

'How Objects Fall' and 'Gill's Electronic Theory of Magnetism 1964'

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Abstract: Applying Gill's electronic theory of magnetism (1964) to planet Earth and relating it to the electron dependent *negative force* ($-e$) and the proton dependent *positive force* ($+e$) of atoms of any object close to the surface of the Earth, it will be explained mathematically how objects close to the Earth fall towards the Earth with a combination of these two forces.

In the northern and southern magnetic hemispheres of the Earth, equations based on known physics laws are offered for objects falling towards the Earth.

Dot-product vector equations will explain why a pendulum will accelerate least at the equator and this lateral acceleration keeps on increasing as we move the same pendulum from the equator towards the magnetic poles of the Earth as has been seen experimentally.

As the object O gains height above the surface of the Earth, the two negative and positive extra-terrestrial forces become effective and O starts losing weight with increasing height.

At a certain greater height above the Earth where the two negative and positive forces from the Earth balance with the two negative and positive extra-terrestrial forces, the object O will start behaving as a satellite. The bigger object O will become a satellite at a greater height.

A brief discussion at the end on why this presentation is more accurate as compared to Sir Isaac Newton's universal law of gravitation which resulted in the incorrect third force concept of gravity in the Physics world in 1687.

As the asymmetry between the magnetic force and the electrical forces is resolved with Gill's electronic theory of magnetism 1964, Albert Einstein's 'Special theory of relativity 1905' which was presented to deal with the asymmetry issue becomes unnecessary along with his 'General Relativity theory 1916' where he tries to justify the gravitational force.

INTRODUCTION

Some third force or gravity is not needed for objects close to the surface to fall towards the Earth as the same can be explained with a combination of the two electromagnetic forces from the two ends of the magnetic Earth with the application of Gill's electronic theory of magnetism (1964). According to Gill's electronic theory of magnetism (1964), there is a major physical change during magnetization in magnetic substances and a minor physical change in other objects which are not magnetic.

Moving away from Maxwell's dipole theory of magnetism (1873) and applying Gill's electronic theory of magnetism (1964) to planet Earth, it will be shown how objects close to the Earth fall towards the Earth because of a combination of the two forces (one electron dependent and the second proton dependent) that emanate from the two ends of the magnetic Earth. The third empirical force or gravity put forward by Newton in 1687 is not required.

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The above approach will lead us mathematically to show how the same object which was falling towards the Earth starts *losing weight with increasing height* and with a further height gain behaves as a *satellite*. All this primarily with the interaction of the two known forces both from planet Earth and the massive extraterrestrial magnetic source or sources. The centrifugal force from the orbiting Earth may play a minor role.

The pendulum acceleration is least at the equator and keeps on increasing as the same experiment approaches the magnetic poles of the Earth is explained with the help of equations based on known physics laws. Newton incorrectly ascribed that to the flattening of the Earth at its two poles.

Only dot product equations suffice with the application of 'Gill's electronic theory of magnetism 1964'. *Cross products of Henrik Lorentz (1893) not needed.*

Sir Isaac Newton postulated the *universal law of gravitation (1687)* based on *empirical observations and inductive reasoning* and that needs to be set aside along with *Maxwell's dipole dependent theory of magnetism (1873)*.

METHOD

A brief summary of 'Gill's electronic theory of magnetism 1964' along with a simple experiment to show that the magnetic force is a combination of two opposing forces.

Next, a brief discussion of *how planet Earth if it was not a magnet* would behave with a small object *O* consisting an electron with a negative charge (-e) and a proton with a positive charge (+e) close to its surface.

Gill's electronic theory of magnetism (1964) will be applied to planet *Earth* between its north and south magnetic poles. It will be explained how the *northern and southern magnetic hemispheres* influence the object *O* close to the surface of the Earth to fall towards the Earth. *Coulomb's law (1783)* will be applied to the interaction between positive and negative forces.

Object *O* consisting of an electron with a negative charge (-e) and a proton with a positive charge (+e) will be placed above the surface of the Earth and its interaction with the magnetic Earth which has the electron based *north magnetic pole* in the northern magnetic hemisphere and the proton based *south magnetic pole* in the southern magnetic hemisphere will be discussed (*Gill's electronic theory of magnetism 1964*). *It will be shown mathematically how these two these forces result in an object O close to the Earth to fall towards the Earth.*

Calculations will be presented to show why the *lateral acceleration* of a pendulum is least at the equator and keeps on increasing to a maximum near the magnetic poles of the Earth.

As a follow up, a mathematical and diagrammatic presentation will be done to show how the same object loses weight with increasing height above the surface of the Earth and how at a certain height above the surface of the Earth depending on the size of object *O*, it starts behaving as a *satellite*.

In the end, a discussion of why the above concept of *two forces* is better. The third force called gravity put forward by Sir Isaac Newton (1687) needs to be set aside. The above explanation is better than Albert Einstein's General theory of relativity (1916).

Method in Detail

GILL'S ELECTRONIC THEORY OF MAGNETISM (1964)

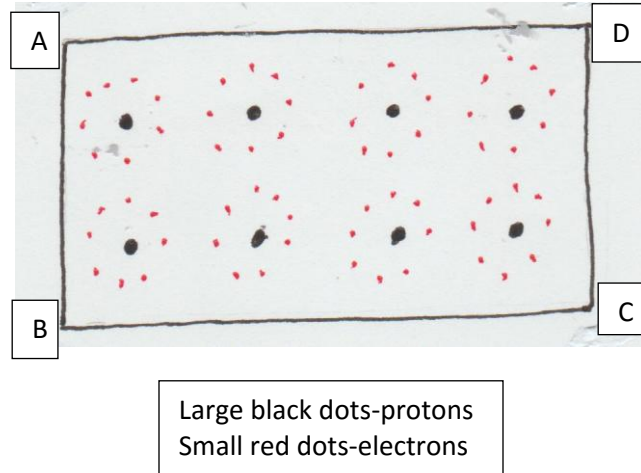


Figure1a

Figure 1a shows neutral iron atoms in the un-magnetized state.

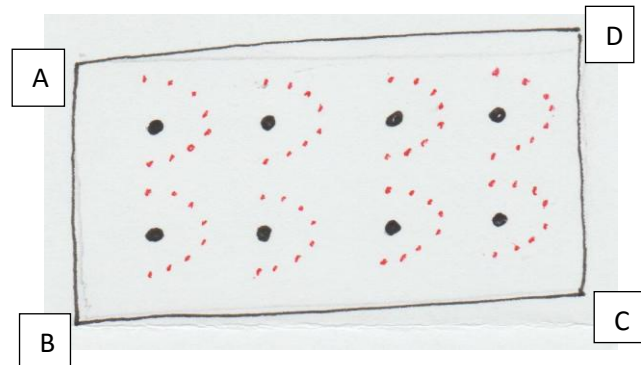


Figure1b

Figure 1b shows the change in position of the inner electrons on magnetization. If the displaced magnetized electrons have a negative torque ($-\tau$), then the exposed protons at the other end of the magnetized atom will have a positive torque ($+\tau$) and vice versa. This chain continues with the magnetic ends manifesting as the exposed negatively torqued ($-\tau$) electron based north magnetic pole and the exposed oppositely torqued ($+\tau$) proton based south magnetic pole of the magnet.

Gill's electronic theory of magnetism (1964) shows the neutral iron atoms in Fig 1a are magnetized in Figure 1b and *CD* has become the negative magnetic pole or north magnetic pole with a negatively torqued ($-\tau$) non-moving charge $-ne$ of the magnet and *AB* has become the positive magnetic pole or the south magnetic pole of the magnet with an opposite positively torqued ($+\tau$) non-moving charge $+ne$ where n is the number of exposed inner electrons at one end and equals the number of exposed protons at the other end.

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The neutral atoms in Fig 1a have become magnetized atoms in Fig 1b by undergoing a change in configuration and each atom also has developed an opposing torque between its own electrons and protons in the magnetized atomic chain to give the magnetized atoms a cork-screw effect.

Experiment Showing that the Magnetic Force is a Combination of Two Forces

A physicist showed me the following experiment in 1965. On a wooden table, spread some coarse iron filings and in the middle of the filings, place a magnet.

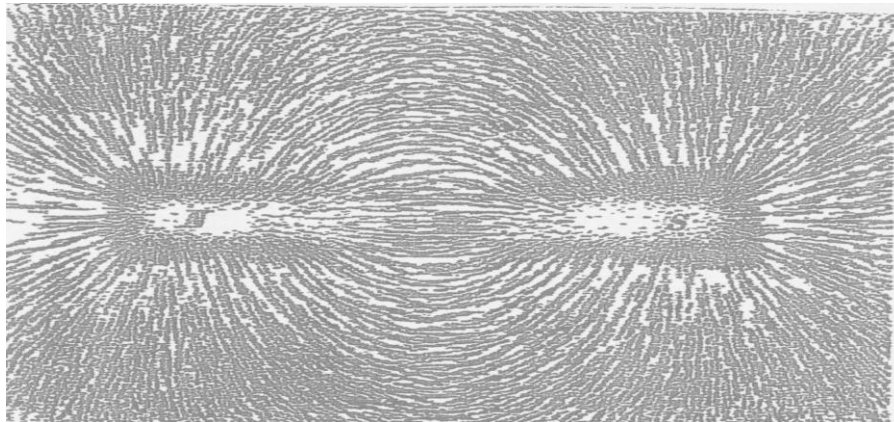


Figure2a

In Figure 2a we see a bar magnet with iron filings arranged along magnetic field lines. According to Gill's electronic theory of magnetism, each magnetic field line is a combination of negative electron dependent force from the north magnetic pole and the positive proton dependent force from the south magnetic pole.

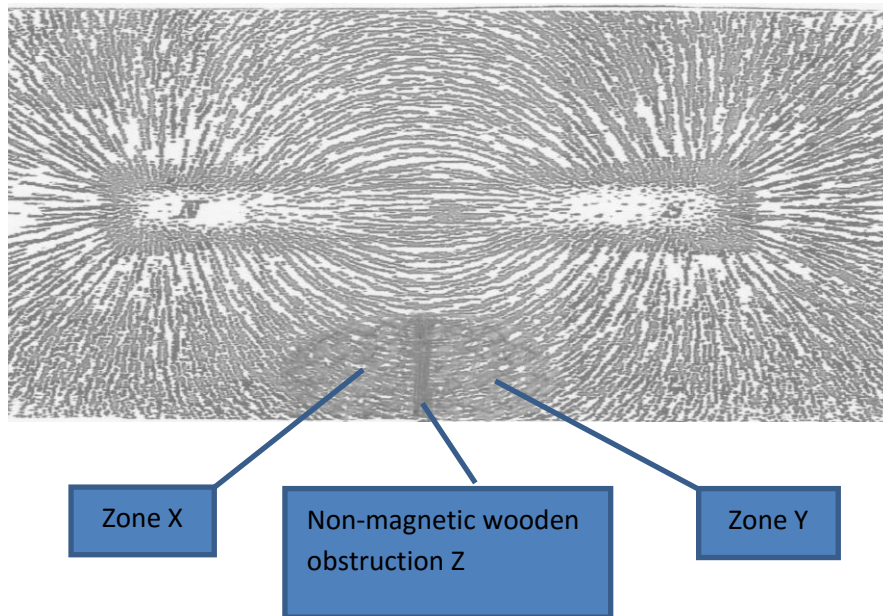


Figure2b

In Figure 2b, a wooden non-magnetic obstruction Z is placed on one side on the iron filings. The iron filings crumple on both sides of Z in zones X and Y . If the magnetic force was a single force, the iron filings should have crumpled in Zone X or Zone Y only.

INTRA-MAGNETIC BEHAVIOR OF MAGNETIZED NEIGHBORING PROTON AND ELECTRON

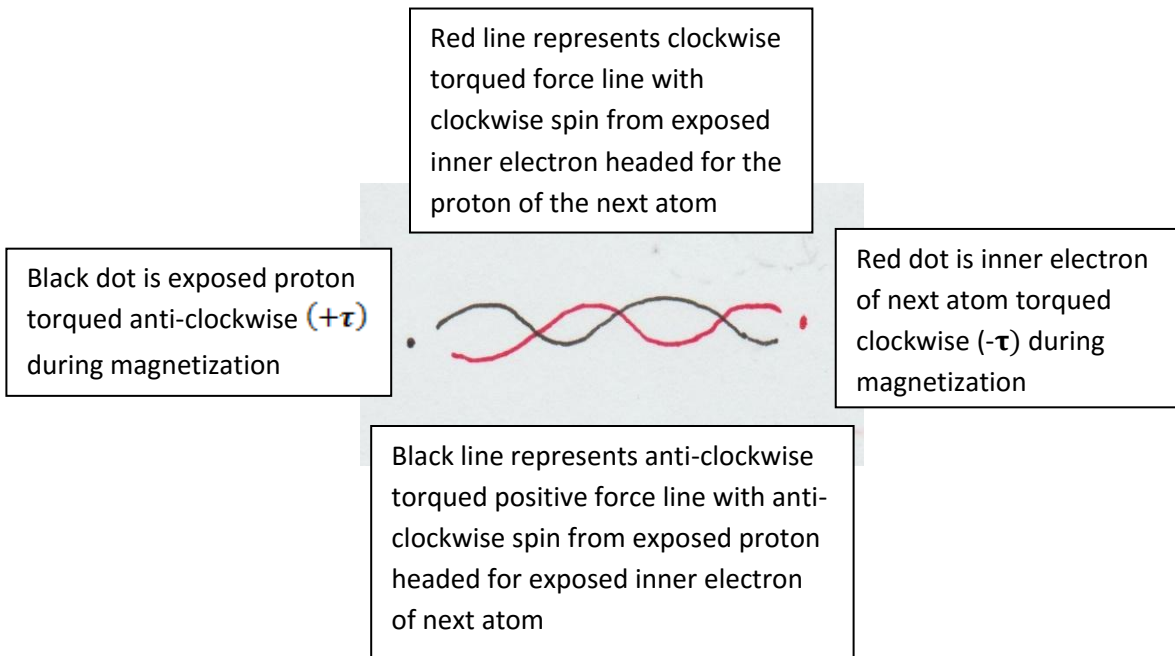


Figure2c

Figure 2c shows *diagrammatically* that in the magnetized intra-magnetic chain *the magnetic force is a combination of two forces* emanating from the proton ($+e$) dependent positive force from the south magnetic pole and the electron ($-e$) dependent negative force from the north magnetic pole of reconfigured magnetized atoms.

A similar force happens outside the magnet between its two magnetized ends.

According to Gill's electronic theory of magnetism (1964), magnetic force \mathbf{B} outside the magnet is a combination of the two forces of attraction between:

- (1) the exposed inner electron based north magnetic pole \mathbf{N} and*
- (2) the exposed proton based south magnetic pole \mathbf{S} .*

Applying Gill's electronic theory of magnetism (1964) to the magnetic Earth and dealing with the magnetic influence of the northern and southern magnetic hemispheres separately, it will be shown how an object \mathbf{O} close to the surface of the Earth will fall down vertically with a combination of the two negative and positive forces.

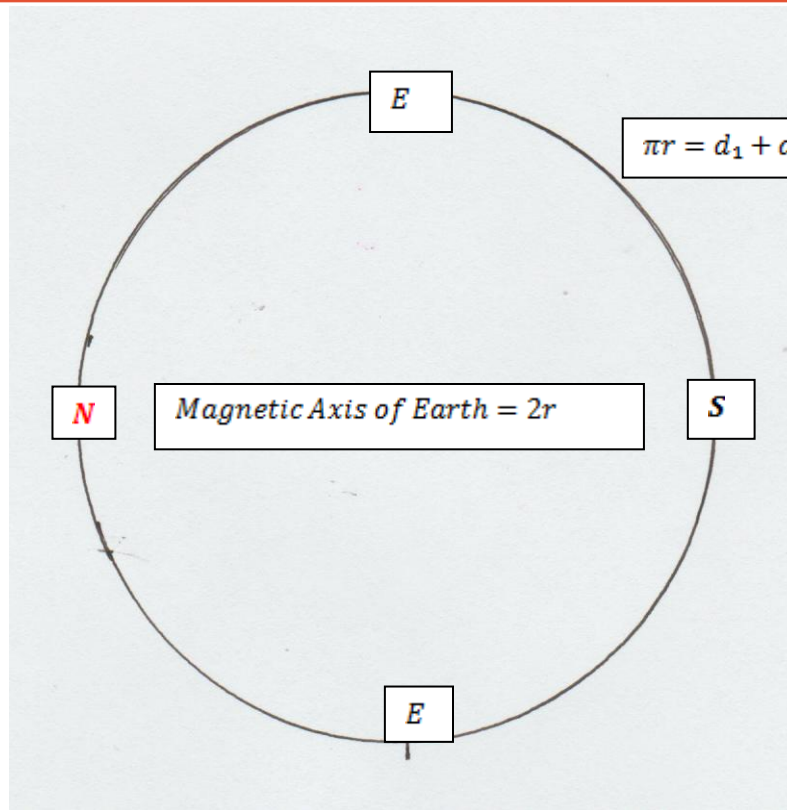


Figure3a

Figure 3a is a diagrammatic representation of the spherical Earth as a magnet. $N = n(-e)$ is the magnetic north pole and $S = n(+e)$ is the magnetic south pole according to *Gill's electronic theory of magnetism*. E Represents the midpoint or equator of the Earth.

Owing to the large dimensions of planet Earth, the diagrams from the North Pole N to the South Pole S will be represented as a straight line with E as its midpoint or equator.

The author will now proceed to show how the two forces from the two ends of a magnet:

- 1- Cause objects close to the Earth to fall towards the Earth.
- 2- How the interaction of this magnetic force with the extra-terrestrial magnetic force leads to a satellite situation.
- 3- Why the pendulum acceleration is least at the equator and maximal near the two magnetic poles of the Earth.

A brief discussion about an object O on the surface of an unmagnetized Earth

What would happen to an object O consisting of an electron ($-e$) and a proton ($+e$) near the surface of an un-magnetized Earth.

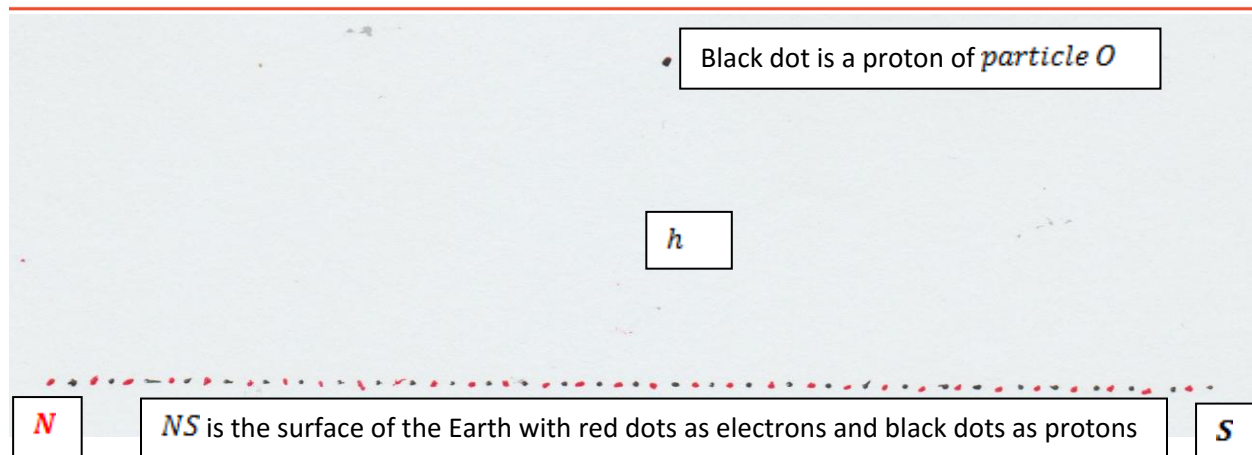


Figure4a

In Figure 4a, we have placed a proton (+e) which is part of a particle O at a height *h metres* above and close to the surface of the Earth (NS) which is depicted as having an alternating row of electrons and protons. Applying Coulomb's law, the proton (+e) will be attracted by an electron (-e) on the surface of the Earth at a height *h metres* with a force

$$F = \frac{k(+e)(-e)}{h^2} = -ke^2 \dots\dots\dots \text{Equation 1a.}$$

Where *k* is the Coulomb's constant.

Right next to the electron on the surface of the Earth in the above equation, we have a proton (+e) which will repel the proton (+e) of particle O at the height *h metres* with a force

$$F = \frac{k(+e)(+e)}{h^2} = +ke^2 \dots\dots\dots \text{Equation 1b.}$$

Thus, the proton +e which is a part of an atom which is part of an object O at a height *h metres* above the surface of the Earth is subjected to two equal and opposite forces from the Earth and would be stationary and not fall towards the Earth.

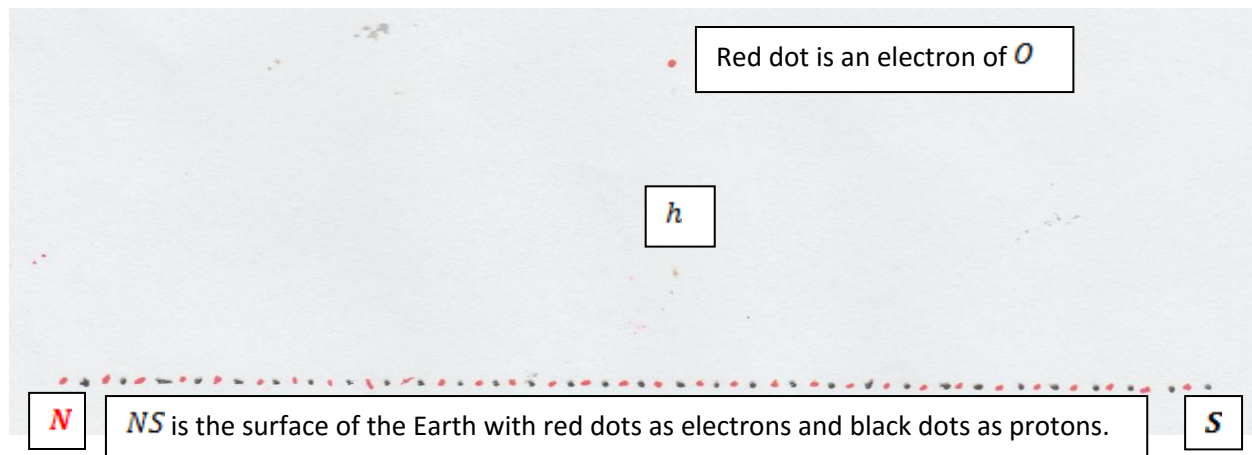


Figure4b

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In Figure 4b, we have placed an electron ($-e$) at a height h metres above and close to the surface of the Earth NS which is depicted as having an alternating row of electrons and protons. Applying Coulomb's law, the electron ($-e$) will be attracted by a proton ($+e$) on the surface of the Earth at a height h metres with a force

$$F = \frac{k(+e)(-e)}{h^2} = -ke^2 \dots\dots\dots\text{Equation 2a}$$

The same electron $-e$ will be repelled by an electron $-e$ right next to the proton on the surface of the Earth in the above equation and at the same height h metres with a force

$$F = \frac{k(-e)(-e)}{h^2} = +ke^2 \dots\dots\dots\text{Equation 2b.}$$

Thus, the electron $-e$ which is a part of the above atom which is part of a particle O at h metres above the surface of the Earth is subjected to two equal and opposite forces from the Earth and should be stationary and not fall towards the Earth.

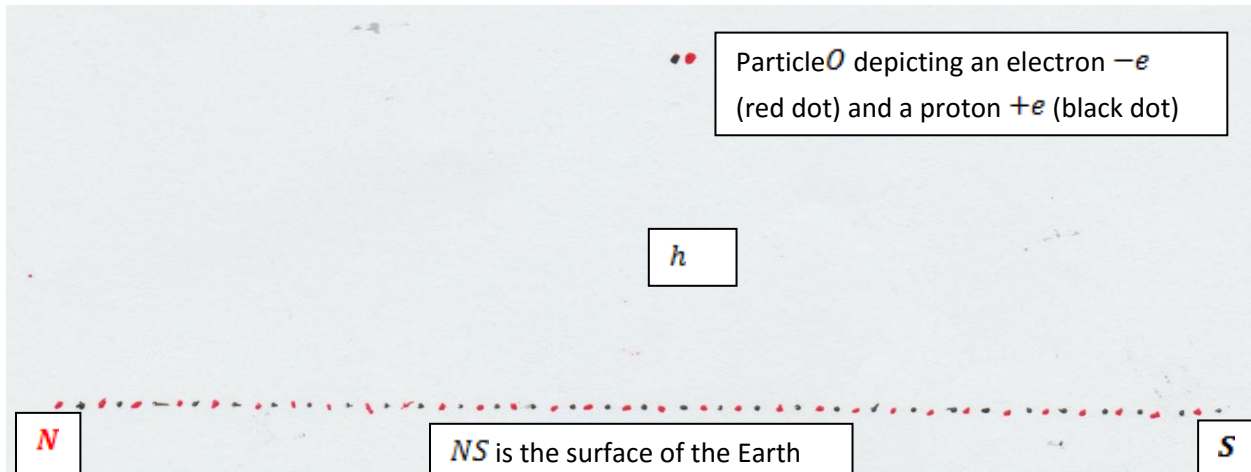


Figure4c

Figure 4c is superimposed image of Figure 4a and Figure 4b and *unless we come up with hither to unknown laws of physics*, this particle O would stay stationary at a height h metres above the surface of the Earth.

The above theoretical discussion applies to the interaction of two forces emanating from the atoms of a particle O and the similar forces from the atoms of an *unmagnetized Earth*.

The author does not want to take recourse to some mythical third gravitational force to explain.

As the planet Earth is magnetized and has the northern magnetic hemisphere under the influence of the north magnetic pole N of the Earth and the southern magnetic hemisphere under the influence of the south magnetic pole S of the Earth, 'Gill's electronic theory of magnetism 1964' will be applied to show how these two negative and positive forces from the two ends of the magnetic Earth make an object O close to the Earth to fall towards the Earth.

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For convenience, we will discuss particle O as having a single electron ($-e$) and a single proton ($+e$) at a distance Δd metres from each other.

Even though the object O is not ferro-magnetic, the magnetic force of the Earth does have some influence on its negative and positive components.

Changing position of sub-particles with changing position of O on surface of magnetic Earth

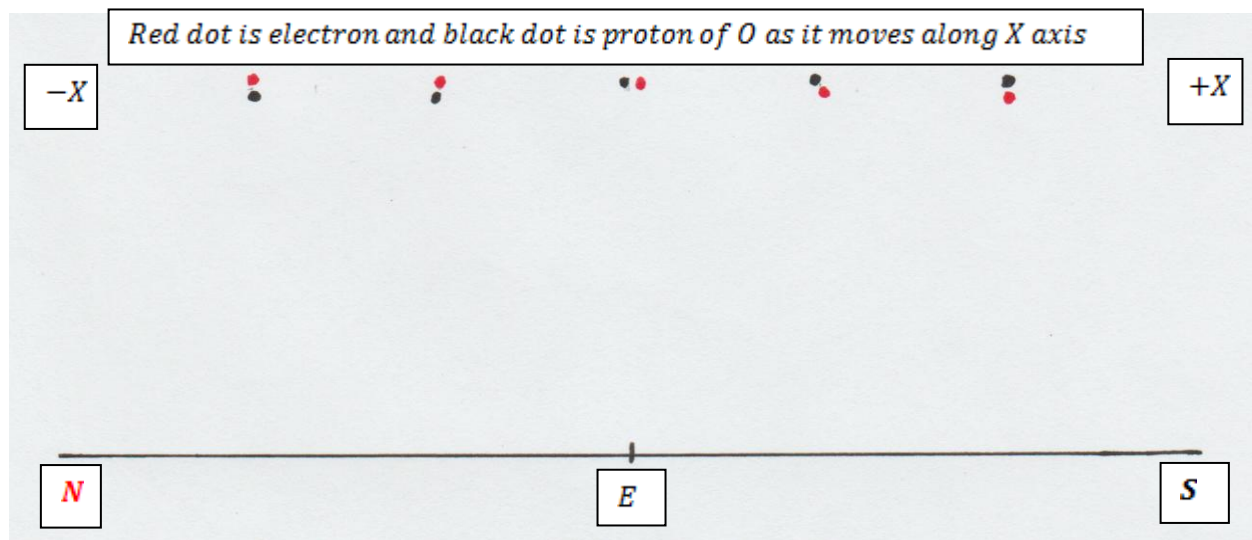


Figure4d

In Figure 4d, *Gill's electronic theory of magnetism 1964* is applied to the Earth (NS) and we have the electron dependent north magnetic pole $N = n(-e)$ and the proton dependent south magnetic pole $S = n(+e)$. Owing to the large distance involved, the surface of the spherical *magnetic Earth NS* maybe represented as a straight line with E as its midpoint or *equator*.

The particle O is placed at the same height above the surface of the Earth at various points along the X axis from $-X$ above the north magnetic pole N to $+X$ above the south magnetic pole S of the Earth.

This particle O has a single electron ($-e$) as a red dot and a single proton ($+e$) as a black dot at a distance Δd meters from each other. The changing physical relationship of the electron and proton of particle O in relation to each other owing to the forces from the magnetic hemispheres of the Earth is shown in Figure 4d from $(-X)$ above N to $(+X)$ above S .

The north magnetic pole $N = n(-e)$ owing to the shorter distance has a greater influence on the object O in the *northern magnetic hemisphere* of the Earth and causes the proton ($+e$) of particle O to be pulled towards the Earth and repels the electron ($-e$) of the same object O away from the Earth by a distance Δd meters.

The south magnetic pole $S = n(+e)$ owing to the shorter distance in the southern magnetic hemisphere of the Earth will have a greater attraction on the electron ($-e$) of the object O and cause

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it to be attracted towards the surface of the Earth and will repel the proton (+e) of the particle O away from the surface of the Earth by a distance Δd meters.

Next, as the particle O undergoes some change in the position of its electron and proton in relation to each other depending on the concerned magnetic hemisphere, we apply the concerned forces in the northern and southern magnetic hemispheres of the Earth separately.

IN THE NORTHERN MAGNETIC HEMISPHERE OF THE EARTH

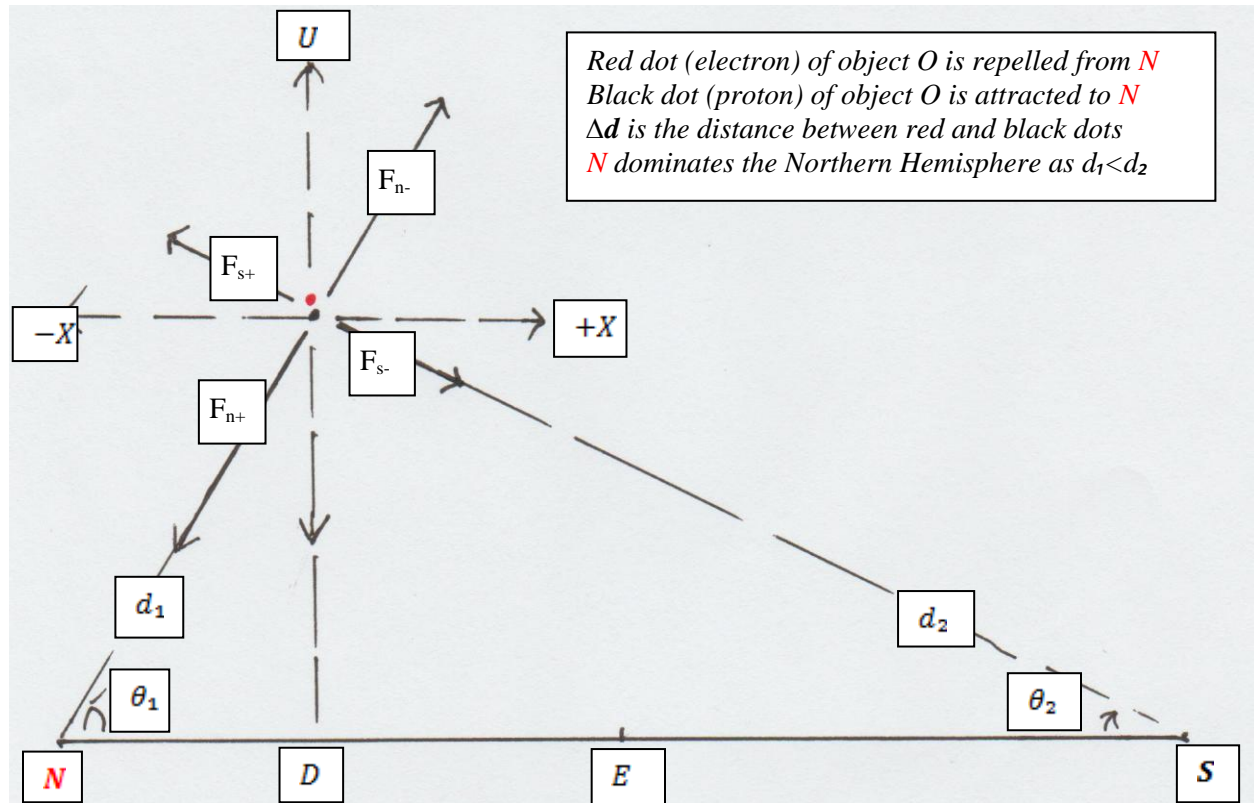


Figure 4e

Figure 4e is an outline of the object O in the Northern magnetic hemisphere of the Earth where the greater influence of the north magnetic pole $N = n(-e)$ causes the proton of object O to be shifted towards the Earth and the electron of object O is repelled in the opposite direction by a distance Δd meters.

Object O has the electron (-e) and the proton (+e) at a distance Δd meters from each other.

F_{n+} is the force of attraction between the north magnetic pole and the proton (+e) of O.

F_{n-} is the force of repulsion between the north magnetic pole and the electron (-e) of O.

F_{S-} is the force of attraction between the south magnetic pole and the electron ($-e$) of O .

F_{S+} is the force of repulsion between the south magnetic pole and the proton ($+e$) of O .

IN THE SOUTHERN MAGNETIC HEMISPHERE OF THE EARTH

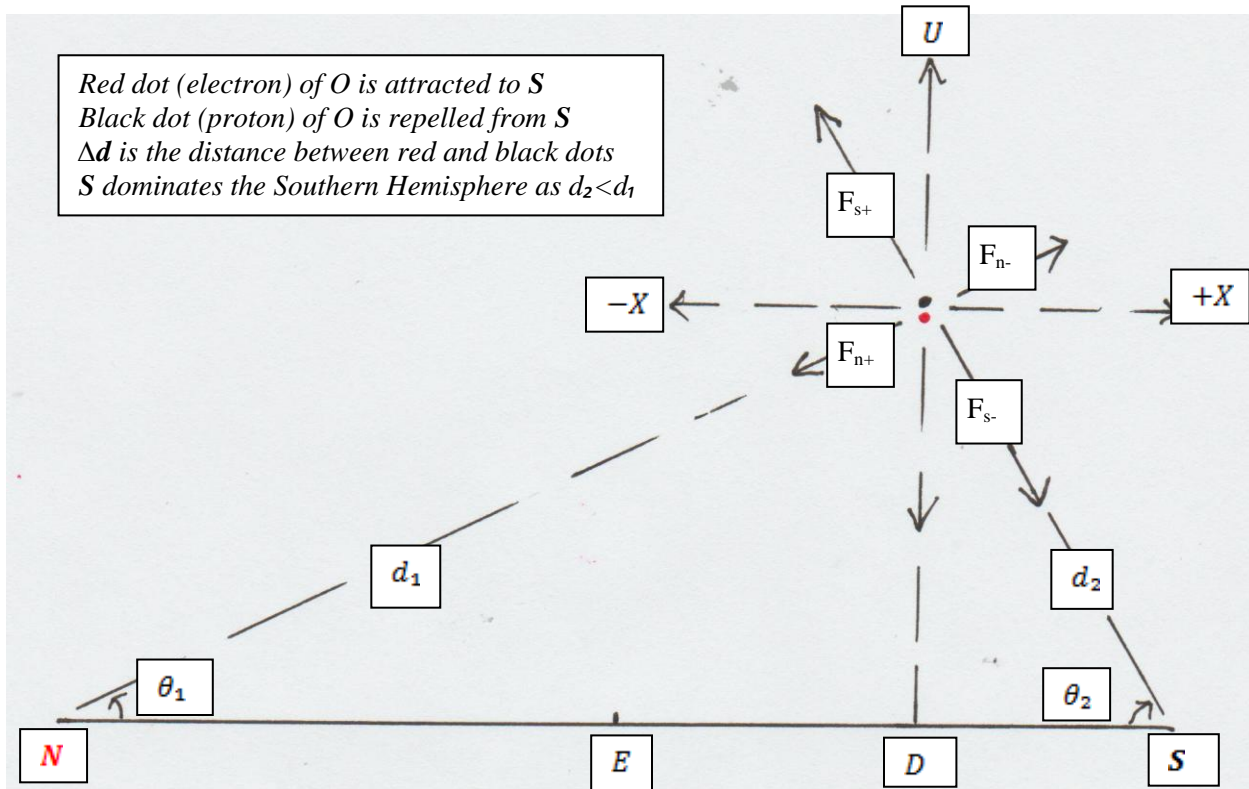


Figure4f

Figure 4f presents an outline of the same particle O in the southern magnetic hemisphere of the Earth. The greater influence of the south magnetic pole $S = n(+e)$ in the southern magnetic hemisphere owing to the shorter distance d_2 causes the red electron ($-e$) of object O to be attracted towards S and the black proton ($+e$) of the same object O is repelled from S by a distance Δd meters.

It is the greater influence of the two magnetic poles of the Earth in their respective magnetic hemispheres on all objects which causes the objects close to the Earth to fall towards the Earth without the need of any 'third force' or gravity.

We will deal with the electron ($-e$) and proton ($+e$) of the same object O separately in the northern and southern magnetic hemispheres on the surface of the Earth NS and later combine the results to get a resultant downward force towards the Earth without recourse to gravity.

IN THE NORTHERN MAGNETIC HEMISPHERE

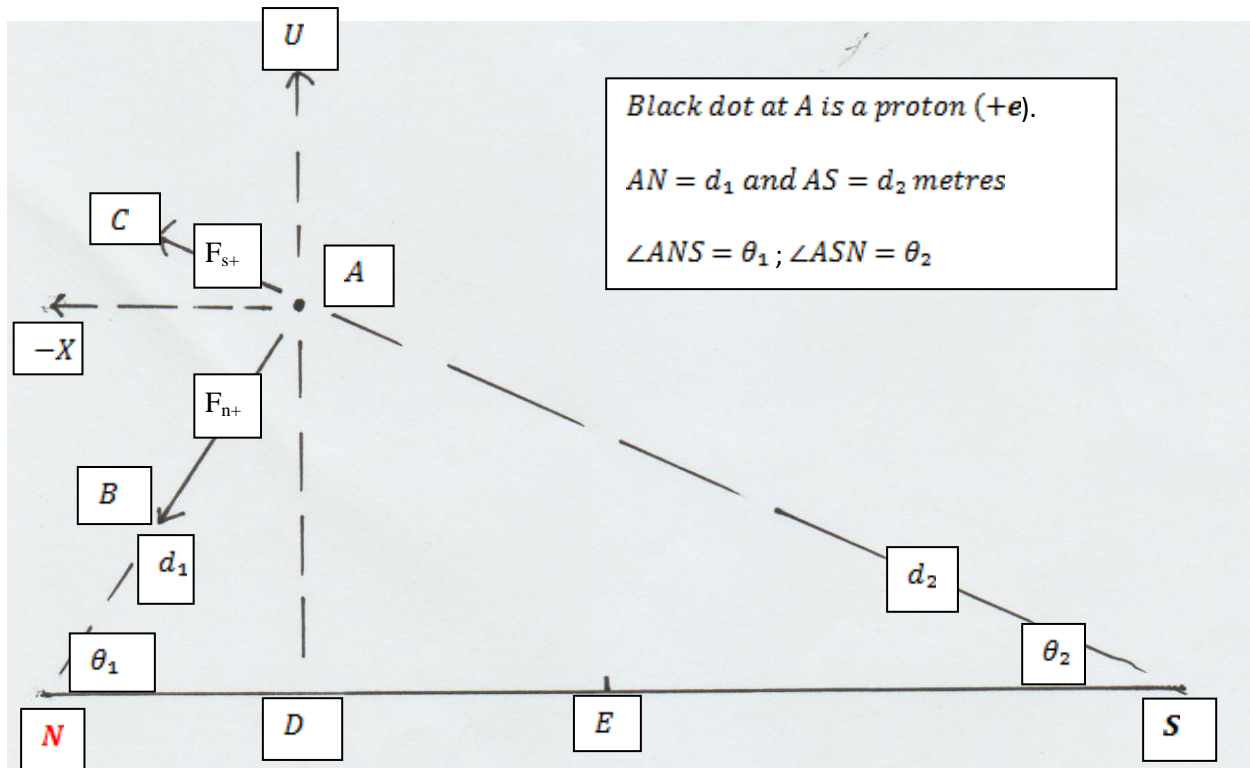


Figure5a

Figure 5a has object O which has a single electron ($-e$) and a single proton ($+e$) at a distance Δd meters from each other at a perpendicular height AD above the surface of the Earth NS .

The object O is in the northern magnetic hemisphere of the Earth with its greater influence due to proximity of the north magnetic pole N . The shorter $AN = d_1$ meters as compared to $AS = d_2$ meters will attract the proton ($+e$) of object O towards N and repel the electron of the object O away from N by a distance Δd meters. Owing to the shorter distance $AN = d_1$ meters, electron at A has been pushed away by a distance Δd metres while pulling the neighboring proton towards N . So, in the northern hemisphere of the Earth, the distance of the proton ($+e$) of the object O at A from $AN = d_1$ from N and $AS = d_2$ from S . The magnetic pole S being much farther has much less influence on the object O in the northern magnetic hemisphere.

In the northern magnetic hemisphere, as the large negative magnetic charge at N is attracting the proton ($+e$) of the object O , applying Coulomb's law, the negative exposed non-moving charge at $N = n(-e)$ will attract the proton ($+e$) at point A along AB with a force F_{n+} .

$$F_{n+} = \frac{k(+e)n(-e)}{d_1^2} = -\frac{kne^2}{d_1^2}$$

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In F_{n+} the small n refers to the north magnetic pole N and the small $+$ sign refers to the positive proton ($+e$) of object O . All distances are in meters.

k being the Coulombs constant and n being the number of exposed inner electrons at N which is equal to the number of exposed protons at S .

The positive charge at $S = n(+e)$ will repel the proton ($+e$) at point A along AC with a force F_{s+} . As this is the northern hemisphere, the distance d_2 of the proton of the object O is greater than d_1 .

$$F_{s+} = \frac{k(+e)n(+e)}{d_2^2} = + \frac{kne^2}{d_2^2}$$

In F_{s+} the small s refers to the south magnetic pole S and the small $+$ sign refers to the positive proton ($+e$) in the object O . All distances are in meters and force is in newtons.

F_{n+} and F_{s+} can each be split into two dot product vectors

$$F_{n+} \text{ along } AD \perp NS = F_{n+} \sin \theta_1 = - \frac{kne^2}{d_1^2} \cdot \frac{AD}{d_1} = - \frac{kne^2(AD)}{d_1^3}$$

$$F_{s+} \text{ along } AD \perp NS = F_{s+} \sin \theta_2 = + \frac{kne^2}{d_2^2} \cdot \frac{AD}{d_2} = + \frac{kne^2(AD)}{d_2^3}$$

F_{s+} along AD will be in direction opposite to F_{n+} along AD and adding the two vertical vectors, we have F_v where small v refers to the vertical vectors perpendicular to the Earth surface NS .

$$F_v = F_{n+} \sin \theta_1 + F_{s+} \sin \theta_2 = -kne^2 \left(\frac{\sin \theta_1}{d_1^2} - \frac{\sin \theta_2}{d_2^2} \right) \dots \dots \dots \text{Equation 5a}$$

As $\sin \theta_1 = \frac{AD}{d_1}$ and $\sin \theta_2 = \frac{AD}{d_2}$, substituting the same above, we get

$$F_v = - \frac{kne^2 AD}{d_1^3} + \frac{kne^2 AD}{d_2^3} = -kne^2(AD) \left(\frac{1}{d_1^3} - \frac{1}{d_2^3} \right) \dots \dots \dots \text{Equation 5a}$$

$$F_{n+} \text{ along } A(-X) \text{ parallel to } NS = F_{n+} \cos \theta_1 = - \frac{kne^2}{d_1^2} \cdot \frac{ND}{d_1} = - \frac{kne^2(ND)}{d_1^3}$$

$$F_{s+} \text{ along } A(-X) \text{ parallel to } NS = F_{s+} \cos \theta_2 = + \frac{kne^2}{d_2^2} \cdot \frac{(NS-ND)}{d_2} = + \frac{kne^2(NS-ND)}{d_2^3}$$

Adding the horizontal force vectors F_{n+} and F_{s+} along AX towards $-X$ parallel to NS .

$$F_{-x} = - \left(\frac{kne^2(ND)}{d_1^3} - \frac{kne^2(NS-ND)}{d_2^3} \right) \text{ towards } -X \dots \dots \dots \text{Equation 6a}$$

F_{-x} is the horizontal vector parallel to NS towards $-X$ as shown in Equation 6a.

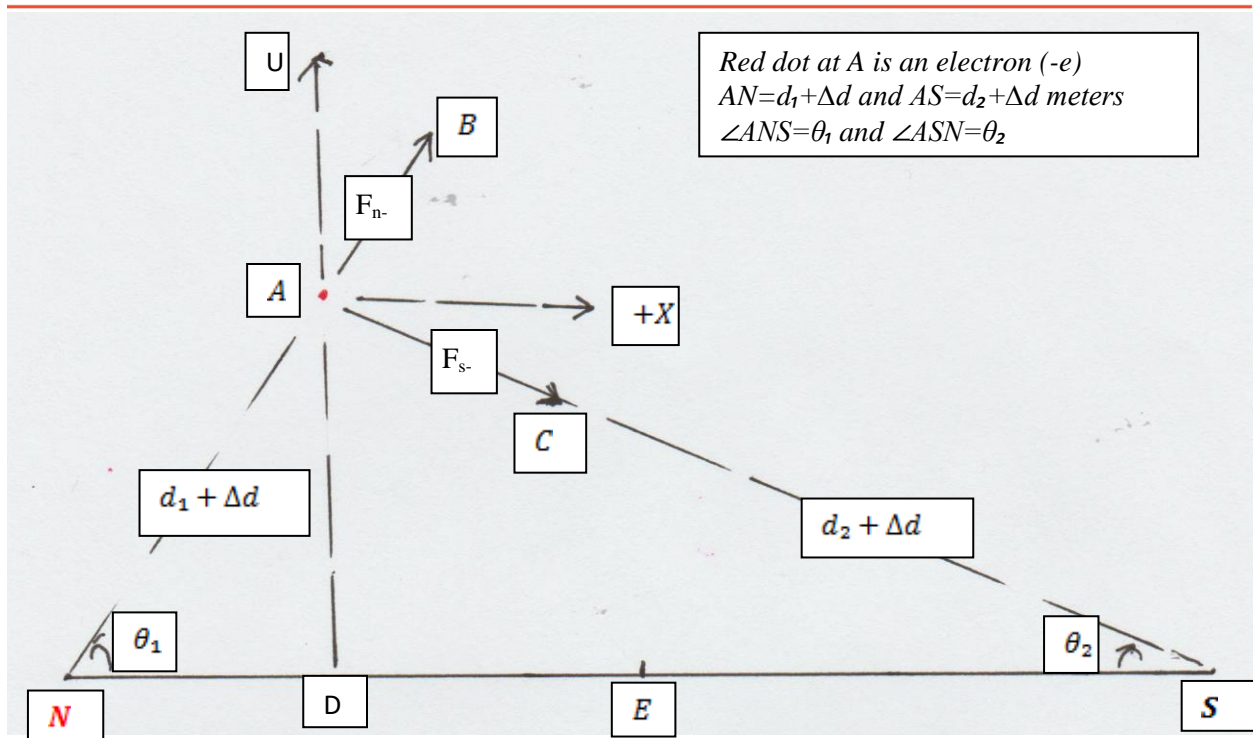


Figure 5b

In Figure 5b, the object O is in the northern hemisphere of the Earth under the greater influence of the magnetic pole N . This shorter AN will attract the proton $(+e)$ of the object O towards N and move the electron $(-e)$ of the object O away from N by a distance Δd meters. Owing to the shorter distance of AN as compared to AS , the electron at A has been pushed away by a distance Δd meters while pulling the neighboring proton of object O towards N . So, in the northern hemisphere of the Earth, the distance of the electron $(-e)$ of the object O at A from N is $AN = (d_1 + \Delta d)$ and $AS = (d_2 + \Delta d)$ from S . As S is far, it has minimal influence on the position of electron and proton of object O in the northern magnetic hemisphere.

In the northern magnetic hemisphere, the large negative magnetic charge at $N = n(-e)$ is repelling the electron $(-e)$ of the object O at point A along AB with a force

$$F_{n-} = \frac{k(-e)n(-e)}{(d_1 + \Delta d)^2} = + \frac{kne^2}{(d_1 + \Delta d)^2}$$

k being the Coulomb's constant and n being the number of exposed inner electrons at N which is equal to the number of exposed protons at S .

The positive charge at $S = n(+e)$ will attract the negative charge of the electron $(-e)$ of object O at point A along AC . As this is the northern hemisphere, it will be at an intra-atomic distance Δd meters away as $(d_2 + \Delta d)$ with an attraction force F_{s-} .

$$F_{s-} = \frac{k(-e)n(+e)}{(d_2+\Delta d)^2} = -\frac{kne^2}{(d_2+\Delta d)^2} .$$

F_n - and F_{s-} can each be split into two dot product vectors

$$F_{n-} \text{ along } AD \perp NS = F_{n-} \sin \theta_1 = +\frac{kne^2}{(d_1+\Delta d)^2} \cdot \frac{AD}{(d_1+\Delta d)} = +\frac{kne^2(AD)}{(d_1+\Delta d)^3}$$

$$F_{s-} \text{ along } AD \perp NS = F_{s-} \sin \theta_2 = -\frac{kne^2}{(d_2+\Delta d)^2} \cdot \frac{AD}{(d_2+\Delta d)} = -\frac{kne^2(AD)}{(d_2+\Delta d)^3}$$

F_{s-} along AD will be in direction opposite to F_n along AD and adding the two vectors

$$F_v = F_{n-} \sin \theta_1 + F_{s-} \sin \theta_2 = \frac{kne^2(AD)}{(d_1+\Delta d)^3} - \frac{kne^2(AD)}{(d_2+\Delta d)^3} = kne^2(AD) \left(\frac{1}{(d_1+\Delta d)^3} - \frac{1}{(d_2+\Delta d)^3} \right) \text{ Equ. 5b}$$

$$F_{n-} \text{ along } A(+X) \text{ parallel to } NS = F_{n-} \cos \theta_1 = +\frac{kne^2}{(d_1+\Delta d)^2} \cdot \frac{ND}{(d_1+\Delta d)} = +\frac{kne^2(ND)}{(d_1+\Delta d)^3}$$

$$F_{s-} \text{ along } A(+X) \text{ parallel to } NS = F_{s-} \cos \theta_2 = -\frac{kne^2}{(d_2+\Delta d)^2} \cdot \frac{NS-ND}{(d_2+\Delta d)} = -\frac{kne^2(NS-ND)}{(d_2+\Delta d)^3}$$

F_n - is positive as it is away from N and F_{s-} along $A(+X)$ is negative as it is towards S and are additive along $A(+X)$ parallel to NS .

$$F_{+x} = \frac{kne^2(ND)}{(d_1+\Delta d)^3} - \frac{kne^2(NS-ND)}{(d_2+\Delta d)^3} \text{ towards } +X$$

As Δd is small, $d_1 \gg \Delta d$ and $d_1 + \Delta d = d_1$ and as $d_2 \gg \Delta d$ so $d_2 + \Delta d = d_2$ and we have

$$F_{+x} = \frac{kne^2(ND)}{d_1^3} - \frac{kne^2(NS-ND)}{d_2^3} \text{ towards } +X \dots \dots \dots \text{Equation 6b}$$

F_{+x} is the horizontal vector parallel to NS from point A towards $+X$.

In order to keep it simple, from a physics point of view, we have presented the object O as having a single electron $(-e)$ at a distance Δd meters from its proton $(+e)$.

In the northern magnetic hemisphere of the Earth, the object O experiences a greater negative or exposed electron force from the north magnetic pole N on the proton $(+e)$ of the object O and is pulled vertically downwards towards the Earth as $d_1 < d_2$.

In Figure 5a and Figure 5b, adding equations 5a and 5b,

$$F_v = kne^2 AD \left(\left(\frac{1}{(d_1 + \Delta d)^3} - \frac{1}{(d_2 + \Delta d)^3} \right) - \left(\frac{1}{d_1^3} - \frac{1}{d_2^3} \right) \right)$$

Rearranging the above, we have

$$F_v = kne^2 AD \left(\left(\frac{1}{(d_1 + \Delta d)^3} - \frac{1}{d_1^3} \right) - \left(\frac{1}{(d_2 + \Delta d)^3} - \frac{1}{d_2^3} \right) \right)$$

From Figure 5a, $\sin \theta_1 = \frac{AD}{d_1 + \Delta d}$ and $\sin \theta_2 = \frac{AD}{d_2 + \Delta d}$

From Figure 5b, $\sin \theta_1 = \frac{AD}{d_1}$ and $\sin \theta_2 = \frac{AD}{d_2}$, the above equation becomes

$$F_v = kne^2 \left(\left(\frac{\sin \theta_1}{(d_1 + \Delta d)^2} - \frac{\sin \theta_1}{d_1^2} \right) - \left(\frac{\sin \theta_2}{(d_2 + \Delta d)^2} - \frac{\sin \theta_2}{d_2^2} \right) \right) \text{ or}$$

$$F_v = kne^2 \sin \theta_1 \left(\frac{d_1^2 - (d_1^2 + 2d_1\Delta d + \Delta d^2)}{d_1^2(d_1 + \Delta d)^2} \right) - kne^2 \sin \theta_2 \left(\frac{d_2^2 - (d_2^2 + 2d_2\Delta d + \Delta d^2)}{d_2^2(d_2 + \Delta d)^2} \right)$$

Δd metres is small and Δd^2 is even smaller and can be ignored. As $d_1 \gg \Delta d$ so $d_1 + \Delta d = d_1$ and as $d_2 \gg \Delta d$ so $d_2 + \Delta d = d_2$ and we have

$$F_v = kne^2 \sin \theta_1 \left(\frac{-2d_1\Delta d}{d_1^4} \right) - kne^2 \sin \theta_2 \left(\frac{-2d_2\Delta d}{d_2^4} \right) \text{ or}$$

$$F_v = -2kne^2 \Delta d \left(\frac{\sin \theta_1}{d_1^3} - \frac{\sin \theta_2}{d_2^3} \right) \dots \dots \dots \text{Equation N}$$

As $d_1 < d_2$ and geometrically $\sin \theta_1 > \sin \theta_2$ in the northern magnetic hemisphere, we have a resultant downward vertical force indicated by the minus sign.

When $d_1 = 1$ meter, $\sin \theta_1 = 1$ as $\theta_1 = 90^\circ$ and as $d_2 = (2 \times 10^{13} - 1)$ meters so $\theta_2 = 0^\circ$ and $\sin \theta_2 = 0$ and Equation N above the north magnetic pole becomes

$$F_v = -2kne^2 \Delta d (1 - 0) = -2kne^2 \Delta d \text{ newtons} \dots \dots \dots \text{Equation N}$$

By another approach

$$\sin \theta_1 = \frac{AD}{d_1} \text{ and } \sin \theta_2 = \frac{AD}{d_2} \text{ and Equation N becomes}$$

$$F_v = -2kne^2 \Delta d \left(\frac{AD}{d_1^4} - \frac{AD}{d_2^4} \right) = -2kne^2 \Delta d (AD) \left(\frac{1}{d_1^4} - \frac{1}{d_2^4} \right) \dots \dots \dots \text{Equation N}$$

As $d_1 < d_2$ and geometrically $\sin \theta_1 > \sin \theta_2$ in the northern magnetic hemisphere, we have a resultant downward vertical force indicated by the minus sign along AD in the northern magnetic hemisphere towards the Earth without the use of gravity.

IN THE SOUTHERN MAGNETIC HEMISPHERE

The interaction of the electron ($-e$) of an object O on the surface of the magnetic Earth NS with the magnetic forces from the Earth is followed with the interaction of the proton ($+e$) of the same object O interacting with the magnetic forces of the Earth in the Southern Magnetic Hemisphere.

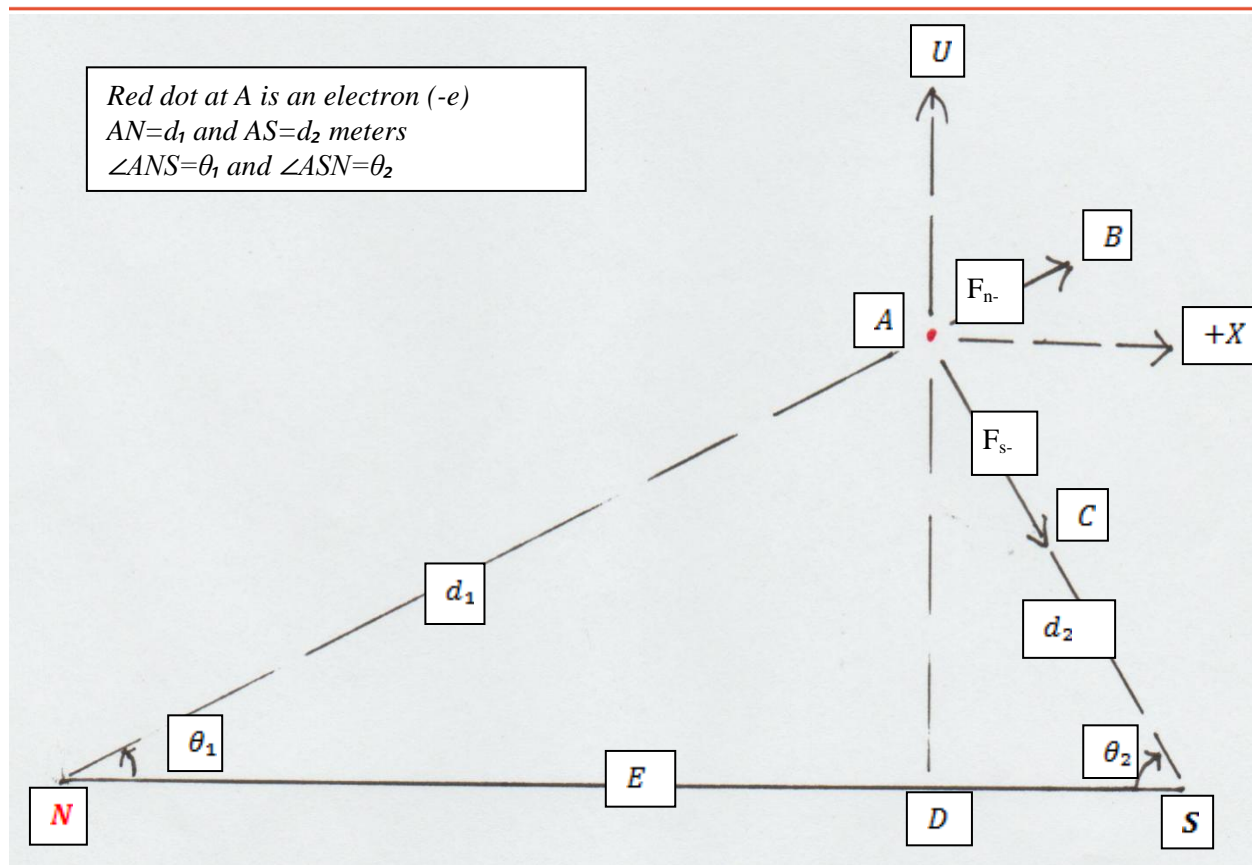


Figure5c

Figure 5c shows the Earth as a magnet NS with E at its midpoint or equator. Owing to the large size of the Earth, NS maybe presented as a straight line. The magnetic Earth NS has the north magnetic pole with a negative charge due to the exposed inner electrons as $N = n(-e)$ and the south magnetic pole has an equal but opposite positive charge due to the exposed protons $S = n(+e)$ according to Gill's electronic theory of magnetism (1964). n is the number of exposed inner electrons at the north magnetic pole and also equals the number of exposed protons at the south magnetic pole of the Earth.

In Figure 5c, the electron (-e) of object O is closer to the Earth in the southern magnetic hemisphere due to the greater influence of the south magnetic pole S as $d_2 < d_1$.

Red dot at point A is an electron with a negative charge (-e).

Let distance AN be d_1 metres and $\angle ANS = \theta_1$.

Let distance AS be d_2 metres and $\angle ASN = \theta_2$.

'How Objects Fall' and 'Gill's Electronic Theory of Magnetism 1964'

Applying Coulomb's law, the negative charge at $N = n(-e)$ will repel the negative charge $(-e)$ at point A along AB with a force F_{n-} (here, small n refers to N and $-$ refers the negative charge of electron $(-e)$ of object O).

$$F_{n-} = \frac{k(-e)(n(-e))}{d_1^2} = + \frac{kne^2}{d_1^2}$$

k being the Coulomb's constant.

The positive charge at $S = n(+e)$ will attract the electron with a charge $(-e)$ at point A along AC with a force F_{s-} (s refers to S and $-$ refers to the negative charge of the electron $(-e)$ of O).

$$F_{s-} = \frac{k(-e)(n(+e))}{d_2^2} = - \frac{kne^2}{d_2^2} .$$

Please note that bold letters in equations denote vectors and the force is in newtons.

F_{n-} can be split into two vectors:

$$F_{n-} \text{ along } AY \perp NS = F_{n-} \sin \theta_1 = + \frac{kne^2}{d_1^2} \cdot \sin \theta_1 = + \frac{kne^2}{d_1^2} \cdot \frac{AD}{d_1} = + \frac{kne^2(AD)}{d_1^3} \text{ as } \sin \theta_1 = \frac{AD}{d_1} .$$

$$F_{n-} \text{ along } A(X+) \text{ parallel to } SN = F_{n-} \cos \theta_1 = + \frac{kne^2}{d_1^2} \cdot \frac{ND}{d_1} = + \frac{kne^2(ND)}{d_1^3} \text{ as } \cos \theta_1 = \frac{ND}{d_1} .$$

F_{s-} can also be split into two vectors

$$F_{s-} \text{ along } AD \perp SN = F_{s-} \sin \theta_2 = - \frac{kne^2}{d_2^2} \cdot \frac{AD}{d_2} = - \frac{kne^2(AD)}{d_2^3} \text{ as } \sin \theta_2 = \frac{AD}{d_2} .$$

F_{s-} along AD is negative and its direction is opposite to F_{n-} along AU and the resultant force along AD perpendicular to NS is

$$F_v \text{ along } AD \perp NS = - \frac{kne^2 AD}{d_2^3} + \frac{kne^2(AD)}{d_1^3} = -kne^2(AD) \left(\frac{1}{d_2^3} - \frac{1}{d_1^3} \right) \dots \dots \dots \text{Equation 5c}$$

As $d_2 < d_1$ and geometrically $\sin \theta_2 > \sin \theta_1$, the minus sign indicates that this is a vertically downward force as in Equation 5c.

$$F_{s-} \text{ along } A(X+) \text{ parallel to } NS = F_{s-} \cos \theta_2 = - \frac{kne^2}{d_2^2} \cdot \frac{NS-ND}{d_2} = - \frac{kne^2(NS-ND)}{d_2^3}$$

Adding F_{n-} and F_{s-} we have towards $+X$ a vector F_{+x}

$$F_{+x} = + \frac{kne^2(ND)}{d_1^3} - \frac{kne^2(NS-ND)}{d_2^3} \text{ towards } +X \dots \dots \dots \text{Equation 6c}$$

In Figure 5c, F_{+x} is the horizontal vector parallel to the Earth in Equation 6c towards S as $d_2 < d_1$ and the minus sign indicates attraction towards $+X$ in the southern magnetic hemisphere.

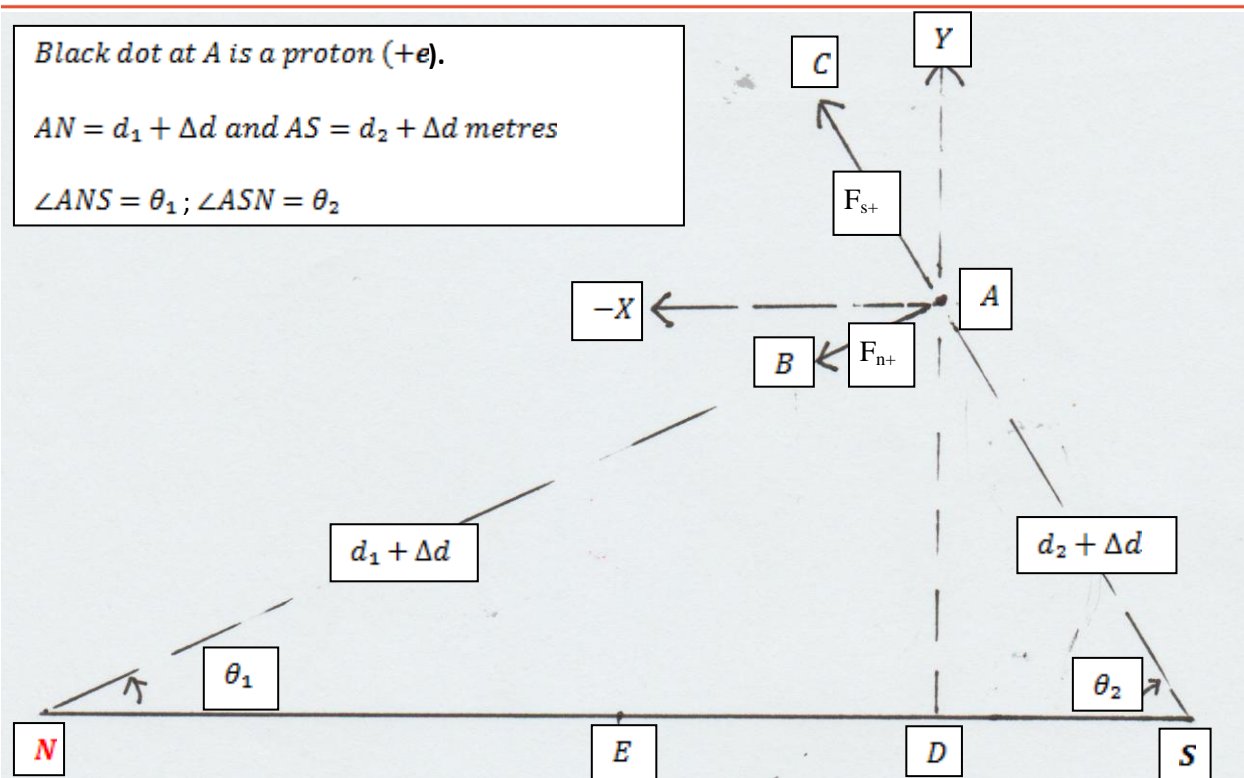


Figure 5d

In Figure 5d, everything is the same as Figure 5c, except that at point A , we have the positively charged proton ($+e$) at a distance Δd meters away from the electron of the particle O .

In the southern magnetic hemisphere of the Earth from the south magnetic pole S up to the equator of the Earth represented by the midpoint E , as shown in Figure 5c and Figure 5d, $d_2 < d_1$ and the south magnetic pole S with its exposed protons will have a greater influence on the object O at point A and the electron ($-e$) of the object O will be attracted towards S which is at a distance d_2 and the proton ($+e$) of the object O will be repelled away from S and the distance of the proton of the object O from S and AS will be $(d_2 + \Delta d)$. As N is at a greater distance $(d_1 + \Delta d)$, it will have less influence on object O in the southern magnetic hemisphere.

As the large negative magnetic charge at N is attracting the proton of the object O , applying Coulomb's law, the negative charge $N = n(-e)$ will attract the positive charge ($+e$) at point A along AN with a force

$$F_{n+} = \frac{kn(-e)(+e)}{(d_1 + \Delta d)^2} = -\frac{kne^2}{(d_1 + \Delta d)^2}$$

k being the Coulomb's constant and n being the number of exposed inner electrons at N which is also equal to the number of exposed protons at S .

'How Objects Fall' and 'Gill's Electronic Theory of Magnetism 1964'

As $d_2 < d_1$ in the southern hemisphere of the Earth, the positive charge at $S = n(+e)$ will repel the positive charge of the proton $(+e)$ of the object O at point A with a greater force as compared to the negative charge $N = n(-e)$ and overall this will be at a small intra-atomic distance Δd meters away from the electron $(-e)$ of the particle O and the distance AS becomes $(d_2 + \Delta d)$ and AN becomes $(d_1 + \Delta d)$ in the southern hemisphere of the Earth.

Now, we have along AB a force F_{s+}

$$F_{s+} = \frac{kn(+e)(+e)}{(d_2+\Delta d)^2} = + \frac{kne^2}{(d_2+\Delta d)^2}.$$

F_{n+} and F_{s+} can each be split into two dot product vectors

$$F_{n+} \text{ along } AD \perp NS = F_{n+} \sin \theta_1 = - \frac{kne^2}{(d_1+\Delta d)^2} \cdot \frac{AD}{(d_1+\Delta d)} = - \frac{kne^2(AD)}{(d_1+\Delta d)^3}$$

$$F_{s+} \text{ along } AD \perp NS = F_{s+} \sin \theta_2 = + \frac{kne^2}{(d_2+\Delta d)^2} \cdot \frac{AD}{(d_2+\Delta d)} = + \frac{kne^2(AD)}{(d_2+\Delta d)^3}$$

F_{s+} along AD will be in direction opposite to F_{n+} along AD and adding the two vectors

$$F_v = F_{n+} \sin \theta_1 + F_{s+} \sin \theta_2 = - \frac{kne^2(AD)}{(d_1+\Delta d)^3} + \frac{kne^2(AD)}{(d_2+\Delta d)^3} = -kne^2(AD) \left(\frac{1}{(d_1+\Delta d)^3} - \frac{1}{(d_2+\Delta d)^3} \right) \text{ or}$$

$$F_v = - \frac{kne^2(AD)}{(d_1+\Delta d)^3} + \frac{kne^2(AD)}{(d_2+\Delta d)^3} = -kne^2(AD) \left(\frac{1}{(d_1+\Delta d)^3} - \frac{1}{(d_2+\Delta d)^3} \right) \dots \dots \dots \text{Equation 5d}$$

$$F_{n+} \text{ along } A(-X) \text{ parallel to } NS = F_{n+} \cos \theta_1 = - \frac{kne^2}{(d_1+\Delta d)^2} \cdot \frac{ND}{(d_1+\Delta d)} = - \frac{kne^2(ND)}{(d_1+\Delta d)^3}$$

$$F_{s+} \text{ along } A(-X) \text{ parallel to } NS = F_{s+} \cos \theta_2 = + \frac{kne^2}{(d_2+\Delta d)^2} \cdot \frac{(NS-ND)}{(d_2+\Delta d)} = + \frac{kne^2(NS-ND)}{(d_2+\Delta d)^3}$$

Adding F_{n+} and F_{s+} along AX , we have F_{-x} parallel to NS towards $-X$.

$$F_{-x} = - \frac{kne^2(ND)}{(d_1+\Delta d)^3} + \frac{kne^2(NS-ND)}{(d_2+\Delta d)^3} \text{ towards } -X$$

As $d_1 \gg \Delta d$ so $d_1 + \Delta d = d_1$ and $d_2 \gg \Delta d$ so $d_2 + \Delta d = d_2$, we have

$$F_{-x} = - \frac{kne^2(ND)}{d_1^3} + \frac{kne^2(NS-ND)}{d_2^3} \text{ towards } -X \dots \dots \dots \text{Equation 6d}$$

So, from Figure 5d, F_{-x} is the horizontal vector parallel to NS towards $-X$.

Combining equations Equation 5c from Figure 5c and Equation 5d from Figure 5d we have:

$$F_v = kne^2(AD) \left(\frac{1}{d_1^3} - \frac{1}{d_2^3} \right) - kne^2(AD) \left(\frac{1}{(d_1 + \Delta d)^3} - \frac{1}{(d_2 + \Delta d)^3} \right)$$

Rearranging the above equation, we have

$$F_v = kne^2(AD) \left(\frac{1}{d_1^3} - \frac{1}{(d_1 + \Delta d)^3} \right) - kne^2(AD) \left(\frac{1}{(d_2)^3} - \frac{1}{(d_2 + \Delta d)^3} \right).$$

In Figure 5c, $\sin \theta_1 = \frac{AD}{d_1}$ and $\sin \theta_2 = \frac{AD}{d_2}$.

In Figure 5d, $\sin \theta_1 = \frac{AD}{d_1 + \Delta d}$ and $\sin \theta_2 = \frac{AD}{d_2 + \Delta d}$.

Substituting the above, we get the vertical force F_v

$$F_v = kne^2 \left(\frac{\sin \theta_1}{d_1^2} - \frac{\sin \theta_1}{(d_1 + \Delta d)^2} \right) - kne^2 \left(\frac{\sin \theta_2}{d_2^2} - \frac{\sin \theta_2}{(d_2 + \Delta d)^2} \right) \text{ or}$$

$$F_v = \frac{kne^2 \sin \theta_1 ((d_1 + \Delta d)^2 - d_1^2)}{d_1^2 (d_1 + \Delta d)^2} - \frac{kne^2 \sin \theta_2 ((d_2 + \Delta d)^2 - d_2^2)}{d_2^2 (d_2 + \Delta d)^2} \text{ or}$$

$$F_v = kne^2 \sin \theta_1 \left(\frac{d_1^2 + 2d_1\Delta d + (\Delta d)^2 - d_1^2}{d_1^2 (d_1 + \Delta d)^2} \right) - kne^2 \sin \theta_2 \left(\frac{d_2^2 + 2d_2\Delta d + (\Delta d)^2 - d_2^2}{d_2^2 (d_2 + \Delta d)^2} \right)$$

As Δd which will be calculated soon is small and is the distance between the proton and the electron in object O , $(\Delta d)^2$ is even smaller and can be ignored and we have

$$F_v = kne^2 \sin \theta_1 \left(\frac{2d_1\Delta d}{d_1^2 (d_1 + \Delta d)^2} \right) - kne^2 \sin \theta_2 \left(\frac{2d_2\Delta d}{d_2^2 (d_2 + \Delta d)^2} \right)$$

As Δd is small, $(d_1 + \Delta d) = d_1$ and $(d_2 + \Delta d) = d_2$ so the above equation becomes

$$F_v = kne^2 \sin \theta_1 \left(\frac{2\Delta d}{d_1^3} \right) - kne^2 \sin \theta_2 \left(\frac{2\Delta d}{d_2^3} \right) \text{ or}$$

$$F_v = 2kne^2 \Delta d \left(\left(\frac{\sin \theta_1}{d_1^3} \right) - \left(\frac{\sin \theta_2}{d_2^3} \right) \right) \text{ or rearranging}$$

$$F_v = -2kne^2 \Delta d \left(\left(\frac{\sin \theta_2}{d_2^3} \right) - \left(\frac{\sin \theta_1}{d_1^3} \right) \right) \dots \dots \dots \text{Equation S}$$

As $\sin \theta_2 = \frac{AD}{d_2}$ and $\sin \theta_1 = \frac{AD}{d_1}$ we get

$$F_v = -2kne^2 \Delta d \left(\left(\frac{AD}{d_2^4} \right) - \left(\frac{AD}{d_1^4} \right) \right) \text{ or}$$

$$F_v = -2kne^2 \Delta d (AD) \left(\left(\frac{1}{d_2^4} \right) - \left(\frac{1}{d_1^4} \right) \right) \dots \dots \dots \text{Equation S}$$

'How Objects Fall' and 'Gill's Electronic Theory of Magnetism 1964'

In the above Equation 5 from point **S** to the equator or midpoint **E** in the southern hemisphere of the Earth, as $d_2 < d_1$ and geometrically $\sin \theta_2 > \sin \theta_1$, we have F_v as the resultant negative downward vertical force on the object **O** along **AD** towards the surface of the Earth, which is a combination of the two forces and is not because of some third force or gravity.

No third force or gravity needed to explain this phenomenon as done by Newton in 1687.

Some Calculations

Gill's electronic theory of magnetism 1964 leads to an easy conversion between the Newton and the Tesla or the force of attraction between the two magnetic poles of the Earth.

The Tesla Unit

If we have an attraction force of one newton between the two magnetic poles when they are one meter apart, then we call it a force of one Tesla.

Magnetic field in the Earth's outer core which is known to be 25 gauss or 2500 microteslas.

$$F = 2500 \times 10^{-6} \text{ Teslas} = 2.5 \times 10^{-3} \text{ Teslas or Newtons}$$

$$\text{Diameter of Earth } d = 1.2742 \times 10^7 \text{ meters; } 1e = 1.6 \times 10^{-19} \text{ C; } k = 8.99 \times 10^9 \text{ Nm}^2 \text{ C}^{-2}.$$

Applying Coulomb's law, the force between the north magnetic pole ($n(-e)$) and the south magnetic pole ($n(+e)$) is

$$F = \frac{k(n(-e))(n(+e))}{d^2} \text{ newtons} = -\frac{kn^2e^2}{d^2} \text{ newtons or}$$

$$n^2 = -\frac{Fd^2}{ke^2} \text{ or in units it is } \frac{\text{Nm}^2}{(\text{Nm}^2 \text{ C}^{-2})\text{C}^2} \text{ or}$$

$$n^2 = \frac{2.5 \times 10^{-3} (1.2742 \times 10^7)^2}{8.99 \times 10^9 (1.6 \times 10^{-19})^2} \text{ or}$$

$$n = \frac{\sqrt{(2.5 \times 10^{-3})(1.2742 \times 10^7)^2}}{\sqrt{(8.99 \times 10^9)(1.6 \times 10^{-19})^2}} = 4.1995985 \times 10^{19} = 42 \times 10^{18}.$$

$Ase = 1.6 \times 10^{-19} \text{ coulombs}$, so the exposed non-moving charge at:

$$\text{North magnetic pole } n(+e) = (42 \times 10^{18})(+1.6 \times 10^{-19}) = +6.72 \text{ coulombs.}$$

$$\text{South magnetic pole } n(-e) = (42 \times 10^{18})(-1.6 \times 10^{-19}) = -6.72 \text{ coulombs.}$$

The above $n = 42 \times 10^{18}$ represents the total number of exposed inner electrons at the north magnetic pole **N** of the Earth which is also equal to the exposed protons at the south magnetic pole **S** of the spherical Earth according to Gill's electronic theory of magnetism 1964. The two negative and positive forces move towards each other as the magnetosphere around the Earth and only a fraction of this magnetic force moves along the surface of the Earth towards each other as shown below.

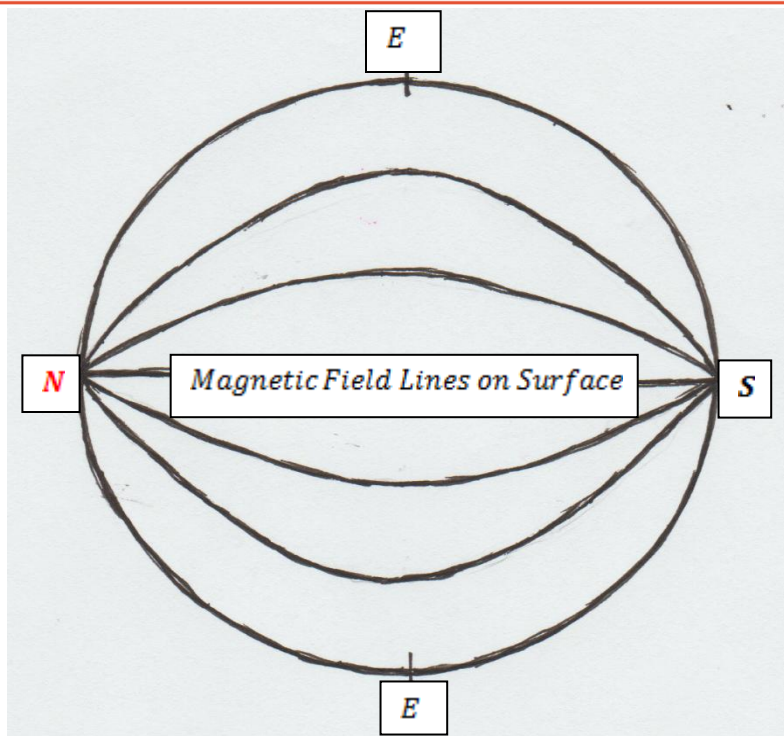


Figure7a

In Figure 7a, each magnetic field line is a combined attractive force between one exposed electron ($-e$) at the North magnetic pole and one exposed proton ($+e$) at the South magnetic pole. The total number of magnetic field lines which is equal to the number of exposed electrons at **N** or the exposed protons at **S** remains unchanged. However, these magnetic field lines are closer to each other at **N** and **S** and get spread out towards the equator owing to the spherical Earth and the magnetic field is known to be 65 microteslas near the magnetic poles of the Earth and 25 microteslas at the equator **E**.

Calculating for 65 microteslas at the magnetic poles of the Earth, which is what travels on or close to the surface of the Earth, we get

$$F = 65 \times 10^{-6} \text{ Teslas or Newtons}$$

$$\text{Diameter of Earth } d = 1.2742 \times 10^7 \text{ meters}$$

$$1e = 1.6 \times 10^{-19} \text{ C}; \text{ Coulombs constant } k = 8.99 \times 10^9 \text{ Nm}^2\text{C}^{-2}.$$

Near the magnetic poles of the Earth as the magnetic field lines are close to each other, the component of the forces from the magnetic pole of the Earth travelling close to the surface of the Earth is:

$$n = \frac{\sqrt{(65 \times 10^{-6})(1.2742 \times 10^7)}}{\sqrt{(8.99 \times 10^9)(1.6 \times 10^{-19})}} = 6.7716492 \times 10^{18} = 67.7 \times 10^{17}.$$

At or near the equator owing to the spherical Earth, the same magnetic field lines have spread out and the magnetic force is measured at 25 microteslas.

'How Objects Fall' and 'Gill's Electronic Theory of Magnetism 1964'

$$F = 25 \times 10^{-6} \text{ Teslas or Newtons}$$

As the magnetic field lines spread apart on the spherical Earth (Figure 7a), the same component of the forces from the magnetic pole of the Earth travelling close to the surface of the Earth is:

$$n = \frac{\sqrt{(25 \times 10^{-6})(1.2742 \times 10^7)}}{\sqrt{(8.99 \times 10^9)(1.6 \times 10^{-19})}} = 4.1995985 \times 10^{18} = 42 \times 10^{17}.$$

The fraction of the *non-moving exposed charges from two magnetic poles* which take part in the magnetic forces or field lines close to the surface of the Earth are:

$$\text{At the North magnetic pole } n(-e) = (67.7 \times 10^{17})(-1.6 \times 10^{-19}) = -1.0832 \text{ coulombs.}$$

$$\text{At the South magnetic pole } n(+e) = (67.7 \times 10^{17})(+1.6 \times 10^{-19}) = +1.0832 \text{ coulombs.}$$

$$\text{At the equator } n(-e) = (42 \times 10^{17})(-1.6 \times 10^{-19}) = -0.672 \text{ coulombs.}$$

$$\text{At the equator } n(+e) = (42 \times 10^{17})(+1.6 \times 10^{-19}) = +0.672 \text{ coulombs.}$$

Where the electron $-e = -1.6 \times 10^{-19} \text{ coulombs}$ and the proton $+e = +1.6 \times 10^{-19} \text{ coulombs}$.

The above numbers represent the non-moving charge from the two magnetic poles of the Earth which move as positive and negative forces towards each other on the spherical surface of the Earth.

The distance from *N* to *S* along the surface of the spherical Earth is $\pi r = d_1 + d_2$ meters, where an object *O* is at a distance d_1 from *N* and d_2 from *S*. However, for calculations of the Tesla units of the Earth, the distance from *N* to *S* will be a straight $2r$ meters. This magnetic force of the Earth is a combination of the two forces from the two magnetic poles *N* and *S* along the surface of the spherical Earth.

Please note that the above numbers relate to the component of the total magnetic field of the Earth which travels close to the surface of the Earth. Close to the Equator, the magnetic field lines spread out because of the spherical shape of the Earth and we get a smaller number.

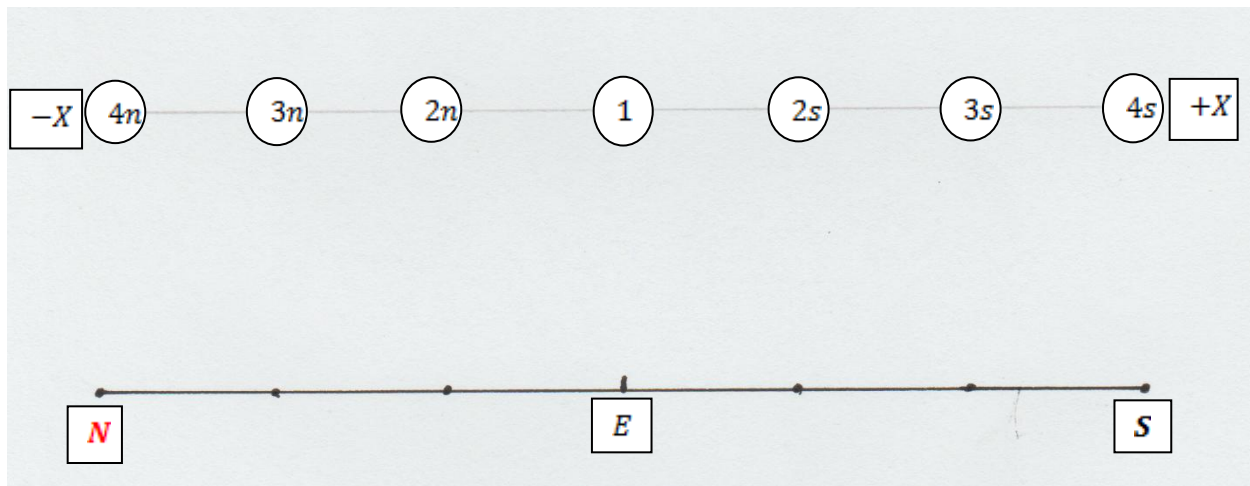


Figure7b

Figure 7b shows the points of interest for calculations parallel to the surface of the Earth.

The variable Δd metres is small and this issue will be resolved during the calculations as further support of the article.

In The Northern Magnetic Hemisphere of the Earth From Midpoint O to N

As the $F_v = -ma$ is known.

Object O has a mass of a proton and an electron $m = (+e) + (-e) = 1.6735328 \times 10^{-27}$ kilograms. Acceleration $a = -9.8 \text{ metres/sec}^2$. This is also equal to Equation N and we get

$$F_v = -2kne^2(AD)\Delta d \left(\frac{1}{d_1^4} - \frac{1}{d_2^4} \right) = -ma \dots\dots\dots \text{Equation N}$$

At Point 4n

On top of the north magnetic pole of the Earth, $d_1 = 0 \text{ meter}$ and $d_2 = 2 \times 10^7 \text{ meters}$. Let height of object O above the ground be $AD = 1 \text{ meter}$. Applying the known values

$$F_v = -2(8.99 \times 10^9)((67.7 \times 10^{17})(+1.6 \times 10^{-19})(1)(\Delta d) \left(\left(\frac{1}{0} \right) - \left(\frac{1}{(2 \times 10^7)^4} \right) \right)) = -\infty \text{ newtons.}$$

At Point 3n

In order to calculate the variable Δd , it is known that $F_v = -ma$ is a tested fact and is equal to the F_v derived above.

$d_1 = \frac{2 \times 10^7}{6}$ and $d_2 = \frac{5(2 \times 10^7)}{6}$ as $(d_1 + d_2) = 2 \times 10^7 \text{ meters}$ and Equation N becomes

$$F_v = -2(8.99 \times 10^9)((67.7 \times 10^{17})(+1.6 \times 10^{-19})(1)\Delta d \left(\left(\frac{6^4}{(2 \times 10^7)^4} \right) - \left(\frac{6^4}{(5(2 \times 10^7))^4} \right) \right)) =$$

$$-(1.6735328 \times 10^{-27})(9.8)$$

or

$$\Delta d = 1.0412916 \times 10^{-10} \text{ meters and}$$

$$F_v = -1.6400621 \times 10^{-26} \text{ newtons.}$$

At Point 2n

$d_1 = \frac{2 \times 10^7}{3}$ and $d_2 = \frac{2(2 \times 10^7)}{3}$ as $d_1 + d_2 = 2 \times 10^7 \text{ meters}$ and Equation N becomes

$$F_v = -2(8.99 \times 10^9)((42 \times 10^{17})(+1.6 \times 10^{-19})(1)\Delta d \left(\left(\frac{3^4}{(2 \times 10^7)^4} \right) - \left(\frac{3^4}{(2(2 \times 10^7))^4} \right) \right)) =$$

$$-(1.6735328 \times 10^{-27})(9.8)$$

or

$$\Delta d = 2.8599934 \times 10^{-9} \text{ meters}$$

$$F_v = -1.6400621 \times 10^{-26} \text{ newtons}$$

At point 1 or exactly the equator $d_1 = \frac{2 \times 10^7}{2}$ and $d_2 = \frac{(2 \times 10^7)}{2}$ as $d_1 + d_2 = 2 \times 10^7$ meters and Equation N becomes

$$F_v = -2(8.99 \times 10^9)((67.3 \times 10^{17})(+1.6 \times 10^{-19})(1)(\Delta d) \left(\left(\frac{2}{(2 \times 10^7)^2} \right) - \left(\frac{2}{(2 \times 10^7)^2} \right) \right) \text{ or}$$

$$F_v = -0 \text{ newtons.}$$

Δd is a small variable which can be calculated only between point 1 and point 4n.

Here we are dealing with an object O which has a single proton with a charge $+1.6 \times 10^{-19}$ at a height $AD = 1$ meter. A larger object will lead to a larger downward force along AD .

As the equation moves from N to the equator E , the downward force stays downward but becomes less and less as we approach the Equator. This is supported by the experimental observation that the downward force is least at the Equator and most near the magnetic poles of the Earth.

In the Southern Magnetic Sphere

As the $F_v = -ma$ is known, here object O has a mass $m = 1.6735328 \times 10^{-27}$ kilograms and acceleration $a = -9.8$ metres/sec² and is equal to Equation S and we get

$$F_v = -2kne^2 \Delta d(AD) \left(\left(\frac{1}{d_2^2} \right) - \left(\frac{1}{d_1^2} \right) \right) = -ma \dots \dots \dots \text{Equation S}$$

At Point 4s

On top of the south magnetic pole of the Earth where $d_2 = 0$ meter and $d_1 = 2 \times 10^7$ meters and let height of object O above the ground be $AD = 1$ meter. Equation S becomes

$$F_v = -2(8.99 \times 10^9)((67.7 \times 10^{17})(-1.6 \times 10^{-19})(1)(\Delta d) \left(\left(\frac{1}{0} \right) - \left(\frac{1}{(2 \times 10^7)^2} \right) \right) \text{ or}$$

$$F_v = -\infty \text{ newtons.}$$

At Point 3s

$$F_v = -2kne^2 \Delta d(AD) \left(\left(\frac{1}{d_2^2} \right) - \left(\frac{1}{d_1^2} \right) \right) = -ma \text{ and}$$

$d_2 = \frac{2 \times 10^7}{6}$ and $d_1 = \frac{5(2 \times 10^7)}{6}$ as $(d_1 + d_2) = 2 \times 10^7$ meters and Equation S becomes

$$F_v = -2(8.99 \times 10^9)((67.7 \times 10^{17})(+1.6 \times 10^{-19})(1)(\Delta d) \left(\left(\frac{6^4}{(2 \times 10^7)^4} \right) - \left(\frac{6^4}{(5(2 \times 10^7))^4} \right) \right) =$$

$$-(1.6735328 \times 10^{-27})(9.8)$$

or

$$\Delta d = 1.0412916 \times 10^{-10} \text{ meters and}$$

$$F_v = -1.6400621 \times 10^{-26} \text{ newtons.}$$

At Point 2s

$$F_v = -2kne^2(AD)\Delta d \left(\left(\frac{1}{d_2^4} \right) - \left(\frac{1}{d_1^4} \right) \right) = -ma \text{ and}$$

$d_2 = \frac{2 \times 10^7}{3}$ and $d_1 = \frac{2(2 \times 10^7)}{3}$ as $d_1 + d_2 = 2 \times 10^7$ meters and Equation S becomes

$$F_v = -2(8.99 \times 10^9)((42 \times 10^{17})(+1.6 \times 10^{-19})(1)(\Delta d) \left(\left(\frac{3^4}{(2 \times 10^7)^4} \right) - \left(\frac{3^4}{(2(2 \times 10^7))^4} \right) \right)) =$$

$$-(1.6735328 \times 10^{-27})(9.8)$$

or

$$\Delta d = 2.8599934 \times 10^{-9} \text{ meters}$$

$$F_v = -1.6400621 \times 10^{-26} \text{ newtons}$$

At point 1 Exactly the equator $d_1 = \frac{2 \times 10^7}{2}$ and $d_2 = \frac{2 \times 10^7}{2}$ as $d_1 + d_2 = 2 \times 10^7$ meters and Equation S becomes

$$F_v = -2(8.99 \times 10^9)((67.3 \times 10^{17})(+1.6 \times 10^{-19})(1)(\Delta d) \left(\left(\frac{2}{(2 \times 10^7)^4} \right) - \left(\frac{2}{(2 \times 10^7)^4} \right) \right)) \text{ or}$$

$$F_v = -0 \text{ newtons.}$$

The small variable Δd can only be calculated anywhere between point 1 and point 4s in Figure 7b.

Object *O* which has a single proton with a charge $+1.6 \times 10^{-19}$ and a mass $m = 1.6735328 \times 10^{-27}$ kilograms. A larger object with a larger mass will lead to a larger downward force along *AD*.

As the equation moves from S to the equator E in a horizontal manner, the downward force stays negative or downward but becomes less and less as we approach the Equator. This is supported by the experimental observation that the downward force is least at the Equator and most near the magnetic poles of the Earth.

DISCUSSION

Latitude

Both Equation N in the northern magnetic hemisphere and Equation S in the southern magnetic hemisphere show that the downward force of acceleration which causes objects near the Earth to fall is not because of a single third force or gravity, but, because of a combination of positive and negative forces from the two magnetic poles of the Earth.

It has been seen experimentally that the sea-level gravity or downward acceleration increases from about 9.780 m/s² at the Equator to about 9.832 m/s² at the poles. The variation of reduced downward acceleration of 0.3% at the Equator is explained by the above Equations. There is no need to ascribe this to the equatorial bulge and the effect of the surface centrifugal force due to rotation of the Earth.

As the electron and the proton of an atom are at a small distance Δd meters from each other, most of the forces on the electron and the proton are counteracted by each other and *when close to the Earth(NS) and far away from the external extra-terrestrial forces, it starts falling towards the Earth*

'How Objects Fall' and 'Gill's Electronic Theory of Magnetism 1964'

because of a resultant combination of the positive and negative forces and not because of a non-existent single third force.

Objects from the midpoint or equator **E** to **N** will fall down because of the greater pull on the proton component and masses from mid-point or equator **E** to **S** will fall down because of greater attraction of the electron component of mass **O**. This situation applies when the height **AD** of the mass **O** above the surface of the Earth is small. The greater the mass of the falling object, the greater will be the force with which it will fall towards the Earth.

When **AD** becomes large, outer extra-terrestrial forces will kick in and we will have the 'satellite situation', which will be discussed later.

Thus, there is no such thing as a single third force or gravity, and objects fall because of a combination of two forces. Isaac Newton in 1687 was in error when he postulated the Universal Law of Gravitation.

Pendulum Acceleration Variation

Experiments over the last over three hundred years have shown pendulum acceleration is least at the equator and keeps on increasing as we move the same experiment towards the magnetic poles of the Earth and this is explained by Gill's electronic theory of magnetism (1964).

The lateral dot product vector forces which are parallel to the surface of the Earth and at right angle to the vertical downward force are responsible for the lateral acceleration of a pendulum. It will be shown mathematically that the lateral dot product vector forces are least at the equator and thus the pendulum acceleration is least at the equator. These lateral dot product vector forces keep on increasing as we move towards the magnetic poles of the Earth and become maximal at the magnetic poles of the Earth. It is due to the continuous increase of the lateral dot product vector forces as the position of the object **O** changes from the equator all the way up to either magnetic pole on the surface of the Earth that causes the variation in the acceleration of the pendulum seen experimentally.

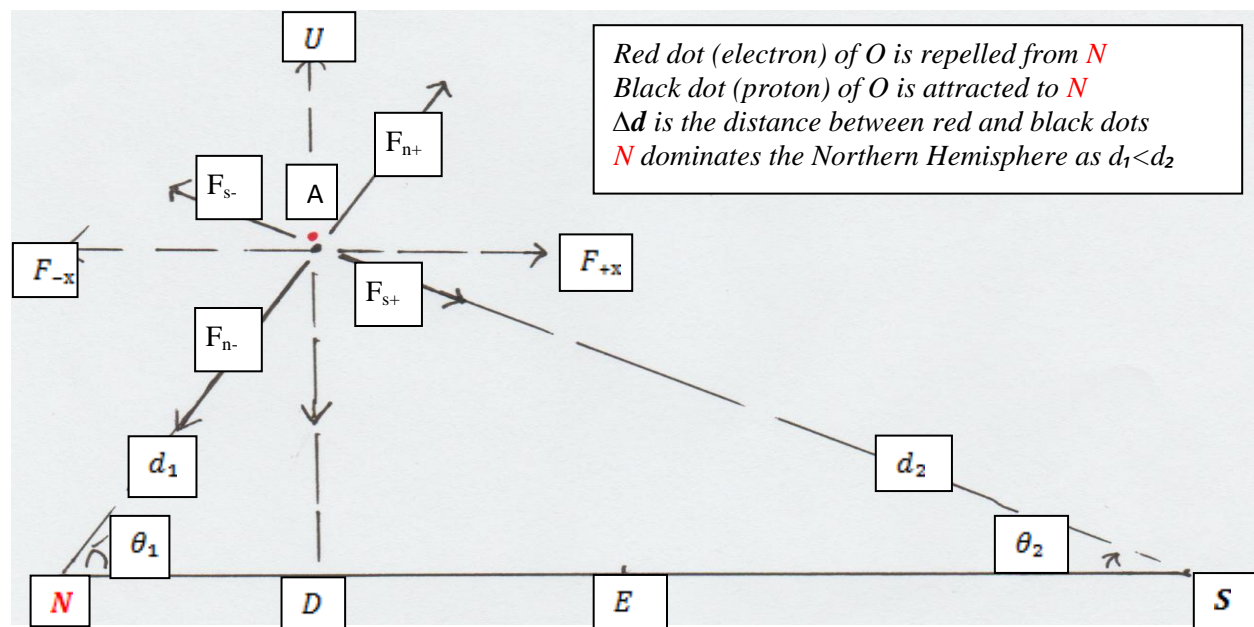


Figure4e

'How Objects Fall' and 'Gill's Electronic Theory of Magnetism 1964'

As seen in Figure 4e which has super-imposed images of Figures 5a and 5b in the *northern magnetic hemisphere*, the lateral dot product vectors F_{-x} and F_{+x} are equal and opposite to each other and parallel to NS and are responsible for the lateral acceleration of the pendulum.

Points of interest in Figure 7b to be used on a horizontal line parallel to the surface of the Earth.

In the northern magnetic hemisphere of the Earth from midpoint E to N

Referring to Figure 5a which has Equation 6a and Figure 5b which has Equation 6b:

$$F_{-x} = - \left(\frac{kne^2(ND)}{d_1^3} - \frac{kne^2(NS-ND)}{d_2^3} \right) \text{ towards } -X \dots \text{Equation 6a}$$

As AD is small, $d_1 = ND$ and $d_2 = (NS - ND)$, we get

$$F_{-x} = -kne^2 \left(\frac{1}{d_1^2} - \frac{1}{d_2^2} \right) \text{ towards } -X \dots \text{Equation 6a}$$

F_{-x} is the horizontal vector parallel to NS towards $-X$ as shown in Equation 6a.

$$F_{+x} = \frac{kne^2(ND)}{d_1^3} - \frac{kne^2(NS-ND)}{d_2^3} \text{ towards } +X \dots \text{Equation 6b}$$

As AD is small, $d_1 = ND$ and $d_2 = (NS - ND)$, we get

$$F_{+x} = + \left(\frac{kne^2}{d_1^2} - \frac{kne^2}{d_2^2} \right) = +kne^2 \left(\frac{1}{d_1^2} - \frac{1}{d_2^2} \right) \text{ towards } +X \dots \text{Equation 6b}$$

F_{+x} is the horizontal vector parallel to NS from point A towards $+X$.

Radius of Earth $r = 6.371 \times 10^6$ meters

Semicircle of Earth $(d_1 + d_2) = \pi r = \pi(6.371 \times 10^6) = 2 \times 10^7$ meters

Equations 6a and 6b are from the *northern magnetic hemisphere* of the Earth and will be applied at various points starting with the midpoint above the equator as in Figure 7b.

Point (1) deals with lateral vectors at the equator or midpoint:

As $d_1 + d_2 = 2 \times 10^7$ meters, at the equator or midpoint E of planet Earth,

$d_1 = d_2 = 2 \times 10^7 / 2 = 10^7$ and the equations 6a and 6b at point (1) or E become

$$F_{-x} = -kne^2 \left(\frac{1}{(10^7)^2} - \frac{1}{(10^7)^2} \right) = -kne^2 \cdot (0) = -0 \text{ newtons at } E \text{ towards } -X.$$

$$F_{+x} = +kne^2 \left(\frac{1}{(10^7)^2} - \frac{1}{(10^7)^2} \right) = +kne^2 \cdot (0) = +0 \text{ newtons at } E \text{ towards } +X.$$

At Point 2n

Each magnetic field line is the attractive force between one exposed electron at the North magnetic pole and one exposed proton at the South magnetic pole.

As the magnetic field lines spread apart on the spherical Earth at point 2n near the equator it is 25 microteslas.

$$n = \frac{\sqrt{(25 \times 10^{-6})(1.2742 \times 10^7)}}{\sqrt{(8.99 \times 10^9)(1.6 \times 10^{-19})}} = 42 \times 10^{17}.$$

Charge from North magnetic pole $n(-e) = (42 \times 10^{17})(-1.6 \times 10^{-19}) = -0.672 \text{ coulombs}$.

Charge from South magnetic pole $n(+e) = (42 \times 10^{17})(+1.6 \times 10^{-19}) = +0.672 \text{ coulombs}$.

$e = 1.6 \times 10^{-19} \text{ coulombs}$. $k = 8.99 \times 10^9 \text{ coulombs constant}$.

Substituting these numbers we get at point (2n) in the northern magnetic hemisphere

where $d_1 = \frac{2 \times 10^7}{3}$ and $d_2 = \frac{2(2 \times 10^7)}{3}$ and the equations 6a and 6b in Figure 7b become

$$F_{-x} = -(8.99 \times 10^9)(-0.672)(1.6 \times 10^{-19}) \left(\frac{3^2}{(2 \times 10^7)^2} - \frac{3^2}{(2(2 \times 10^7))^2} \right) = -1.6311456 \times 10^{-23}$$

newtons towards $-X$.

$$F_{+x} = (8.99 \times 10^9)(+0.672)(-1.6 \times 10^{-19}) \left(\frac{3^2}{(2 \times 10^7)^2} - \frac{3^2}{(2(2 \times 10^7))^2} \right) = +1.6311456 \times 10^{-23}$$

newtons towards $+X$.

At Point 3n

As the magnetic field lines starting from the magnetic poles are closer to each other near their origin on the spherical Earth and at point 3n it is 65 microteslas.

Charge from North magnetic pole $n(-e) = (67.7 \times 10^{17})(-1.6 \times 10^{-19}) = -1.0832 \text{ coulombs}$.

Charge from South magnetic pole $n(+e) = (67.7 \times 10^{17})(+1.6 \times 10^{-19}) = +1.0832 \text{ coulombs}$.

$d_1 = \frac{2 \times 10^7}{6}$ and $d_2 = \frac{5(2 \times 10^7)}{6}$ and the equations 6a and 6b at point 3n in the northern magnetic hemisphere shown in Figure 7b become

$$F_{-x} = 8.99 \times 10^9(-1.0832)(1.6 \times 10^{-19}) \left(\frac{6^2}{(2 \times 10^7)^2} - \frac{6^2}{(5(2 \times 10^7))^2} \right) = -1.3461767 \times 10^{-22}$$

newtons towards $-X$.

$$F_{+x} = 8.99 \times 10^9(1.0832)(-1.6 \times 10^{-19}) \left(\frac{6^2}{(2 \times 10^7)^2} - \frac{6^2}{(5(2 \times 10^7))^2} \right) = +1.3461767 \times 10^{-22}$$

newtons towards $+X$.

At Point 4n

On top of the northern magnetic hemisphere, $d_1 = 0$ and $d_2 = 2 \times 10^7$ and the equations 6a and 6b in the northern magnetic hemisphere shown in Figure 7b become

$$F_{-x} = -kne^2 \left(\frac{1}{0} - \frac{1}{(2 \times 10^7)^2} \right) = -kne^2 \left(\infty - \frac{1}{(2 \times 10^7)^2} \right) = -\infty \text{ newtons towards } -X.$$

$$F_{+x} = +kne^2 \left(\frac{1}{0} - \frac{1}{(2 \times 10^7)^2} \right) = +kne^2 \left(\infty - \frac{1}{(2 \times 10^7)^2} \right) = +\infty \text{ newtons towards } +X.$$

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Please note that $+X$ to $-X$ is a horizontal line parallel to the surface of the Earth. Thus, the lateral vector F_{+x} towards $+X$ or the lateral vector F_{-x} towards $-X$ are equal and opposite to each other while calculating each point. However, we are dealing with dot product vectors in opposite directions with a time interval $t \approx 0$ seconds. It is this time interval which allows the opposing vectors to manifest in a pendulum experiment.

Equations 6a and 6b explain the greater acceleration of the pendulum as the same experiment is moved from the equator towards the magnetic North pole of the Earth and is borne out experimentally for the last three hundred years.

In the Southern magnetic hemisphere of the Earth

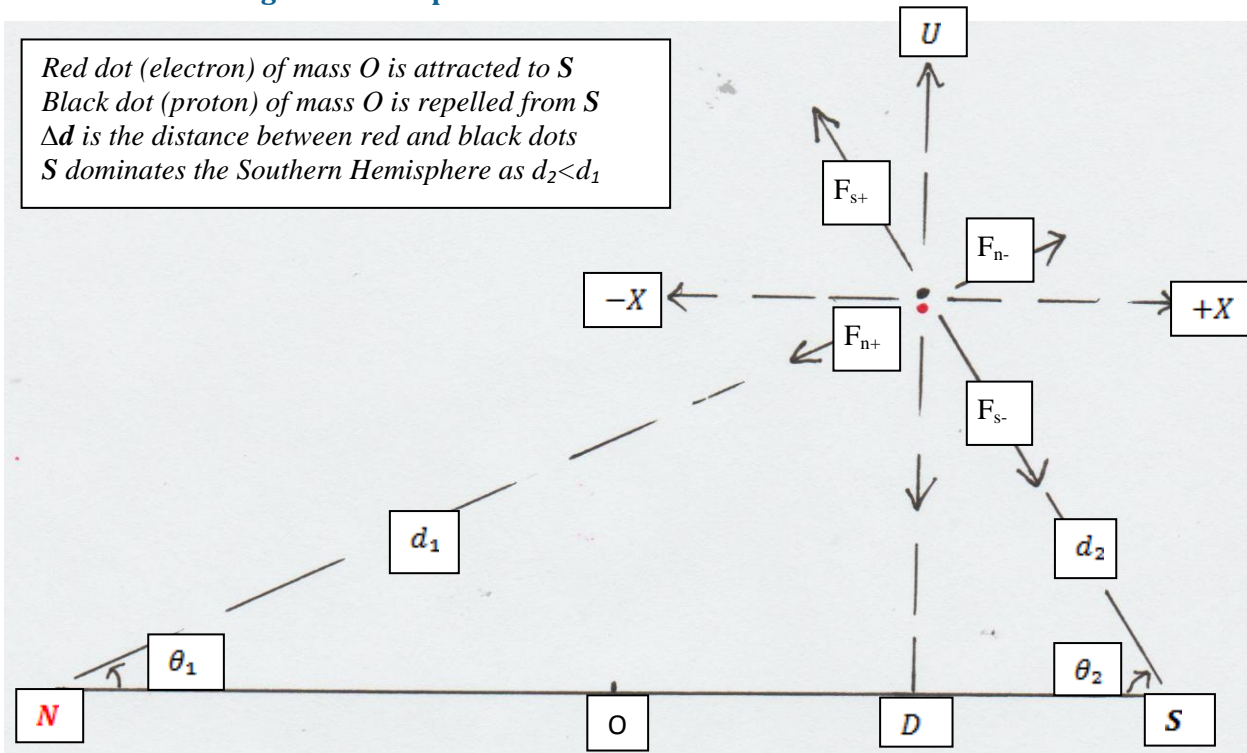


Figure4f

As seen in Figure 4f which has super-imposed images of Figures 5c and 5d in the southern magnetic hemisphere, the lateral dot product vectors F_{-x} and F_{+x} are equal and opposite to each other and parallel to NS and are responsible for the lateral acceleration of the pendulum.

Referring to Figure 5c which has Equation 6c and Figure 5d which has Equation 6d:

$$F_{+x} = + \frac{kne^2(ND)}{d_1^3} - \frac{kne^2(NS-ND)}{d_2^3} \text{ towards } +X \text{ Equation 6c}$$

$$F_{-x} = - \frac{kne^2(ND)}{d_1^3} + \frac{kne^2(NS-ND)}{d_2^3} \text{ towards } -X \text{Equation 6d}$$

As AD is small, $d1 = ND$ and $d2 = (NS - ND)$ and we get

$$F_{+x} = +kne^2 \left(\frac{1}{d_1^2} - \frac{1}{d_2^2} \right) \text{ towards } +X \text{ Equation 6c}$$

$$F_{-x} = -kne^2 \left(\frac{1}{d_1^2} - \frac{1}{d_2^2} \right) \text{ towards } -X \text{ Equation 6d}$$

$$\text{Semicircle of Earth } (d_1 + d_2) = \pi r = \pi(6.371 \times 10^6) = 2 \times 10^7 \text{ meters}$$

Equations 6c and 6d are from the *southern magnetic hemisphere* of the Earth and will be applied at various points starting with the midpoint above the equator as in Figure 7b.

F_{+x} and F_{-x} are the horizontal vector forces parallel to the Earth *NS* in the southern magnetic hemisphere.

Point (1) deals with lateral vectors at the equator or midpoint:

As $d_1 + d_2 = 2 \times 10^7$ meters, at the equator or midpoint *E* of planet Earth, $d_1 = d_2 = \frac{2 \times 10^7}{2}$ and the equations 6c and 6d at *point (1) or E* in Figure 7b become

$$F_{+x} = +kne^2 \left(\frac{2^2}{(2 \times 10^7)^2} - \frac{2^2}{(2 \times 10^7)^2} \right) = +kne^2 \cdot (0) = +0 \text{ newtons at } E \text{ towards } +X.$$

$$F_{-x} = -kne^2 \left(\frac{2^2}{(2 \times 10^7)^2} - \frac{2^2}{(2 \times 10^7)^2} \right) = -kne^2 \cdot (0) = -0 \text{ newtons at } E \text{ towards } -X.$$

At Point 2s

In the southern magnetic hemisphere, $d_1 = \frac{2(2 \times 10^7)}{3}$ and $d_2 = \frac{2 \times 10^7}{3}$ and the equations 6c and 6d at *point (2s)* in the southern magnetic hemisphere in Figure 7b become

$$F_{+x} = +8.99 \times 10^7 (0.672)(-1.6 \times 10^{-19}) \left(\frac{3^2}{(2(2 \times 10^7))^2} - \frac{3^2}{(2 \times 10^7)^2} \right) = +1.6311456 \times 10^{-23}$$

newtons towards *+X*.

$$F_{-x} = -8.99 \times 10^7 (0.672)(-1.6 \times 10^{-19}) \left(\frac{3^2}{(2(2 \times 10^7))^2} - \frac{3^2}{(2 \times 10^7)^2} \right) = -1.6311456 \times 10^{-23}$$

towards *-X*.

At Point 3s

In the southern magnetic hemisphere, $d_1 = \frac{5(2 \times 10^7)}{6}$ and $d_2 = \frac{2 \times 10^7}{6}$ and the equations 6c and 6d in the southern magnetic hemisphere shown in Figure 7b become

$$F_{+x} = 8.99 \times 10^9 (1.0832)(-1.6 \times 10^{-19}) \left(\frac{6^2}{(5(2 \times 10^7))^2} - \frac{6^2}{(2 \times 10^7)^2} \right) = +1.3461767 \times 10^{-22}$$

newtons towards *+X*.

$$F_{-x} = 8.99 \times 10^9 (-1.0832)(1.6 \times 10^{-19}) \left(\frac{6^2}{(5(2 \times 10^7))^2} - \frac{6^2}{(2 \times 10^7)^2} \right) = -1.3461767 \times 10^{-22}$$

towards *-X*.

At Point 4s

In the southern magnetic hemisphere, $d_1 = 2 \times 10^7$ meters and $d_2 = 0$ and the equations 6c and 6d in the southern magnetic hemisphere as shown in Figure 7b become

$$F_{-x} = -kne^2 \left(\frac{1}{(2 \times 10^7)^2} - \frac{1}{0} \right) = -kne^2 \left(\frac{1}{(2 \times 10^7)^2} - \infty \right) = +\infty \text{ newtons towards } +X.$$

$$F_{+x} = +kne^2 \left(\frac{1}{(2 \times 10^7)^2} - \frac{1}{0} \right) = +kne^2 \left(\frac{1}{(2 \times 10^7)^2} - \infty \right) = -\infty \text{ newtons towards } -X.$$

As shown in Figure 7b, $+X$ to $-X$ is a horizontal line parallel to and close to the surface of the Earth and the lateral vector F_{+x} towards $+X$ or the lateral vector F_{-x} towards $-X$ are equal and opposite to each other at each point.

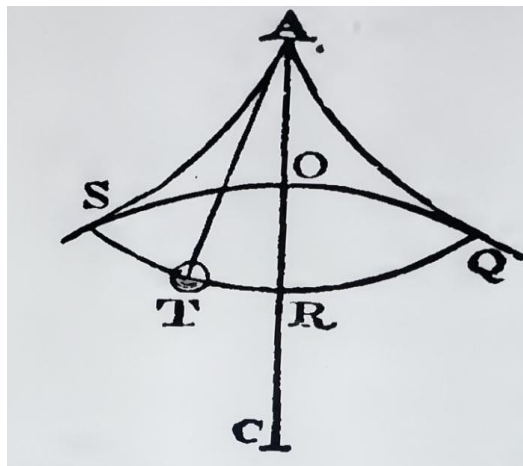


Figure7c. is pendulum sketch from Newtons book *The Principia* where C is gravity. Newton ascribed the variable acceleration of the pendulum to flattening of the two poles of the Earth.

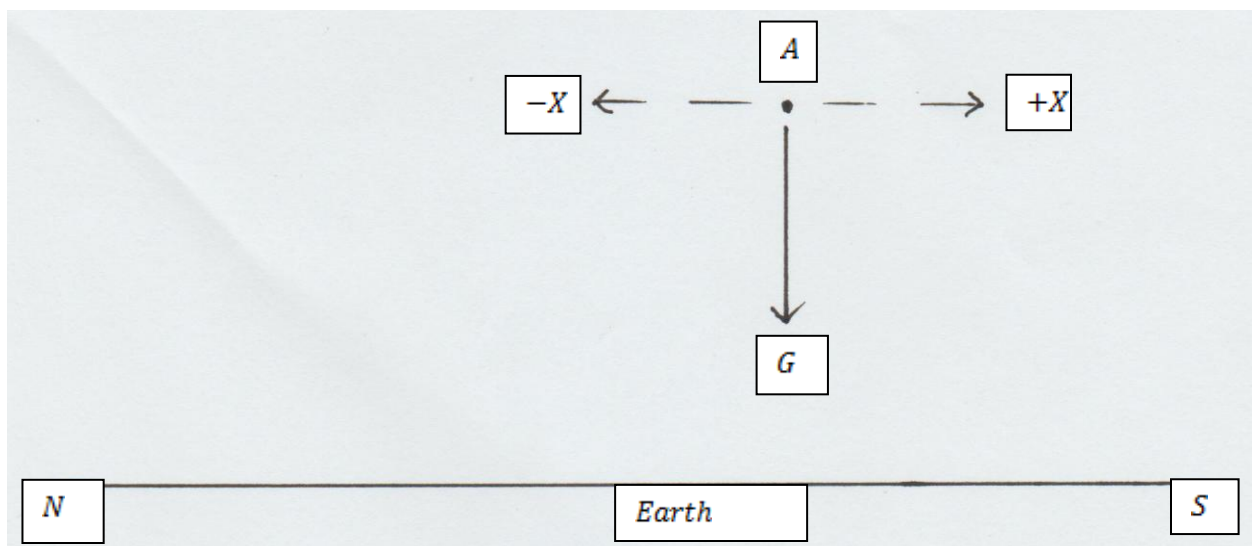


Figure7d

'How Objects Fall' and 'Gill's Electronic Theory of Magnetism 1964'

Figure 7d has a point object *A* above the Earth *NS* being pulled by 'gravity' in a perpendicular manner towards the center of the Earth with a force 'g' or $F = g$. The lateral vector force of $F = g$ along *AX* at 90° in a positive or negative direction will be given by a dot-product vector:

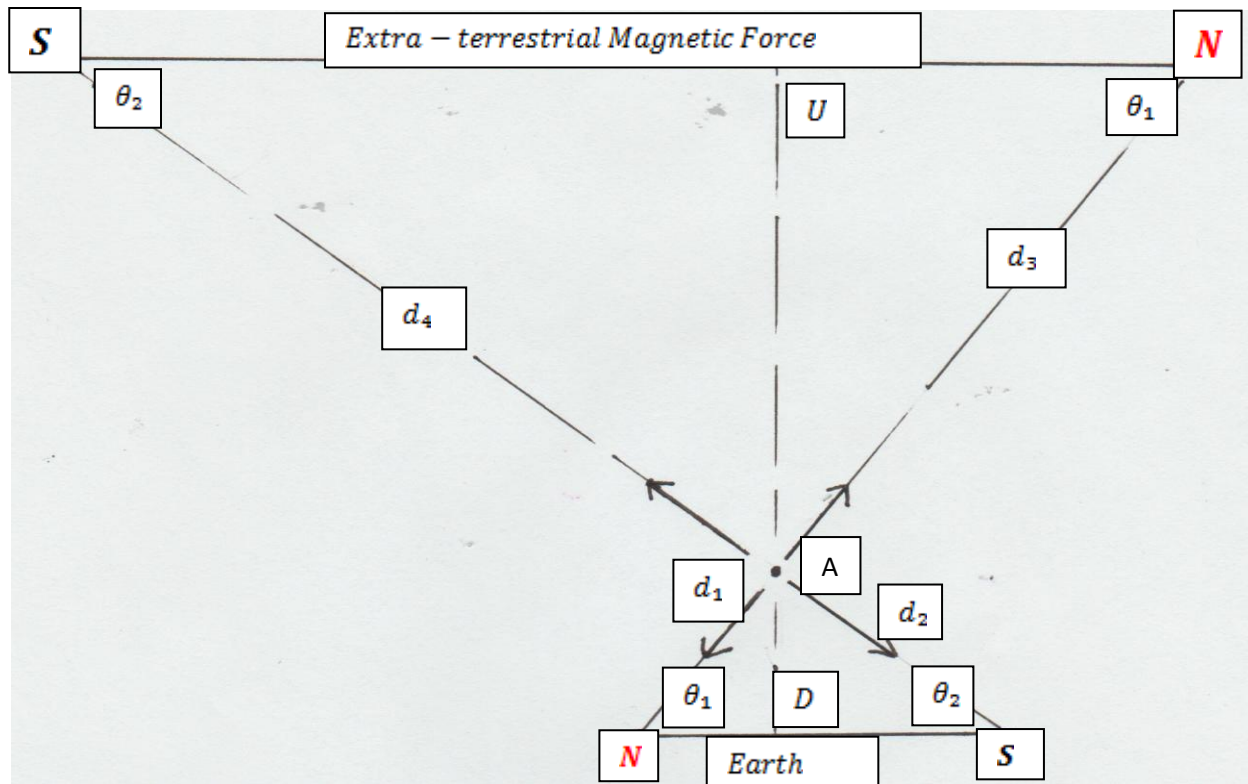
$$F_{90^\circ} = g \cos 90^\circ = 0 \text{ as } \cos 90^\circ = 0.$$

There is no lateral vector if we believe in gravity.

CONCLUSION

As shown in Figure 7b, $+X$ to $-X$ is a horizontal line parallel to the surface of the Earth at right angle to the downward vertical force. Application of *Gill's electronic theory of magnetism 1964* helps explain the lateral vector forces which cause the lateral acceleration of the pendulum are smallest at the equator as shown in Figure 7b at **point 1** and keep on increasing at **points 2n** and **2s**, and increase further at **points 3n** and **3s** to become largest at **points 4n** and **4s** which is at the magnetic North and South poles of the Earth. This has been supported experimentally. There is no need to explain this with some flattening of the Earth at its two ends as done by Newton in 1687.

Altitude and the Satellite Principle



In Figure 8, the magnetic force of the Earth interacts with the extra-terrestrial magnetic force.

The extra-terrestrial magnetic source is much bigger and at a much greater distance and has a north magnetic pole $N = q(-e)$ where q is the number of exposed electrons and a south magnetic pole $S = q(+e)$ where q is the number of exposed protons.

'How Objects Fall' and 'Gill's Electronic Theory of Magnetism 1964'

When AD is small, the extra-terrestrial magnetic force has no effect and we have a combined downward force causing a net downward force and acceleration.

$$F_v = -2kne^2 \Delta d \left(\frac{\sin \theta_1}{d_1^3} - \frac{\sin \theta_2}{d_2^3} \right) \dots \dots \dots \text{Equation N}$$

As $d_1 < d_2$ and geometrically $\sin \theta_1 > \sin \theta_2$, there is a resultant vertically downward force F_v along AD in the northern hemisphere towards the Earth. Similar results are obtained in the southern magnetic hemisphere of the Earth. No third force or gravity is required to show why objects close to the Earth fall down.

$\sin \theta_1 = \frac{AD}{d_1}$ and $\sin \theta_2 = \frac{AD}{d_2}$ and the above equation becomes

$$F_v = -2kne^2 \Delta d \left(\frac{AD}{d_1^4} - \frac{AD}{d_2^4} \right) = 2kn(-e)(+e)\Delta d(AD) \left(\frac{1}{d_1^4} - \frac{1}{d_2^4} \right) \dots \dots \dots \text{Equation N}$$

The minus sign has moved into the equation and the resultant force is still downward.

(AD) is the height of object O above the surface of the Earth.

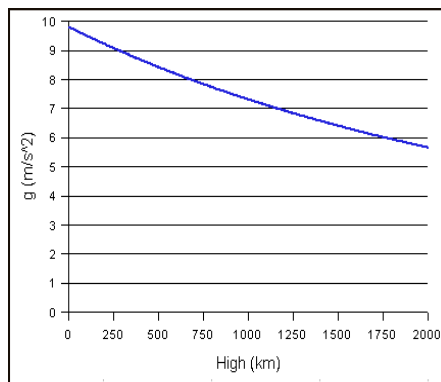
$\left(\frac{1}{d_1^4} - \frac{1}{d_2^4} \right)$ is a variable constant which varies with the latitude. It is least at the equator and keeps on increasing as we move towards either magnetic pole of the Earth.

$n(-e)$ is the magnetic force in Teslas from north magnetic pole of the Earth and is constant.

Coulomb's constant $k = 8.99 \times 10^9 Nm^2 C^{-2}$ where N is for newtons, m is in meters and C is for coulombs.

Δd is the variable intra-atomic distance between the proton and the electron of object O .

$(+e)$ represents the positive charge on object/satellite O and this depends on object size.



The graph shows the decrease in the downward force with the increase in height of object O .

When (AD) is small at sea level, the extra-terrestrial forces as shown in Figure 8 do not play a significant role.

When (AD) is increased to 9000 meters above sea level, the downward force decreases by 0.29% reflected in a decrease in weight of the object O . This weight decrease is not because of some decreased attraction from the center of the Earth but because of increased attraction towards the extra-terrestrial source owing to that decreased distance AU (Figure 8).

'How Objects Fall' and 'Gill's Electronic Theory of Magnetism 1964'

When (AD) increases significantly, the extra-terrestrial force AU as shown in Figure 8 assumes significance and a situation is reached when the object O deals with a downward force F_v towards the surface of the Earth becoming equal to the upward force F_u towards the extra-terrestrial magnetic forces. *At this stage, the object O behaves as a satellite.*

From Figure 8, using calculations similar to the ones used for deriving F_v , the upward force F_u along (AU) away from planet Earth is

$$F_u = -2kqe^2 \Delta d \left(\frac{\sin \theta_1}{d_3^3} - \frac{\sin \theta_2}{d_4^3} \right) \dots \dots \dots \text{Equation M}$$

$\sin \theta_1 = \frac{AU}{d_3}$ and $\sin \theta_2 = \frac{AU}{d_4}$ and above equation towards the extra-terrestrial source becomes

$$F_u = -2kqe^2 \Delta d \left(\frac{AU}{d_3^4} - \frac{AU}{d_4^4} \right) = 2kq(-e)(+e)\Delta d(AU) \left(\frac{1}{d_3^4} - \frac{1}{d_4^4} \right) \dots \dots \dots \text{Equation M}$$

$q(-e)$ is the magnetic force from the north magnetic pole of the extra-terrestrial magnetic source and $+e$ represents the positive charge on object/satellite O .

When F_v in equation N is equal to F_u in equation M, we have the satellite situation in the northern hemisphere for object O . Object O represented by $(+e)$ in the above equation M will behave as a satellite.

When $F_v = F_u$, this results in the satellite situation.

When object O is increased in size, the downward force F_v increases as $(+e)$ increases and (AD) will have to be increased and (AU) will have to be decreased to achieve a new equilibrium between F_v and F_u to put the larger object O in a satellite situation or away from the surface of the Earth. Thus, the larger the object O , the higher would be its required height above the surface of the Earth to behave as a satellite.

Similar discussion and equations will apply to a satellite in the southern magnetic hemisphere of the Earth.

$$F_v = -2kne^2 \Delta d \left(\frac{\sin \theta_2}{d_2^3} - \frac{\sin \theta_1}{d_1^3} \right) \dots \dots \dots \text{Equation S}$$

$\sin \theta_2 = \frac{AD}{d_2}$ and $\sin \theta_1 = \frac{AD}{d_1}$ above equation becomes

$$F_v = -2kne^2 \Delta d \left(\frac{AD}{d_2^4} - \frac{AD}{d_1^4} \right) = 2kn(+e)(-e)\Delta d(AD) \left(\frac{AD}{d_2^4} - \frac{AD}{d_1^4} \right) \dots \dots \dots \text{Equation S}$$

The minus sign has moved into the equation and the resultant force is still downward.

The above Equation S is from point S to the equator or midpoint E in the southern magnetic hemisphere of the Earth, and $d_2 < d_1$ and geometrically $\theta_2 > \theta_1$ so $\sin \theta_2 > \sin \theta_1$ and F_v is the negative resultant downward force on the particle O along AD towards the surface of the Earth owing to the dominant exposed proton dependent force of the South magnetic pole of the Earth.

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No third force or gravity needed to explain this downward force D as done by Newton in 1687.

$$F_u = -2kqe^2 \Delta d \left(\frac{\sin \theta_2}{d_4^3} - \frac{\sin \theta_1}{d_3^3} \right) \dots \dots \dots \text{Equation (M)}$$

$\sin \theta_1 = \frac{AU}{d_3}$ and $\sin \theta_2 = \frac{AU}{d_4}$ and above equation towards the extra-terrestrial source becomes

$$F_u = -2kqe^2 \Delta d \left(\frac{AU}{d_4^4} - \frac{AU}{d_3^4} \right) = -2kqe^2 \Delta d (AU) \left(\frac{1}{d_4^4} - \frac{1}{d_3^4} \right) \dots \dots \dots \text{Equation (M)}$$

As calculated in the previous pages, the downward force F_v along AD towards the Earth is dependent on the resultant downward force and not gravity.

q refers to the number of exposed electrons in the magnetic North pole and also the number of exposed protons in the South magnetic pole of the *extra-terrestrial magnetic source*.

For objects close to the surface of the Earth, F_u will have a negligible impact at point A and these objects will fall towards the Earth.

As AD increases and AU decreases, a point will be reached for A when

$F_u = F_v$ at a greater height and the object O at point A will behave as a satellite.

For objects close to the surface of the Earth, the larger the mass of the object O , the larger will have to be the height of AD to put it in the satellite situation.

DISCUSSION

Gill's electronic theory of magnetism 1964 when applied to the magnetic Earth:

- Explains how objects close to the Earth fall down with a combination of the two known forces without applying the Newtonian gravity.
- Explains why a pendulum accelerates more near the magnetic poles of the Earth and accelerates least at the equator.
- Explains the satellite situation.

As the author has just shown that there is no single source gravity, Albert Einstein's 'General Theory of Relativity 1916' where he used his mathematical skills to combine gravity, electromagnetic force and electrical forces loses relevance.

The electromagnetic force is a combination of positive and negative forces and the various phenomenon are explained with its application. *Application of Gill's electronic theory of magnetism 1964 makes it possible to use dot product calculations and cross product calculations of Henrik Lorentz 1893 are not needed.*

'Gill's electronic theory of magnetism 1964' unlike 'Maxwell's dipole theory of magnetism 1873' resolves the asymmetry issue which was the primary reason for Albert Einstein's 'Special Theory of Relativity 1905'.

Conclusion: *There is no single gravitational force and everything is better explained with the application of the two known forces emanating from the two ends of the magnetic Earth which*

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combine to create an equivalent downward force as shown. Gill's electronic theory of magnetism (1964) helps us in understanding why objects close to the Earth fall towards the same without taking recourse to the non-existent single source gravity postulated by Newton in 1687.

How an object at a greater height starts behaving as a satellite has been explained.

Application of Gill's electronic theory of magnetism (1964) explains the greater acceleration of the pendulum near the magnetic poles of the Earth and it is least at the equator. This has been borne out experimentally for centuries.

The mediator of single source gravity has never been identified. Sir Isaac Newton in Principia (1713) stated **Hypotheses non fingo** ("I feign no hypotheses"). But from today.....

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