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Magnetism: Insights from the Thomas Young Experiment

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Abstract;

The principles of Thomas Young's double slit experiment are used to find out further the nature of magnetism. This paper shows that not only can magnetism be defined as a wave but it allows us to understand the nature of all waves and concept of polarization in quantum mechanics. A wave pattern results from the interactions. It is something else before it organizes into a wave formation. In all, because of the nature of magnetic phenomenon, it must be studied at close range with the double slit experiment. This gives an incredibly unique insight. All data is available at figshare.com to share.

Keywords: double slit experiment, khumalon, magnetic particle, magnetic wave, monopole, quantum magnetism

1.0 Introduction

"[1]If information was not independent you could only learn everything or nothing, you could never isolate information, information can only be extracted because each information package is independent and discrete…" (Khumalo)

Why should what is coming out of a lodestone be any different? (It can not be magic what is coming out of a lodestone?) We need to know the characteristics of whatever is coming out of a lodestone. Is it discrete or is it the most unique of information packages? Only an experiment can assist.

2.0 Aims

The aim of the experiment is to increase our understanding of magnetism.

3.0 What we Know about Magnetism

What we do know about magnetism is that the phenomenon that is leaving the magnet is not returning to its source. We will call it a phenomenon because we do not know what it is. That is the point of the experiments, to find out what it is. We always know this phenomenon weighs nothing. Natural magnets do not weigh less because they are emitting this magnetic phenomenon. Whatever is coming out of a lodestone is made up of something, has unique characteristics and we have categorized it as a magnetic phenomenon.

Introducing an electric current allows a piece of iron to emit magnetic phenomenon and increased photonic activity such that with the introduction of an electric current we get:

$I = \Delta Ep + M_{ph}$ (1) where:

I = current flow

ΔE_p = change in Ep, photonic activity including heat

M_{ph} = magnetic phenomenon

In time, of course, we are dealing with the quantum and everything will need to be expressed in the quantum in as discrete a manner as possible. Such that (1) above can be expressed as

I = the current as defined by V/R which is voltage divided by resistance.

E_P = number of photons being released, quantum mechanics is about discrete phenomenon, it is about the number of something. How bright is something depends on the number of photons. Any intensity in the electromagnetic field is about number of a discrete phenomenon. In this case the photon.

We also know that the phenomenon dwindles in strength quickly as one moves away from it. A good example of such an experiment and can be quickly and simply understood is an experiment carried out by a [2]Bill WW. (2) gives an idea of how the phenomenon behaves as one moves away from the source.

$M_{ph} = ae^{-KePec}$ Where: (2)

M_{ph} = magnetic phenomenon

a = magnetic phenomenon at face

e = natural exponential function

K_e = kinetic energy

P_e = potential energy/ amount of matter

c = speed of light

equation 2 tells us the magnetic phenomenon gets weaker with distance from the source.

This conceptualization will be important as we investigate the phenomenon using the double slit experiment. (What was expected what was given, given what we know). We need to understand equations 1 and 2 so that we can appreciate that the magnetic phenomenon's strength decreases as one moves away from the face, hence the need to look at it closely. What equation 2 turns out to be depends on the result of the experiment. What would be the point of the experiment if not to understand what is happening and understand it in the simplest manner with an equation 3 at the end.

4.0 Experiment:

4.1 Metal for the Experiment and Initial Expectations

This data was collected during the period of September and October 2020.

All experiments involved measuring mm the gauss reading in front of metal slab millimeter by millimeter with different configurations: 6 types of slabs where used and these will be referred to as A, B, C, D, E, and F and their configurations are laid out in figures 2 – 7. The technical layout of these experiments is laid out in appendix B. The magnet never touches the slabs. They are separated by a 2cm wood block. The magnet that was used was a neodymium magnet of dimensions 4 x 2.5 x 2.5 cm, with strength of between 4.5 – 5 kilogausses at the pole. The magnet itself is not important. It is the patterns that are produced when measurements take place that are important. The slabs merely create an interference a disturbance.

The blank test is a blank slab but each experiment can be considered a blank test of the other because the configurations are different. The experiment is about one thing. The pattern at the slits and the pattern as we move further away. There is nothing going around in circles. That is just absurdity because it would mean the magnetic phenomenon changes from one polarization to another as it goes around the magnet. This needs to be said, often people will take iron filings or something similar, sprinkle them around a magnet and call it a magnetic field. Then they will draw arrows showing a magnetic field going from north to south. That would imply if iron fillings were enough to make such a conclusion that the magnetic phenomenon leaves a pole and it changes polarization. That is what it means.

Take figures 1a and 1b from [3]Hyper Physics and [4]Britannica, respectively. They show what are called flux lines with arrows clearly implying something is travelling from north to south pole. The implications are that this material travelling from north to south at some point starting as a north polarized phenomenon becomes a south polarized phenomenon, travels through the magnet and remerges as a north polarized phenomenon. This just gets people confused. It confused the author because it implies entanglement. Logic used by the author in a [5]paper, and they are misleading. Those 19th century diagrams are part of what has led people to believe what is coming out of a lodestone is magic, going around and around and then needing massive shielding, far from it. The author does not accept that and this is why I set up the experiment in its form. There is no proof and there will never be any proof that those iron fillings have anything to do with shape of a magnetic field or flux. It is just the property of the magnetized iron fillings. The phenomenon gets weaker as one gets away. The magnetic phenomenon can never be utterly understood by iron filings. Measure it using a gauss meter and look at the data. A gauss meter is the only instrument that can tell us how much of this phenomenon is there but no name shall be given until we know what it is. That is why in this paper its largely referred to as a magnetic phenomenon both field or flux, field or flux merely to show what has led people to believe what is coming out of a lodestone is something unknown as its basic characteristics can not be known. Is it discrete or something from another dimension so to say?

Figure 1a: Magnetic Field As illustrated By Hyper Physics

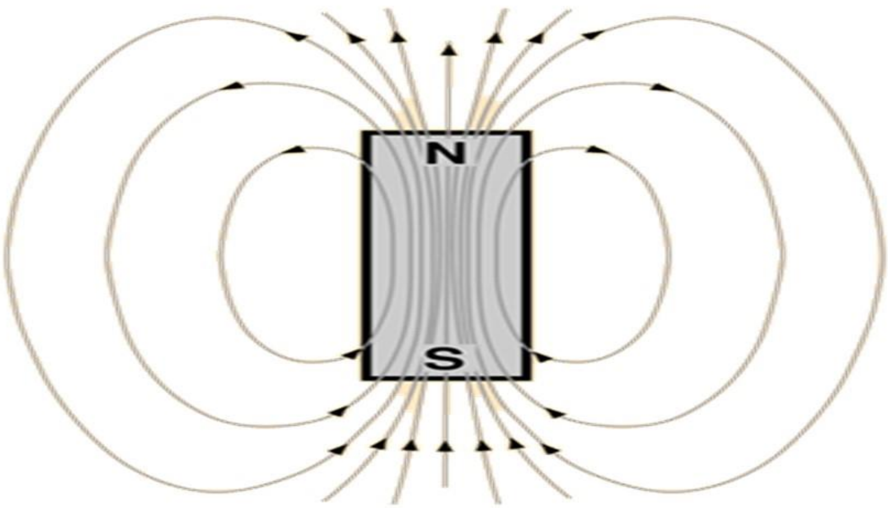
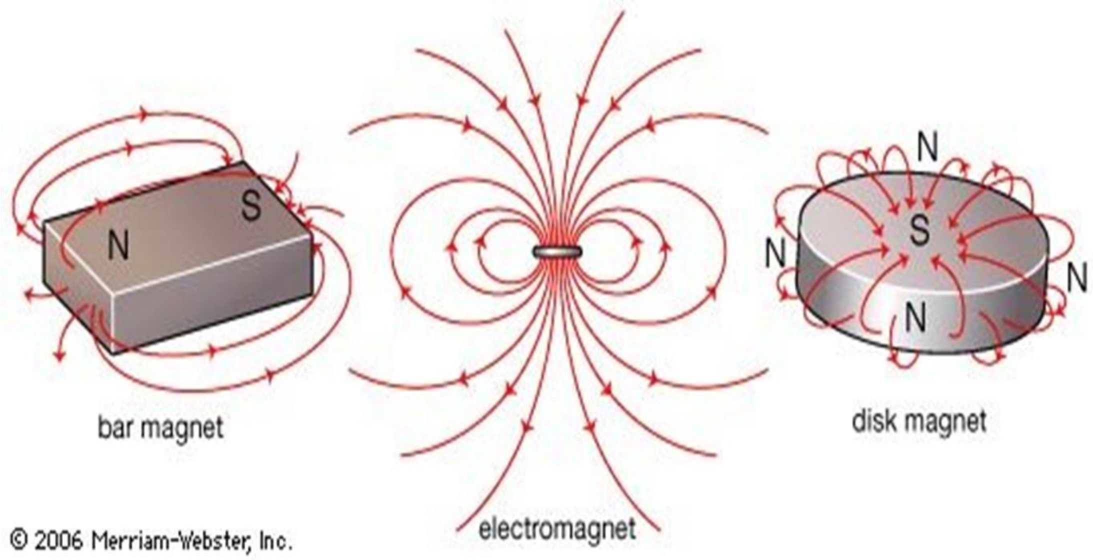


Figure 1b: Magnetic Field As illustrated By Britannica



The phenomenon is coming straight out and not coming back. Bigger slabs will not change the behaviour at the slits and the paper will become too bulky. This is a basic experiment which should have been done 100 years ago, gauss meter was invented in the early 19th century by Carl Friedrich Gauss. Nobody saw the reason to test the magnetic phenomenon for its true nature as there was no theoretical foundation to suggest this simple experiment so what was coming out of a lodestone has been thought of as something mysterious. Its basic nature is not known. What is it?

If there are to be any different configurations they will belong in another paper as confirmation. Shielding was at first considered but one realized that the shielding did not change the behaviour of patterns just reduced magnetic phenomenon at face in a linear fashion. The more slabs you add on the sides, the magnetic phenomenon just decreases in a linear fashion. This why the author decided it is best to measure with the dimensions given and not continue with a bulky experiment. That was the first experiment. The author realized only thing that matters is pattern produced by the data.

Figure 2: A = iron slab slits 19mm apart

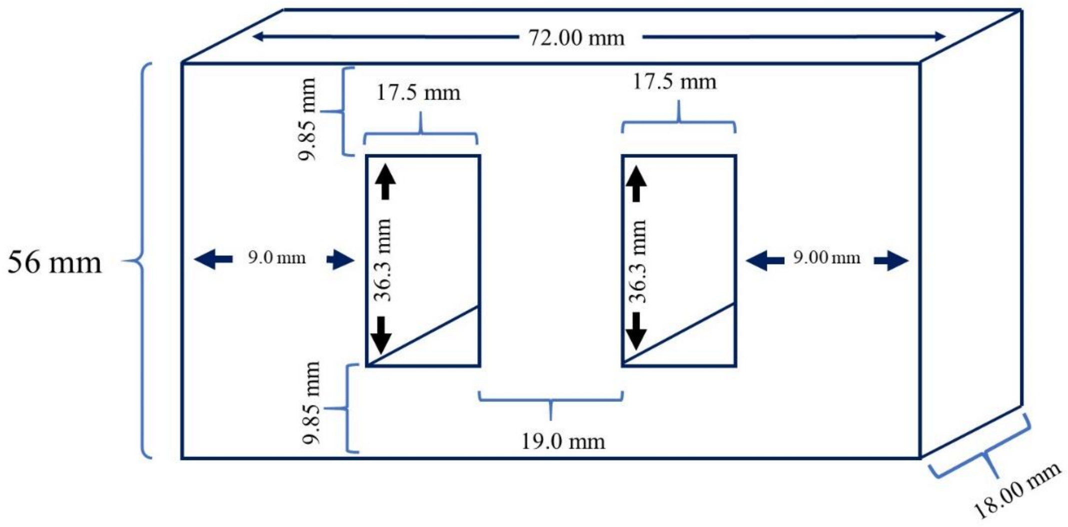


Figure 3: B = iron slab slits 5.0mm apart

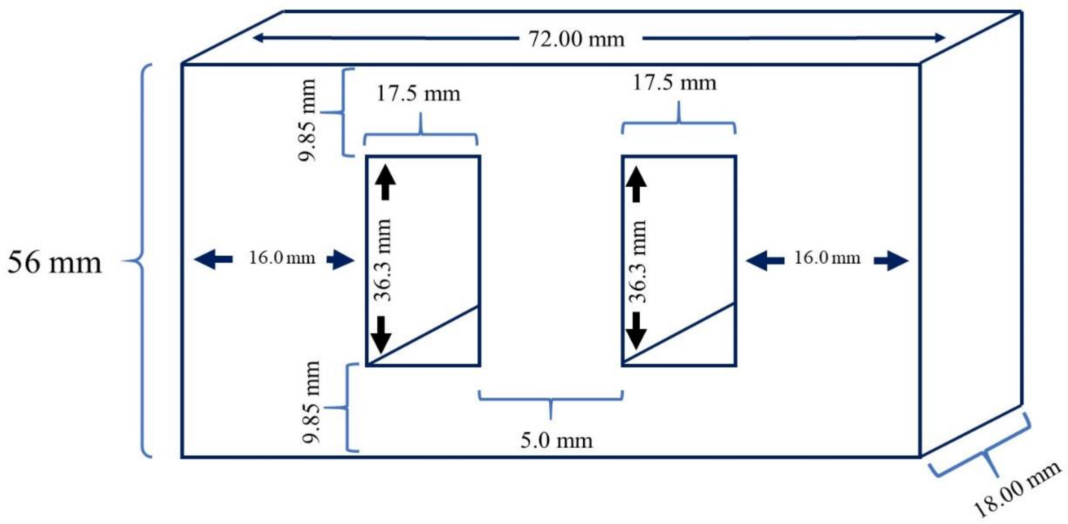


Figure 4: C = iron slab blank test

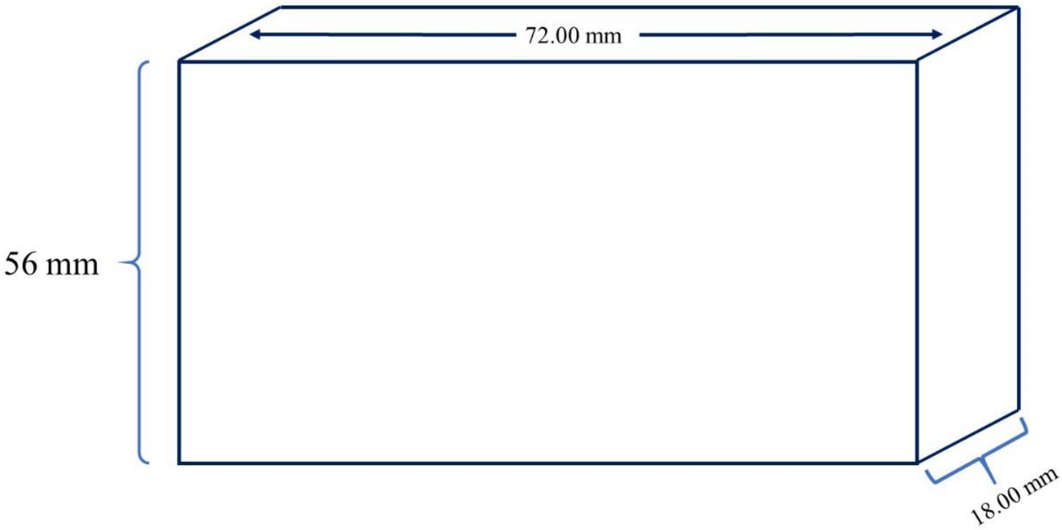


Figure 5: D = ferrite

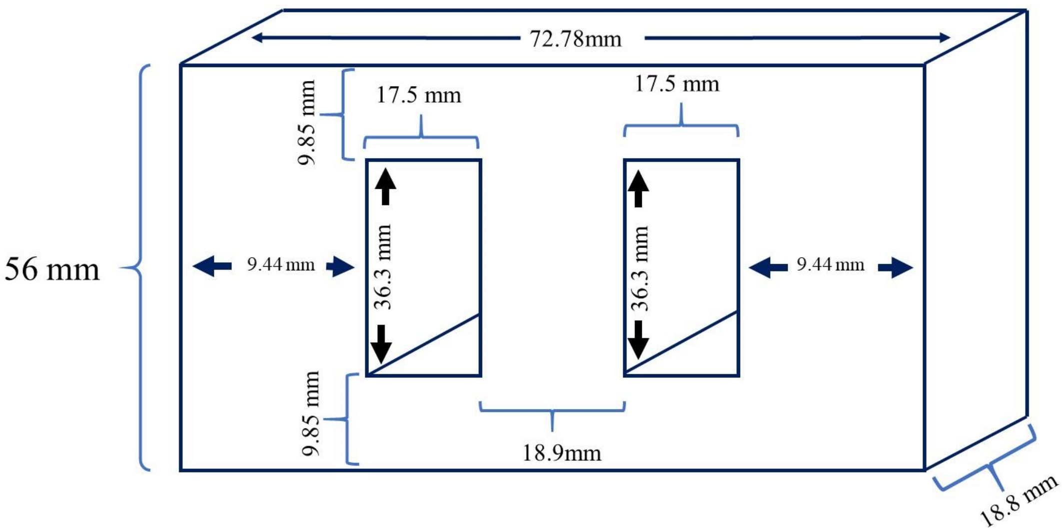


Figure 6: E = 80 x 80 x 12 mm metal lab with slits

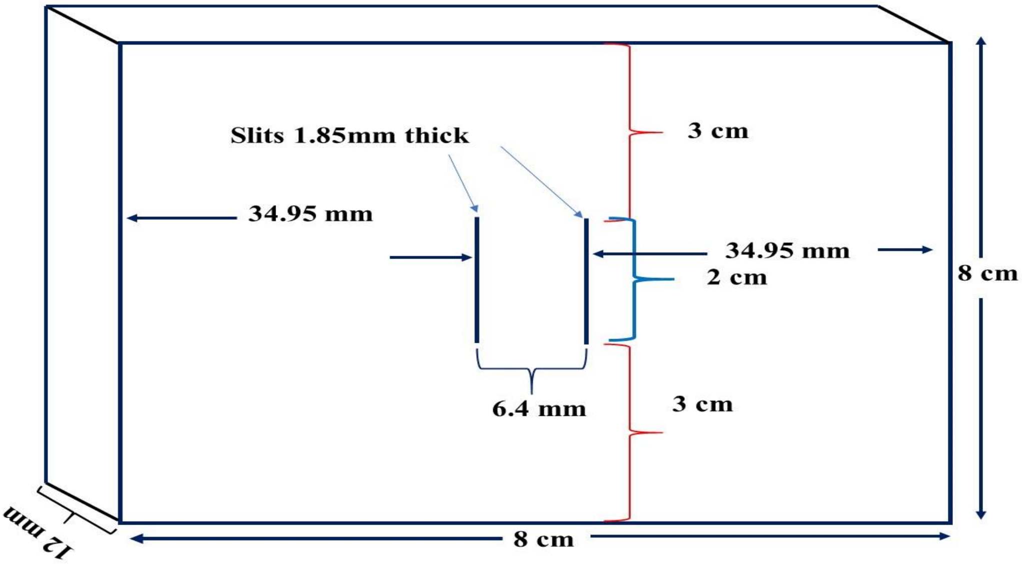
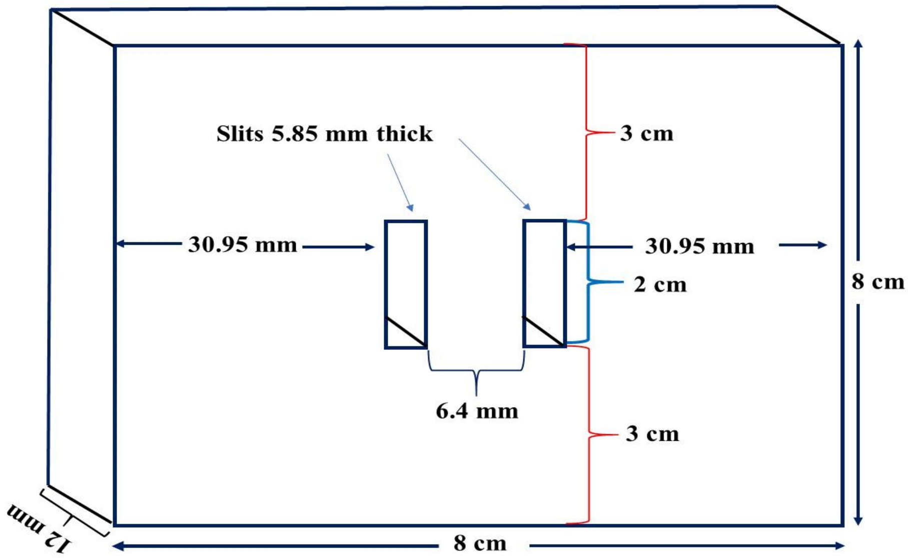


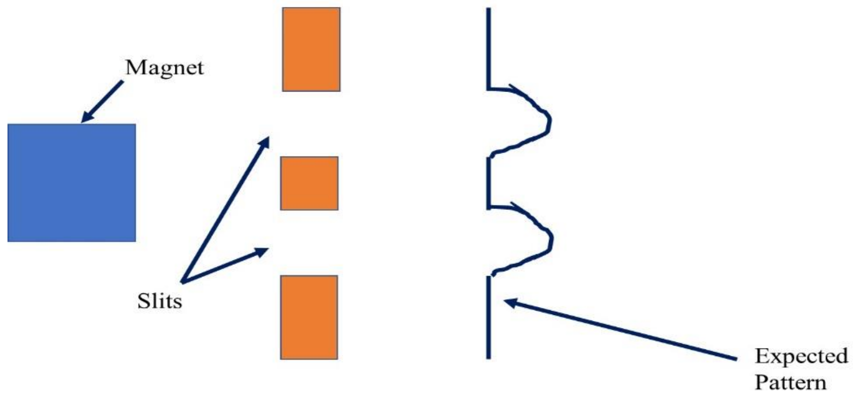
Figure 7: F = 80 x 80 x 12 mm metal lab with 5.8mm slits



4.2 Initial Experiments

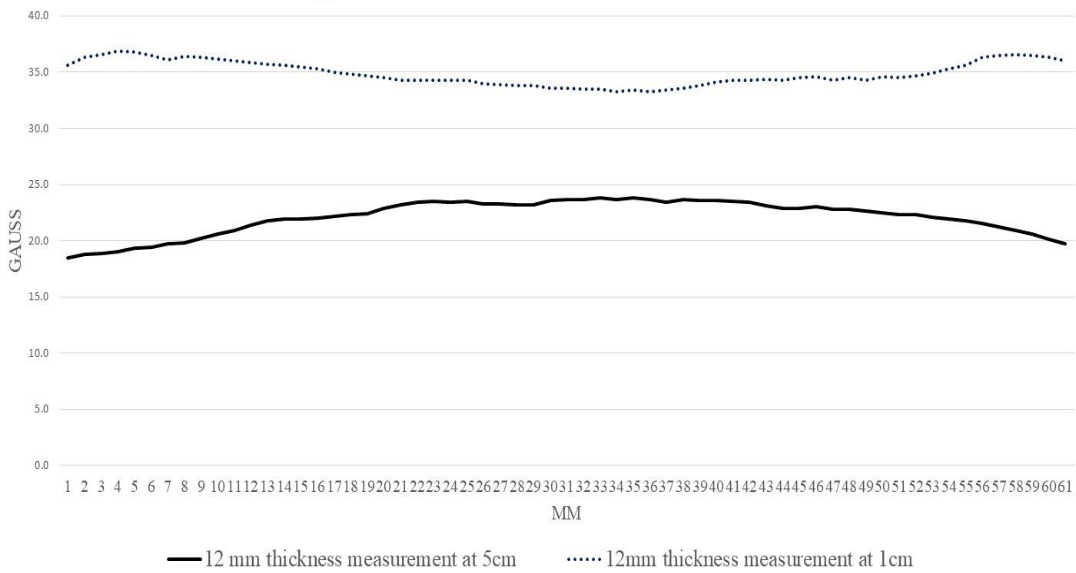
The first experiment to be reported involved using block E. as block was 8 x 8 cm. It was decided to measure 6 cm across the face of the block 3cm either side of the center. From theoretical discussions what was expected was figure 8. The reasoning was the iron would absorb the magnetism and the phenomenon will pass through the slits.

Figure 8: Expected Magnetic Pattern from Experiment



What was given by the experiment was something completely unexpected. This is shown in figure 9.

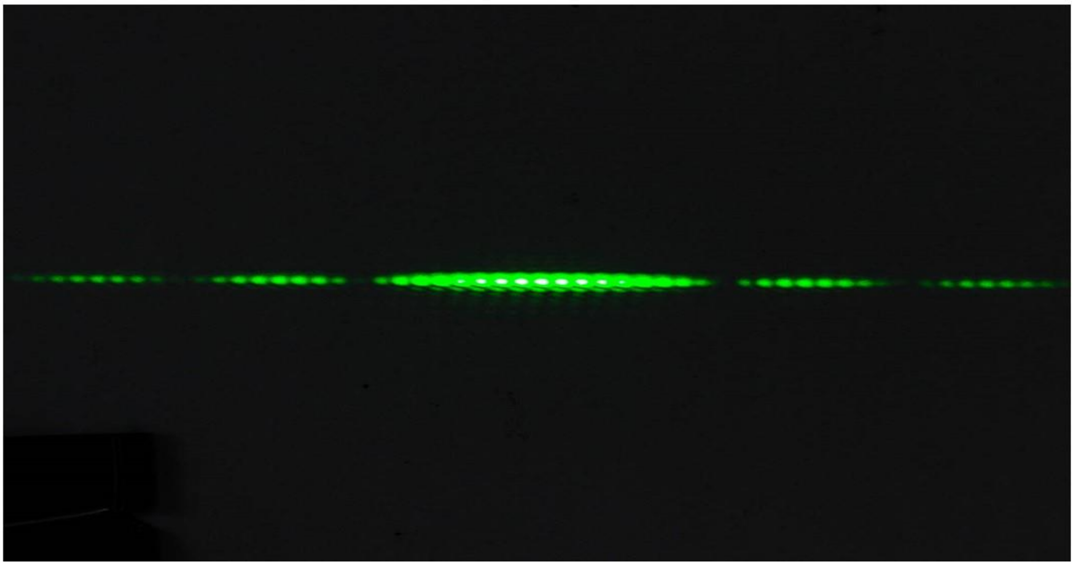
Figure 9: Results of test on E



The expected pattern was not there. Not even near the face. What was noticed is that at 5 cm we have a wave. No further tests were done. Perhaps the slits needed widening. Leading to a test on slab F. The results are graphically shown in figure 11.

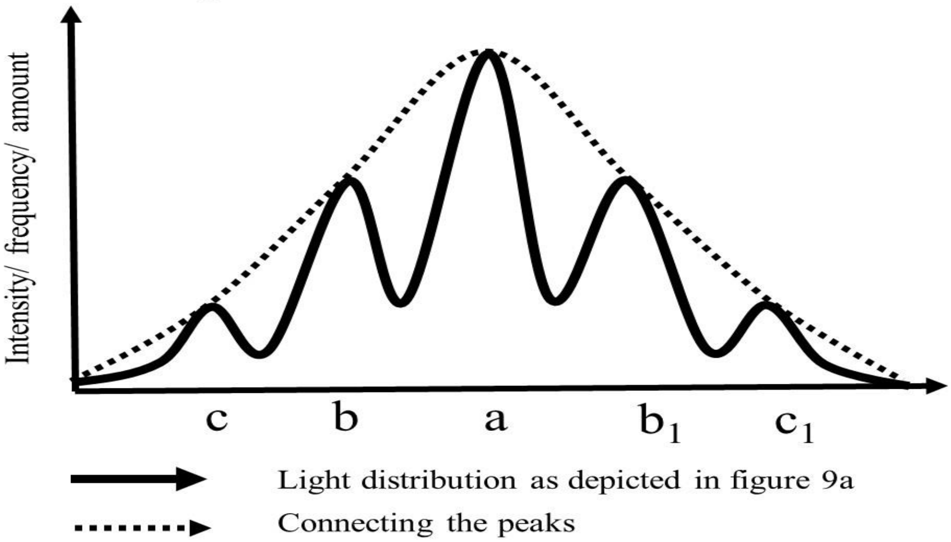
A wave in quantum mechanics is just how a system organizes itself, the distribution pattern, a predictable distribution pattern. Take figure 10a, now, this paper is using a demonstration from the [6]Exploratorium, but one can use any search engine and see what illustration they like, not forgetting the experiment has improved greatly since Thomas Young first did it over 200 years ago.

Figure 10a: Double Slit Experiment From Exploratorium.com



Looking at figure 10b, 10a has been put into a graphical illustration to make it easy to understand why this is considered a wave not by the author, but accepted fact. It is called a wave. It could have been called anything. Not to be confused with an ocean wave. Absolutely wrong. One will understand this with further explanation.

Figure 10b: Double Slit Experiment from Exploratorium.com; Graphical Illustration of Interference Pattern

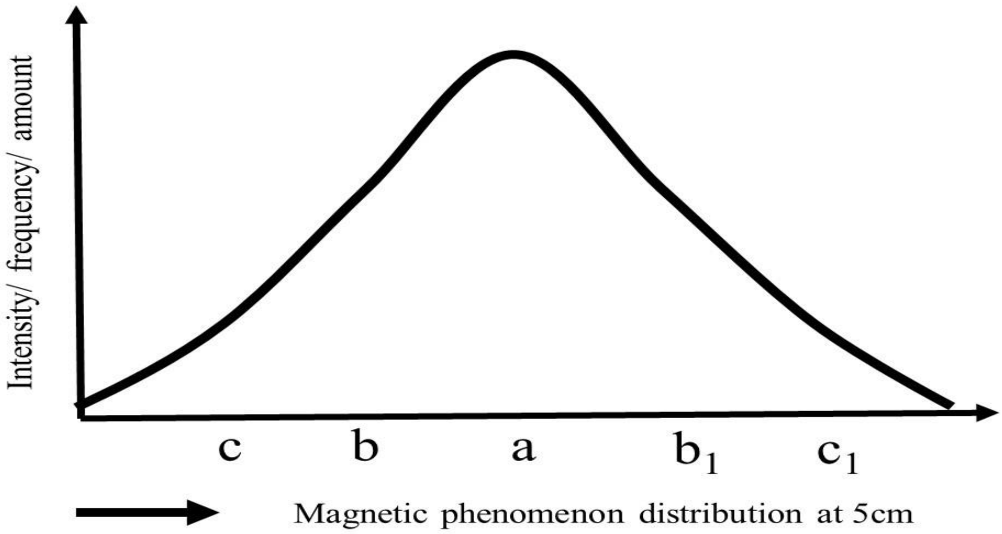


We see this pattern because we have put an interference in front of the laser. Those slits do not occur naturally. A man thought about it and put those slits there. In figure 10b, we have the highest intensity of light at a, the center and as one moves away from the center the intensity of light gets less. We have b and b_1, and the more we move away from the center, a, we get to c and c_1, then the "wave" tapers off.

We have another dashed curve connecting the peaks. We need to understand that this interference pattern is how light is moving away from the slits but at any time as one moves away, we have this pattern. It is a statistical / probability distribution and we can predict the likelihood of where a particle, a photon will be because of this probability distribution.

At 5 cm from the face, and if one continues to read the paper, they will appreciate it occurs from 2.5cm or less we get the interference pattern as illustrated in figure 10c. This is the distribution we get. We can only appreciate this if they get to section 4.4 of this paper.

Figure 10c: Results of Experiment on E at 5cm, the Interference Pattern/ distribution



The magnet has a distribution and keeps this distribution from 5cm on. The "wave" distribution we see with magnetic phenomenon will be a gaussian distribution. Is that not fitting, the man who gave us the gauss meter the ability to measure the strength of the magnetic phenomenon? Carl Friedrich Gauss also gave us the distribution function to understand the wave of the magnetic phenomenon.

This experiment is new and was expected that the phenomenon will go through the thin slits. It did not and that is all there is to say. It was expected the magnetic "phenomenon" emanating from the magnet most would be absorbed by the metal, but some would go through. What happened was the metal was magnetized and magnetic phenomenon was emitted by the metal. Now we know.

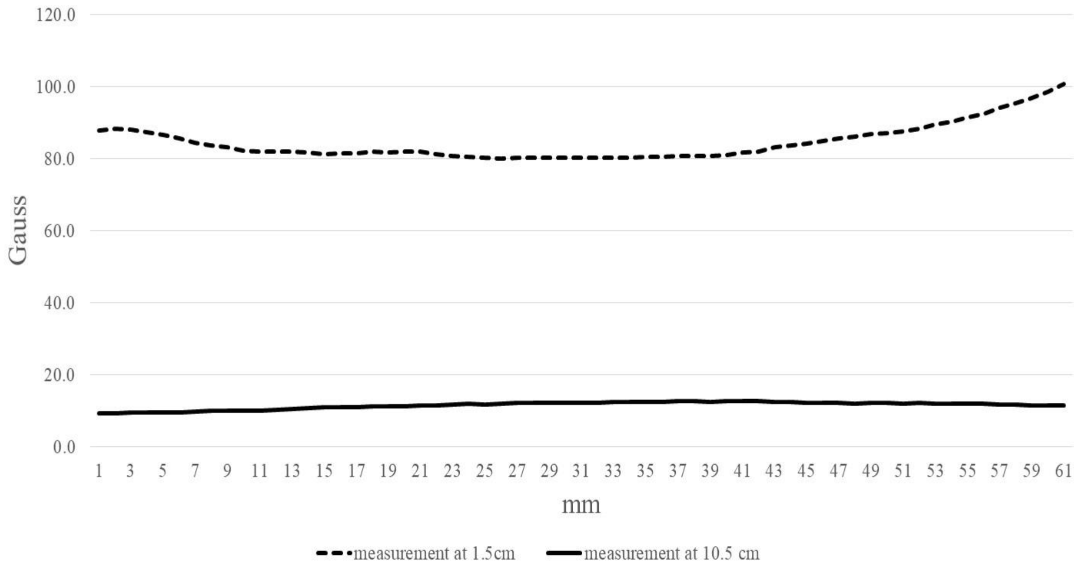
It is not flat near the face therefore one must understand why equations 1 and 2 are so important. It is merely the scaling that makes it seem flat. This phenomenon is not like light. It decreases in amount rapidly. Thus, when somebody looks at say figure 9 they believe something is flat. No, the magnetic phenomenon does not work like that. It is scaling because at 5cm there is so much less of it. Reading further it is explained lowest in the middle at 1 cm.

Testing the iron slab with no slits there is no magnet inducing opposite polarizations anywhere. As one reads on they will know that with this set up every magnetic phenomenon coming out of the slab is polarized the same depending on the pole they are receiving the magnetic phenomenon from the magnet. When one talks of poles with magnets one is talking of magnetic poles. There are always 2, a north and south pole. These are regions on a magnet where the magnetic phenomenon from a magnet is at its strongest and where the magnetic material/ phenomenon coming out of a magnet is at its highest.

Perhaps in the slits there is cancellation but this experiment is not about that. All it wants to see is what patterns are created as one moves away. If they cancel each other in the slits all the better as one can see we get big dips that disappear. That is what one is after, what is happening due to this interference causing magnetic phenomenon to interact amongst itself? The purpose of the experiments.

One must appreciate that what is coming out of a lodestone is not a photon, an electron, a neutron, a neutrino, nor a proton. It has its own unique characteristics, then what is it? Nobody can tell you. Looking at figure 8 there is a difference between how phenomenon behaves at 5cm and 1 cm. This is not magic. Continue reading and understand what is happening in section 4.4. There is no way the phenomenon organizes itself the way it does unless it is magic or interference with itself. At the end of the day, we have also interfered with the path of the magnetic phenomenon by merely placing an iron slab in front of it. This does not mean interfering with itself. This is the same with the iron filings. The phenomenon is being looked at within the context of being in a relationship with the iron filings but the iron filings are magnetic and will have their own magnetic signature interfering with the magnetic signature from the magnet.

Figure 11: Results of test on F



The results on F with the wider slits did not result in the expected pattern, however, at 10 cm one realizes it is a wave just like the magnetic phenomenon being released with slab E. As can be seen from figure 11, the magnetic pattern for slabs E and F are the same especially at the face. What is noticed is that though the slits are not clear, the magnetic material is weakest in the middle of the plate. What this means is that at the face, the plates are magnetized in such a way that the poles are the strongest. The magnetic pattern at the face of the plate can be illustrated as figure 12. The magnetic phenomenon is weakest in the middle of the plate.

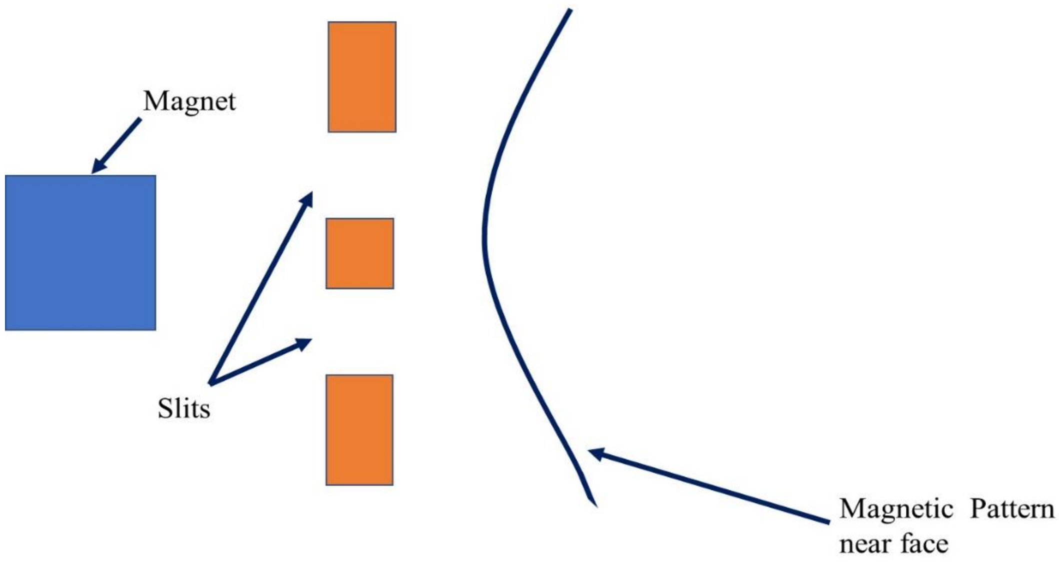
What is meant in the above paragraph is we have 2 distinct areas where magnetism is at its highest when measured near the face of the plates though not real magnets. These are the magnetic poles artificially induced by set up in the experiment.

Looking at figures 9 and11, we merely look at the shape of the phenomenon that was measured at 5cm for figure 9 and 10.5cm for figure 11 it has a wave formation, straight out of the Thomas young experiment, phenomenon higher in the center and lower as one moves from the center. Why would magnetic phenomenon end up like this? We look at the explanations for figures 10a – 10c as well as read further to appreciate.

Looking at the double slit experiment, before measurement it is a wave just look at figure 10a. Intense in middle and as one moves from middle it loses intensity. This should be basic knowledge at this level. One can do the experiment with some cardboard boxes and a laser.

There are two poles following what is understood about the magnetic phenomenon thus far. It is highest at the poles and that is what we have when we measure near the face, two peaks and a dip in the middle.

Figure 12: Magnetic Pattern at face for E and F

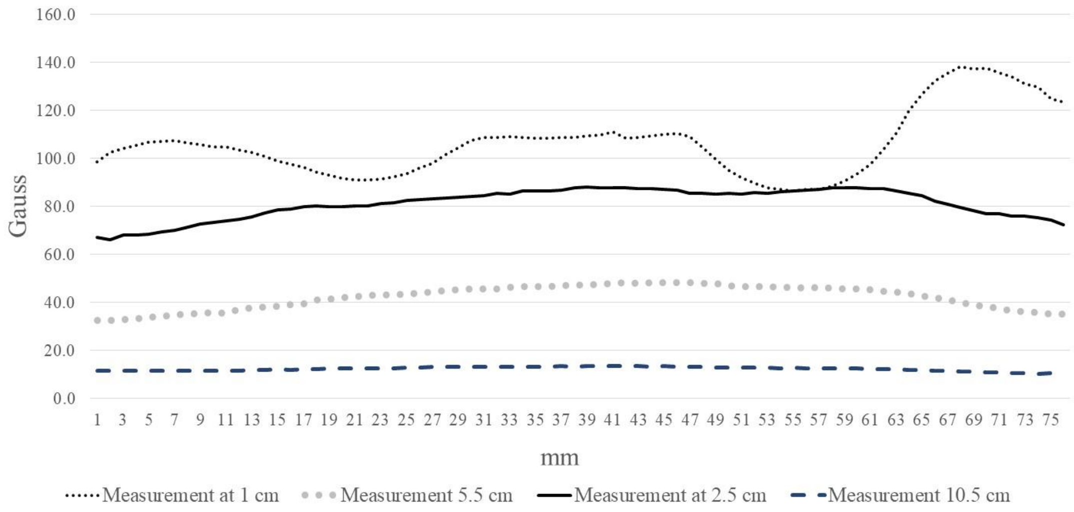


As can be seen though interesting figure 12 is not the expected pattern of figure 8. What has been gained though is that at the face we understand as we go towards the poles there is more of this magnetic material.

Figure 12 is what it is, just a visualization of what is happening near the face in figures 9 and 11. The phenomenon is higher at the poles and a dip in the middle and the slits are small referring only to figures 9 and 11 as explained. Where it dips is the middle of the plates, obviously generalization of the results from figures 9 and 11, nothing is flat.

Still needing a material that would produce desired effects as in figure 8. Ferrite was seen in the laboratory and an impromptu experiment was carried out using slab D as in figure 5. Due to suspicions of magnetic phenomenon being higher at the sides of the face, measurements were taken across the whole face and this is what was with D as shown in figure 13.

Figure13: Results of Test on D



D gave the results desired at the face but inversely. The tests in D confirm results from tests on slabs E and F. It is a wave as one moves away from the face.

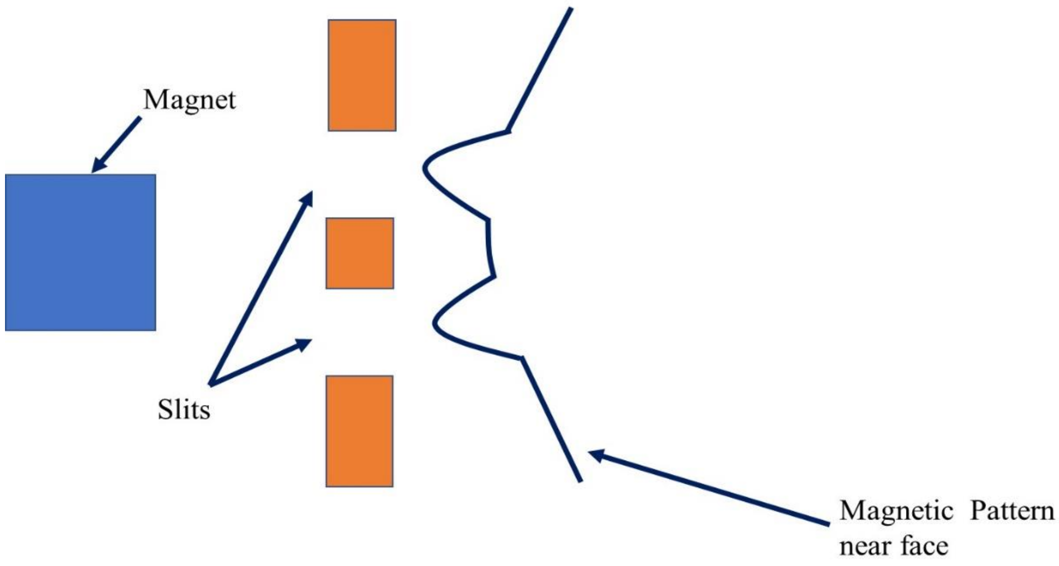
Understanding the reason behind equations 1 -2, we understand that we have a scaling problem as phenomenon rapidly decreases in strength. The Thomas Young experiment, commonly referred to as double slit experiment always shows a wave pattern before measurement, or interference. It does not need mathematics because you can see the pattern with your eyes. This author has done experiment himself using his daughters McDonalds Happy Meal box.

A wave pattern is said to occur when in the middle there is highest concentration of a quantum phenomenon and it decreases as one moves away from the center. That is what one sees when we do the double slit experiment, even at home with cheap card boxes and a laser from a dollar store. The same principle must apply to the magnetic phenomenon. Goal posts must never change in science. That is what is happening from 2.5cm to 10.5 cm. Nothing is flat, the magnetic phenomenon is not uniformly spread out.

The Pattern at near the face of D is not what we expected but the mistake is quickly ratified understanding equation (2) above. The phenomenon loses strength rapidly, in an exponential manner, as it goes through the slits it has greatly reduced strength. The reason for the dips, that are more pronounced than in tests for E and F. This can be seen in figure 14.

Compare figures 14 and 12. Look at figure 13 considering measurement at 1cm compared to figure 11 at 1.5cm and figure 9 at 1cm.

Figure 14: Magnetic Pattern at face for D



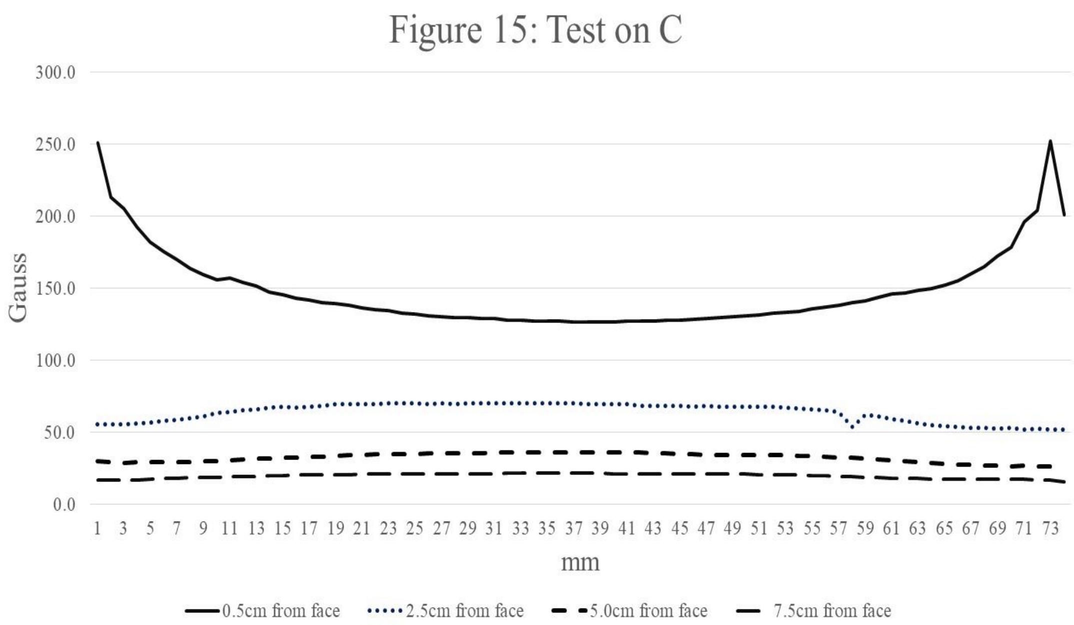
4.3 Can Tests be Redone and Confirmed

What has been confirmed is that this phenomenon is a wave. It has wave like qualities. The experiments must be confirmed. With explanations that go with figure 13 and 14. Is this behaviour because of the property of the ferrite? Can it be repeated using iron?

4.4 Confirming aspects of the Magnetic Phenomenon

4.4.a test on C

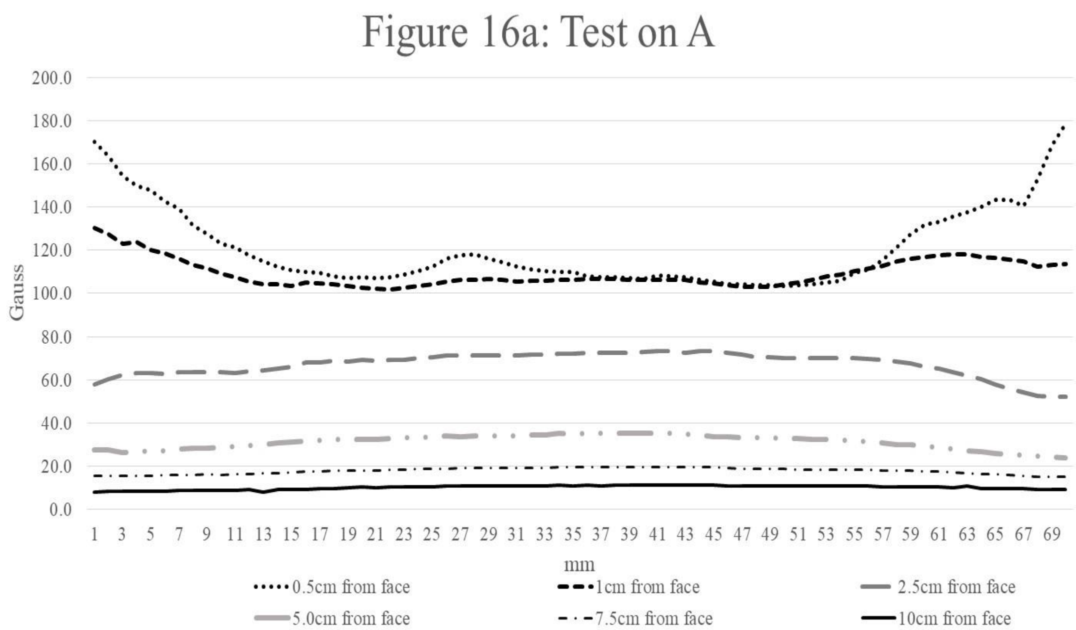
An iron slab, C, with the same dimensions as the ferrite, D, but with no slits. The reason for this was to have a blank test as well as to confirm what is happening at the poles with this phenomenon when measured near the face. A confirmation is always needed. Figure 13 shows the test on C.



What is confirmed is that at the poles not far from the face the magnetic phenomenon is strongest. It becomes a wave as we move away from the face.

4.4.b test on A

Slab A was made in the same dimensions as the ferrite, D, including the slits. The reasoning is to see if the same pattern at the face is achieved. The wave pattern is now expected. The results for this test on A can be seen in figure 16a.



As can be seen from figure 16a, A and E, the ferrite block, have a similar pattern. The wide slits allow us to see this. It is not the behaviour of the slab as it has not moved but the magnetic phenomenon. After 2 cm the phenomenon is in a wave formation.

The above paragraph can easily be defended. If one reads further to section 5 most justification will be there. Take figure 16b. It is extending figure 14 above. It shows the expected magnetic pattern if there is no influence on it, reducing in strength as it moves away from the slab but keeping the same pattern as it did at the face.

Figure 16b: Magnetic Pattern without Organization

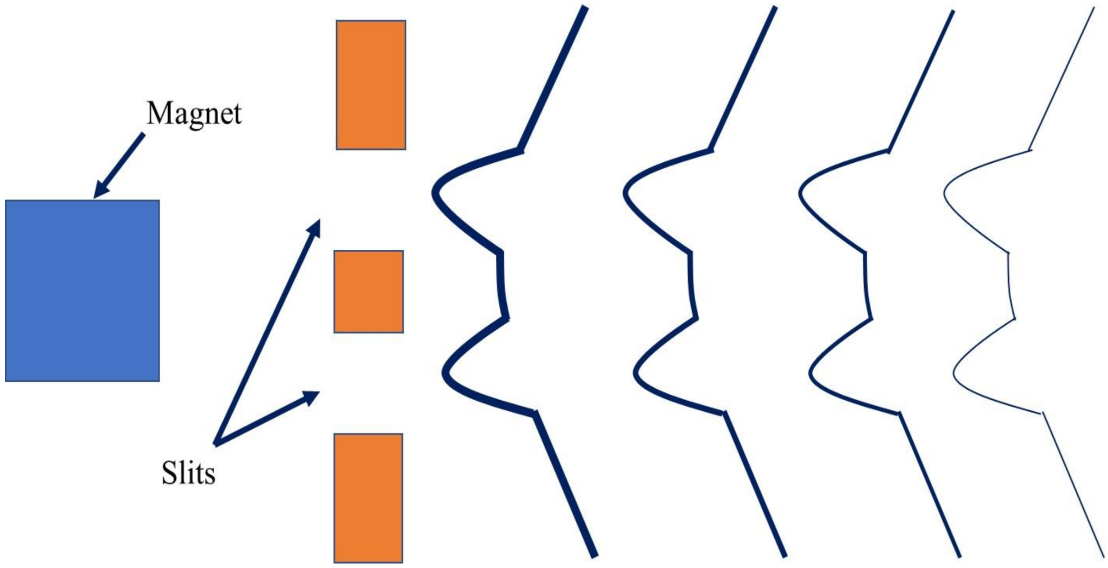


Figure 16d shows what is happening. The phenomenon has organized itself into a wave and interfered with itself. The same pattern one gets with original Thomas Young double slit experiment that one can do at home with probably a cereal box if determined and a cheap key ring laser. Points A, B, and C being highest concentration as from the graphs and reducing as one moves away from the center. In both 16b and 16d the phenomenon is shown to illustratively get weaker and weaker, hence constant need to know equations 1 and 2.

Note that points A, B, and C in figure 14d are the highest points of concentration of the phenomenon. Just take figure 10c and turn it clockwise, that's all that figures 16b and d represent. It is not difficult to imagine small mental trick as in figure 16c. Take 16a and turn it 90° clockwise.

Figure 16c: Figure 9c Turned Clockwise

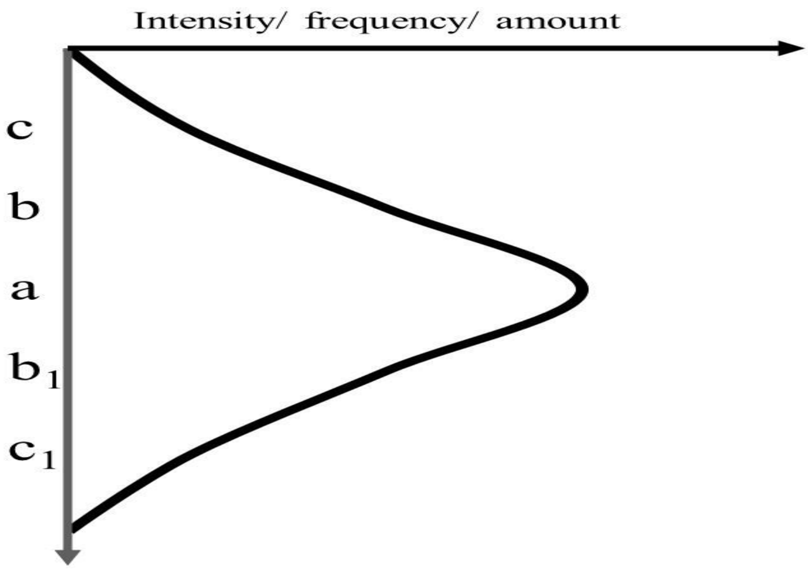
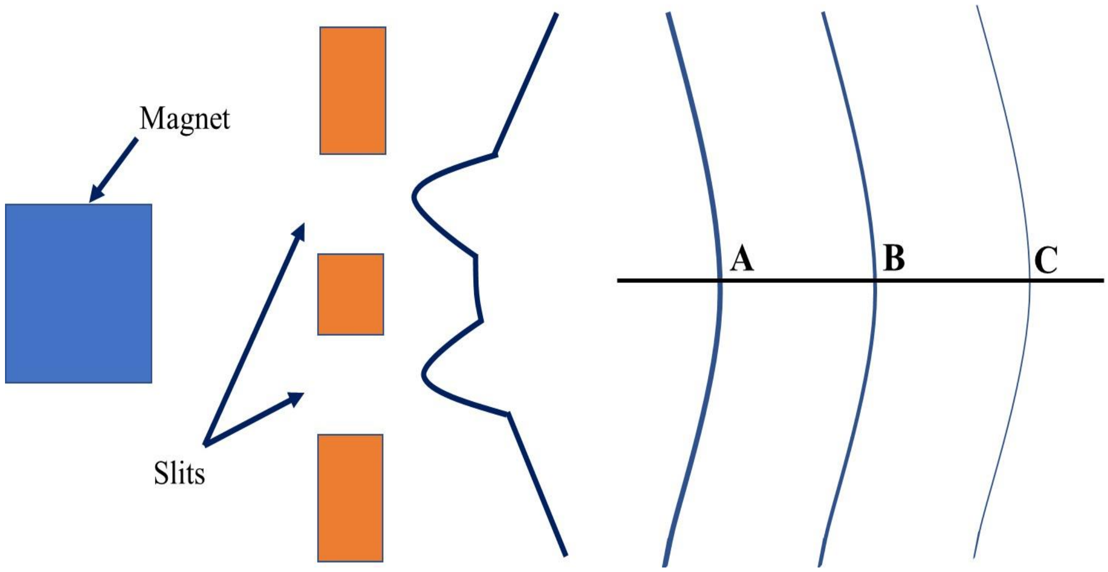


Figure 16d: Magnetic Pattern with Organization



4.4.c test on B

B has the same configurations as the ferrite and A however, the slits are moved closer as can be seen from figure 2 above. For comparison, we understand now it is in wave formation after 2 – 2.5cm of distance travelled.

Figure 17: Test on B

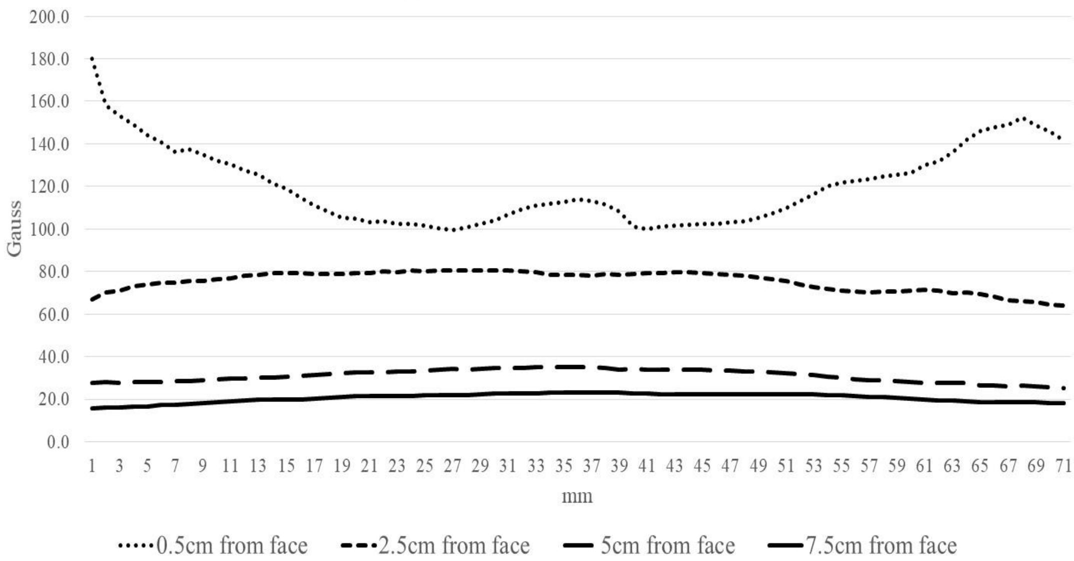


Figure 17 also shows the effects of the slits even when you move them closer. It is the pattern at the face that is important as it is once again confirmed to be a wave.

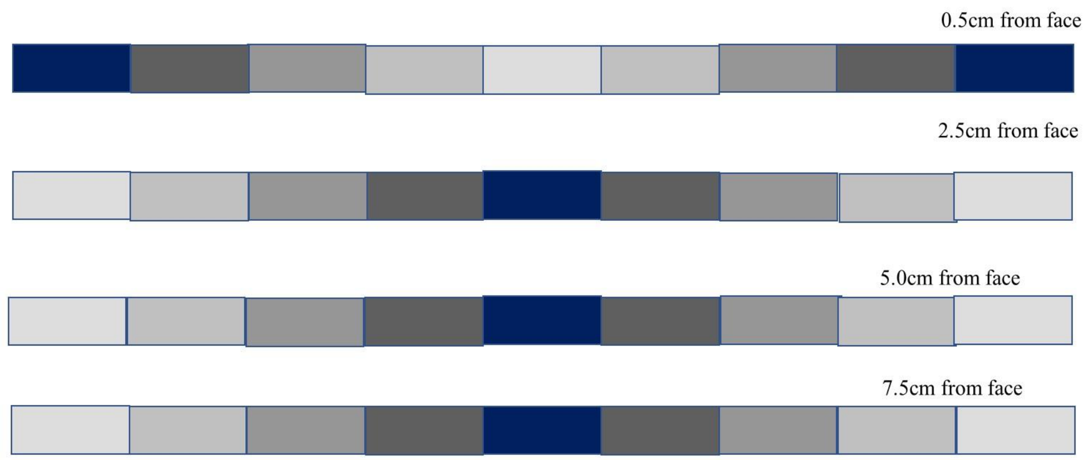
5.0 Why a Wave?

Results from all the experiments say this phenomenon has a wave formation. However, at the face, the closer we get to the face of the slab there is no wave pattern. Phenomenon is strongest at the poles. Within 2cm it is in all purposes what is considered a wave formation but it does not start that way. It is generally accepted that the propagation of a magnetic field is at the speed of light.

As this phenomenon travels at the speed of light, it means that within approximately 2 jiffies, approximately 67 picoseconds, this phenomenon becomes a wave. There is a reason it takes this shape, meaning this phenomenon sorts itself out and takes the familiar wave structure. Why? It can only take this form meaning it is moving through a medium and this is the most efficient pattern it has to move through this medium. The process of taking this takes approximately 2 jiffies.

Looking at figure 18 we can see what is happening with slab C. One can see near the face, the phenomenon is strongest at the sides but at 2 cm and further on it is strongest in the middle, just as would be expected in a wave formation.

Figure 18: Visualization of General Magnetic Phenomenon



The darker the shade the more intense the magnetic phenomenon

6.0 Why Does Phenomenon Diminish So Quickly?

Our answer comes from particle colliders like the one found at CERN. Each time they switch on a collider and particles smash into each other. Within the smallest fraction of a second unstable material, particles, disappear. That is the only explanation possible. The magnetic phenomenon is not entirely stable after the smallest fraction of second. Perhaps as quickly as 0.1 of a jiffy, 3 picoseconds or even sooner. This behaviour we only see in colliders, unstable particles.

In colliders particles disappear in fractions of a second just as this magnetic phenomenon disappears in fractions of a second or it will have the same strength all the way to the nearest sun, clearly not. It is unstable. That is it.

7.0 What is Phenomenon before it is wave?

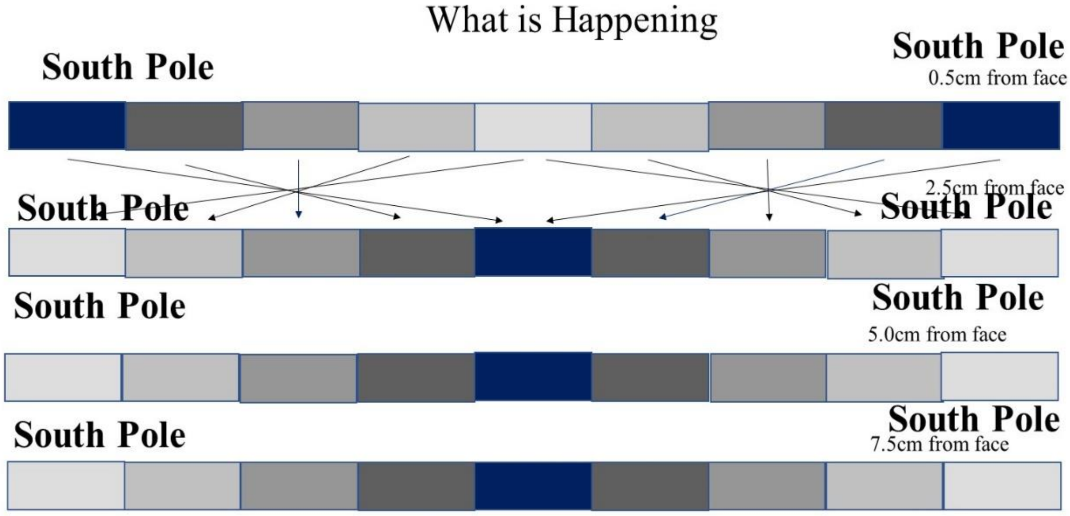
Unless one wants to invent new phenomenon, it can only be a particle before it takes a wave formation. In fact, waves are just particles organized in a manner such that they appear as a wave. Anyone can do this experiment. It is not a wave before 2 jiffies. This material then organizes itself in such manner so that it travels at what the universe considers the most efficient manner. This can only mean it is travelling through a medium.

The name of the particle is a khumalon, it is only fair, magnet is from a province in Greece called [7]Magnesia. It was originally to be named a khumson, but that conflicted with a name of a town in Uzbekistan, that is not where concept originates from.

8.0 Polarization of the Slabs

In the set up we have with iron slab c, explanation for figure 15, the phenomenon was all south polarized. The slabs on either side had their highest gauss readings. We can consider them poles. Both were found to be South. Using a compass, as well as a gauss meter, it was found the solid slab was a [8]monopole, both high ends were south pole. This was near the face. It was done several times. Perhaps in other configurations things will be different, for example, with a horseshoe magnet. This is illustrated in figure 19.

Figure 19: Visualization of General Magnetic Phenomenon What is Happening



The darker the shade the more intense the magnetic phenomenon

9 Equation 3

Equation 2 from above can now be given a formal end product. We now know what the magnetic phenomenon is, it is a particle that organizes itself into a wave formation. Equation 2 then becomes:

$K = ae^{-KePec}$ (3) where

K = Total number of khumalons

a = number of khumalons at the face.

Ke = Kinetic energy

Pe = Potential Energy

We deal in the amount of something, discrete numbers to describe discrete phenomenon. Quantum mechanics at the end of the day needs to be clear in its simplicity. The strength of the magnetic flux, or activated magnetic field, because any field has a potential to be activated anywhere in this universe. A fields strength is about the amount of something discrete. Hopefully, when one talks of a magnetic field, they are talking field in the quantum sense or there will be just too much confusion around magnetism. Speaking of an electromagnetic field, the higgs boson field, these are fields in quantum mechanics and no other concept. There must be a standard.

Something must be expressed as simply as possible. The simplest way to express a quantum phenomenon is to understand the thing you are talking about as discrete whole numbers. For example, when we talk of an electromagnet and the strength of the activated magnetic field, the simplest logic to express this would be to say, for every single electron passing a certain point we get so many photons of this variety and so many khumalons. Straight forward and the reality of what is happening.

This is the reason why K in equation 3 is the number of khumalons. The strength of any field is about the number of something discrete. Take the brightness of visible light, luminous intensity, it is described in terms of candles. It would be far better to express it in the number of photons. The simple truth.

Conclusion

The magnetic phenomenon we have investigated after 2cm or 2 jiffies of a second has a wave pattern. The distribution of this wave pattern is a gaussian distribution using the tool available to us a gauss meter.

All experiments are unique according to what they are looking at. Before becoming a wave, and taking a distinct pattern, what has been called the magnetic phenomenon organizes itself into a wave formation. That thing that organizes itself into a wave formation has been termed the khumalon.

The strength of the activated magnetic field is like any quantum material dependent on the quantity of something, as equation 3 shows, it depends on the quantity of what has been termed a khumalon. The khumalon organizes itself into a wave formation and we know what it is there nothing wrong with calling this a magnetic wave.

Seeing the khumalon organize itself into a wave formation means it is most likely all other quantum phenomenon organizes itself into a wave. It is not spontaneous.

In hindsight, test on slab C, figure 4 alone confirms there is something organizing itself into a wave formation.

Important to remember for the future, quantum mechanics is about a quantity of something so many electrons, so many photons, so many khumalons, so many neutrinos etc.

Acknowledgements:

[8]George Hathaway provided the facilities for the experiment. Bot not only did he provide the facilities for the experiment he provided invaluable advice on how t set up the experiment in a practical manner. He helped with understanding the magnet and difficulties, things that helped. The author thought he could do the double slit experiment with cardboard, impossible, phenomenon would go straight through. Helpful in design of experiment, ideas on how to get a meter to move millimeter by millimeter across the slab, author wanted to use a fishing rod, screw is better, you could move a tenth of millimeter if one decided, detail not needed.

Great thanks go to 2d laser, of Vaughan, Ontario, Canada whose material was used and who did the cutting for the sake of science. I hope this paper will be received in a positive manner.

As English is authors third language, he would like to thank Adam Pease for helping with the language.

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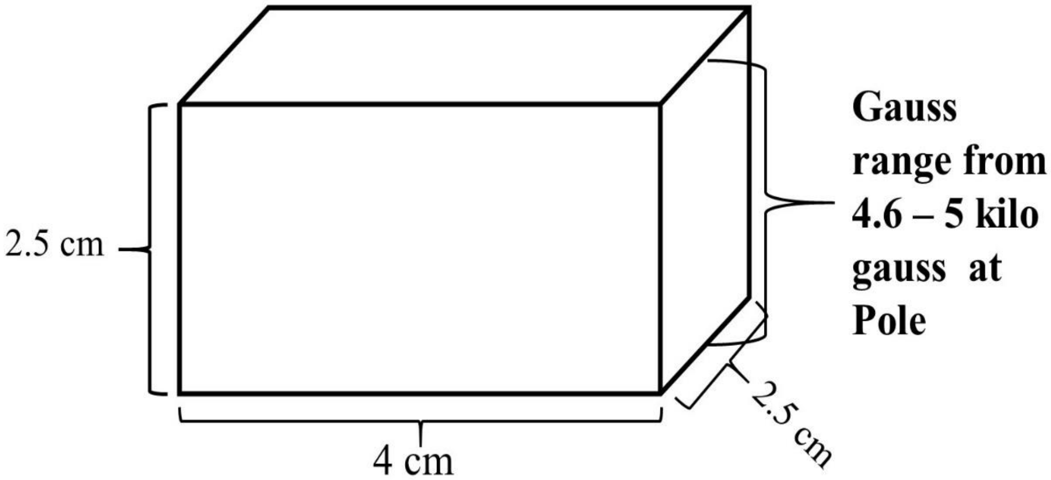
Appendix

Appendix A: Dimensions of Magnet



Appendix B: Basic Experiment Set Up