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'Coil Effect Design'

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ABSTRACT

The Northern and Southern Lights are caused by the solar IMF. 'Gill's Electronic Theory of Magnetism 1964' shows how the solar IMF on approaching the magnetosphere of the Earth splits into its negative and positive electric energy components which head for the opposite magnetic poles of the Earth to cause the equally bright Aurora Borealis and Aurora Australis.

Why these Northern and Southern lights do not reach all the way to the magnetic poles of the Earth and why they are brighter on the night side will be explained with illustrations.

The great 1859 spectral auroral event affecting the Earth which also showed the link between the magnetic effect and the electrical effect is explained (Message from the SUN) and helps us toward the 'Coil Effect Design'.

*The 'Coil Effect Design' to harness the solar electrical energy reaching the Earth is presented and **dot product equations** are presented to support these applications without any need of Henrik Lorentz's 1893 cross products.*

***'Gill's electronic theory of magnetism1964'** explains the **'Coil Effect Design'** and should replace 'Maxwell's pre-existing dipole theory of magnetism1873'.*

INTRODUCTION

The Northern and Southern lights also called the Aurora Borealis and Auroral Australis are a natural light display in the sky particularly in the high latitude (Arctic and Antarctic) regions known to be close to the magnetic poles of the Earth. Most aurorae occur in an auroral zone which is typically $3°$ to 6° in latitudinal extent and at all local times or longitudes. It had been established by Elias Loomis 1860, Hermann Fritz 1881 and S. Tromholt 1882 that the aurora appeared in the *"auroral zone",* a ring-shaped region with radius of 2500 km around the *Earth's magnetic pole.* During a geomagnetic storm, the auroral zone expands to lower latitudes as happened in 1859.

***'Gill's electronic theory of magnetism 1964'** has been applied to the SUN and the Earth. The solar IMF (a combination of proton $(+e)$ dependant positive electrical field lines from the positive or south magnetic pole S of the SUN and the electron $(-e)$ dependant negative electrical field lines from the negative or north magnetic pole N of the SUN) on approaching another magnet (Earth) splits with the negative electric field lines heading for the positive or south magnetic pole S of the Earth and the positive electric field lines heading for the negative or north magnetic pole N of the Earth. Diagrams will show the increase in electrical charge density to about 40,000 volts (number from satellite experiments) at 80 kms above the ground in the Earth's

rarefied atmosphere to cause the colorful Aurora Borealis and Aurora Australis.

A diminishing electrical component does reach the Earth's auroral zones and lower latitudes by atmospheric dispersal. The 'Coil Effect Design' will be presented on how to tap this component of solar electrical energy supported by *dot product calculations*.

METHOD

***'Gill's electronic theory of magnetism 1964'** along with a simple electromagnetic experiment to show that the magnetic force is a combination of electron $(-e)$ and proton $(+e)$ dependant forces entwining with each other will be summarized.

It will be explained that as the magnetic force from the magnetic SUN approaches the magnetic Earth, its positive and negative components will split. Guided by the magnetosphere of the Earth, the positive electrical field lines from the proton $(+e)$ dependant positive or south magnetic pole S of the SUN will head for the inner electron $(-e)$ dependant negative or north magnetic pole N of the magnetic Earth and the negative electrical field lines from the electron $(-e)$ dependant negative or north magnetic pole N of the SUN will head for the proton $(+e)$ dependant positive or south magnetic pole S of the Earth.

A diagram will show a component of the solar IMF

approaching the Earth on the day side and a much larger component of the solar IMF going down the sides of the Earth to later turn around and affect the night side to cause a brighter light effect on the night side, while heading towards its magnetic poles.

Calculations will show the increased electrical charge density at 80 kms above the ground encountering the atmospheric gases to cause the auroras near the magnetic poles of the Earth and a diminished electrical charge does reach the magnetic poles of the Earth and the ground.

'GILL'S ELECTRONIC THEORY OF MAGNETISM 1964'

'Gill's electronic theory of magnetism 1964' is based on the structure of the atom and explains how the positively charged protons and the negatively charged electrons of an atom are responsible for both magnetism and electrical forces.

In the diagrams that follow in this article, we are using a simplified version of the structure of an atom with a large black proton mass and small red inner electrons. *Please note that the outer free valence electrons (not shown) take part mainly in electrical current flow.*
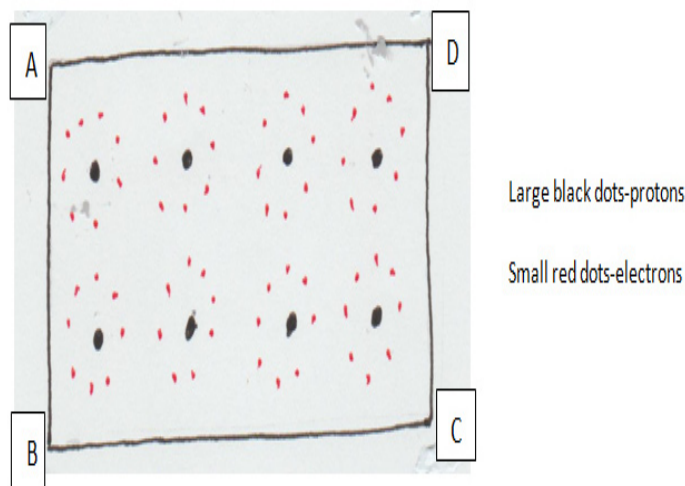

Large black dots-protons

Small red dots-electrons

Figure 1a

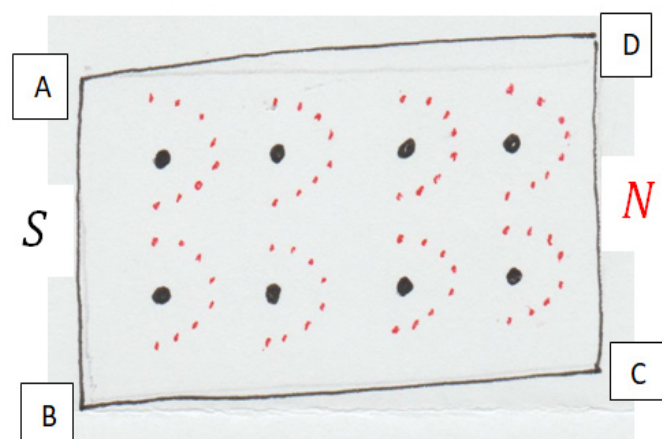Figure 1a shows neutral iron atoms in the un-magnetized state.

Figure 1b

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 negative or north magnetic pole **N** and the exposed oppositely positively torqued $(+\tau)$ proton based positive or south magnetic pole **S** 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 or north magnetic pole **N** with a negatively torqued $(-\tau)$ non-moving charge $-ne$ of the magnet and AB has become the positive or south magnetic pole **S** 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.

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 to give the magnetized atoms a corkscrew effect.

In *'Gill's electronic theory of magnetism 1964',* magnetic force **B** *is the force of attraction between*

(1) the exposed inner electron based negative or north magnetic pole **N** *and*

(2) the exposed proton based positive or south magnetic pole **S***.*

The application of *'Gill's electronic theory of magnetism 1964'* in Figure 1b shows that *the magnetic force comprises of two forces (positive and negative) emanating from the* proton $(+e)$ dependant positive or south magnetic pole and the electron $(-e)$ dependant negative or north magnetic pole of *reconfigured magnetized atoms.*

Why $(+e)$ and $(-e)$ forces spin
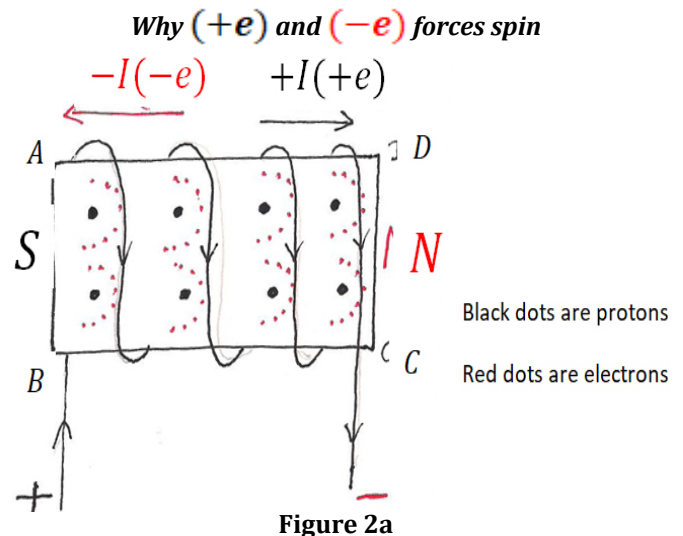
Black dots are protons

Red dots are electrons

Figure 2a

In Figure 2a, *'Gill's electronic theory of magnetism 1964'* has been applied to a piece of iron as it is magnetized by a direct electric current coil as shown in Figure 2a. Applying 'Gill's

electronic theory of magnetism 1964' to the above electro-magnetic experiment shows how and why the two forces spin and entwine while they head for the opposite source.

The negative free valence electrons $(-e)$ as they flow as a negative direct electric current in the coil in the negative direction towards AB act on the iron piece inside the coil and lead to an exposure of protons by attraction at the positive or south magnetic pole S and these exposed protons at the magnetic end $(+e)$ have also *developed a positive torque* $(+\tau)$ by attraction in the direction of the circular electron flow in the electro-magnetic coil.

The same negative free valence electron $(-e)$ flow in the electric coil causes the exposed inner electrons of atoms in the iron piece inside the electric coil to be repelled sequentially towards CD to become the north magnetic pole N and these exposed inner electrons have *developed a negative torque* $(-\tau)$ by repulsion from the circular electron flow in the electro-magnetic coil.

The atoms in the iron piece are getting *sequentially magnetized* and *at every inter-atomic intra-magnetic level* there is an exposed proton $(+e)$ based positive or south magnetic pole S with a positive torque $(+\tau)$ facing an exposed inner electron $(-e)$ based negative or north magnetic pole N with a negative torque $(-\tau)$ of the next atom.
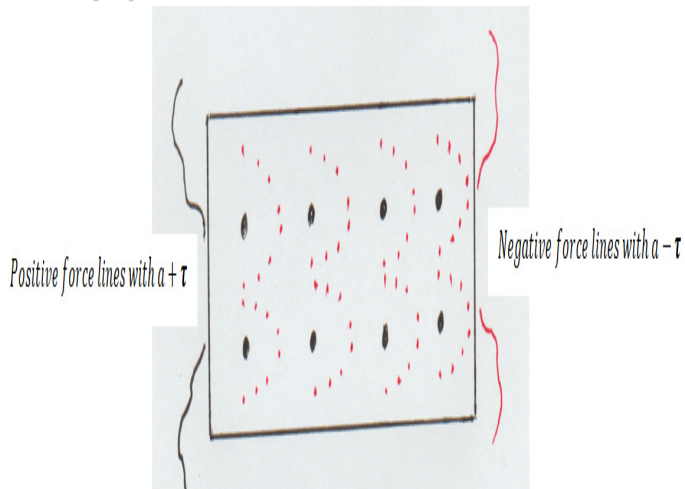

Figure 2b. at the start of magnetization

In Figure 2b, at the start of magnetization at $t = 0$ seconds, the negative forces are coming out from the exposed inner electron $(-e)$ based negative or north magnetic pole N and these negative forces are experiencing a negative torque $(-\tau)$ passed on from the negative torque $(-\tau)$ of the exposed inner electron based negative or north magnetic pole N.

The exposed proton $(+e)$ based positive or south magnetic pole S has the positive forces coming out with a positive torque $(+\tau)$ passed on from the positive torque $(+\tau)$ of the exposed protons of the south magnetic pole S.

These negative and positive forces also exist at the inter-atomic intra-magnetic level when magnetized and even inside the magnet there is a much greater coulombs force of attraction as the coulombs force law is applicable.

These negative forces with a negative torque $(-\tau)$ from N travel towards the positive or south magnetic pole S and the positive forces with a positive $(+\tau)$ torque from S travel towards the negative magnetic pole N and owing to their opposing torque they entwine to manifest as a single magnetic force *erroneously called the single fundamental force of magnetism.*
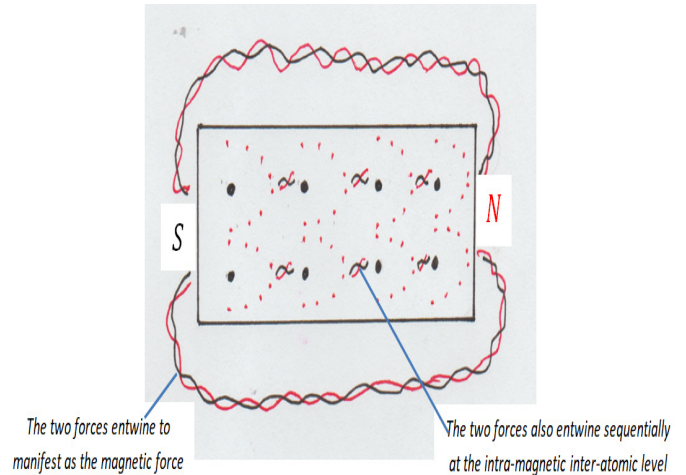

The two forces entwine to manifest as the magnetic force

The two forces also entwine sequentially at the intra-magnetic inter-atomic level

Fig 2c. Magnetized

In above figure 2c at $t > 0$ seconds, the negative forces are coming out of the negative or north magnetic pole N with a negative torque $(-\tau)$ and are headed for the exposed positive or south magnetic pole S and the positive forces are coming out of the exposed south magnetic pole S with a positive torque $(+\tau)$ and are headed for the negative or north magnetic pole N.

The intra-magnetic force will get stronger with cooling owing to decreased inter-atomic distance *and no magnetic flux/force whatsoever can be expelled laterally.* Cooling will facilitate increased magnetization as the electrons and protons of neighboring atoms get closer to each other and this will manifest from the exposed magnetic ends only.

The magnetic force of attraction is a combination of the negative force from the negative or north magnetic pole N with a negative torque $(-\tau)$ and the positive force from the positive or south magnetic pole S with a positive torque $+\tau$.

Owing to the opposing torque between the forces from the negative or north magnetic pole N and from the positive or south magnetic pole S, these two forces of attraction entwine with each other in Figure 2c and appear to be a single magnetic force:

1-at the inter-magnetic intra- magnetic level, this attractional force gets stronger with cooling due to decreased inter-atomic distance and no lateral expulsion of magnetic flux/force possible although greater magnetization possible. [1]

2-at the extra-magnetic level it does manifest from the two ends of a magnet.

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1 refer Meissner effect re-explained with Gill's electronic theory of magnetism 1964 by author in ARJPS 2018.

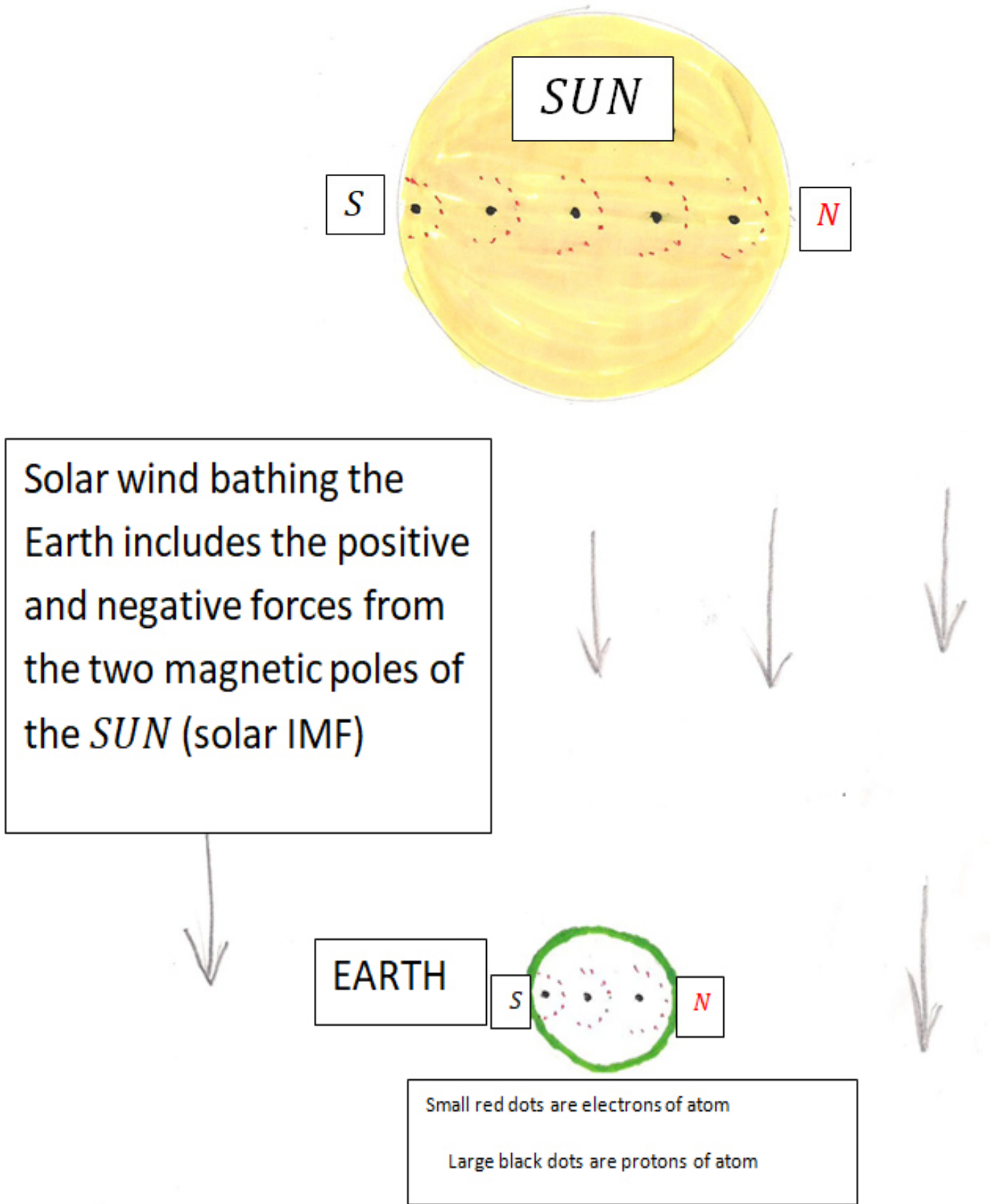**DIAGRAMS EXPLAINING THE AURORA BOREALIS AND AURORA AUSTRALIS**

Figure 3

Figure 3 above shows 'Gill's electronic theory of magnetism1964' applied to both the *SUN* and the Earth. Please note that the positive or south magnetic pole*S*is near the geographic north pole and the negative or north magnetic pole *N* is near the geographic south pole of the Earth. Same nomenclature is applied to the *SUN*. The*IMF* or inter-planetary magnetic force is a part of the solar wind from the*SUN*.

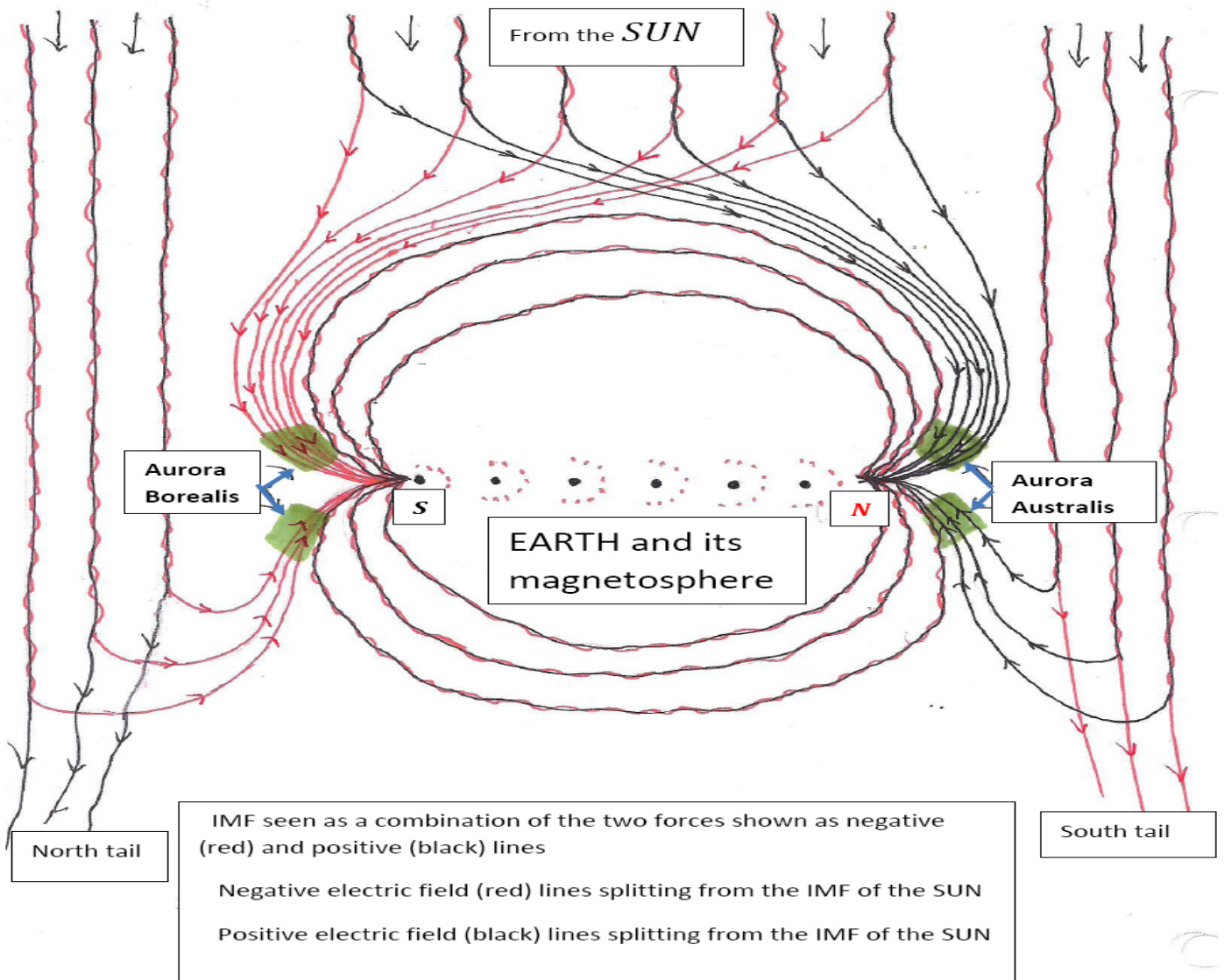**Figure 4**

Figure 4 above shows the solar IMF which is a combination of proton $(+e)$ dependant positive and electron $(-e)$ dependant negative forces from the two magnetic poles of the SUN approaching the magnetic Earth at 400 kms/second.

The Earth has its magnetic **N**-pole as a non-moving negative charge consisting of exposed inner electrons (red dots represent the electrons) near the geographic South pole of the Earth and its magnetic **S**-pole is a positive charge seen as a large black dot which signifies the presence of exposed protons near the geographic North pole of the Earth. Between the magnetic **N**-pole and the magnetic **S**-pole inside the Earth is shown the arrangement of the ferromagnetic atoms inside the Earth according to 'Gill's electronic theory of magnetism1964' and the magnetosphere of the Earth is shown as a combination of positive and negative forces from the two magnetic poles of the Earth.

As the solar IMF composed of the electron $(-e)$ and proton $(+e)$ based forces from the magnetic poles of the SUN approaches the Earth at a speed of 400 km/second, at a certain distance from the Earth of about 65,000 kilometers,

the IMF of the SUN on encountering the magnetosphere of the Earth starts splitting into its positive and negative electrical field lines, which will head for the opposite magnetic poles of the Earth. The above negative and positive electric field lines from the solar IMF are guided by the magnetosphere of the Earth towards the opposite positive and negative poles of the Earth respectively.

As shown in the line diagrams, these electric field lines get pushed closer to each other resulting in an *increased charge density* (sigma σ) near the magnetic poles and satellites have observed a voltage of 40,000 volts at 80 kilometers above the surface of the Earth in these auroral zones.

As seen in Figure 4 supported by **Kristian Birkeland's (1900-1908)** 'terrella' experiments, this voltage is enough to cause the *Aurora Borealis* and *Aurora Australis* due to interaction of the positive and negative electric components of the solar IMF with the Earth's rarefied atmospheric oxygen and nitrogen as they head for the opposite magnetic poles of the Earth.

Passing down the side of the magnetic **S**-*pole* of the Earth(which is close to the geographic North pole of the Earth), the negative electric field lines head for the magnetic **S**-*pole* and its positive component is repelled which goes on to become the **N**-*tail or* **N**-*lobe.*
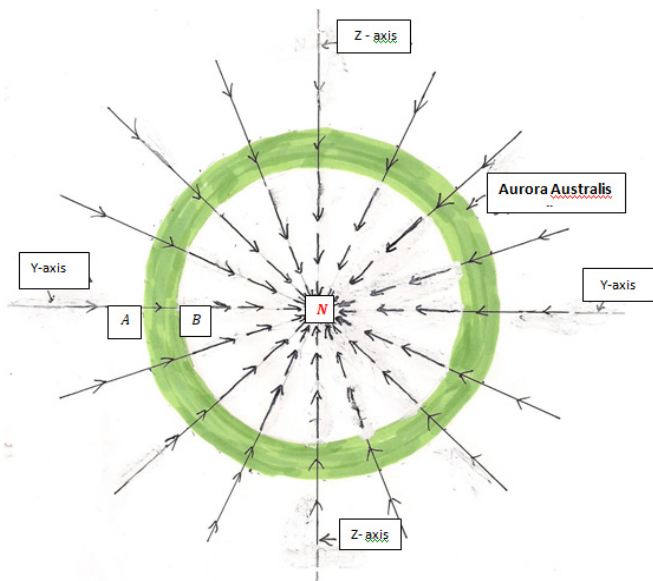
Also, passing down the side of magnetic **N**-*pole* of the Earth (which is close to the geographic South pole of the Earth),the positive electric field lines are pulled towards the magnetic **N**-*pole* of the Earth and here the negative component is repelled to become the **S**-*tail or* **S**-*lobe.*

The Aurora Australis and the Aurora Borealis viewed along the magnetic N-S axis of the Earth
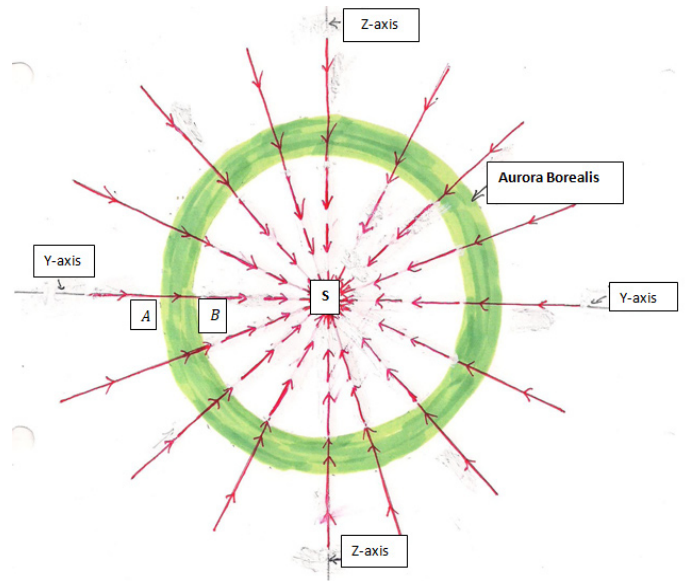
In Fig 5a, Fig 5b and Fig 5c, we are looking at the *Aurora Australis* and the *Aurora Borealis* along the X-axis which is the magnetic N-S axis of the Earth.
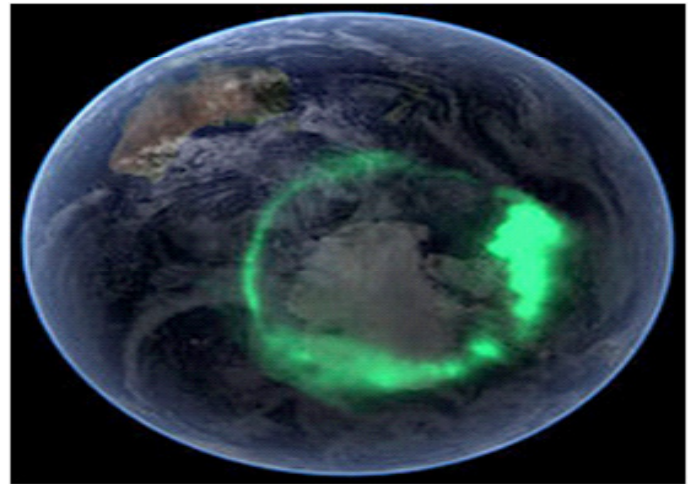
Figure 5b. Aurora Australis captured by NASA satellite in 2005. Resembles Figure 5a.

Figure 5a

Figure 5c

In above Figure 5a, we are looking at the North magnetic pole **N** near the geographic south pole of the Earth along the N-S magnetic axis of the Earth. Figure 5b is a NASA satellite photograph of the same.

In Figure 5a, the positive electric field lines from the solar IMF are shown headed for **N**, the magnetic **N**-pole of the Earth from all directions. The positive electric field lines are getting closer and closer to each other and when distance $A-N$ is about 80 kilometers, the increased charge density sigma (σ) or the electric current is strong enough to interact with the rarefied atmospheric gases like nitrogen and oxygen to cause the greenish Aurora Australis from point A to point B.

This electric current is getting used up or dispersed in causing the Aurora Australis from point A to point B and it has diminished at point B so that between point B and point N there is an electric current which is continuously diminishing owing to partial dispersal as it passes through the atmosphere and is not strong enough to cause the Southern Lights all the way to the Earth.

In Figure 5c, we are looking at the South magnetic pole **S** near the geographic north pole of the Earth from Figure 3 in the Y-Z plane along the X-axis which is the $N-S$ magnetic axis of the Earth.

The negative electric component of the Sun's IMF which is equal and opposite to the positive component is shown headed for **S**, the magnetic **S**-pole of the Earth from all directions. The negative electric forces are getting closer and closer to each other and when distance AS is about 80 kilometers, the electric current density is strong enough (about 40,000 volts) to interact with the atmospheric gases like oxygen and nitrogen to cause the greenish Aurora Borealis.

From point A to point B, we have the Aurora Borealis but some of the electric energy has been used up due to interaction with atmospheric gases to cause it.

The electric energy has diminished at point B so that between point B and point S there is an ever-diminishing electric current density which is not enough to cause the Northern Lights all the way to the Earth. *The human body does not feel electric current less than 5 mA.*

The electric current whether it is positive positron dependant electric current in Figure 5a and Figure 5b or the negative electron dependant electric current in Figure 5c will interact with the rarefied atmospheric nitrogen and oxygen to cause equally bright Northern and Southern lights.

Solar IMF less on the daylight side and much more down the sides of the Earth
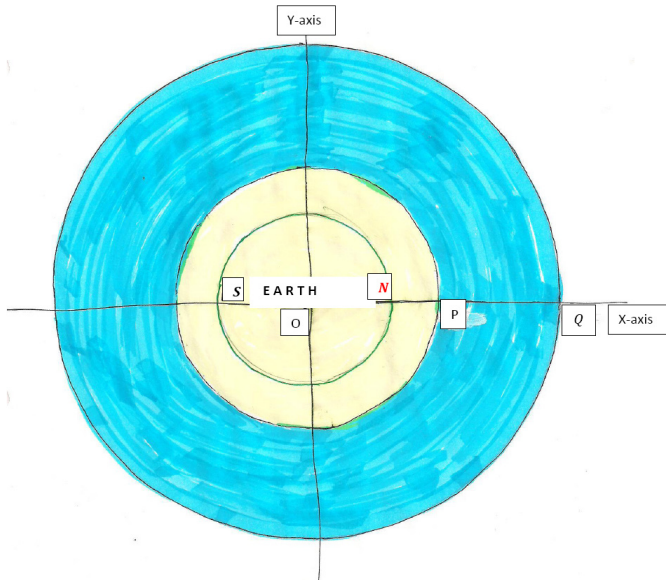
Solar IMF approaching the EARTH in the X-Y plane

Figure 7

Figure 7 shows the solar IMF approaching the Earth and its atmosphere from O to P on the daylight side and a much larger part of the solar IMF goes down the sides of the Earth from P to Q (blue area).

ON=radius of Earth; NP=atmosphere of Earth; ON+NP=r;PQ represents beyond is≈or >than OP.

The solar IMF runs into the Earth plus its atmosphere on its daylight side for a total area of πr^2. The solar IMF going down the sides of the Earth is $\pi(2r)^2 - \pi r^2 = 3\pi r^2$. Actually, PQ approaches infinity.

Thus, a much larger part of the solar IMF goes down the sides of the Earth (blue area)some of which will curve back on the night side of the Earth towards its magnetic poles guided by the magnetic tail of the Earth.

It has been observed that the auroras are brighter on the night side and the above reasoning explains the same.

It has also been observed that the same clouds when on the day-light side have some thunder and lightning, but come nighttime, the same clouds display a much louder thunder and greater lightning as the solar electrical energy on the night side is much more as explained above.

Kristian Birkeland (1900-1916) pointed out that the solar wind is a combination of negative electrons $(-e)$ and positively charged ions represented by $(+e)$. This solar wind is headed for the Earth at 400kms/second and is squishing the magnetosphere of the Earth. At 65,000 kms above the Earth, the solar wind has $5\ ions/cm^3 = 5 \times 10^6 ions/m^3$ and an equal number of negative electrons.

Thus, the total negative charge (in combination with an equal positive charge) headed for the daylight side of the Earth in one second is $= \pi r^2 h \times charge/m^3$

r=OP=radius of Earth+atmosphere=6371kms+100kms=6.471×10m^6.

$h = 400 kms = 4 \times 10^5 m$.

$charge\ (c) = 5(-e)/cm^3 = 5 \times 10^6(-e)/m^3$.

Thus, total negative charge on daylight side headed for the Earth in one second is

$\pi r^2 h(c) = \frac{22}{7}.(6.471 \times 10^6 m)^2.(4 \times 10^5 m).5 \times 10^6(-e)/m^3 = 2.632 \times 10^{26}(-e)$.

As $-e = -1.6 \times 10^{-19}C(coulombs)$, applying this to the above calculation, we have

$\pi r^2 h(c) = 2.632 \times 10^{26}(-1.6 \times 10^{-19}C) = -4.2 \times 10^7 C/sec$.

There is also an equal number of positive ions alongside the negative electrons, and we also have

total positive charge on daylight side of the Earth $+4.2 \times 10^7 C/sec$.

From Figure 5, we see that the solar IMF going down the sides of the Earth is *at least* three times.

Thus, total negative charge moving down the sides of the earth is $-12.6 \times 10^7 C/sec$.

And the total positive charge moving down the sides of the Earth is $+12.6 \times 10^7 C/sec$.

So, we have a solar IMF consisting of a negative electric current of $-4.2 \times 10^7 C/sec$ combined with a positive electric force of $+4.2 \times 10^7 C/sec$ headed for the daylight side of the Earth.

Also, we have a solar IMF consisting of a negative electric current of $-12.6 \times 10^7 C/sec$ along with a positive electric current of $+12.6 \times 10^7 C/sec$ going down the sides of the Earth and later curving back towards the Earth.

As $\frac{Coulomb}{sec} = Amperes(A)$, the path of the electric field lines in Figure 3 show that the total positive charge of $+4.2 \times 10^7 A$ has come close to each other in the auroral zone on daylight side along with a total positive charge of $+12.6 \times 10^7 A$ on the night side heading for the north magnetic pole **N** of the Earth. This results in an increased charge density (**40,000 volts** by satellite experiments at **80 kms** above the ground)which causes the Aurora Australis.

The path of electric field lines in Figure 3 shows that the total negative charge of $-4.2 \times 10^7 A$ has come close to each other in the auroral zoneon daylight side along with a total negative charge of $-12.6 \times 10^7 A$ on the night sideheading for the south magnetic pole **S** of the Earth resulting in an increased charge density (**40,000 volts** at **80 kms** above the ground corroborated by astrophysicist Joan Feynman's1970data

collected by the Explorer 33 spacecraft and also seen by other satellite experiments) which causes the Aurora Borealis.

DISCUSSION

The solar IMF which starts from a temperature of 2 million degree Celsius on the surface of the SUN is the finest example of negative electrical energy converting to electrons and positive electrical energy converting to protons or positrons. So, the above electric field lines could be in the shape of energy or corresponding charged particles.

It has been observed that Aurora Borealis and Aurora Australis are of equal intensity at any given time and brighter on the night side. The above discussion and application of Gill's electronic theory of magnetism1964 corroborates this finding.

The large gathering of negative electric field lines from the Sun near the magnetic **S**-pole of the Earth which is near the geographic North pole causes the 'Aurora Borealis' and the large gathering of positive electric field lines from the Sun near the magnetic **N**-pole which is close to the geographic South pole causes 'Aurora Australis' as these separated components of the Sun's electromagnetic force traverse the atmospheric gases and head for the magnetic **S**-pole and the magnetic **N**-pole respectively. *These electric components are getting partly used up in causing the aurorae and hence not able to cause an aurora all the way to the magnetic poles of the Earth.*

The magnetic forces of the Earth's magnetosphere have minimal direct role in causing the Aurora Borealis or the Aurora Australis but do help in directing the solar positive and negative electric field lines towards the opposite magnetic poles of the Earth.

The authors projection diagrams aided by the application of 'Gill's electronic theory of magnetism 1964' explains how the solar positive and negative electric charges (both components of the solar IMF) flow towards the opposite magnetic poles of the Earth from all directions and cause the ring-shaped aurora lights in the auroral zone *and not in the east-west direction as previously stated by Kristian Birkeland.* The flow of electric charge in the East to West direction is an *erroneous* conclusion although it might appear like that from the ground.

The concentration of the electrical charges is because these electrical field lines are all headed for the magnetic poles of the Earth (shown diagrammatically) and come closer to each other aided by the Earth's magnetosphere with the positive and negative electrical energy from the SUN being the primary source causing the auroras.

Some of the diminished electrical forces do reach the magnetic poles of the Earth and are the *essential seeding source* for the geomagnetic dynamo of the Earth which causes the magnetosphere of the Earth.

The component of the charge that reaches the ground is *less than 5 milliamperes* or may even be in microamperes and is

thus not felt by the human body. This diminished charge is more near the magnetic poles but extends in a diminishing manner up to the equator.

HARNESSING THE MILD SOLAR ELECTRIC CURRENT ON OR NEAR THE GROUND

Thus, this simple grounded coil will charge the cell-phone or make an AM transducer audible when applied to the ear with the help of the opposite increased electric energy down the middle of the coil. If we put a straight wire instead of the coil, it does not work.

This coil will work better in cold weather and at night as per previous discussion. It will work better in the auroral zones but should work well beyond the auroral zone as the solar electric current headed for the magnetic poles of the Earth undergoes some dispersal by the atmosphere . The coil effect could be calculated as follows.
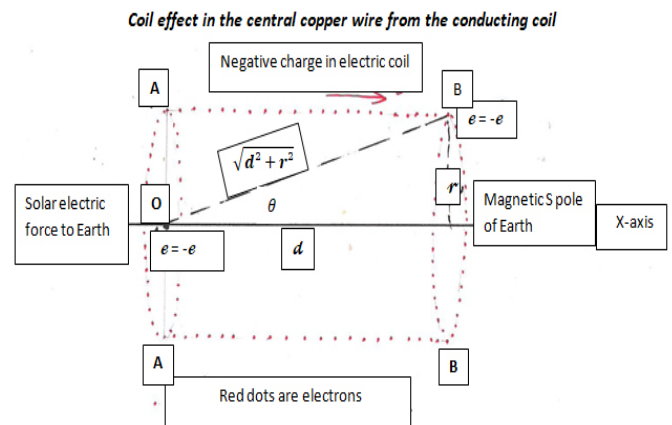

Figure 10

AA to BB is a cylindrical conducting copper coil from point A to point B pointed towards the magnetic South pole **N** of the Earth which is near the geographic North pole of the Earth. A copper wire has been placed in the center of the coil along the X-axis. At the point O of the central copper wire along the X-axis, we have placed a valence electron of an atom of the wire with a charge $e = -e$. As the mild solar electrical current is flowing through the coil, we have electrons flowing from $A \rightarrow B$ in the copper coil and we have an electron with a charge $-e$ at point B in the conducting copper coil. The distance $A \rightarrow B = d$ in meters and r is the radius of the coil in meters. Applying Pythagoras theorem, the distance $OB = \sqrt{d^2 + r^2}$.

Using Coulomb's law, the force of repulsion between $e = -e$ at O and $-e$ at point B is

$$F = \frac{k(-e)(-e)}{(\sqrt{d^2+r^2})^2} = +\frac{ke^2}{d^2+r^2}$$ (Newtons-the electrical force unit)

Where k is the Coulomb's constant. The bold letter equations are vectors.

The plus sign indicating repulsion between the flowing negative electron at point B and the negative free valence electron of an atom of the central copper wire at point O.

θ is the angle between OB and the X-axis and the dot product vector of OB along the X-axis is

$$F\cos\theta = +\frac{ke^2}{d^2+r^2}\cos\theta = +\frac{ke^2}{(d^2+r^2)}\cdot\frac{d}{\sqrt{d^2+r^2}}$$

When d is very large compared to r, then r^2 is still smaller and can be ignored and the above vector along X-axis is

$$F\cos\theta = +\frac{ke^2}{d^2}\cdot\frac{d}{\sqrt{d^2}} = +\frac{ke^2}{d^2}.$$

As the electrons move from A to B, d varies from $d = 0$ at A to $d = d$ at B and if d_x is an infinitesimally small distance along A-B, then the vector along the X-axis becomes

$$F = \int_0^d +\frac{ke^2 dd_x}{d^2} = +ke^2\int_0^d \frac{d_x}{d}$$

The derivative of $\log d = \frac{1}{d}$, so the anti-derivative of $\frac{1}{d} = \log d$ and integrating from 0 to d

$$F = +ke^2[logd]_0^d = +ke^2(logd - log0) = +ke^2.logd$$

newtons..............Equation 1a

As the number of electrons rotating in a circular manner in every coil is a at any particular time where in case of copper wire, each atom has one free valence electron, so a also represents the number of copper atoms in the circular coil, where a depends on radius r and the **total** a will depend on the number of coils at each level and the total vector from **equation 1a** along positive X-axis direction from $A \rightarrow B$ is

Electrical force $F(total) = +kae^2logd$ newtons--------------------Equation 1b

This increased central electrical force will manifest on loose valence electrons in the central wire. The increased positive force on the central wire is due to the *coil effect* where an otherwise moving electron in a straight line has become a significant multiple at each level and increasing the distance d of the coil as far as technically possible would also help.

Electric power is the rate at which electric energy is transferred by an electric circuit. The SI unit of power is one joule per second called the watt.

$$Work\ (P) = \frac{newton.meters}{sec} = \frac{joules}{second} = +kae^2logd\ \frac{newton.meters}{sec}\ or\ watts.$$

As the atoms in the central metallic wire are in a homogeneous medium, the calculations can be done from the central axis of the central wire for all the atoms in the central metallic wire.

Simply put, if we convert 100 meter of straight copper wire through which mild solar electric current of 5 milliamperes (mA) is flowing into a coil one meter long, we will have 500mA of opposite electric energy flowing down the center of the coil. If we put ten of these coils parallel to each other atop a windmill, we will have 5000 mA=5 Amperes of opposite electrical energy going down the middle in Fig.10 or in Fig.12. This could be used both directly or to store it in a battery.

The above calculations point to a significant multiplication of the available solar electrical energy with the help of the *coil effect.* Thus, the positive force on the central wire causing a positive electric current in the same direction as the negative electric current in the coil is a significant multiple of the mild negative electric current in the coil.

An electron or a proton placed in the middle of a super-conductor coil travels at great speed along the central length of the coil.

We have now placed an electricity-conducting wire in the middle of this mini-cyclotron and the loose valence electrons in this central wire will flow through this central wire as an amplified electric current which is many times the small solar electric current flowing in the coil N-E.

The electric current I is inversely proportional to the absolute temperature T $\left(I \propto \frac{1}{T}\right)$.

The electric current I is also inversely proportional to the wire resistance R $\left(I \propto \frac{1}{R}\right)$. Absolute temperature T is directly proportional to the resistance of the wire R $(T \propto R)$.

Although Fig.9, Fig 11and Fig.12 will function all the way upto the equator, they will work best in:

-auroral zones (magnetic poles of Earth being the primary target of solar electric energy)

-better with colder temperature (superconducting effect)

-better at night (explained in this article)

-better at height (solar electric energy keeps on diminishing as it approaches the ground).

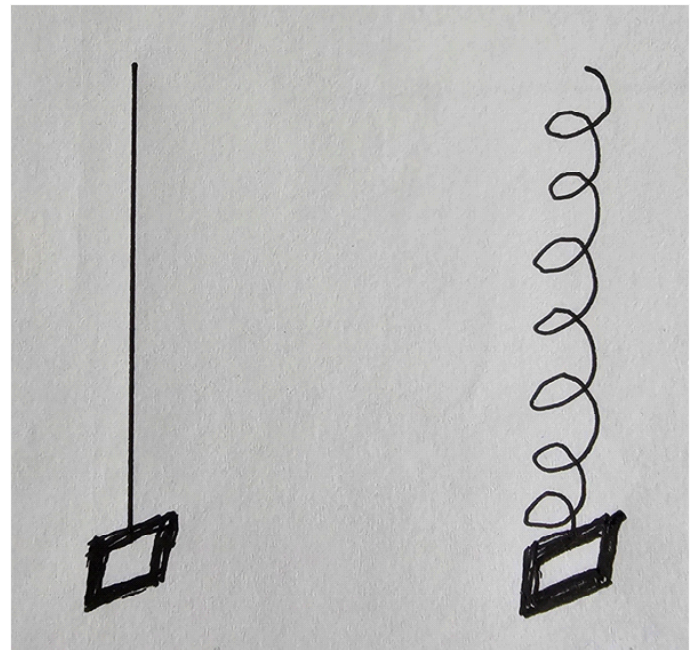**The aim would be to convert a milli-ampere into an ampere.**

Coil Effect Design

Figure 8

In above Figure, a straight steel wire with about 1 mA current from the SUN connected to an AM transducer. No voice heard.

Same steel wire converted into a coil for 'Coil Effect' and connected to an AM transducer. Clear AM radio functions owing to the '*Coil Effect'* as *seen experimentally.*
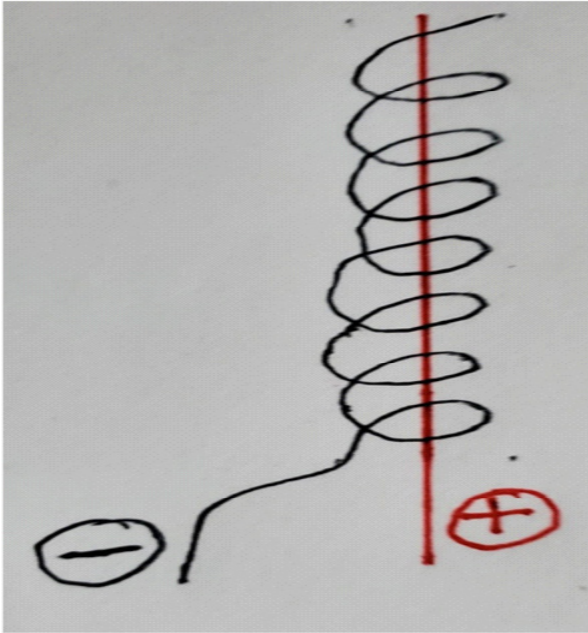
Coil Effect Design (contd.)

Figure 8a

In Figure 8a, a central wire is placed in the coil to facilitate the flow of opposite electrical energy due to the 'Coil Effect'.

As the Solar electrical energy reaching the Earth is less than 5 mA, it is not felt by the human body.

Step Two

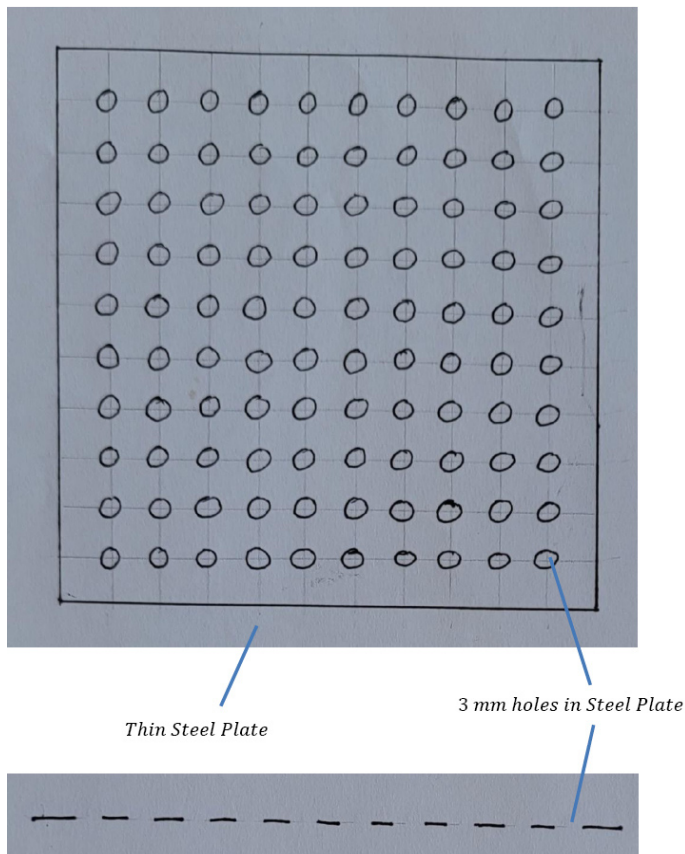Arrange these coils in series on a steel plate to increase the electrical energy.

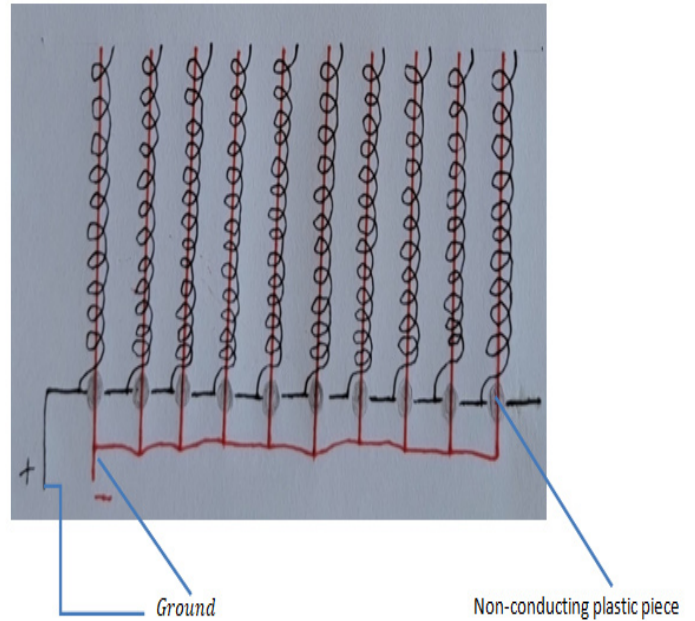*Thin Steel Plate*

3 mm holes in Steel Plate

Figure 8b

Ground   Non-conducting plastic piece

Figure 8c

THE PARALLEL COIL EFFECT DESIGN

We arrange these coils in series to increase the electrical energy depending on requirement.

Notes: Completed Orders by author for provisional patents for Figure 12 and Figure 11.

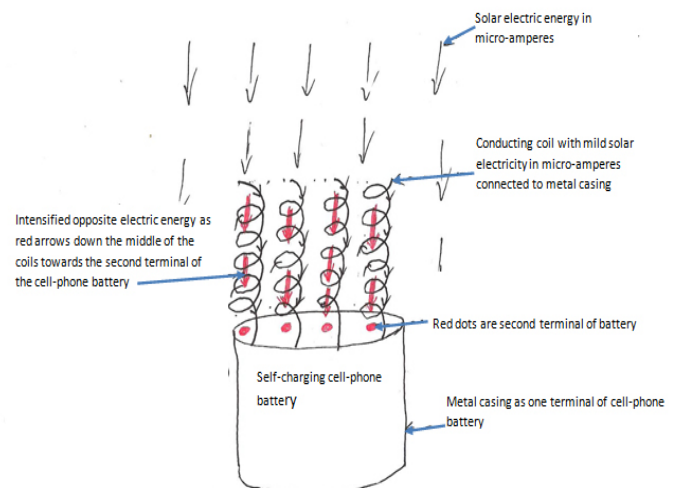| ORDER NO.	DOCUMENT NAME	FOR	DATE PURCHASED	STATUS	
38372066	Provisional Application for Patent	Solar electric charger atop a Windmill or Windmill + Solar electric charger.	03/20/2015		
34803625	Provisional Application for Patent	Solar electric energy cell-phone battery charger.	04/20/2014		

SELF-CHARGING CELLPHONE BATTERY

Figure 11. Solar Electric Cell-phone Battery Charger

Figure 11 is an outline of self-charging cell-phone battery. For very simple functions, this cell-phone could work without a battery although grounding will be needed.
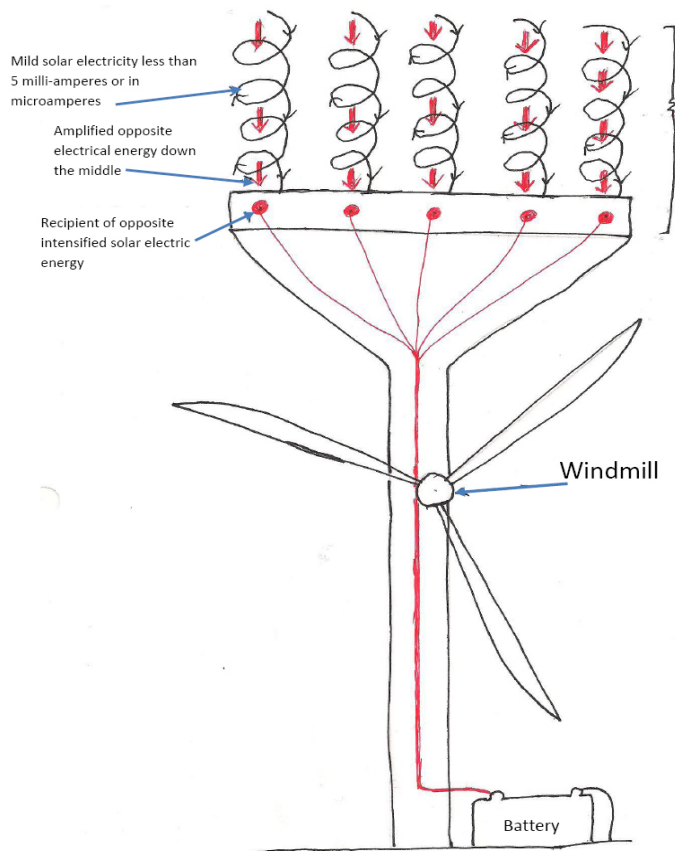
A MODIFIED WINDMILL

Mild solar electricity less than 5 milli-amperes or in microamperes

Amplified opposite electrical energy down the middle

Recipient of opposite intensified solar electric energy

Windmill

Battery

Figure 12

Figure 12 is Solar electric amplifier atop a windmill making electricity more economical.

CONCLUSION

The solar IMF causing the Northern and Southern lights also known as Aurora Borealis and Aurora Australis is explained with the help of *Gill's electronic theory of magnetism 1964.* It is explained how the solar IMF splits into its positive and negative electric components which flow towards the opposite magnetic poles of the Earth from both day and night sides and not in the east-west direction as previously stated. It is explained why both the aurorae are equally bright and brighter on the night side.

Harnessing of milder electrical energy reaching the Earth from the SUN by amplifying it to a useful level by the *'Coil Effect'.* These applications are supported with *dot product calculations.*

The *solar IMF* as being composed of positive and negative electrical energy has been explained with the application of **'Gill's electronic theory of magnetism 1964'**.

This article also helps in supporting Gill's electronic theory of magnetism 1964 as it simplifies the above explanations unlike Maxwell's dipole theory of magnetism 1873.

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