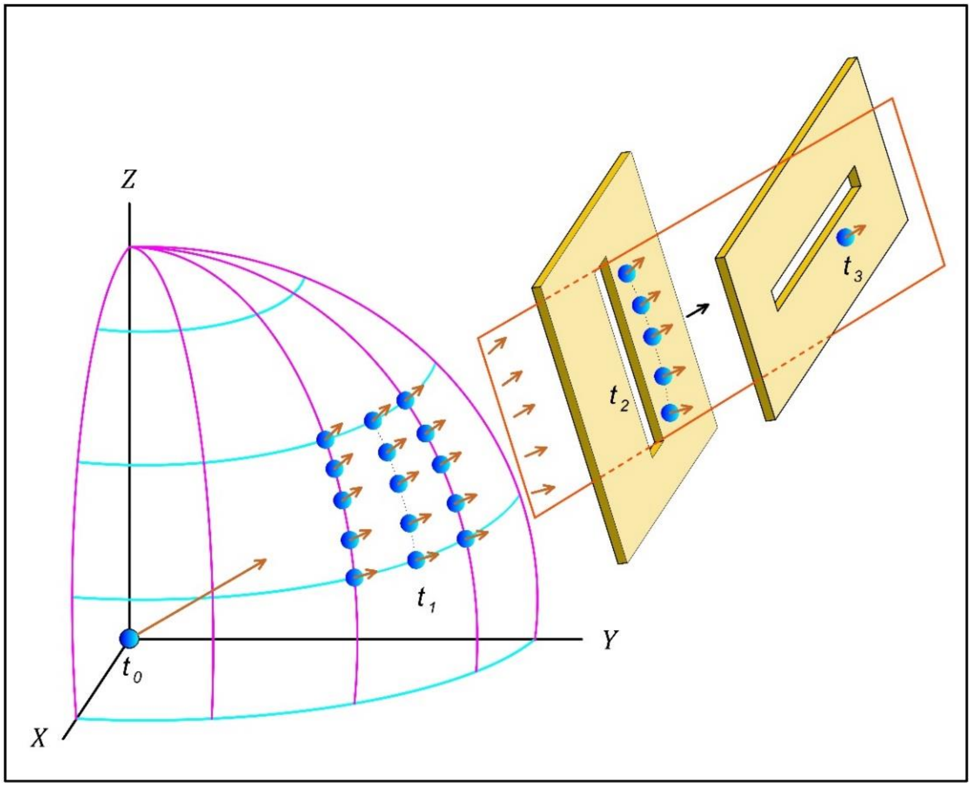

Fig. 11 Diagram depicting the motion and transferring of momentum from a single particle at $(T = t_0)$ to a wave front of light at $(T = t_1)$, and the subsequent motion and transferring of momenta after the polarizing filters at $(T = t_2)$, and $(T = t_3)$.

One particle from such an ensemble of M particles at a wave front is considered, $(T = t_0)$. This particle transfers its gained momentum spherically to the particles ahead in various directions. It needs to be emphasized that momentum itself moves and is transferred via M particles in space in a spherical manner. [Fig. 11] at time $(T = t_1)$, shows the motion and transferring of momenta through subsequent M particles at a new wave front.

Now, if a polarizer is configured to have its filter oriented at an angle as shown in [Fig. 11] at time $(T = t_2)$, only the momenta of particles whose propagations are oriented in the same direction can move and be transferred through the polarizer. At time $(T = t_2)$ in [Fig. 11], a number of M particles after the polarizer are shown transferring momenta. It is noted here that these are particles that gained a component of the momenta of the original particles propagating before the polarizer whose momenta resultant were aligned with the filter's orientation in space. For momenta whose direction of motions are not in alignment with the filter's orientation, they are blocked by the polarizer. Therefore, only those momenta whose direction of motions are in sync with the filter's orientation are able to be transferred through the polarizer.

Now, we place another polarizer in front of and near the first polarizer so that its orientation is perpendicular to the orientation of the first polarizer, as shown in [Fig. 11] at time$(T = t_3)$. As the direction of propagation of the momenta of the particles before the second polarizer are not in sync with the second polarizer, the momenta cannot pass to the particles ahead of the second polarizer. Only a fractional portion, those in the perpendicular orientation to the two polarizers, can pass through both - a very small and insignificant amount.

The momenta of each particle or the momenta of an ensemble of M particles (i.e., light) are always propagated spherically towards a certain direction, such that their resultant directions and magnitudes is always constant. If we use a polarizer, momenta of particles move and are transferred only in a certain orientation, but after leaving the polarizer, they are freely transferred in all directions. Of course, the total magnitudes and resultant directions will be again equivalent to the output from such a polarizer.

6. Heat and Thermal Radiation

Heat can be explained as a result of two contributing features. Considering, for instance, for a solid object being hammered or a gaseous fluid undergoing rapid compression, the first feature is the moving back and forth of the atoms or molecules with respect to one another. The second feature is the arrangement of the M particles around atoms and molecules. For example, if the object is heated or being hammered, it affects the arrangement of the M particles. The outer shapes of the atoms and molecules change rapidly, causing surface vibrations, while the M particles remain along the surface [Fig. 12]. These two features always affect one another.

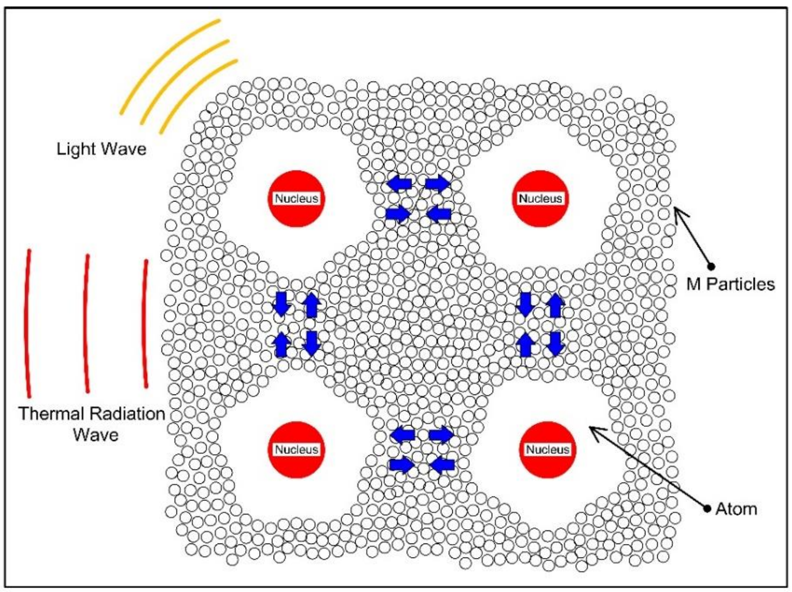

Fig. 12 Light wave and thermal radiation wave from atoms and molecules via M particles

Any object that has a temperature greater than absolute zero emits waves. These waves can best be described as vibrations of ensembles of M particles. As an object is heated, thermal radiation and at the same time surface vibrations of atoms and molecules are manifested. In the beginning, the frequencies of these waves are less. As the temperature increases, at first thermal radiation is observed. However, then, as the frequency of the surface vibrations of atoms and molecules increase to reach into the visible light spectrum, red light will next be observed. After the temperature is continued to be increased, increasing the frequency of vibrations of the surface of atoms and molecules, then the emission of yellow light will at one point be observed, and so will the other colors on in the spectrum of light. Light is a result of the vibrations of the surface level of atoms and molecules, while a thermal radiation wave is the result of the moving back and forth of the atoms or molecules with respect to one another. After producing these waves, they are transferred by and through M particles.

(Derived from the conceptual model shown in [Fig. 12], it can be again concluded that surface vibrations of these atoms and molecules are such that they can only produce longitudinal waves as light waves in the M particles in the surrounding space. As the light produced from the surface of atoms and molecules propagates spherically throughout space, thus light waves are longitudinal waves and cannot be transverse waves.

7. Electricity

The phenomenon of electricity is the result of the motion of M particles through a conductor or between two objects having imbalanced M particles around their atoms and molecules. For the case of current electricity, those M particles that have linear momentum, namely electrons, transfer their linear momentum one by one to the next through a conductor [Fig. 13]. The transfer of linear momentum occurs as a result of the interaction of M particles at the surface and in-between the atoms and molecules. Any object with a greater propensity to do this is a better conductor.

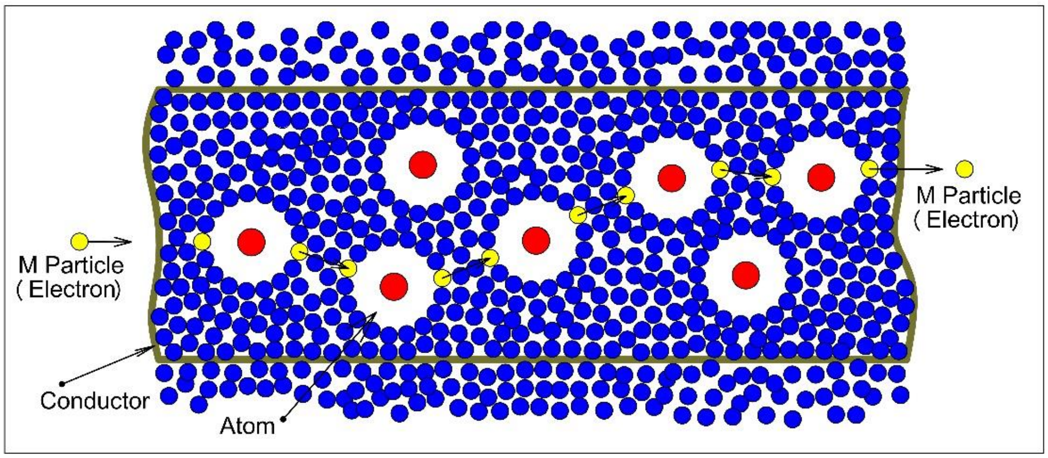

Fig. 13 Electrical current flow through a conductor

Under normal circumstances, M particles on the surface of atoms and molecules between two objects or between two points within an object are balanced. Static electricity is the result of the state of imbalance of M particles.

8. Magnetism

In space, generally, the direction of angular momentums of M particles as a whole are in equilibrium, or in balance. However, if the direction of angular momentums of M particles are oriented towards a single direction, then the phenomenon of magnetism is observed.

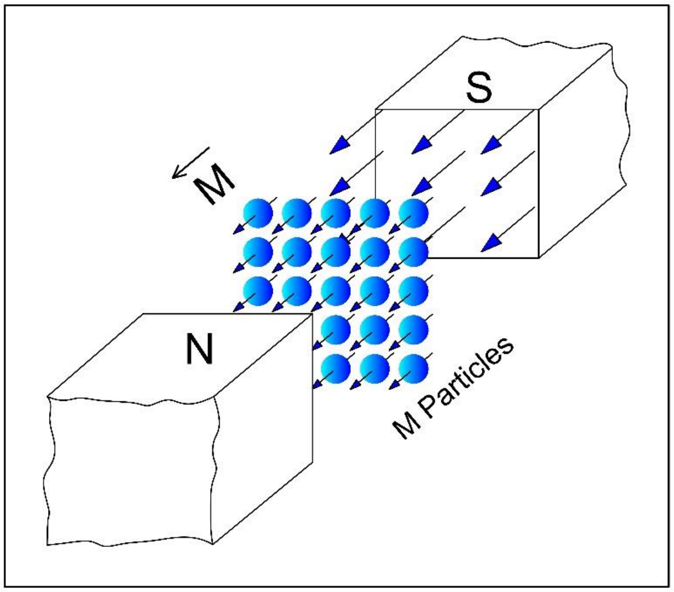

Fig. 14 The M Domain Direction as denoted by ($\vec{M}$)

In such a case, the whole domain of M particles is directed towards a single direction, denoted here as "M Domain Direction" (MDD), or ($\vec{M}$). The direction of ($\vec{M}$) is defined from S to N of the magnets, as shown in [Fig. 14].

9. Radio Waves

Oscillations of an electron or electrons along a path or through a conductor produce radio waves. These radio waves are transverse waves, and are waves of fluctuations in the orientations of angular momentum of M particles throughout space, [Fig. 15]. The frequencies of these waves are with the same frequency as that of the oscillating electron(s). Here in [Fig. 15], the axis of oscillation of the source electron(s) is perpendicular to the plane.

Depending on vertical, horizontal, or any other orientation of electrons' oscillations with respect to a reference system, corresponding converse orientations of the polarized radio waves are produced. If the electrons oscillate vertically, then the polarized radio waves will be horizontal – and vice versa. The greatest intensity of radio waves is observed in the regions near the plane that is perpendicular to the oscillation path of electron(s) and passing through its midway point, and in regions which are nearest or closest to the oscillations of the electrons at the source.

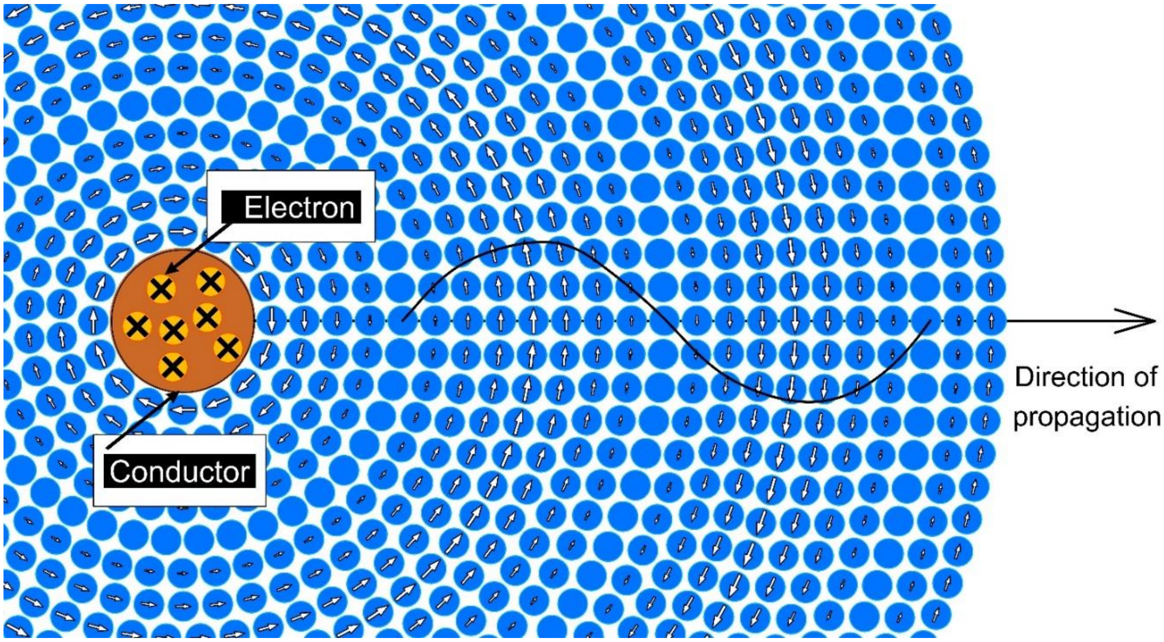

Fig. 15 Model of fluctuation of orientations of angular momentum of M particles and propagation of radio waves in space caused by the oscillations of electrons in a conductor. This diagram shows a snapshot of these waves and M particle orientations at the time that the electrons are pointed into the plane.

Radio waves, classically defined as a low-frequency band in the electromagnetic spectrum, are in reality a result of the fluctuations in the orientation of angular momentum of M particles in space. When an electron or electrons pass through a path in a given direction, for example as in the case of [Fig. 15], the electrons act as the source causing the surrounding M particles to be oriented perpendicularly to the path of oscillation. As a result, through any path that the electrons are oscillating by, there will be perpendicular planes to the oscillation path and they will form the crests and troughs of a wave. The oscillations of the electrons cause the M particles in the surrounding spaces to be orientated continuously to form crests and the troughs away from the source. Under analysis, it can be viewed that the M particles are acting analogously to tiny magnets in space. The effect continues to produce a wave-like pattern that is described classically as an electromagnetic wave. Such a wave is not, in fact, electromagnetic; however, it can be viewed as a magnetic wave and behaves similarly. If another conductor is placed along such a wave and perpendicular to the plane where the M particles are orientated, this causes fluctuations in the orientations of M particles within the conductor, resulting in inductions of electric current in the conductor. This phenomenon will be explained in more detail in a future article under the title of "Electricity and Magnetism."

10. Comparison between Light Waves and Radio Waves

Any interactions between M particles involve both linear momentum and angular momentum of the particles. For light, transmission is the result of collisions of M particles one after another. There is a minor change in the direction of angular momentum of the M particles in the case of light; in fact, most of the change would be in their linear momentums and thus the propagation of light is mainly longitudinal.

One of the most striking differences between radio waves and light waves is that generally, the radio waves can penetrate through walls and other solid entities while the light waves cannot. Radio waves are transverse waves which allow them to more readily transmit through solid bodies. In more detail, a radio wave is, in fact, the fluctuating of the orientation of the angular momentum of M particles, and it acts on the M particles perpendicularly along the direction of the wave's advance. This enables the wave to transmit through and beyond objects. The radio waves are more readily able to pass through than the case of light waves, which transmit via longitudinal action. In the case of light waves, the spread of linear momentum motion and transmission is significantly impacted by the certain object's constituents, the atoms and molecules, which are in the direction of travel. This prevents light wave from easily passing through those certain objects.

11. Bending of Light near Stars and Massive Objects

Bending of light as it travels towards the observer, while passing nearby massive objects, incorrectly termed "Gravitational lensing" [10, 11] is, in fact, due to variances in the M particle densities around the massive objects. Vibrations of M particles closer to a massive object are greater than those farther away because the body of massive objects excite the surrounding M particles via the vibrations of their nuclear particles of atoms and molecules as per the mechanism described in the discussion of "Introduction". As a result, further away from a massive object, higher M particle density is observed.

As described, light is a wave of motion of momenta which are conveyed by an ensemble of M particles that acts harmonically and propagate throughout space. The speed of momentum depends on the spacing in-between M particles. If momentum moves and is transferred through a path of higher density region of M particles, its speed of motion is higher than where it moves through a path with lower density.

For investigating the bending of light near a massive object, from the spherical spread of the momenta via the M particles, two nearby layers (layer (1) and layer (2)) of an ensemble of M particles transferring momenta are considered as per [Fig. 16]. Layer (1) is farther from the massive object than layer (2). It is assumed that particle (a) from layer (1) and particle (b) from layer (2) are at a wave-front of light having simultaneous momenta in the same direction and equal in magnitude. As previously discussed, the speed of momentum to the particles ahead along each of the layers depends on the distances between the particles. Each of the particles ahead gains the momentum and this is further spread in a spherical manner, where only the particles along the path are actually shown in [Fig. 16]. As such, particle (c) gains part of momentum from particle (a) earlier as compared to particle (d), which in turns gains its part of momentum from particle (b). Subsequently, particles (c) and (d) continue to transfer their momenta spherically to the particles ahead, where this is not actually shown in [Fig. 16]. As the gained momentum of particle (c) as compared to (d) is earlier in time, the combined momenta will be at particle (e), which is further away from particle (c) as compared to particle (d). Thus, the final resultant of the total momentum transferred by the two layers is a linear momentum along the path at (e) as shown in [Fig. 16].

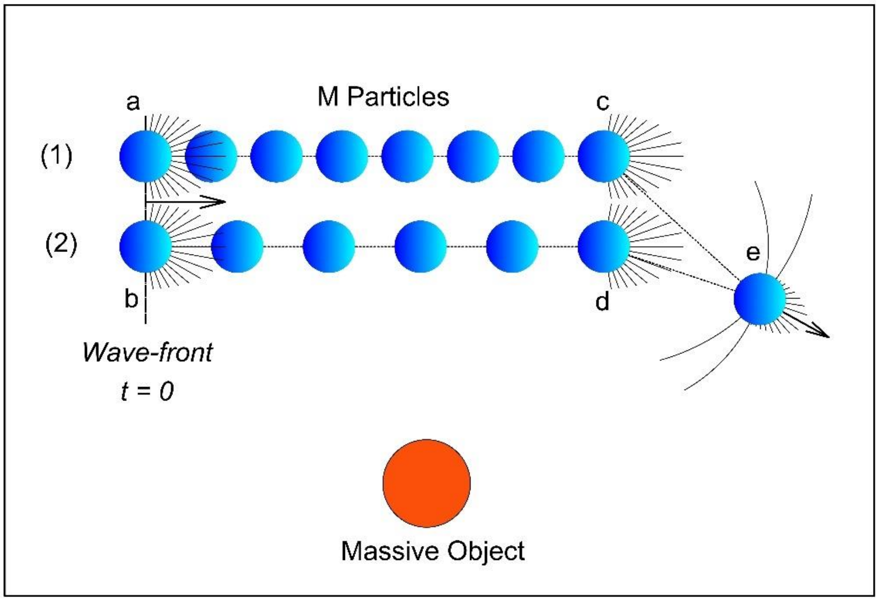

Fig. 16 Layer (1) and Layer (2) of M particles around a massive object

Based on the above discussions, the transmission of light and how it behaves near a massive body can now be deduced. Extending the two-layers model from [Fig. 16] and expanding to multiple layers as in [Fig. 17 (a)], it can be seen how initial momenta, starting points (1) to (4), are the basis of momenta at time $(t = t_1)$ and time $(t = t_2)$, which are ultimately transferred to the observer.

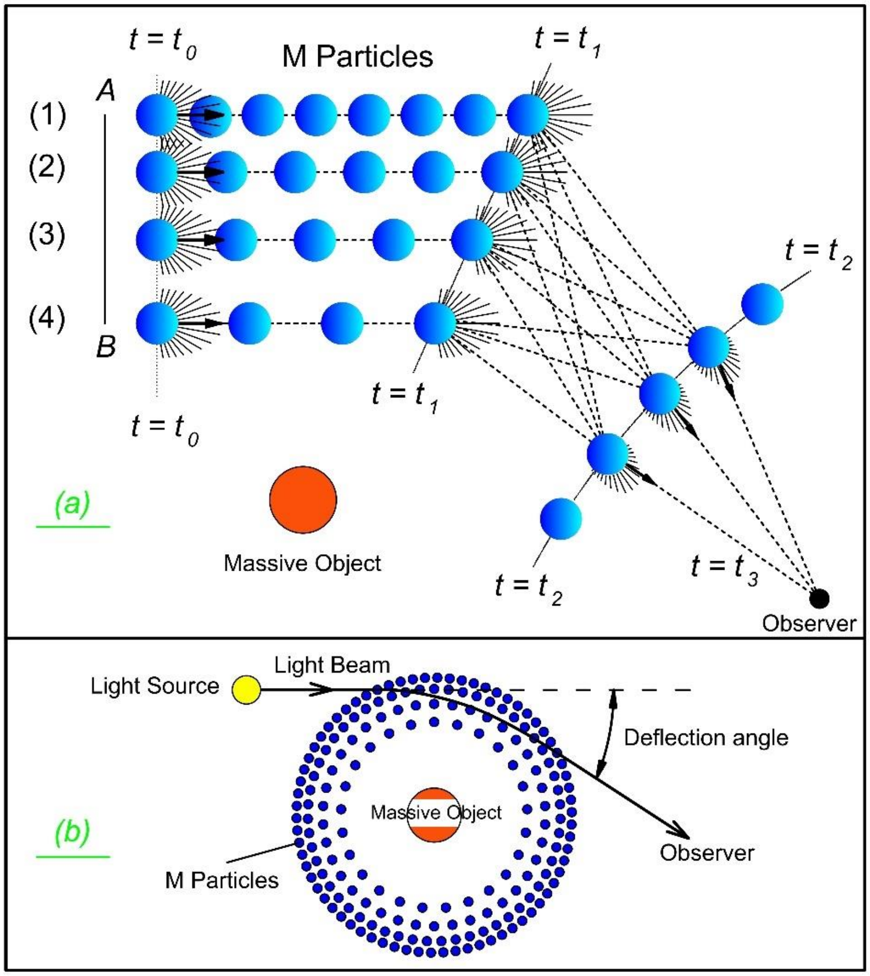

Fig. 17. a) Multi-layers of M particles, and, **b)** bending of light near a massive object

It should be noted that in reality, the peripheral momenta of M particles advance in various directions, and the momenta from M particles at (1) to (4) can always deviate somewhat from a straight path, but that their overall action over the length to the end particles along each path can most be approximated or modeled as such in [Fig. 17 (a)]. The magnitude of the momenta of M particles will also decrease along the straight paths being considered in [Fig. 17 (a)] while the total momenta of all the impacted particles remain conserved. The observer will thus see a narrow subset of the momenta from (1) to (4), which will be less in magnitude due to the deviations along the paths taken by the momenta. As seen in [Fig. 17 (a)], at time $(t = t_2)$ the combined momenta of initial momenta occurred at a plane with an angle with the initial wave front which is called "deflection angle". Therefore, light bends around the massive object with a deflection angle, as shown in [Fig. 17 (b)]

The intensity of light decreases as it travels near a massive object. As mentioned, the reason is that some of the momenta propagate in various directions without coming together to produce any crest. However, in all cases, the sum of all momenta, including those observed and those that are not, are conserved.

12. Redshift and Blueshift

The phenomena commonly known as redshift and blueshift are not solely due to the velocity of a source relative to an observer. It is commonly believed that the shifting of the wavelength of light from faraway objects like stars is only due to the speed of those objects relative to the observer [12]. However, "MM Theory" explains that this shift in the wavelengths can also, in reality, be affected by the variations in the density of the M particles among other factors. As light travels from the emitting source to an observer, it passes through media of different densities. Thus, its speed, wavelength, and direction not only are affected by the velocity of a source relative to an observer but are also affected according to the variations in the densities of M particles and distance from nearby massive objects. The phenomena of redshift and blueshift are thus explained due to many contributing factors as light travels through space.

With the passing of light through space, it travels nearby many massive bodies. As a result, the wavelength of light can be affected multiple times as it travels and so can its direction. Consequently, what is seen as redshift or blueshift or the direction of the incoming light, does not define the distance of a star or galaxy or a certain position of an object being away from the observer as is commonly believed.

13. Photoelectric effect

In regards to the photoelectric effect [13, 14, 15, 16, 17, 18] the emitted wave causes an influx of M particles onto the surface of atoms and molecules, which causes other M particles to be ejected. If the light wave influx is sufficient beyond a certain threshold, then this will cause the emission of one or more "M particles" to become electrons.

14. Dark matter

The unseen matter in the universe, termed "dark matter" is generally regarded as the answer to the many questions and mysteries that have arisen in modern physics. Dark matter can, in fact, be described by M particles' properties like their mass and behaviors.

15. Prediction

The MM theory predicts that there are places in the universe where light travels slower or even faster than the supposed maximum speed limit, c. It is proposed that this fact will be experimentally observed in the future. The MM theory predicts that it is possible to arrange and conduct an experiment to increase the speed of light to faster than c.

16. Conclusion

In this part, a new particle called "M Particle" was presented and its properties and behavior were described. It was shown that Newton's Laws of motion were unable to explain the motion of certain scenarios. As such, the First Law of Motion was defined based on the concept of the motion of momentum and a new term in physics, called "Velocity of Motion of Momentum" was also introduced and defined. It came to conclusion that light is a wave of motion of momenta which are conveyed by an ensemble of M particles that acts harmonically and propagates longitudinally throughout space. The propagation and behavior of light is in a waveform manner. Light advances by "M Particles" through distance. It is also concluded that heat is the vibrations of atoms and molecules with respect to each other in any object with temperature above absolute zero and thermal radiation is the wave of these vibrations conveyed by M particles. This paper also explained static electricity as an imbalance in the

M particles of objects or points within an object. Current electricity was explained as the result of the transfer of linear momentum of M particles through interactions with one another, from surface to surface of atoms and molecules. Magnetism was briefed as the directing of M particles' angular momentums in a single orientation in space. MM theory was also able to explain the photoelectric effect as an influx of particles that displaced other M particles from the surface of atoms and molecules. It was shown that radio waves and light waves differ in their manner of transmission. While radio waves are transverse waves through M particles, light waves are longitudinal ones.

Astronomical phenomena, including bending of light, redshift, and blueshift, were elaborated on. The variances in the M particle densities around massive objects account for the bending of light as it passes near stars or other large massive bodies. It came to reasoning that as light travels, its speed, wavelength, and direction are affected by the variations in the M particles densities and distance from nearby stars and massive objects.

In addition, the results of an experiment presented here showed that the speed of light decreases by rapid fluctuations in the orientations of angular momentums of the M particles. As a result, the speed of light, c, is not constant. Therefore, the theories of Special and General relativity are denied [19, 20].

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Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Previous Version

The first and second versions of the first part of the work are posted at preprint archive viXra/rXiv [21].

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