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RESEARCH ARTICLE

THE EXTERNAL ENERGY SUPPLY TO THE SUN IS OVERWHELMINGLY OBVIOUS AND HAS RECENTLY BEEN DETECTED BY SPACE PROBES

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ABSTRACT

The external energy supply to the sun is overwhelmingly obvious even before space probes (Voyagers and IBEX) have detected it. The sunspot cycle, the surface temperature, the reverse temperature gradient and the existence of the corona in itself, are some of the outstanding evidence that point to the external energy supply that our star receives. In fact, all the basic features of the Sun are in complete disagreements (or in direct contradictions) with the concepts of the Standard Solar Model (SSM). In physical reality our star is not an isolated celestial body, but rather it is linked permanently to the Universe- not only to our galaxy-since magnetic fields are permanently present in the building blocks of matter. Furthermore, the Sun-like all stars- is not a self-sufficient entity, but it is externally powered by inducing current from high energy particles (cosmic rays). And yes, its radiated energy is the result of nuclear fusion, except that this nuclear fusion is a consequence of another primary process. In other words, the process of nuclear fusion-not thermonuclear fusion- is generated in the sun as a result of interactions between the sun's layers and the external energy source which is transported by complex galactic magnetic fields. More importantly, the sun converts energy to mass, not the other way around. Nonetheless, those theoretical physicists who established and developed the concepts of the SSM had simplified it by ignoring the roles of magnetic fields and rotation. They assumed that the sun is spherically symmetric and neutral object. Based on real solar physics, the Sun is an overall positively charged celestial object, where interaction of magnetic fields and rotation have the dominant roles on the solar surface, over the corona and in the solar interior. In addition to that, the physical mechanism of the Heliosphere is completely governed by magnetic fields interactions. Nevertheless, the high energy cosmic particles that power the sun are modulated by the Heliospheric Current Sheet (HCS) and the Solar Polar Fields (SPF). The increasing phase of the external energy supply is during solar minimum while the decreasing one is during solar maximum.

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INTRODUCTION

The Heliospheric magnetic field (HMF) is so huge. It extends out beyond the orbits of the planets. In current physics, it is believed that the solar wind drags the coronal magnetic field out into the solar system, forming the HMF (Dynamical Properties of Stellar Coronas and Stellar Winds, Parker, 1964; Solar and Stellar Magnetic Fields and Atmospheric Structures – Theory, 1989; Heating the Solar X-Ray Corona, Parker, 2005; Hufbauer, 1991). The concept is shown in the sketch blow
Observational data about the HMF that were collected by spacecraft-borne magnetometers, differ substantially from the theoretical models of heliophysics (Physics of the Sun and Its Atmosphere, Proceedings of the National Workshop (India) 2006; Schwadron *et al*., 2009; McComas *et al*., 2009). Some of the observations were exactly opposite to what theoretical models predicted. The first observations of the near-Earth solar wind were made by the Mariner spacecraft in the early 1960s. It was soon followed by other spacecrafts that collected detailed data of near-Earth magnetic field. Such as, Pioneer 10 and 11 that were launched in the early 1970s. These two spacecrafts were the first to go beyond one AU. Pioneer 10 was tracked to as far as 80 AU. However, the contact was lost a long time ago with the Pioneers. On the other hand, Voyager 1 and 2 that were launched in 1977 are still operating. Voyager 1 crossed the termination shock in 2004 at 94.5 AU and recently became the first spacecraft to cross the Heliopause at 121.6 AU and enter interstellar space. Voyager 2, following behind, crossed the termination shock at 84 AU in 2007. The other space probes that launched in the 1970s were Helios 1 (H1) and Helios 2 (H2) launched in 1974

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and 1976. H1 and H2 surveyed the inner Heliosphere in the ecliptic plane between 0.3 and 1 AU from the Sun. In the 1990 Ulysses was launched for a six year orbit of the Sun inclined at 80.2° to the solar equator, with perihelion at 1.3 AU and aphelion at 5.4 AU. It was the first space probe to survey the 3-dimensional structure of the Heliosphere over a large latitude range. The operations of Ulysses came to a halt on June 30 2009. The last spacecraft to explore the Heliosphere was STEREO. It consists of two spacecrafts, that have equipments on-board with the aims of making stereoscopic views of the Sun and the measurements of HMF and solar wind. There are a number of excellent reviews of the HMF (e.g., Balogh and Erdős, 2013; Zurbuchen, 2007), particularly focussed on the three-dimensional structure revealed by the Ulysses spacecraft (Smith, 2008).

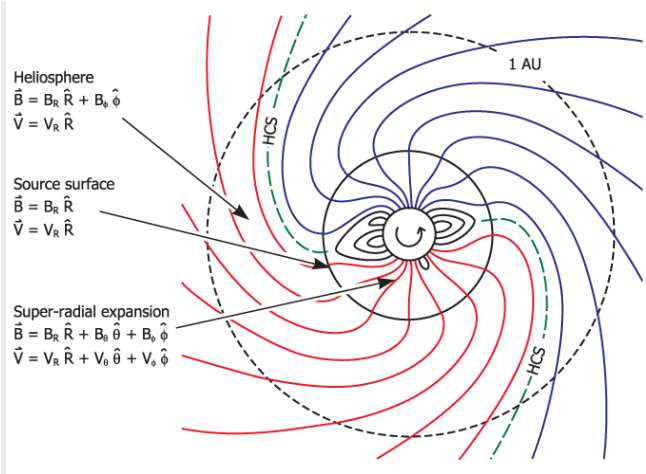


Figure 1. "A sketch of the steady-state solar magnetic field in the ecliptic plane. Close to the Sun, in a spatial region approximately bounding the solar corona, the magnetic field dominates the plasma flow and undergoes significant non-radial (or super-radial) expansion with height. At the source surface, typically taken to be a few solar radii, the pressure-driven expansion of the solar wind dominates and both the field and flow both become purely radial. In the heliosphere, rotation of the HMF footpoints within a radial solar wind flow generates an azimuthal component of the HMF, leading to a spiral geometry. Regions of opposite HMF polarity, shown as red and blue lines, are separated by the heliospheric current sheet (HCS), shown as the green dashed line". Image adopted from Schatten *et al.* (1969)

Unexpected data by space probes of the heliospheric regions

The above mentioned space probes have collected valuable information of the three distinctive regions of the Heliosphere. The inner, middle and outer Heliosphere. The inner one is characterized by many short term events, that are important for understanding how diffusion and drift of cosmic rays vary from solar minimum to solar maximum and in the determination of the Heliospheric diffusion coefficients. The middle Heliosphere is the region, where restructuring of the solar wind occurs and the effects of coronal mass ejections lose their properties and merge into larger entities, or what is known as Merged Interaction Regions (MIRs). With regard, to the least explored region, the outer heliosphere, the findings of the Voyagers and IBEX have shocked theoretical physicists and shattered their models. Voyager 1 has found the plasma density of the Heliopause, the boundary region between the solar wind and the rest of the galaxy to be forty times denser. A very sharp increase in the cosmic ray flux streaming into the Heliosphere was detected at that region. This is contrary to what theoretical physicists were expecting. When Voyager 1 was getting closer to crossing the Heliosphere boundary, NASA scientists were keeping an eye on two important pieces of data, particle energy counts and magnetic field strength (and orientation). In 2010, when the probe finally crossed into the stagnation region – the region where the solar wind slows to zero and the magnetic field becomes compressed and begins to fluctuate. The theory says, as the magnetic field starts to fluctuate, the number of high-energy cosmic rays should decrease inside the Heliosheath -- charged cosmic rays entering the solar system should become scattered by the magnetic fluctuations, decreasing the number of detections by Voyager 1. But, actually the researchers found the opposite to be true -- as the magnetic field became more chaotic, the number of high-energy particles increased and the number of low-energy particles decrease. See the figures below. The important features of the magnetic field and cosmic rays related to the Heliosheath, interstellar plasma and the transition from the Magnetosheath to the interstellar plasma are shown in figs (4 & 5). Both figures are adopted from http://iopscience.iop.org/article/10.1088/0004-637X/784/2/146

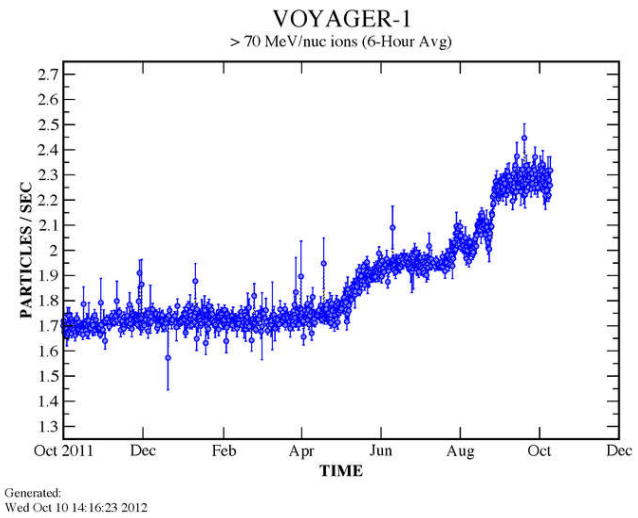


Figure 2.

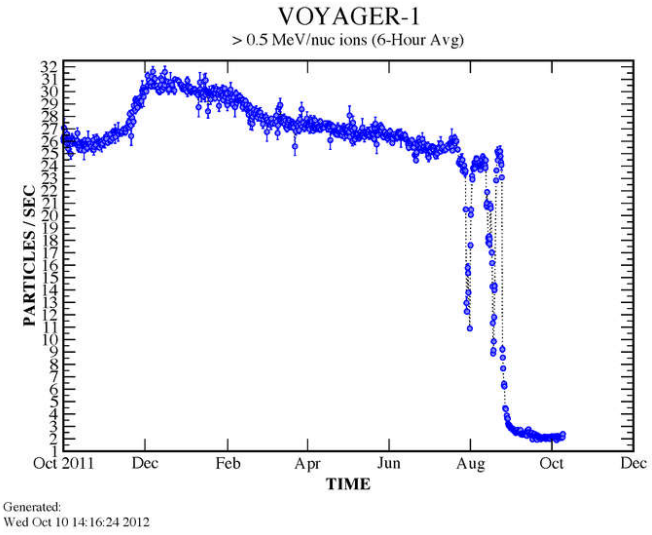


Figure 3.

The two figures above (2 & 3) exhibiting the rapid increase in high-energy particles (upper) and the rapid decrease in low-energy particles (lower) -- both occurred late, 2012: © NASA

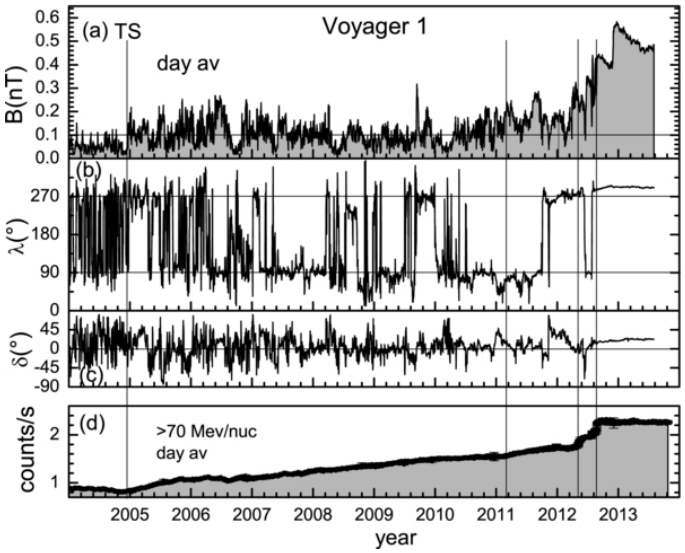


Figure 4. "Overview of the magnetic field and cosmic rays in the heliosheath and interstellar plasma. Daily averages of (a) magnetic field strength B, **(b) azimuthal angle** λ, **(c) elevation angle** δ, **and (d) counting rate of cosmic rays >70 MeV/nuc. The four vertical lines represent (1) the termination shock (TS), (2) a break where the cosmic ray counting rate increases despite strong fields in contrast to the expectations of the CR–**B **relationship, (3) the first sharp jump in the cosmic ray counting rate, and (4) a second similarly sharp jump in the counting rate bringing the counting rate up to a constant level characteristic of the nearby interstellar magnetic fields and particles"**

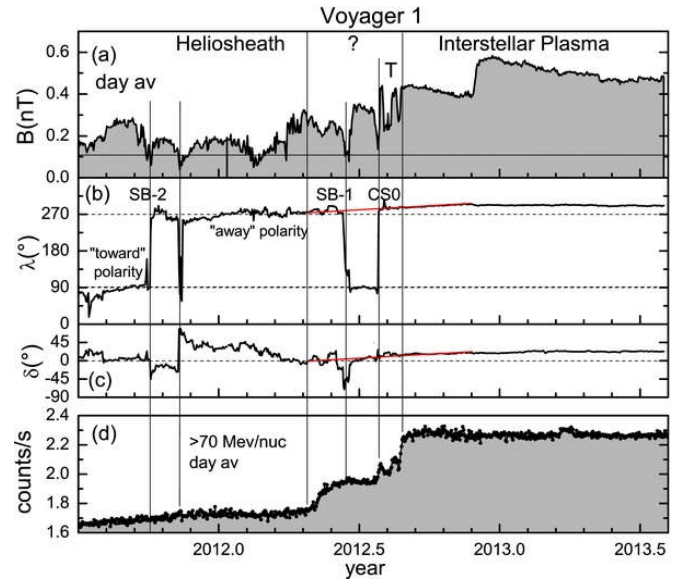


Figure 5. "Important features of the magnetic field and cosmic rays related to the transition from the magnetosheath to the interstellar plasma. (a) Magnetic field strength B, **(b) azimuthal angle** λ, **(c) elevation angle** δ, **and (d) counting rate of cosmic rays >70 MeV/nuc. The third and sixth vertical lines, which extend from top to bottom of the figure, mark the interval from the beginning of the first step of the cosmic ray increase to the end of the second step. The "?" emphasizes that the structure and processes within this region are not understood. The fourth and fifth vertical lines refer to a sector boundary SB-1 and a current sheet CS0, which marks the beginning of observations of the away-polarity interstellar magnetic field." "During 2012,** B **increased to the highest values observed since** V1 **crossed the TS. The cosmic ray counting rate also increased very rapidly in a notable "two-step profile" to a plateau which persisted until the end of the data set at 2013.5863 (2013/215)."**

Those high energy particles possess 40 times the pressure of the solar wind particles. At the same time, it was observed that coronal mass ejections (CME) would cause a 30% reduction in cosmic ray intensity at that location. These findings show that the so-called "Forbush decrease" is caused mainly by coronal mass ejections (CME), not by the 11 year cycle of sunspot numbers and solar flares.

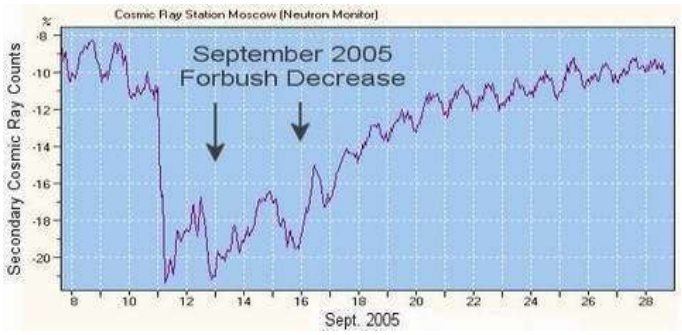


Figure 6. Neutron counts from a cosmic ray monitoring station in Moscow. Radiation levels dropped in early Sept. during a period of intense solar activity

NASA said that the solar system is passing through *Local Interstellar Cloud* or "Local Fluff" It's about 30 light years wide and contains a wispy mixture of hydrogen and helium atoms at a temperature of 6000°C. "Using data from Voyager, we have discovered a strong magnetic field just outside the solar system," explains Merav Opher, a NASA Heliophysics Guest Investigator from George Mason University. This magnetic field holds the interstellar cloud together and solves the long-standing puzzle of how it can exist at all. Voyager data showd that *the Fluff* is much more strongly magnetized than anyone had previously suspected. "The fact that *the Fluff* is strongly magnetized means that other clouds in the galactic neighborhood could be, too. Eventually, the solar system will run into some of them, and their strong magnetic fields could compress the heliosphere even more than it is compressed now. Additional compression could allow more cosmic rays to reach the inner solar system, possibly affecting terrestrial climate and the ability of astronauts to travel safely through space." The above findings by Voyager, are in agreement with the findings of IBEX (Interstellar Boundary Explorer) (Fuselier *et al*., 2009; Gruntman *et al*., 2001; Funsten *et al*., 2001). The spacecraft has carried out the first all-sky maps of the heliosphere and the data collected by it proved the previous data obtained by Voyager. At the same time IBEX detected something new and totally unexpected. A giant ribbon of high energy particles floating at the edge of the solar system. "This is an important finding," says Arik Posner, IBEX program scientist, quoted on NASA's website. "Interstellar space just beyond the edge of the solar system is mostly unexplored territory. Now we know, there could be a strong, well-organized magnetic field sitting right on our doorstep." "That cannot be a coincidence," said IBEX principal investigator Dave McComas. *But what does it mean? No one knows. "We're missing some fundamental aspect of the interaction between the Heliosphere and the rest of the galaxy. McComas added "This is a shocking new result. We had no idea this ribbon existed--or what has created it. Our previous ideas about the outer heliosphere are going to have to be revised." Theorists are*

working like crazy to figure this out. "Understanding the physics of the outer Heliosphere is important because of the role it plays in shielding the solar system against cosmic rays.

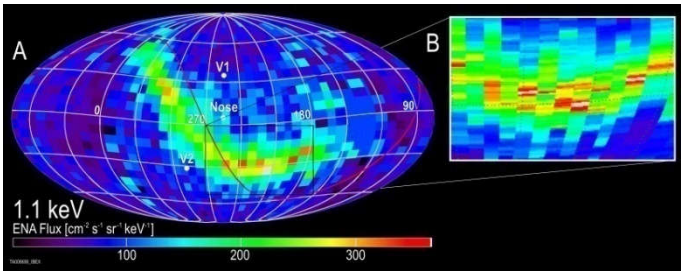


Figure 7. Accurate timing of the incoming ENAs allows the IBEX team to obtain a higher resolution in the latitudinal direction. This shows some of the fine detail of the ribbon in the blow-up section. Credit: SwRI

One NASA scientist came up with a weird theory, by proposing that this "mysterious ribbon" is a reflection of solar wind particles. Specifically, the theory claims that the particles of the solar wind are reflected back into the solar system by a galactic magnetic field. "We believe the ribbon is a reflection," says Jacob Heerikhuisen, a NASA Heliophysics Guest Investigator from the University of Alabama in Huntsville. "It is where solar wind particles heading out into interstellar space are reflected back into the solar system by a galactic magnetic field." The theory claims that "the ribbon exists in a special location where neutral hydrogen atoms from the solar wind cross the local galactic magnetic field. Neutral atoms are not affected by magnetic fields, but when their electrons get stripped away they become charged ions and begin to gyrate rapidly around magnetic field lines". This process causes the ions to go back toward the sun. The lucky ions that can pick up electrons at the right time means an extra boost of neutral atoms that create the ribbon (Interstellar boundary explorer measurements and magnetic field in the vicinity of the heliopause, 2011).

It is amazing how far institutional scientists can go with their claims to support their orthodox theories. Neutral atoms are not affected by magnetic fields and then all of the sudden their electrons get strippd away. How can their electrons get stripped away if they are neutral atoms and why only in that region they became affected by magnetic fields? They become charged ions and begin to gyrate rapidly around magnetic field lines. And why these charged ions head back to the solar system? First of all, the law of reflection, which is driven from the Fresnel equations requires a real surface. Secondly, reflection is associated exclusively with light. It occurs when light waves bounce at a surface. Moreover, the constructed models based on this reflection notion, showed a ribbon much narrower than what IBEX observed. Furthermore, the explanation of NASA scientist is also a contradiction of how the solar wind is behaving within the Heliosphere. The solar wind slows down at around 75-90 AU. And when it enters the Heliosheath, it slows dramatically and becomes turbulent. In the Heliopause the solar wind is stopped altogether by and in balance with the interstellar medium. That means its pressure is no longer strong enough to push back against the pressure of galactic high energy particles. So how can the solar wind be reflected if its velocity is practically zero? Thus, from a scientific point of view, the notion is a complete nonsense, and just another desperate attempt to rescue the standard solar model.

However, the Interstellar Boundary Explorer (IBX) has exposed another important fact about the Heliosphere, namely that the so-called Bow Shock region does not exist. The Heliosphere is moving through the LISM at about 52000 miles per hour, roughly 7000 miles per hour slower than previously thought, which means our star's interaction does not reach the critical threshold to form a bow shock, but rather a bow wave. In fact, the previous observation by Voyager of the interstellar medium is sufficient to refute the existence of the bow shock. The strong magnetic field of the interstellar medium, requires even a faster speed to produce a bow shock.

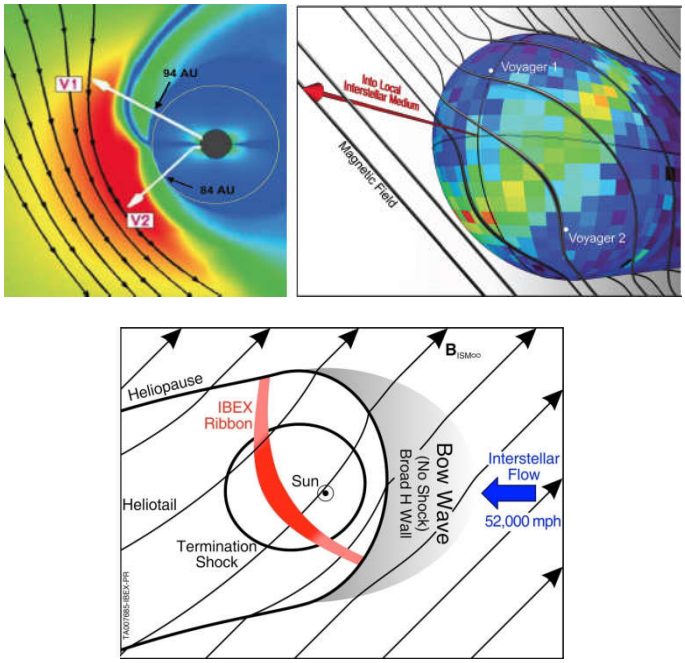


Figure 8. Crossing of the termination shock by Voyager 1 (V1) and Voyager 2 (V2) at different locations (left) indicated a strong influence of the interstellar magnetic field in distorting the heliosphere (Opher *et al*. 2006). Left panel shows a side view of the heliosphere where color contours indicate the magnetic-field intensity. Related results were obtained by IBEX (middle panel), where the ribbon location appears to be influenced by the interstellar magnetic field that shapes the heliosphere. SOURCE: Left, M. Opher, E.C. Stone, and P.C. Liewer, The effects of a local intersteller magnetic field on Voyager 1 and 2 observations, Astrophysical Journal 640:L71, 2006. Reproduced by permission of the AAS. middle, D.J. McComas, F. Allegrini, P. Bochsler, M. Bzowski, E.R. Christian, G.B. Crew, R. DeMajistre, H. Fahr, H. Fichtner, P.C. Frisch, H.O. Funsten, *et al*., Global observations of the interstellar interaction from the Interstellar Boundary Explorer (IBEX), Science 326:959-962, doi:10.1126/ science.1180906, 2009. Right figure illustration of the Heliosphere surrounding our solar system is buffeted by strong magnetic fields, shown here as the black, diagonal, upward-pointing arrows. The Heliosphere and the interstellar material of the local cloud pass by each other at a speed of 52,000 miles per hour, as shown by the blue arrow. *Credits: SWRI*

Beside, the nonexistence of the Bow shock region, the shape of the Heliosphere as a whole was found to be in a disagreement with current theoretical models. Those models assume that the Heliosphere is created by the constant outflow of magnetic solar material from the Sun, and is shaped like a comet, with a rounded head and an extended tail. But, a new finding based on data covering an entire 11-year solar cycle, obtained by Cassini spacecraft and combined with data from Voyagers and IBEX suggest that the Heliosphere is rather rounded on both ends, making its shape almost spherical. The instrument on

board Cassini spacecraft was initially designed to image the ions that are trapped in the magnetosphere of Saturn. A paper on this surprise finding was published in Nature Astronomy (Dialynas, *et al*., 2017). One of the authors of the paper, Tom Krimigis. Stated, "we never thought that we would see what we're seeing and be able to image the boundaries of the Heliosphere." If the heliosphere's 'tail' is stretched out like a comet. We'd expect that the patterns of the solar cycle would show up much later in the measured neutral atoms, but because patterns from solar activity show just as quickly in tail particles as those from the nose, that implies the tail is about the same distance from us as the nose. This means that long, comet-like tail that scientists envisioned may not exist at all -- instead, the heliosphere may be nearly round and symmetrical" A spherical Heliosphere makes a perfect physical sense, according to the Universal concept of the Magnetic Structure of matter (MSM). Physical entities from atomic-subatomic scales to the galactic-extragalactic ones are spherical in shape, such as particles, stars, planets, moons..etc. Some of these entities are close of being perfect spheres, like in the cases of the Sun and the electron that were found recently to be almost perfect spheres. Actually in the case of the electron, it was found to be a perfect sphere. Also, atoms are spherical in shape, although, Heisenberg uncertainty principle- the fundamental principle of quantum mechanics- asserts that atoms and particles have no fixed shape. So, in spite of the fact, that empirical evidence has showen the electron to be a perfect sphere, current mainstream physics does not accept it as a physics fact, since quantum mechanics considers it a violation of its fundamental principle. Anyway, in case of celestial bodies, some of them are perfect spheres, while others are oblate spheroid shapes. *But, at the fundamental level all physical objects tend to form into spheres, and the oblate spheroid shape is related to the spinning velocity. If the celestial object is spinning rapidly enough, it will flatten out all the way into disks.* These issues will be explained in detail in a paper that deals mainly with the *so-called proton radius puzzle.* However, spherical Heliosphere also makes sense based on previously mentioned data that was obtained by Voyager and IBEX. The data from these spacecrafts showed that the Heliosphere is surrounded by a very strong magnetic field, much stronger than what was anticipated in the past. That implies the Heliosphere has to be rounded, rather than shaped like a comet.

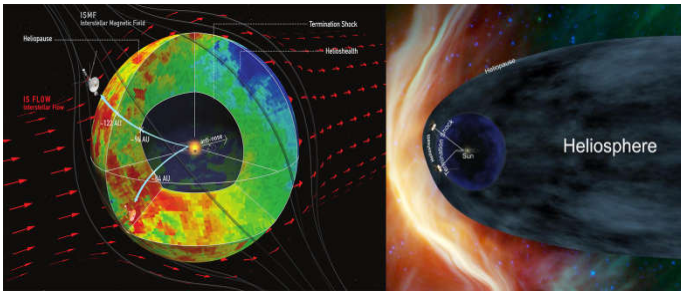


Figure 9. New data from NASA's Cassini, Voyager and Interstellar Boundary Explorer missions show that the Heliosphere — the bubble of the Sun's magnetic influence that surrounds the inner solar system — may be much more compact and rounded than previously thought. The image on the left shows a compact model of the Heliosphere, supported by this latest data, while the image on the right shows an alternate model with an extended tail. The main difference is the new model's lack of a trailing, comet-like tail on one side of the Heliosphere. This tail is shown in the old model in light blue. Credits: Dialynas, *et al.* (left); NASA (right

Under the standard solar model the origin and mechanism of the sun's magnetic field are still mysteries

The first theory that tried to solve how the sun generates its magnetic field was introduced by Larmor in 1919. He proposed that the motion of charged particles on the solar surface create magnetic fields, like a current flowing in a wire. But his theory was soon dismissed by T.S Cowling on the grounds that these "dynamo fields" cannot be self-sustaining due to the resistance of the solar gases. In other words, the solar plasma would dissipate the magnetic fields almost as quickly as they tried to form. Early in the second half of the 20th century, Eugene Parker proposed another solution to the solar magnetic fields. This became known as the "Parker Solar Dynamo Theory". Parker's theory was based on the idea that currents of charged particles in the convective zone would induce magnetic fields and these fields would rise to the surface. Along the way the magnetic fields would be cyclonically twisted by the Coriolis Effects. This process is supposed to form sunspot-like magnetic regions at the surface. Over a full solar cycle these magnetic field regions would merge and form a large-scale solar magnetic field. This theory of Parker's was followed, or complemented, by the Babcock-Leighton Model (BLM). According to the (BLM) the differential rotation of the solar surface would distort the magnetic fields and wrap them more tightly. As a result sunspots would tend to form at higher solar latitudes at the beginning of the cycle and then move steadily to lower latitudes as the cycle progressed. Despite the fact that Parker theory and BLM together could explain a few features of the sunspot cycle, they could not predict the cycle length and more importantly, they did not explain how the surface magnetic field was created in the first place. Calculations have also shown that the Sun's magnetic field cannot be generated in the highly-turbulent convection zone or in the so-called Radiation zone. However, the currently accepted theory suggests that the solar dynamo is divided into two separate processes; the Local Dynamo and the Global Dynamo. The first one is responsible for generating small-scale magnetic features on the solar surface through the flow of charged particles in the granulation convection. The Global Dynamo is responsible for generating and evolving the main features of the Sun (such as sunspots), creating the changes that take place during the solar cycle activities and the overall magnetic polarity of the Sun. But, recent observations by satellites and space observatories have shown this Dynamo theory to be obsolete. Researchers have found an effective method to show how heat from the deep interior of the Sun is transferred to its surface. They have created an "MRI" of the Sun's interior plasma motion. And in order to develop their "MRI" of the Sun's plasma flows, the researchers used high-resolution images of the Sun's surface, taken by the Helioseismic and Magnetic Imager (HMI) on-board NASA'S Solar Dynamic Observatory. Using a 16-million pixel camera, HMI analyses motion on the surface of the Sun caused by convection. The invisible plasma motion was calculated using the observed movement of waves on the surface. What the researchers found was new and important evidence against the current theory. The speed of the Sun's plasma motions was found to be approximately 100 times slower than what theoretical physicists had previously projected based on their model. "Our current theoretical understanding of magnetic field generation in the Sun relies on these motions being of a certain magnitude," said the Indian scientist, Shravan Hanasoge, a researcher in geoscience at

Princeton University. "These convective motions are currently believed to prop up large-scale circulations in the outer third of the Sun that generate magnetic fields. However, our results suggest that convective motions in the Sun are nearly 100 times smaller than these current theoretical expectations. If these motions are indeed that slow in the Sun, then the most widely accepted theory concerning the generation of solar magnetic field is broken, leaving us with no compelling theory to explain its generation of magnetic fields and the need to overhaul our understanding of the physics of the Sun's interior." (Shravan M. Hanasoge, 2012)

The above results are clear evidence, that the temperature and pressure within the interior of the Sun are totally different than what theoreticians believe. And that means the hypothetical notion of the so-called quantum tunneling cannot possibly take place within the Sun's core. But, in spite of these empirical findings, no question has been raised about the validity of thermonuclear reaction, because one has to keep in mind this hypothetical reaction, is considered as one of the two most fundemental physics facts that dominate astrophysics and cosmology. The other one is the so-called gravitational collapse. In fact, the hypothetical thermonuclear fusion is supposed to be a consequence of the gravitational collapse. The fusion is occurring in response to gravity's attempts to compress the mass of the sun (countermeasure to the comperssion attempts by gravity). But, in reality this is not the case at all, the huge difference in the mass *(or more accurately the huge difference in the magnetic field strength)* between the proton and the electron-(the proton is 1836 times heavier than the electron)-implies that in the sun's strong magnetic field atoms of the elements that make up the chemical compositions of the sun, will form weak dipoles with their positive poles aimed at the sun's center. At the sun's surface elements are weakly ionized. The radial aligned atomic dipoles would cause the free electrons in the plasma to propel toward the sun's surface, leaving behind an excess of positive charges. As we all know, like charges repel. Therefore, the magnetic force would prevent comperssion from happening and makes the sun close of being a perfect sphere and homogeneous, with presumably a small core. Recent images obtained from advanced space telescope have shown the Sun to be almost a perfect sphere. And, even without these recent data, the sun's size is what expected or should be, if its core is not compressed. The notion of internal nuclear furnace is not needed to bloat the Sun to the size we see. So, in physical reality, there's no such thing as gravitational compression or gravitational collapse, and thermonuclear fusion does not exist in the interior of the stars. This fundamental notion came as a consequence of the misunderstanding of gravity and its real role in the distribution of matter in the Universe. Since the beginning of the space age, many observations sharply contradict the theories of a gravity-dominated Universe, and recent observations have created even larger holes in those theories. https://watchers.news/2016/01/24/recent-discoveries-provided-more-decisive-evidence-for-the-magnetic-structure-of-matter/ The details of how gravity is misunderstood has already been explained, with the concept of the magnetic structure of matter and will be explained in details in a different paper. However, modern solar facilities, such as Helioseismology and Asteroseismology cannot only be used to study the Sun's interior, but also its surface and can also reveal an important data about the radial and the latitudinal dependence of the structure and dynamics of the Sun. In fact, new and unexpected data from the surface of the Sun have already been obtained based on these modern solar facilities. These advanced technologies have not only shown the obsoleteness of the theoretical models which are supposed to explain the energy transport from the sun's interior, but also, the models that are supposed to explain the properties of the Sun's surface. From the beginning of the last decade, calculations based on a new accurate method that involve three dimensional Non-Local Thermodynamic Equilibrium Stellar Spectroscopy (3D NLTE photospheric estimate) have led to the reduction of the value of solar metallicity (Maria Bergemann *et al*., 2010). Before, 2004 the values of Z/X were believed to be 0.018, but from 2005 several papers were published showing lower values for the abundance elements such as O, C and N in the photosphere. Asplund, Grevesse & Sauval (2005) calcuated that Z/X for the Sun is only 0.0165. (Asplund *et al*. (2005, 2009); Caffau *et al*. (2011); Scott, Pat *et al*. (2015a,b); Grevesse, Nicolas *et al*. (2015). This recent revision of photospheric abundances is another serious blow to the standard solar model in particular and stellar models in general. The new solar abundances mean not only opacities are wrong, but also the equation of state and diffusion rates. In fact, even before these new data, the models of energy transport suffer from serious defects and contradictions. The opacity term which is a function of temperature, density and composition is not determined, and the best speculated model has an error of at least ±20%.

According to the standard theory of stellar structure, the energy transport equation depends on the mode of the energy transport. For conductive energy, transport that supposed to be appropriate for the so-called a white dwarf, the equation is given as $\frac{dT}{dr} = -\frac{1}{k}\frac{l}{4\pi r^2}$ where k is the thermal conductivity. However, the energy transport equation suitable for the core of a solar mass main sequence star and the outer envelope of a massive main sequence star is $\frac{dT}{dr} = -\frac{3K\rho l}{6\ 4\pi^2\sigma T^3}$ Where K is the opacity of the matter, $\boldsymbol{\sigma}$ is the Stefan-Boltzmann constant. This constant is set to one, and the convective energy, transport does not have a known rigorous mathematical formulation. It involves turbulence in the gas and usually modeled using mixing length theory. The gas in the star is considered of having discrete elements which approximately retain the temperature, density and pressure of their surroundings, but move through the star as far as a characteristic length, called mixing length. With regard to monatomic ideal gas, when the convection is adiabatic, the convective gas bubbles do not exchange heat with their surroundings. In this case, the mixing length theory yields $\frac{dT}{dr} = (1-\frac{1}{\gamma})\frac{T}{P}\frac{dp}{dr}$ Where $\gamma = c_p/c_v$ is the adiabatic index, the ratio of specific heats in the gas (for a fully ionized ideal gas, γ=5/3). But, when the convection is not adiabatic, the real temperature gradient cannot be represented by this equation. For instance, it is believed that in the sun the convection at the base of the convection zone, close to the core, is adiabatic but that near the surface is not. The mixing length theory contains two free parameters which must be set to make the model fit observations. In other words, it is a phenomenological theory rather than a rigorous and precise physical theory with mathematical presentation (Disentangling discrepancies between stellar evolution theory and sub-solar mass stars, the influence of the mixing length parameter for the UV P s c binary, 2003). Anyway, the mixing length theory is only one of so many theoretical concepts in solar physics. Mathematical physicists are always ready to come up with new

concepts, in order to enforce any new observations into the SSM. But, all theoretical notions and efforts since the 1920s, have failed to really explain the basic features of the Sun. For examples, the models connected to the solar dynamo theory can explain neither the 11-year period of the Sunspot cycle nor Hale's polarity law and the 22-year magnetic cycle. Besides that, current models cannot explain Joy's law for the observed tilt of Sunspot groups, and at the same time, they cannot explain both the equator-ward drift of the active latitude and the reversal of the polar fields near the time of maximum activity, as seen in the magnetic butterfly diagram.

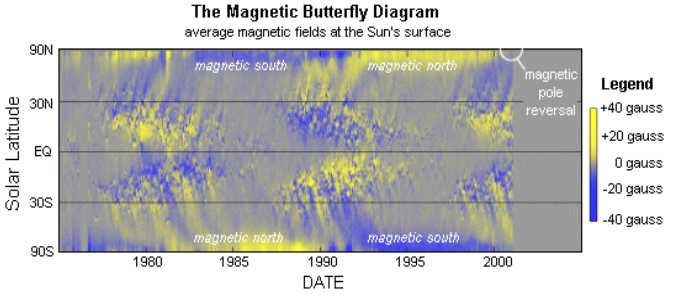


Figure 10. Magnetic butterfly diagram. Diagram constructed (and regularly updated) by the solar group at NASA Marshall Space Flight Center

However, the crisis of the SSM when it comes to the Sun's magnetic field is not only restricted to its generation, but also to its origin. Based on the theory of stellar evolution, the Sun like all stars, is supposed to be formed from a cloud of interstellar gas by the process of the gravitational collapse, and its magnetic field is a remnant of the ancient field acquired by it at the time of its formation. But, this notion cannot possibly be correct. The current magnetic field of the Sun, which is the strongest magnetic field compared to any other body in the solar system, cannot be a remnant of an ancient magnetic field. If this is indeed the case, then the primordial surface field must have diffused back into space in just a few million years. In other words, the vestigial magnetic field should have been carried off by the solar wind and by the ejected plasma (Coronal Mass Ejections). Astronomers and astrophysicists who study newly formed stars observe very high activity from these young stellar objects. They produce intense flares and other powerful magnetic explosions during their chromospherically-active formative years. Thus, since our star had to go through the same process, then its ancient magnetic field must have diffused into space in a matter of a few million years after its formation. In fact, theoretical physicists, not only believe that the magnetic field of the Sun is a remnant of the ancient field acquired by it during its formation, but they also believe this primordial field is still trapped within the so-called " Radiation zone ", located 100,000 km below the Sun's surface. They also think that the strength of this field is over one million Gauss. But this theoretical belief is not supported by any modern space observation. Data from satellites like SOHO that use Helioseismometers clearly showed that the internal magnetic field cannot be stronger than 30-40 Gauss.

The models of solar cycle activity are based on hypothetical notions with flexible mathematical formulations

Solar cycle prediction methods, such as the well known precursor and extrapolation methods are based on the hypothetical dynamo theory. The dynamo action is explained by the equations of Magneto-Hydro-Dynamics (MHD) in a rotating frame. These equations consist of the MHD induction equation $\frac{\partial B}{\partial t} = \nabla \times (V \times B) + \eta \nabla^2 B$ plus the equations for mass continuity, momentum (Navier-Stokes) and internal energy. There are valuable reviews of the solar dynamo models presented by Petrovay (2000), Ossendrijver (2003), Solanki *et al*. (2006), and Charbonneau (2010). These reviews provide extensive details of all current models that are based on the mean-field theory approach. A coupled system of partial differential equations governs the evolution of the toroidal and poloidal components of the large-scale magnetic field. This large-scale field is considered to be axially symmetric. Additionally, in some nonlinear models the averaged equation of motion, governing large-scale flows is also coupled into the system. In the simplest case of homogeneous and isotropic turbulence, where the scale l of turbulence is small compared to the scale L of the mean, variance (scale separation hypothesis), the dynamo equations have the form $\frac{\partial B}{\partial t} = \nabla$ x (U x B + αB) − ∇ x (η_T x ∇B), where B is the large-scale mean magnetic field and U is the flow speed. η_T is the magnetic diffusivity and α is a parameter connected to the non-mirror symmetric character of the magnetized plasma flow. But, in the case of axial symmetry the above equation would be simplified into the following pair.

$\frac{\partial A}{\partial t} = \alpha B - (U_c \cdot \nabla) A - (\nabla \cdot U_c) A + \boldsymbol{\eta}_T \nabla^2 A$, $\frac{\partial B}{\partial t} = \Omega \frac{\partial A}{\partial x} - (U_c \cdot \nabla) B - (\nabla \cdot U_c) B + \boldsymbol{\eta}_T \nabla^2 B$, where **B** and **A** are the T-components of the magnetic field and of the vector potential, respectively, and $\frac{\partial A}{\partial x}$ is to be evaluated in the direction 90° clockwards of ~Ω (along the isorotation surface) in the meridional plane. The strong toroidal field is generally considered to be located near the bottom of the convective zone (Dynamo Models of the Solar Cycle, Living Reviews in Solar Physics, Paul Charbonneau, 2010; Solar Cycle Prediction, living reviews in solar physics, 2010). Mainstream solar physicists, assume that the flux transport mechanisms such as (*the pumping* concept) remove magnetic flux from the solar convective zone on a time scale shorter than that of sunspot cycle. Anyway, the two main dynamo models, interface dynamos and flux transport dynamos, differ mainly in their assumptions about the site and mechanism of the α-effect responsible for the generation of a new poloidal field from the toroidal field. In interface dynamos α is assumed to be concentrated near the bottom of the convective zone, in a region adjacent to the ***solar tachocline*** (the transition region of the sun which, is supposed to be located between the radiation zone, and the differentially rotating outer convective zone). Nonetheless, it is currently believed that the dynamo operates as a wave propagating along the interface between these two layers. While these models may be roughly consistent from the mathematical point of view, they had no success or rather a very limited one at best in reproducing the observed characteristics of the solar cycle**.** Flux transport dynamos, in contrast, rely on the Babcock–Leighton mechanism for α, arising due to the action of the Coriolis force on emerging flux loops, and they assume that the corresponding α-effect is concentrated near the surface. They keep this surface layer incommunicado with the tachocline by introducing some arbitrary unphysical assumptions (such as very low diffusivities in the bulk of the convective zone). The poloidal fields are induced by this surface α-effect and then the advection starts to the poles and down to the tachocline by the meridional circulation – which is considered as an important process in these models. On the other hand, the equatorward

deep return flow of the meridional circulation is assumed to have a significant overlap with the tachocline *(another controversial point)*. It keeps transporting the toroidal field generated by the rotational shear towards the equator. By the time it reaches lower latitudes, it is amplified sufficiently for the flux emergence process to start, resulting in the formation of active regions. In summarizing the processes involved, one can say that not only the flux transport models clearly lack physical consistency, but all current solar dynamo models are based on arbitrary assumptions that depend entirely on a number of free parameters. The functional form and amplitude are far from being well constrained. *Bushby and Tobias* have stated in their published work in 2007 that all current solar dynamo models are only of "an illustrative nature". It is more or less, a good assessment. But, in reality, however, all current models of solar cycle activity are hypothetical notions with flexible mathematical formulations.

Bushby and Tobias have shown in their analysis that even a minuscule stochastic variation in the parameters of a particular flux transport model can lead to large, unpredictable variations in the cycle amplitudes. Furthermore, even in the absence of stochastic effects, the chaotic nature of nonlinear dynamo solutions seriously limits the possibilities of prediction, and that include the interface dynamo models. Therefore, the inability to specify the initial conditions that represent the system implies that predictions are impossible even for short range solar cycle forecast. Thus, the basic conclusion that can be drawn after examining, current Solar cycle prediction methods is the following, all current models are based on arbitrary assumptions that depend entirely on a number of free parameters. Thus, one can obtain from the above theoretical analysis and observations of unmanned spacecrafts, an overwhelming evidence for the obsoleteness of the solar dynamo models. These models assume that the process of solar cycle activity, including the reversal of magnetic polarity is induced internally by the Sun itself. But, this basic concept is totally false. The Sun, like all stars, is a variable star and its cycle activity is determined by the amount and intensity of the external energy supply that reaches it. Keeping in mind that the energy supply to the sun fluctuates slightly on a short time scales and fluctuates largely on a longer time scale. Data show the intensity of the magnetic field at the surface of the Sun, varies from one solar cycle to another. There were a few cycles when the magnetic activity on the surface declined substantially, and others when the magnetic activity increased substantially. Sunspot observation since the beginning of the 17th century is the material evidence. There were grand minima and grand maxima during those times. See the figure below. Additionally, a research carried out by M. Lockwood, R. Stamper, and M.N. Wild from, World Data Centre C-1 for STP, Rutherford Appleton Laboratory, Chilton, England, UK showed the doubling of the Sun's coronal magnetic during the 20th century. The magnetic flux in the solar corona has risen by 40% between 1964-1999, and by a factor of 2.3 between 1901 and 1999. The whole paper can be read at https://www.ukssdc.ac.uk/wdcc1/papers/nature.html. See the second figure below. These observations show the obsoleteness of the current model.

The dominant roles of magnetic fields and rotation in the energetic and dynamic events on the solar surface

The internal and external solar magnetic fields operate with notable variations, but at the same time they operate in co-ordination and synchronisation. It is a solar physics fact which has now been confirmed with absolute certainty. A research team from New Jersey Institute of Technology (NJIT) has reported in 2016 in Nature Communications, that they have observed the huge impact of flares on sunspots. The flare causes the sunspots to rotate at much faster speed. Their observational data were based on high-resolution images captured through NJIT's 1.6 meter New Solar Telescope (NST) at Big Bear Solar Observatory (BBSO). This is a shocking discovery to mainstreamers who are sure of how the Sun works. The plasma density of the corona is around a hundred million times less than that of the photosphere. "It's analogous to the tail wagging the dog". The lower-density regions by far less energetic and forceful, said the leading author of the paper. *"Flare differentially rotates sunspots on Sun's surface." https://www.nature.com/articles/ncomms13104* "We do think the rotation of sunspots builds up magnetic energy that is released in form of solar flares, but we have also observed conclusively that flares can cause sunspots to rotate about 10 times faster. This highlights the powerful, magnetic nature of solar flares".

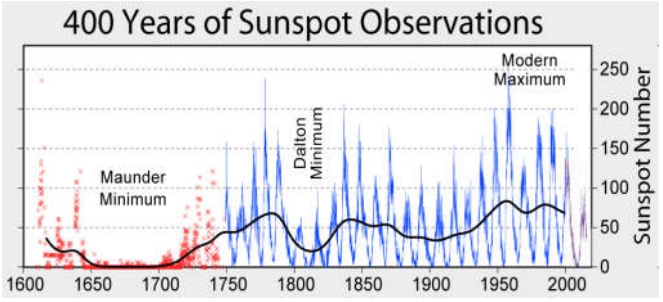


Figure 11. "Summarizes sunspot number observations. Since c. 1749, continuous monthly averages of sunspot activity have been available and are shown here as reported by the Solar Influences Data Analysis Center, World Data Center for the Sunspot Index, at the Royal Observatory of Belgium. These figures are based on an average of measurements from many different observatories around the world. Prior to 1749, sporadic observations of sunspots are available. These were compiled and placed on consistent monthly framework by Hoyt & Schatten (1998a, 1998b). The most prominent feature of this graph is the c. 11 year solar magnetic cycle which is associated with the natural waxing and waning of solar activity. On longer time scales, the sun has shown considerable variability, including the long Maunder Minimum when almost no sunspots were observed, the less severe Dalton Minimum, and increased sunspot activity during the last fifty years, known as the Modern Maximum" Credit: This figure was prepared by Robert A. Rohde and is part of the Global Warming Art projct.

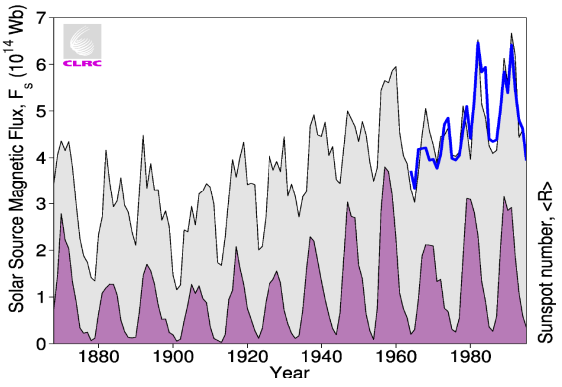


Figure 12. "The total solar magnetic flux emanating through the coronal source sphere[8], F_s, , derived from the geomagnetic *aa* data for 1868-1996 (black line bounding grey shading) and the values from the interplanetary observations for 1964-1996 (blue line). The variation of the annual means of the sunspot number <*R*> is shown by the area shaded purple. The magnetic flux in the solar corona has risen by 40% between 1964-1999 and by a factor of 2.3 between 1901 and 1999." Credits: M. Lockwood

Previous images detected by space solar missions at lower resolutions had also shown this phenomenon, but were inconclusive according to many solar physicists. Now the NJIT team has not only confirmed it, but they could also characterize the time-spatial dimension of the sunspot's rotation as the flare travels through it. The co-author of the research said, that the observations will prompt scientists to revisit the mechanisms of flares and the basic physics of the Sun in a fundamental way. *"We used to think that the surface's magnetic evolution drives solar eruptions. Our new observations suggest that disturbances created in the solar outer atmosphere can also cause direct and significant perturbations on the surface through magnetic fields, a phenomenon not envisioned by any major contemporary solar eruption models. This has immediate and far-reaching implications in understanding energy and momentum transportation in eruptions on the Sun and other stars. We will continue to study, and possibly re-interpret, the relationship between the different layers of the Sun." Valuable data collected by the Big Bear Solar Observatory (BBSO) can be read at the homepage of the observatory,* http://www.bbso.njit.edu/

The above finding has definitely exposed part of the physical reality of the Sun, namely, the dominant roles of magnetic fields in the energetic and dynamic events on the solar surface. The other important fact, that plays a major role and is correlated with magnetic fields is the differential rotation. Different points on the Sun rotate at different speeds, that causes the Sun's magnetic fields to stretch and spread at different rates.

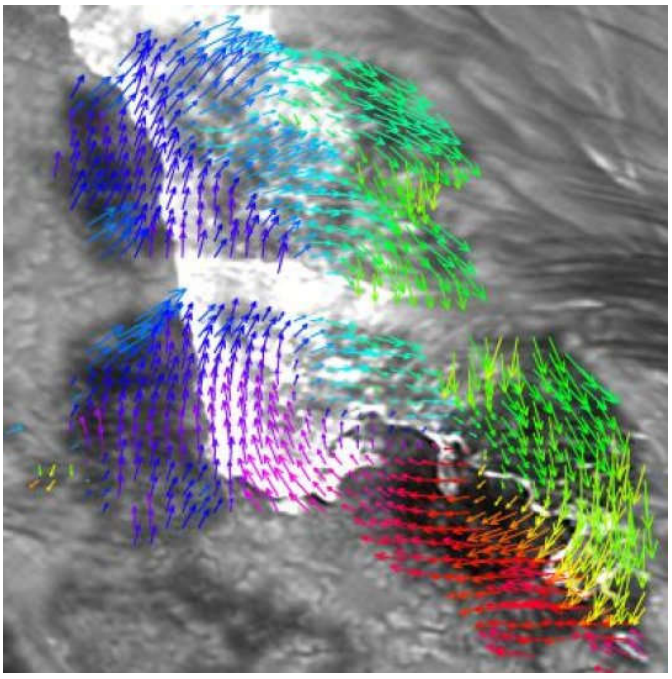
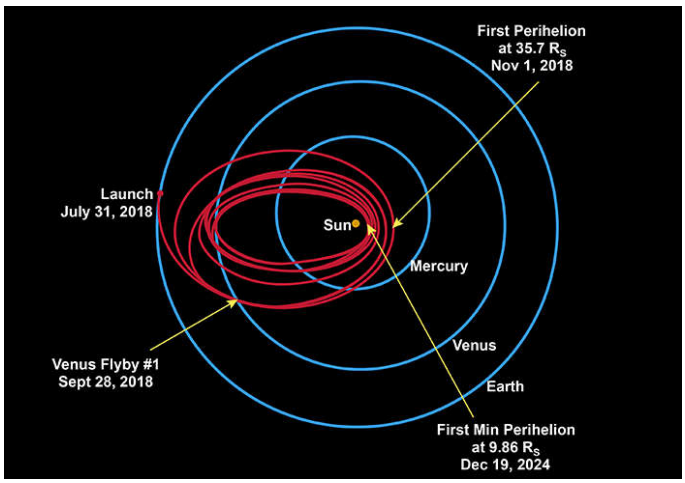


Figure 13. High-resolution images captured by the New Solar Telescope at Big Bear Solar Observatory show solar flares speeding up the rotation of sunspots. Credit: Image courtesy of New Jersey Institute of Technolog

The pseudo physics notion of magnetic reconnection

There are several types of eruptions on the Sun. But, the biggest ones are the Coronal Mass Ejections (CME) and solar flares-or what is also known as Coronal Ejections (CE). Both eruptions are huge explosions of magnetic field and plasma from the Sun's corona (gigantic release of energy), and usually these two types of large eruptions take place at the same time. In fact, the most intense flares are always correlated with Coronal Mass Ejections. However, the effects of CE are quite different from that of CME. The ejected energy from an intense flare can disrupt the area of the atmosphere through which radio waves propagate. On the other hand, the released energy of CMEs can induce huge stress on Earth's magnetic fields. They can create currents that drive particles down toward Earth's poles, especially the fastest CMEs that erupt from large sunspot active regions, powered by the strongest magnetic field concentrations on the Sun. Nonetheless, in spite of the fact, these major solar phenomena have been observed for decades, solar physicists were unable to develop a realistic model that explains how they happen. Furthermore, those physicists were thinking that these two major eruptions arise through very different *mechanisms, and only CME are* associated with filaments or "prominences".

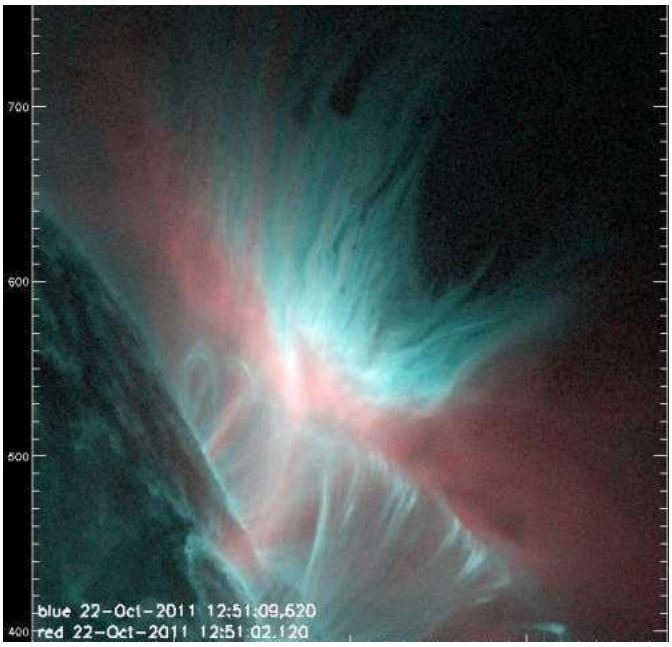


But, now observations have linked filaments to jet eruptions as well. A joint research team from Durham University and NASA's Goddard Space Flight Center has declared that they came up with a Universal model that *explains all solar eruptions. It is called the "breakout model". "In CMEs, filaments are large, and when they become unstable, they erupt. Recent observations have shown the same thing may be happening in smaller events such as coronal jets. Our theoretical model shows the jet can essentially be described as a mini-CME." "It was previously thought that there were different drivers for the varying scales of eruptions from the Sun, but our research provides a theoretical Universal model for this activity, which is very exciting," http://www.nature.com/nature/journal/v5 44/n7651/full/nature 22050.html. The researchers are correct in their assessment, that all kinds of solar eruptions can* be considered as the same kind of event, only in different sizes and manifested in different ways. But, the proposed model, the so-called breakout model does not represent the real physical mechanism of solar eruptions. The hypothetical breakout model assumes that magnetic reconnection causes the energy release. In other words, magnetic reconnection is supposed to be a process in which magnetic field lines come together and explosively realign into a new configuration. "In stable conditions, loops of magnetic field lines hold the filament down and suppress eruption. But the filament naturally wants to expand outward, which stresses its magnetic surroundings over time and eventually initiates magnetic reconnection. The process explosively releases the energy stored in the filament, which breaks out from the Sun's surface and is ejected into space." Future data based on high-

resolution observations of the magnetic field and plasma, that flows in the solar atmosphere, particularly around the *Sun's poles where most jets originate, will reveal the obsoleteness of the breakout model. These future data most likely will come from Parker space probe, which will be the first spacecraft that will "deep dive" into the Sun's atmosphere. If this probe can survive the blistering heat and radiations, then the data based on it, will strip theoretical and solar physicists of their remaining clothes.*

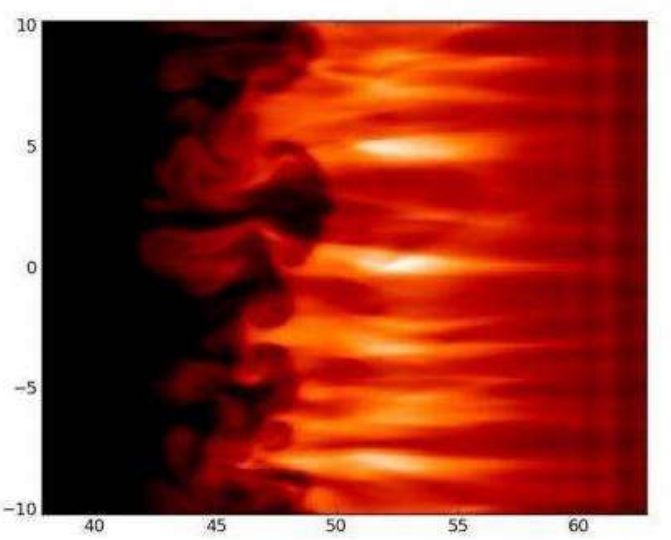
Trajectory and speed of Parker Space Probe, scheduled for lunch next year: Supplied by NASA

Anyway, the concept of magnetic reconnection has also been involved in explaining another phenomenon associated with solar flares, that puzzled solar physicists for many years. Using modern space Observatories, solar researchers started to observe dark plasma structures, which are usually visible for only a few minutes in the upper part of the solar flares. All attempts for more than one and a half decade to explain these structures were unsuccessful.



The image obtained from the AIA instrument of the SDO satellite shows the ultraviolet radiation from part of the corona on 22 October 2011. It was taken at a wavelength of 13.1 nanometres (shown in blue) and 9.4 nanometres (red). The dark finger-like structures of the Rayleigh-Taylor instability can be seen

In 2014 a research team, from the Max Planck Institute for Solar System Research came up with a real explanation to this phenomenon. https://www.mpg.de/8791459/solar-eruptions-atmosphere But, the magnetic reconnection part of the explanation is once again, pure fantasy. However, the research team evaluated flare images from both Solar Dynamics Observatory (SDO) and Solar Terrestrial Relations Observatory (STEREO). Both probes can observe the Sun at several wavelengths of ultraviolet light. Nevertheless, the researchers of Max Planck Institute are correct in their assessment that these structures are instabilities that form when plasmas of different densities encounter each other. In fact, this type of instability is a well known process in fluid dynamics, called Rayleigh-Taylor instability. This instability occurs, for instance, between two fluids of different density when they are accelerated with respect to each other. The three-dimensional MHD computer model of the research team is identical with the observations. See the figure below.



The figure above is the result of the computer simulation based on MHD. The dark finger-like structures indicate the Rayleigh-Taylor instability. Credit: MPS

However, the fantasy part of the explanation is the following, "in the corona, the magnetic field lines take on the role of the rubber band. When the field lines suddenly regroup, a beam of thin plasma forms a jet, which is accelerated from the site of the reconnection towards the solar surface. Further down, the jet meets up with denser plasma. As a result, the Rayleigh-Taylor instability takes place". *In my new research paper, that shows how to replicate the real fusion process that takes place in the sun, the observed Rayleigh-Taylor instability will be explained in details.* Theoretical physicists can come up with as many magnetic reconnection based-models *as they want, but that does not eliminate the fact, that the concept of magnetic reconnection is physically groundless.* Magnetic field lines are not physical entities. They are only mathematical visualization or aid. So, how can magnetic field lines reconnect if they do not exist at all? As, Nicholas Sykes from the electric Universe, accurately stated, ″Lines of magnetic force are not physical entities, any more than are the contours of a geographer's map, or the isobars of a weatherman's chart. One might just as well talk about a "contour reconnection" as being the explanation of a volcanic eruption, as to consider "magnetic reconnection" to be an explanation of energy outbursts of various sorts." The basic aim behind the notion of magnetic field lines is to describe mathematically the magnetic field as a vector field. It is the only way to represent the information contained within a vector field. With this mathematical visualization the density of field lines (where field lines bunch together) indicates the strongest magnetic field regions. And the field lines do not start or stop anywhere, they always make closed loops and the direction of the field is indicated by drawing arrowheads along the lines. The lines of force can easily be considered or thought of as between those lines as in any of the lines themselves. In the real word, however, magnetic field can best be seen by iron filings dropped on a surface near strong magnetic material, such as a bar magnet. It can be seen that, each filing behaves like a tiny magnet with a north and south poles. The filings are separated

from each other, due to the fact that similar poles repel each other.

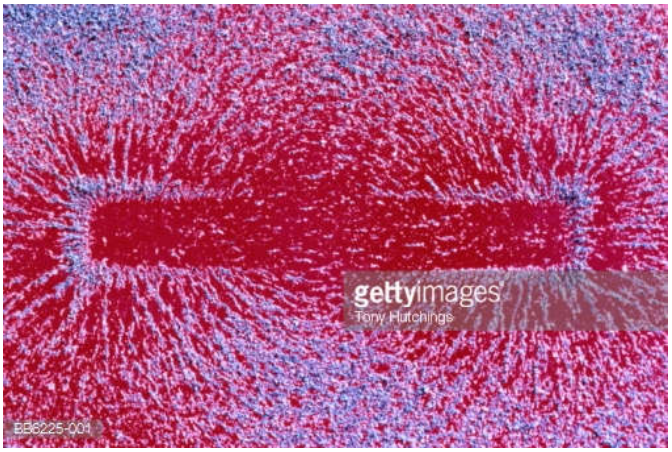


Figure 14. Iron filings revealing the magnetic field around bar magnet, Credit Tony Hutchings

Although, the concept of magnetic reconnection is widely used-and only superficially- in explaining many astrophysical phenomena, in physical reality, it is one of the biggest pseudo physics notions. The elegant theory of magnetic reconnection does not explain those energetic events, that take place in the Sun or anywhere else in the Universe. The equations of magnetic reconnection assume very slow discharge of energy lasting for years, but as it can be observed, solar flares discharge in minutes with far more energy than what theoretical models assume. Conventional astrophysicists cannot and will not be able to solve this puzzle of excess energy production within the framework of the theory of "magnetic reconnection". Moreover, whenever this phenomenon takes place, there are regions of electron-depleted space associated with it. And a two-layer flow of particles is formed that speeds those electron-depleted atoms. The propagation velocities can reach up to 700M /sec. Thus, it is obvious this phenomenon is entirely different from the theoretical notion of "magnetic reconnection". In reality, it is nothing more than a well known plasma phenomenon called exploding double layer. A Double Layer (DL) is formed in plasma when electric charge flows through it. Different types of electromagnetic radiations in space are emitted based on the mechanism of DL. Furthermore, the latest experimental investigations have shown the double layer phenomenon, to be self-generating. That means, it can be incorporated into an efficient spacecraft thrust mechanism.

However, as it can be seen in the figure below, a double layer is consists of two oppositely charged parallel layers, resulting in a voltage drop and electric field that accelerates the plasma's electrons and positive ions in opposite directions. If there are sufficiently large potential drops and layer separation, electrons might accelerate to ultra-high velocities, producing synchrotron radiation. It is worth noting that, the exploding double layers are not exclusively cosmological and astrophysical phenomena, but well known phenomena that take place, on the surface of the Earth, namely, in power transmission switchyard when a circuit breaker is opened incorrectly. This problem was first recognized in the 1960's by the late Hannés Alfvén. The Swedish power company was using large rectifiers to convert electrical power from AC to DC for the purpose of long transport. But, from time to time the plasma in the rectifier would explode. The problem turned out to be exploding double layers, identical to those observed in "magnetic reconnection" on the Sun. Nevertheless, according to my thoughts, the root cause for all current pseudo physics notions, mysteries and puzzles is the lack of realizing the true building blocks of matter. Realization of this infinitely important physics fact, is the key to explain all physical observations, phenomena and solve all puzzles and mysteries including the biggest one. Namely, the origin of magnetic fields of the Universe. Mainstream physicists and also, the advocates of the electric Universe, belief that magnetic fields occur whenever, electric charges are in motion. In physical reality, this conventional belief is absolutely wrong. The magnetic force is permanently present in the electric charge itself, and when it moves the magnetic field only increases its intensity. As more charge is put in more motion, the strength of the magnetic field increases further. And since, the magnetic force is permanently present in the building blocks of matter, consequently, this implies that magnetic fields are continuous throughout the Cosmos. Therefore, there is no such thing as magnetic reconnection.

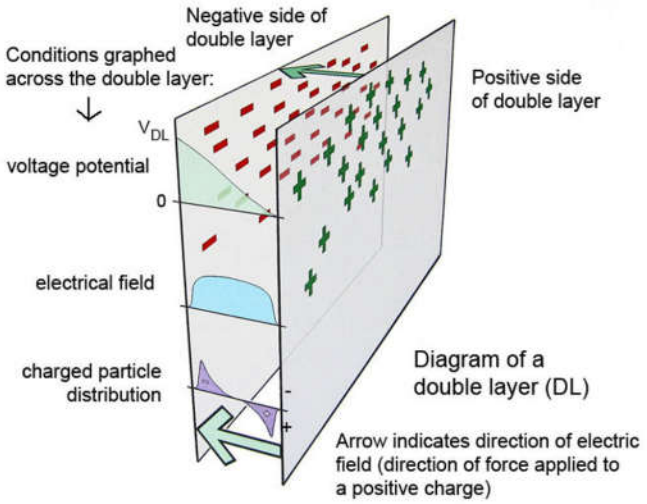


Figure 15. Adapted from https://www.thunderbolts. info/wp/2011/ 12/03/essential-guide-to-the-eu-chapter-5/ to illustrate charge relationships and electric field potential in a DL – J. Johnson, 2011

The external power supply to the sun has been detected

The biggest questions that faced and still facing the mainstream solar model are the ones related to the corona. To start with, why the Sun has a corona? If the corona is a consequence of the thermonuclear engine or related to it, then why the Earth-which does not have thermonuclear engine at its core "like the Sun"-has a magnetosphere similar in many ways to the Sun's atmosphere (the corona that stretches to around 5 million miles from the solar surface)? Mainstream physicists are deliberately ignoring this fundamental question, because, they cannot provide any sort of explanation that would show a correlation between the corona and the hypothetical thermonuclear furnace. And, even if the SSM can give an explanation why the corona exists, it surely cannot tell us why the corona extends into millions of kilometres in space. The other crucial question is the temperature of the corona. Why the hottest region of the Sun begins at an altitude of 4000 kilometres and extends over a million kilometres from its surface without any significant temperature drop? If an object is heated internally, then as the distance from the surface

increases the temperature should decrease. It is a matter of simple thermal emission mechanics: temperature decreases with the square of the distance. Besides, the increasing of temperature with distance, the escaping velocity of the solar wind is another mystery under the theory of gravity-driven sun. The solar wind escapes the sun at a velocity between 400-800 km per second, and sometimes much higher. For instance, on July 23, 2012, NASA spacecraft STERO recorded the velocity of a massive cloud of CME that was travelling between 1800 and 2200 miles per second as it left the sun. Based on the concepts of the SSM, the heat and radiation pressure of the sun are inadequate to explain the observed escaping velocity of the solar wind and why its particles accelerate past the planets. Are the particles of the solar wind rocket powered objects?

Figure 1

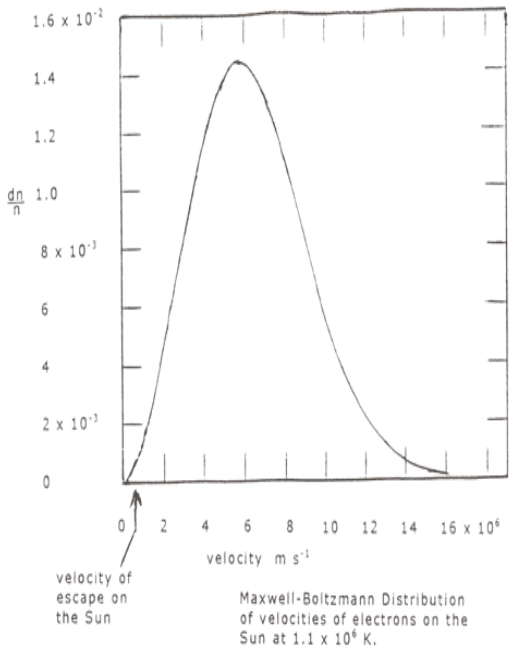
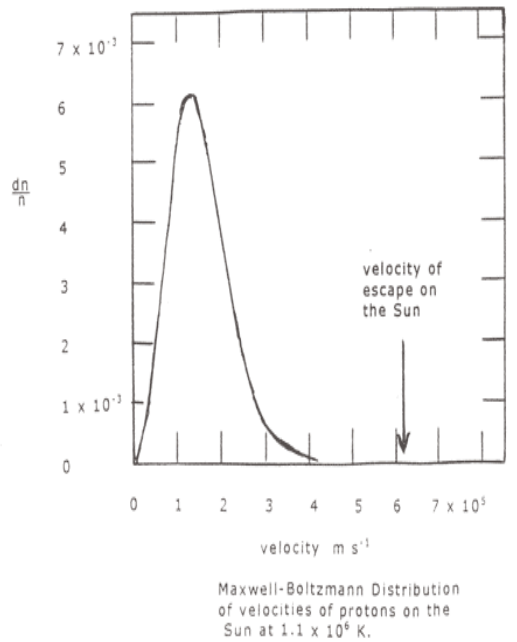


Figure 2



Credit: ***Bernard Bligh,*** **http://altcosmology.com/Home.php**

In fact, when it comes to the solar wind velocity and acceleartion the biggest question, is not the escaping velocity in general, but rather why in the corona, oxygen ions, are accelerated radially away from the Sun faster than protons? *(Antonucci, Dodero and Giordano 2000, and Kohl et al 1998, Aschwanden et al. 2001) This observed fact, cannot be interpreted as a simple diffusion, since oxygen ions are 16 times heavier than protons. The only reason of course for the fast acceleration of oxygen ions is the high positive charge of the Sun. The sun is not a neutral object, as the current model assumes, but it has an effective overall positive charge. Eddington's method in calculating the velocities of ions in the Sun is totally flawed. The details of his wrong method and analysis will be shown in another paper.* However, in spite of the fact, that leading authorities in astrophysics and theoretical physics in general do not question the correctness of the SSM, they acknowledge that how the corona is heated remains a mystery. Some theoretical physicists think that the temperature increase comes from the "magnetic reconnection". A few years ago, SOHO and TRACE observed small, rapidly changing magnetic regions on the photosphere. This observation was interpreted by the opportunists as "reconnection events". But, as already been explained, this interpretation is pure fantasy. Magnetic fields cannot be broken and then reconnect. As Donald Scott, a dissident scientist and electric Universe advocate has stated accurately, "no one has ever observed magnetic field lines reconnect and no one ever will" Now, a research group at NASA think that the long standing mystery might be solved by recent data from the Interface Region Imaging Spectrograph (IRIS), that was launched in 2013. The researchers said that IRIS has identified "heat bombs" that can explain the reverse temperature gradient. In reality, nonetheless, these observations show the fundamental defects of the current model like all recent observations. If the roles of magnetic fields and rotation would have been understood, then these concepts would not have come up. The external energy supply to the Sun, the ejection of the Sun'internal energy and its acceleration on the surface and in the atmosphere, like the coronal mass ejection, prominences and solar flares are totally ruled by magnetic fields interactions. The internal magnetic field rises up rapidly from the surface of the Sun into the upper atmosphere through the chromosphere, sometimes reaching an altitude of 150,000 km. The energy of the magnetic filament or prominence is rapidly transforming. This is the reason for the spectacular-rapid increase of temperature from 6000°C to 20,000 °C. The mechanism is somehow identical to the sudden temperature jump in chemical kinetic where the heating usually involves discharging of a capacitor (in the kV range) through a small volume (<1mL) of a conducting solution. On the other hand, the external magnetic field of the Sun that extends into a great distance accelerates the ejected particles to a very high velocity. The acceleration starts at the surface and both magnetic fields (internal and external) operate in coordination. The propagation velocity of the ejected solar materials can reach enormous levels. In general, the particles flow outward at varying velocities depending on their origin. The process of energy ejection starts, when the current flowing into the Sun's plasma sheath increases beyond a critical threshold. That triggers a sudden release of the stored magnetic energy, causing solar flares and other gigantic prominence eruptions. The observed phenomena can be explained fully by the Plasma Pinch Discharge Mechanism (PPDM). PPDM is a disruptive discharge of magnetic energy which is stored in a double layer. The disruptive discharge will cause the plasma cable to pinch

into a very narrow column by an inward magnetic pressure of the discharge current. As a result of this process, large-voltage and high-temperature discharge column will generate high energy magnetic radiations. The figure below is an approximate illustration of the Solar Double Layer mechanism. Image created by Ian Tresman on July 13th, 2005, based on an images by Hannes Alfvén in his book *Cosmic Plasma* (1981), p.55. "Hannes Alfvén considered the heliospheric current sheet to be part of a heliospheric current system, as he believed all cosmic plasmas to be part of a plasma circuit. The Sun behaves as a unipolar inductor producing a current that flows outwards along both axes B2, and inwards in the equatorial plane, C, and along Solar magnetic field lines B1. The current closes at a large distance, B3". The model of Alfven-Carlqvist is superior compared to the standard solar model. It can explain some basic features of the Sun, like the eruption of solar flare and the acceleration of the solar wind.

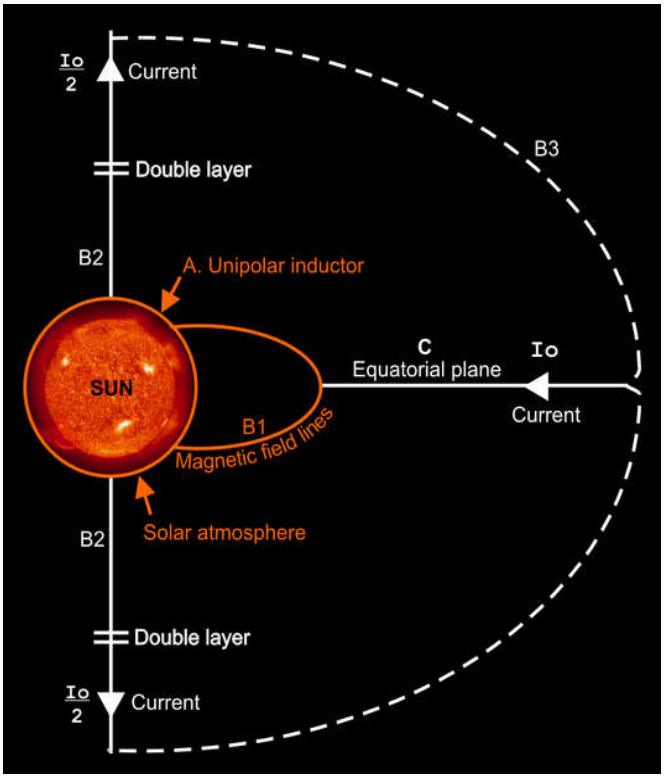


Figure 16. Approximate Illustration of Solar Double Layer Mechanism

In fact, all energetic explosive phenomena, such as the intense gamma-ray flashes that have atmospheric origin, supernovae, GRBs and many others including, the most intense radiations that originate from the centre of galaxies behave in much the same manner and obey the same principles. All these energetic phenomena and their associated radiations are produced, emitted and propagate as a result of magnetic fields interactions.

However, based on, the physical reality of the Sun, not on the hypothetical standard solar model, the observations of IBEX and Voyager stated in the previous pages make perfect sense. It is obvious that the ribbon detected by IBEX has a galactic origin. It runs perpendicular to the direction of the galactic magnetic field, just outside the Heliosphere, as shown in the right figure below.

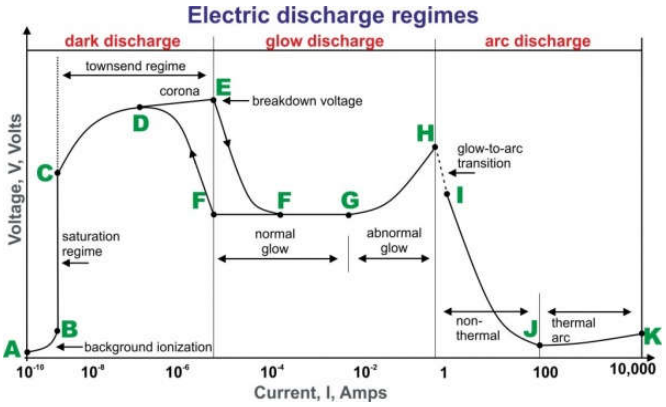


Figure 17. Structure of a Glow Discharge, Princeton Plasma Physics Laboratory

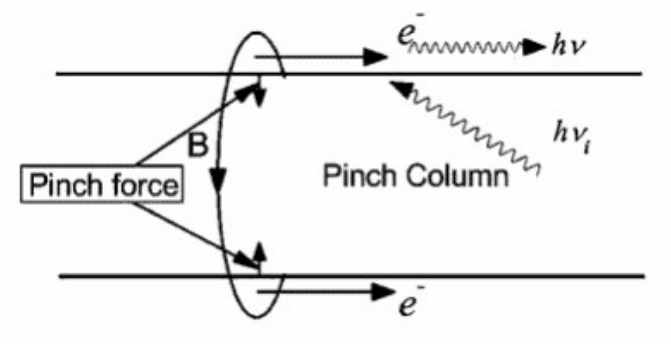
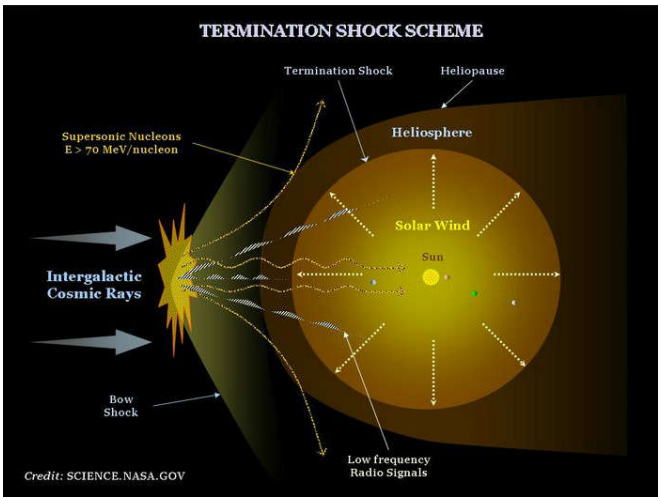


Figure 18. Pinch discharge model of GRBs. e⁻ represents electrons and hν the mean photon energy



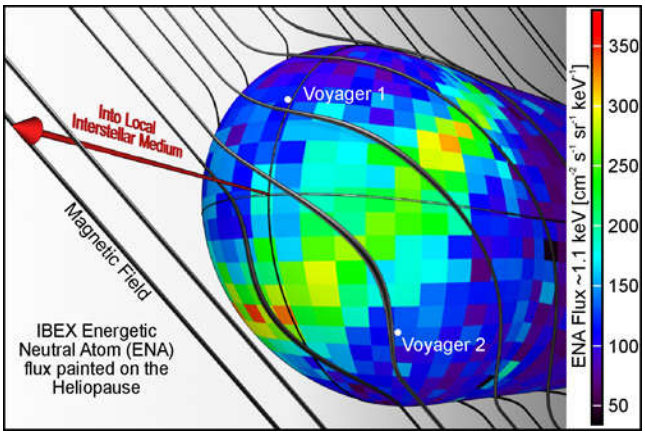


Figure 19. Left, Termination Shock Scheme. Right, Ribbon Detected by IBEX, Credit: NASA

Those observed galactic high energy particles get into a spiral motion along the Heliospheric Magnetic Field and lose large amounts of their kinetic energy. This kinetic energy cannot simply disappear as the first law of thermodynamics states. It is the energy that powers our star, and this energy varies with solar cycle activity. Observations and detections from the last a few decades, clearly show a correlation between the rate of high energy cosmic particles penetrating the Heliosphere and solar cycle activity. There is a long 22-year cycle, which is dominated by the 11 year-sunspot cycle (Webber and Lockwood, 1988). At the same time the cycles are influenced by time-dependent gradient, curvature, and current-sheet drifts, as well as turbulence above the poles (Manuel *et al*., 2014). The Heliospheric Current Sheet (HCS) divides the two opposite magnetic poles of the Heliosphere. The tilt angle of the HCS varies with solar activity and exhibits a periodicity with the short sunspot cycle. The inclination of HCS has a major effect on the global Heliospheric field and plays a significant role in the drift motions of cosmic particles (CP). The intensity of CP that are entering the Heliosphere is modulated as they travel through the Heliospheric magnetic field embedded in the solar wind (Parker, 1965; Rao 1972; Venkatesan and Badruddin 1990; Potgieter *et al*., 2001). The modulation of ions is dominated by the Global Merged Interaction Regions (GMIRs)

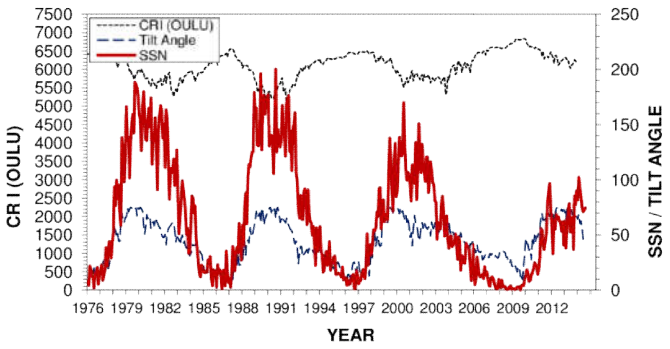


Figure 20. The monthly variation of Tilt Angle and sunspot numbers with cosmic ray intensity (Oulu) from 1976 to 2014

All space probes and other forms of unmanned spacecrafts have provided detailed data of the huge changes in the structure of the Heliosphere and the variation of high energy cosmic particles within it over the course of a solar cycle. The variation in the structure of the Heliosphere is mainly due to the changes in the structure and the inclination of the Coronal Magnetic Field and the Heliospheric Current Sheet (HCS). The observed overall variation of cosmic particles in the heliosphere, is exclusively determined by the fluctuation in the strength of the Heliospheric Magnetic Field (HMF), and the strength of the Solar Polar Field (SPF). Diffusion is the dominant process during solar maximum and it correlates with the strength of the HMF. While, drift is the dominant process during solar minimum and it is correlated with the variation of the tilt angle. These changes are evidence to the increasing and decreasing of the external energy supply that powers our Star. The increasing phase is during solar minimum while the decreasing one is during solar maximum. These facts will be explained in an extensive details in another research paper.

Unsolved solar phenomena, conclusion and future work

The current theory of the Sun and the stellar theory in general should have been discarded a long time ago. A good and well established theory should not only be free of contradictions, but also be able to explain any new observations without additional ad hoc notions. The SSM and the stellar models do not meet these fundamental requirements. The gaps between theoretical stellar models and observations are so huge even after all of the adjustable parameters are pushed to their limits. The following statements are from a well known institutional scientist and expert on stellar interiors: "The standard solar model predicts no motion in the photosphere. The solar surface is a mess. There is a gap in our understanding of stellar evolution. Some of the things we're finding are not what we expected. The radii of some stars are out by ±10 percent according to our models. Something is clearly wrong. Some of the things we're finding are not what we expected. We've all been carefully taught in the wrong way." "We need theories that are not so infinitely flexible." *Eugene N. Parker, who is considered as one of the leading experts in solar physics, wrote in his special historical review article in* Solar physics*: "The pedestrian Sun exhibits a variety of phenomena that defy contemporary theoretical understanding. We need look no farther than the sunspot, or the intensely filamentary structure of the photospheric magnetic field, or the spicules, or the origin of the small magnetic bipoles that continually emerge in the super-granules, or the heat source that maintains the expanding gas in the coronal hole, or the effective magnetic diffusion that is so essential for understanding the solar dynamo, or the peculiar internal rotation inferred from helioseismology, or the variation of solar brightness with the level of solar activity, to name a few of the more obvious mysterious macro-physical phenomena exhibited by the Sun." These frank acknowledgments (or confessions) have one thing in common,* misunderstood Sun*, due to invalid model. In fact, the* enigmas and contradictions facing the SSM *are widespread to all basic features of the Sun. like neutrino deficiency and variability. Particularly, the correlation of solar neutrino rate with surface activity.* And strong evidence has already been found that showed correlation, between solar rotation and the number of solar neutrino detected. *Moreover, the mysteries of solar wind speed and ions acceleration, are very serious ones. For instance, why oxygen ions in the corona are accelerating away much faster than protons, in spite of the fact, that oxygen ions are 16 times heavier than protons?* And in general the acceleration of the solar wind cannot be explained by the principles of the current theory. *The other serious dilemma is connected with the Sun's atmosphere, because* based on gas laws, the Sun's atmosphere should be only a few thousand kilometers. Instead, it is extended to great distance, where it heats up to more than a million degrees. *Beside that, the differential rotations (differential rotation by latitude & differential rotation by depth) are some of the most obvious defects under the current model. Also, the turbulence parameters do not explain the existence of photosphere granules. While, the existence of transverse waves on the photosphere, the helium abundances in both solar flares and solar wind and the existence of equatorial plasma torus are without any explanations. In addition, to the above unexplained surface phenomena, observed sunspot migration and rotation contradict the concepts of the theoretical models of sunspot formation and fine structure. More importantly,* there is clear conflict between the observed data from Helioseismology, and the predictions made by stellar interior models for the Sun. In other words, *the observed element abundances do not match the expectation of element abundances based on the SSM. On the top of all the above, there are other recent discoveries, like the ones that showed*

the Sun to be almost a perfect sphere, and the speed of the plasma within the interior was found to be 100 times slower than what theoretical models are assuming. On the other hand, huge amount of financial resources have been wasted on the so-called controlled thermonuclear reactions. All the mega projects of the world leading institutes of thermonuclear fusion research are still unable to sustain those thermonuclear reactions. For almost seven decades using different methods and reactors, researchers could not produce one useful reaction based on the thermonuclear model. In other words, the input energy spent on creating a short-lived plasma state from thermonuclear reactions, like deuterium-tritium reaction is still much higher than the output energy. The reason of course, is because thermonuclear reactions are quasi nuclear fusion reactions, and can never be sustained long enough that would allow the final phase of the reaction to be obtained and confined permanently. Additionally, it is worth mentioning that close examination of the so-the called H-bomb exposes further the quasi nature of thermonuclear reactions. *The brilliant-Indian nuclear scientist, K. Santhanam, deserves the highest scientific prize for being honest about the tests of the so-called Indian H-bomb.*

However, our star must be considered as the Cosmological candle. The reasons for such consideration are abundantly obvious. First of all, when we will be able to reconstruct an artificial Cosmological candle on the surface of the Earth, and light it up then we will be able to understand and see the entire Universe, without using any detecting or imaging devices in deep space. At the same time, reconstructing this candle means possessing the cleanest and most ideal energy source, that keeps our planet healthy and provides almost all our energy needs. Moreover, true understanding of the physical mechanism of the Cosmological candle, means true understanding of the history of our planet, and the current changes that are taking place on it. Nevertheless, the physical reality of the Cosmological candle and how to replicate its nuclear fusion process, will be completely revealed in an extremely important paper, that will be written in the near future. *Replicating the Energy Production of our Star Based on its physical reality.*

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