

The sun produces muon neutrinos flux without neutrino oscillations

Abstract

The sun energy source is from magnetic fields in the galactic disk distributed by the supermassive black hole(reference 1). This article we will discuss the effect of the sun new energy source on the neutrino particle experiments and research. The sun new energy source revokes the solar neutrino problem and its immediate solution by neutrino oscillations.

A historical review of the solar neutrino experiments will clarify that the solar neutrino flux describes a solar activity entirely different from that predicted by the standard solar model. The solar neutrino experiments are more useful as an internal probe of the sun activity then to verifying the standard solar model.

The new sun energy source is an astrophysical explanation to the solar neutrino problem that invalidates the neutrino oscillation solution. Without neutrino oscillations, the SNO detector results show that the sun produce a muon neutrinos flux, created by heavy particle interactions of the second family of the standard particle model.

Abbreviations

SSM – The Standard Solar Model where the sun energy source is fusion. When the SSM is mentioned it is usually related to common knowledge.

MST – Magnetic Sun Theory – According to this new theory (reference 1) the sun energy source is from magnetic fields distributed by the supermassive black hole at the center of the galaxy. Those magnetic fields propagate chaotically through the galactic disk and reach the sun. Locally the solar cycle reverses its magnetic field polarity every 11 years to heat the sun. The MST is usually mentioned with new and original topics.

SK – The Super-Kamiokande neutrino observatory in Japn.

SNO – The Sudbury Neutrino Observatory in Canada.

Short history

The neutrino was presented by Wolfgang Pauli in 1930 to set the beta decay process in agreement with the laws of energy and momentum conservations. In June 1956 the neutrino particle was detected by the first time by Frederick Reines and Clyde Cowan, when observing the fission beta decay from the Savannah River nuclear reactor. The muon neutrino was detected at Brookhaven National Laboratory in 1962 and soon after two families of quark and leptons integrated in the particle model. The third

charged lepton the Tau was detected in 1975 at the Stanford Linear accelerator, followed by the discovery of the third family, to set the three families of the standard particle model. The Tau neutrino of the third family was discovered in 2000 at Fermi-lab.

The beta decay

Fermi suggested in his classical paper on beta decay to measure the neutrino mass using beta decay. The electron energy is measured at the end point part of the electron energy spectrum. The experiment is done with tritium decay where a neutron in the tritium nucleus is decayed by the process:



The outcome is a proton plus electron and anti-neutrino as shown in Figure 1.

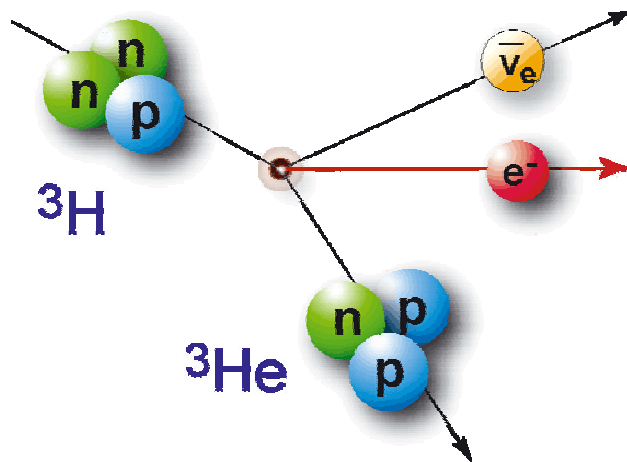


Figure 1 – In the tritium beta decay one neutron of the tritium nucleus is decayed into a proton plus electron and anti-neutrino. Precise measurement of the end point part of the beta spectrum enables to determine the neutrino mass. This experiment shows no indication of massive neutrinos.

The spectrum of the electron energy is shown in figure 2a; the end point is enlarged in 2b. If the neutrino has zero mass, then the kinetic energy of the electron at the end point must equal the energy released by the beta decay. If the kinetic energy of the electron is a little smaller than the beta decay energy, the neutrino must have mass. This experiment was conducted many times with increasing accuracy. However, no indication of massive neutrino was found. Based on this experiment, neutrinos were considered as a massless particle for decades, and placed with zero mass in the standard model.

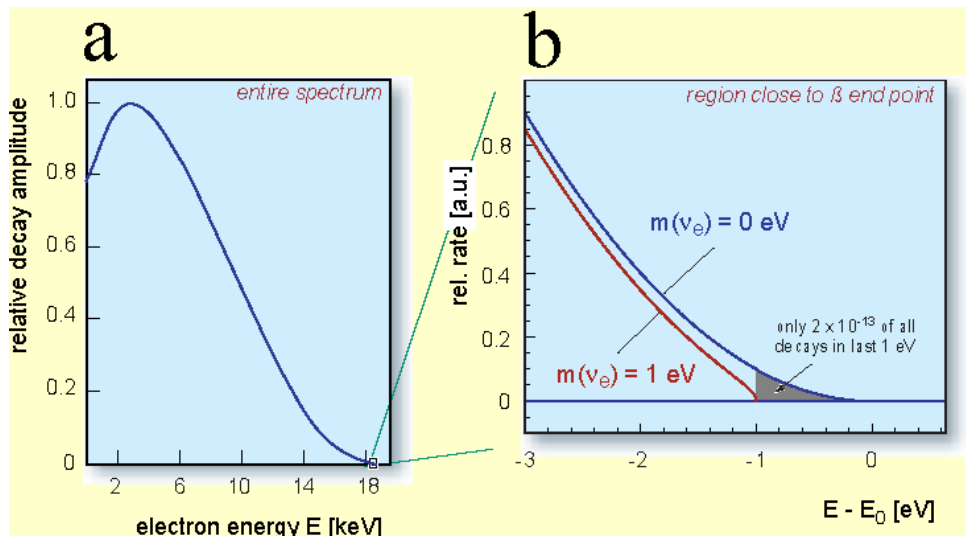


Figure 2 – The entire spectrum of the electron kinetic energy in the tritium beta decay is shown in 2a. The end point is shown enlarged in 2b. For neutrino to have mass the kinetic energy of the electron should be slightly smaller than the energy released by the beta decay as shown by the red line. Actual result from measuring the electron kinetic energy shows no indication of massive neutrinos. (Image by the Katrin collaboration)

The latest and most advanced experiment in the tritium beta decay is the Katrin experiment (Figure 3). It is the most accurate – in using complex spectrometer it can find masses of electron neutrinos with sensitivity of 0.2 eV. The process starts when gaseous tritium is pumped to a tube in the left side. At the transport section the tritium is removed and the electrons from the beta decay are guided to the spectrometer. At the pre-spectrometer a static electric field is applied to remove most of the electrons with the smaller energies. At the main spectrometer two superconducting magnet are used to produce a broad beam of electrons that get filtered by a static electric field. Only the electrons with the highest energy reach the detector at the right side. This experiment, similar to the older beta decay experiments, will find that the electron neutrino mass is zero and refute the neutrino oscillation theory.

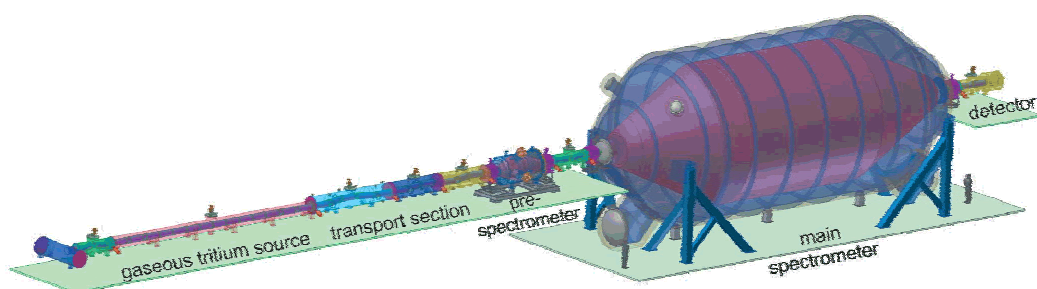
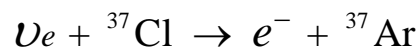


Figure 3 - The latest and most advanced experiment in the tritium beta decay is the Katrin experiment. It is the most accurate – in using complex spectrometer it can find masses of electron neutrinos with sensitivity of 0.2 eV. This experiment, similar to the older beta decay experiments, will find that the electron neutrino mass is zero and refute the neutrino oscillation theory. (Image by the Katrin collaboration)

The first solar neutrino experiment at Homestake

In 1967 Dr. Raymond Davis started the Homestake experiment to check the neutrino flux from the sun and to verify the Standard Solar Model (SSM). According to the SSM, Hydrogen is fused to Helium in the p-p chain while converting the mass difference between the helium nucleus and the hydrogen nucleus to energy. The fusion rate of the hydrogen according to the SSM was needed to create the sun heat and to generate the energy lost by the sun luminosity. Dr. John N. Bahcall used the SSM to predict the fusion rate and the electron neutrino flux according to the energy emitted by the sun luminosity. The Homestake experiment goal was to confirm the predicted neutrino flux and to substantiate the SSM with firm evidence.

The experiment was built 1500 meters below ground in the abandoned Homestake gold mine to shield the experiment from cosmic rays interference (Figure 4). They filled a tank with 615 tons of dry-cleaning fluid perchloroethylene (C_2Cl_4). The Chlorine 37, when interacted with solar electron neutrino, becomes Argon 37.



Argon 37 is radioactive with a half-life of 35 days and its quantity can be measured precisely to reflect the number of neutrino interactions.

The P-P Chain, by which the hydrogen is fused into helium in the sun according to the SSM, is divided into three reactions identified by their specific neutrino energies. The first is the P-P beta decay with energy below 0.42 MeV that produces 90% of the neutrino flux. The second is electron capture on Beryllium 7 with energy below 0.86 MeV that produce about 10% of the neutrino flux. The third is the beta decay of Barium 8 with the relative high energy below 15 MeV and flux of 0.01% of the total flux. The Homestake experiment could detect neutrinos from the Beryllium 7 and the Barium 8 interactions but not from the P-P beta decay.

The results of the Homestake experiment did not confirm the expected neutrino flux according to the SSM, despite running for 30 years with many modifications. It found only third of the expected neutrino flux and created the solar neutrino problem.

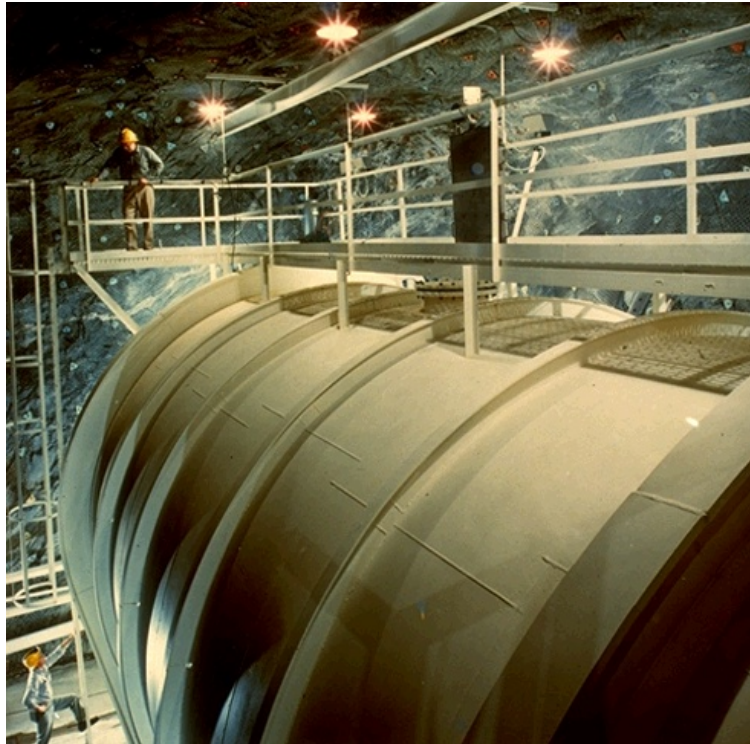
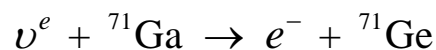


Figure 4 – The Homestake solar neutrino experiment is a tank filled with 615 tons of dry-cleaning fluid. It measured for a bout 30 years the neutrino flux from the sun to be third of the expected neutrino flux according to the Standard Solar Model. This result is not evidence for neutrino oscillations but of a new solar model.

In 1991 the Gallex experiment was built in Italy based on the interactions of neutrino with Gallium according to :



A tank of 30.3 tons of gallium–chloride solution was installed inside the [Gran Sasso](#) mountain to be shielded from the cosmic ray interference. A similar experiment Sage in Russia used a target of 57 tons of metallic Gallium. The Gallium experiments could detect neutrinos from the Beryllium 7, the Baron 8 and the P-P beta decay reactions of the SSM. Both the Gallex and the Sage experiments found flux that was about half of the flux expected by the SSM and confirmed the solar neutrino problem.

The Super-Kamiokande experiment

In 1996 the Super-Kamiokande neutrino observatory (Figure 5) started operation in Mozumi Mine in Hida city in Japan. It is located 1000 Meter underground and contain 50,000 tons of ultra purified water. The detector is using 11,146 photomultiplier tubes (Figure 6) to find Cherenkov radiation from collisions inside the tank. The Cherenkov light is emitted when a recoiled electron is passing inside the water filled detector in a speed higher then the speed of light in water. The particle creates in the water a shockwave similar to the one created by supersonic airplane in the air. The particle speed is still smaller then the speed of light in vacuum as required by special relativity. The photomultiplier tubes are shown in Figure 6 they consist of a spherical

glass tube, 50 cm in diameter, that the air inside them is removed. When a single photon from the Cherenkov radiation hit the Photo-Cathode inside the tube, an electron is emitted from the cathode. The electron is accelerated and hit layers of dynodes to emit additional electrons and eject a small current pulse. For the atmospheric neutrino, SK can detect both high energy electron neutrinos and muon neutrinos and can reveal the direction from which they hit the detector. For the solar neutrinos, SK found, by the electron scattering interactions, that the Boron 8 neutrino flux is about half as that expected by the SSM. Therefore, like to the previous neutrino experiments, SK confirmed the solar neutrino problem. However, SK was also designed to measure the neutrino flux from cosmic rays hitting the air molecules of the upper atmosphere. Usually a high speed proton is hitting an air molecule at the upper atmosphere to produce a pion (Figure 7) the pion is then decaying to an electron by producing two muon neutrinos and one electron neutrino. This set the ratio between the flux of the muon neutrinos and the electron neutrinos to be 2. After measuring the neutrino flux for 4 years SK presented two results that suggested neutrino oscillations. First, the ratio between the muon neutrino and the electron neutrino was about 1.3 suggesting that some of the muon neutrino were missing. Second, the upward flux of muon neutrino was smaller than the downward flux suggesting that the upward neutrino due to the longer path oscillated to other flavor. However, the interpretation of those results with neutrino oscillation is incorrect. The solar neutrino problem is solved with the MST so the atmospheric results stand alone to support neutrino oscillations. The SK results stem from partial understanding of cosmic rays, or from some error in the experiment, or due to contamination that affect the data.

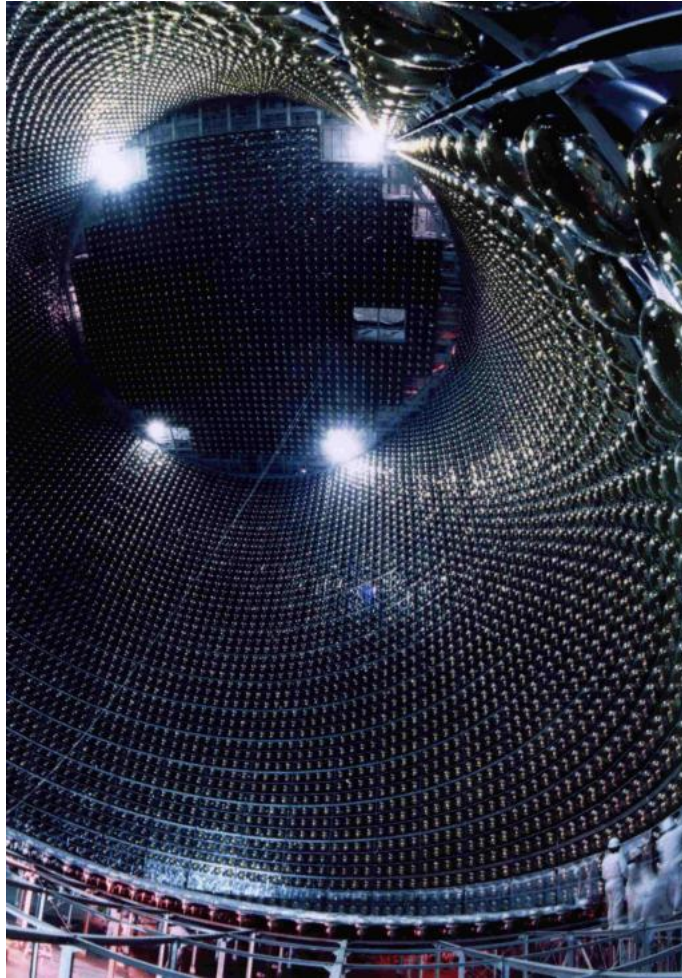


Figure 5 - The SK detector is using 50,000 tons of ultra-purified water with 11,146 photomultiplier tubes. Using Cherenkov radiation both electron neutrino and muon neutrino can be detected. The detector found anomaly in the neutrino emitted by the cosmic rays. The cosmic rays, by the decay of the pion should emit two muon neutrinos for each electron neutrino. The detector found 1.3 muon neutrinos for each electron neutrino. Also, the upward flux of the muon neutrino was much lower than the downward flux. This result opposes the MST and cannot be attributed to neutrino oscillation. The CERN to Gran Sasso experiment will prove that the muon neutrino to tau neutrino oscillation is impossible.



Figure 6 - The photomultiplier tubes inside the SK are glass spheres of about 50 cm in diameter with the air removed. They turn a photon from the Cherenkov radiation into small current pulse that can be detected and analyzed.

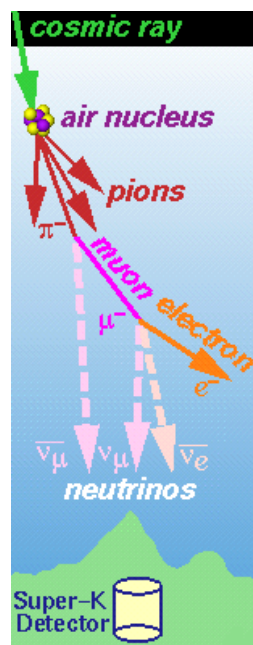


Figure 7 – Cosmic rays in the form of protons and Helium nucleus are hitting the upper atmosphere to produce pions. The pions decay first to a muon by producing a muon neutrino. The muon is then decaying to electron producing muon neutrino and an electron neutrino. This process sets the expected ratio of the flux of the muon neutrino to electron neutrino to be 2.

Not all atmospheric neutrino experiments suggest a deficit in the muon neutrino (Figure 8). There are two experiments Frejus and Nusex that found the ratio of the measured and expected ratios of the muon and electron neutrino to be 1 and not 0.6 as

in the SK experiment. However, those experiments were smaller in size and older than the SK experiments.

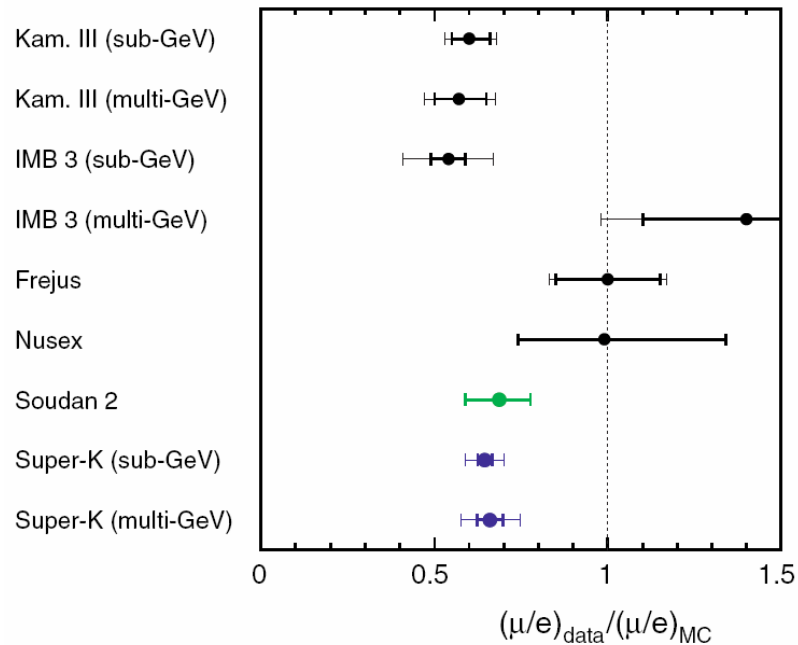


Figure 8 – The ratio of the measured and expected ratios of the muon and electron neutrino of the atmospheric neutrino experiments. Frejus and Nusex experiments found the ratio equal to 1 and not 0.6 as in the SK experiment. However, those experiments were smaller in size and older than the SK experiments. (Adopted from a lecture by Ed Kearns at Fermi labs)

The deficit in the muon neutrino in SK and other atmospheric experiments is explained by the conversion of the muon neutrino into tau neutrino by the neutrino oscillation theory. To test this hypothesis a long base experiment is constructed - the CERN neutrino beam to Gran Sasso (Figure 9). At one end of the experiment the proton accelerator at CERN will produce a beam of muon neutrinos. The neutrino beam will pass underground 732 km to the other end of the experiment at Gran Sasso, where a tau neutrino detector will try to detect appearance of tau neutrinos from oscillations of muon neutrinos. According to the MST no tau neutrino will appear at Gran Sasso. This will prove that neutrino oscillation are impossible and the SK claim that muon neutrino are transformed to tau neutrino are incorrect. Both the atmospheric neutrino problem and the solar neutrino problem cannot be solved by neutrino oscillation. The solar neutrino problem can be solved by presenting new solar model where the sun energy is not from fusion but from magnetic fields originated at the super massive black hole in the center of the Galaxy.

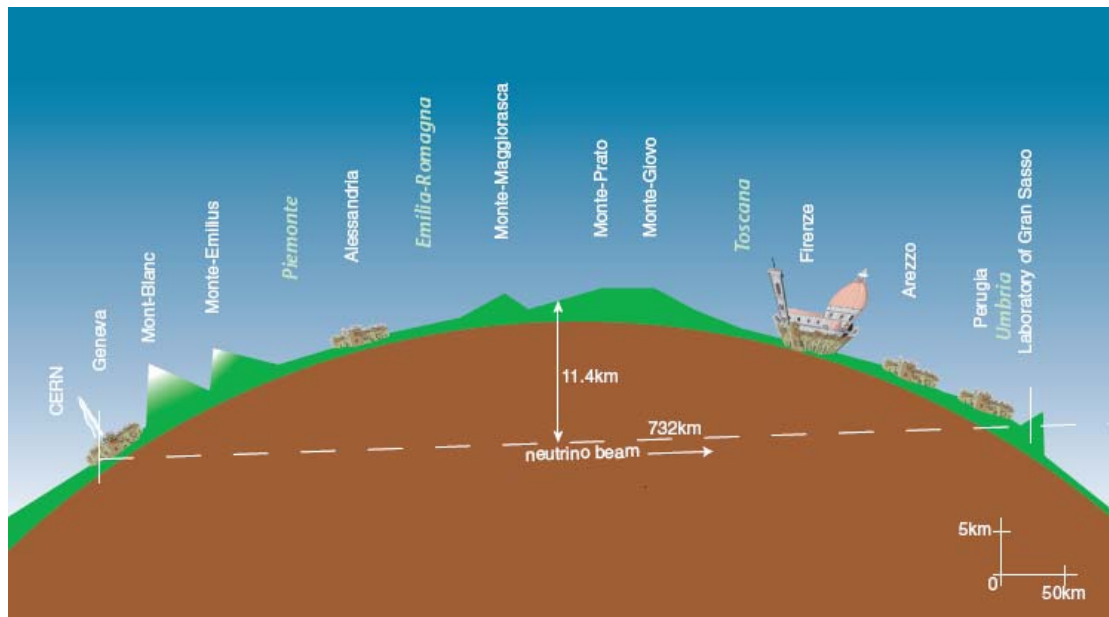


Figure 9 – CERN project for a neutrino beam to Gran Sasso. CERN proton accelerator will produce a muon neutrino beam that will pass 732 km underground to a detector at Gran Sasso. The detector at Gran Sasso will try to detect appearance of tau neutrinos. The tau neutrinos will appear only if muon neutrinos transformed by neutrino oscillation. The experiment is conducted to find if the muon to tau neutrino oscillation claimed by the SK is correct. This experiment will show according to the MST that no tau neutrino appears at Gran Sasso and neutrino oscillation are not possible. Therefore, the SK results cannot be explained by neutrino oscillations. (Image by the CNGS collaboration)

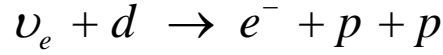
The long base experiments are constructed from an accelerator that produces a beam of neutrino at one end, and a neutrino detector at the other end. The neutrino beam pass underground along a path of few hundred kilometers. The long base experiments are divided into two categories - appearance and disappearance. Disappearance experiments identify neutrino oscillations when part of the original neutrinos is missing at the detector due to flavor change. This is considered as a weak prove of neutrino oscillations. Appearance experiments identify oscillation by finding other flavor of neutrino in the beam. The CNGS experiment, for instance, try to find tau neutrinos in the muon neutrino beam. There is no appearance experiment that gave positive result because neutrino oscillations are not possible.

The LSND was an appearance experiment that claims the appearance of electron neutrinos from muon neutrinos beam. A later experiment MiniBooNE tried to verify this result, but it refuted the LSND findings. It gave negative result and no electron neutrino where found.

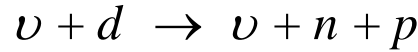
The neutrino speed could also determine if neutrino has mass. If the neutrino has zero mass it must always travel at the speed of light. Firm evidence, that neutrino travel at the speed of light, is revealed in the explosion of supernova. SN1987A. SN1987A is 168,000 light years away so even a small speed below the speed of light of the neutrinos should produce a long delay in the arrival time relative to the photons. A neutrino burst from the supernova was detected a bout 3 hours before the photon from the supernova were visible. Though the neutrinos escape the supernova before the photons, the close arrival times suggest the neutrino travel at the speed of light or very close to the speed of light. Also the neutrino arrived all at once in a 15 second period. If neutrino have mass they would have different speeds and their arrival time would spread along wider interval.

The SNO experiment and the solar muon neutrino flux

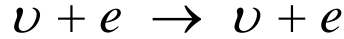
The Sudbury Neutrino Observatory (SNO) operated between 1999 and 2006. It is located underground in a mine in Sundbary, Ontario, Canda at about 2 km below ground (Figure 10). Unlike SK that hold light water the SNO detector holds heavy water and detects interactions with deuterons. The deuterium has larger cross section for neutrino so only a much smaller amount of deuterium is needed compared to water. SNO uses 1000 tons of heavy water, contained in a 6 meter radius acrylic vessel and encircled with 9600 photomultiplier tubes. The neutrinos are detected by the Cherenkov radiation emitted by the relativistic electrons recoiled from the collisions. There are three reactions detectable in SNO. Each of the reactions has different sensitivity to the neutrino types. In the Charged Current interactions the neutrino converts a neutron in the deuteron to a proton and an electron.



This reaction can detect only electron neutrinos. In the Neutral Current Interactions the neutrino break the Deuteron into its components neutron and proton.



The three types of neutrino are equally participating in this interaction to give the total number of neutrinos. In the Electron Scattering interaction the neutrino hits electrons that recoil at high speed.



This interaction is more sensitive to electron neutrinos then to muon and tau neutrinos.

Figure 11 shows the direction of the solar neutrinos events relative to the sun. The number of elastic scattering events and their direction relative to the sun indicate the production of muon and tau neutrinos by the sun.

The neutrino flux of the three interactions is shown in Figure 12. The Natural Current interactions give the total flux from the three types of neutrinos. This flux is very near the flux of the electron neutrinos predicted by the SSM. The Natural Current flux is $6.42 \times 10^6 \text{ cm}^{-2}\text{s}^{-1}$ while the SSM prediction is $5.05 \times 10^6 \text{ cm}^{-2}\text{s}^{-1}$. This gives a difference of 27% between the two, so the agreement is only achieved by using the large uncertainties. In the light of the MST this agreement is only a coincidence since the sun energy is not from fusion and the SSM is not correct. The electron neutrinos flux was found to be $1.76 \times 10^6 \text{ cm}^{-2}\text{s}^{-1}$ and the muon and tau neutrinos flux was found to be $3.41 \times 10^6 \text{ cm}^{-2}\text{s}^{-1}$. The ratio of the number of the electron neutrinos to the sum of the three types of neutrinos is about 1/3. Therefore, this ratio and the agreement of the total flux with the SSM are considered incorrectly as a strong case in favour of neutrino oscillation. The electron neutrino from the sun seemed to oscillate into muon

and tau neutrino, so even though the sun produces only electron neutrinos, they transform into muon and tau neutrino during their pass from the sun to the earth.

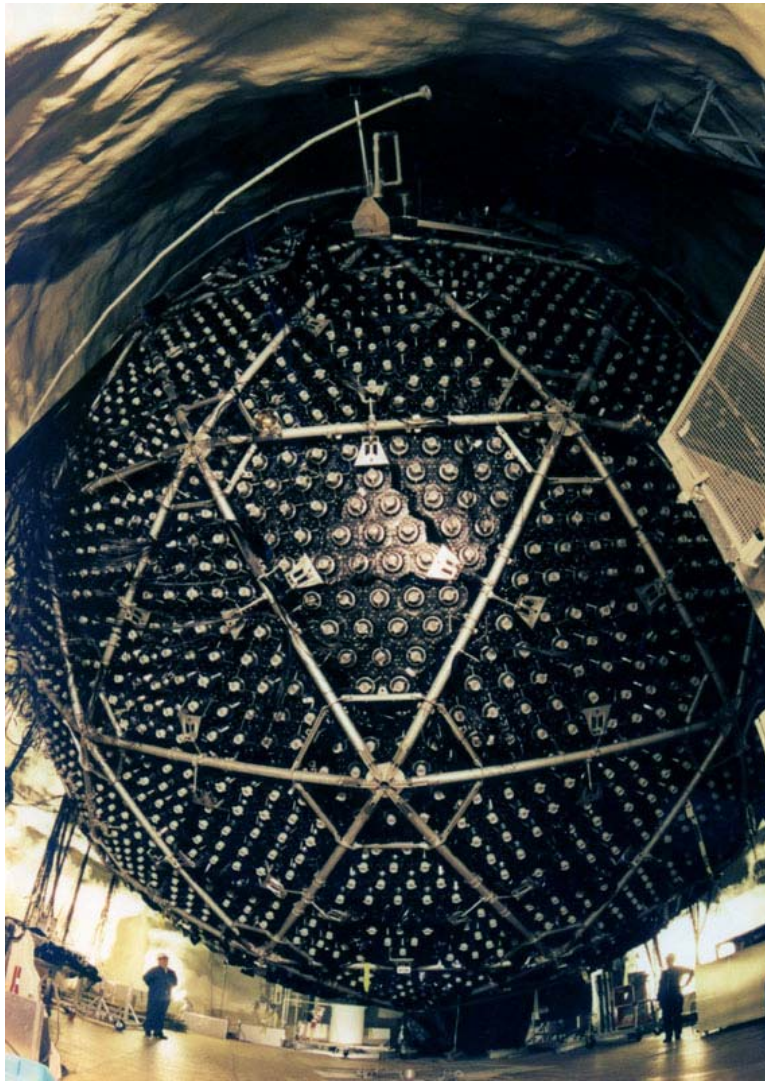


Figure 10 – The Sudbury Neutrino Observatory contain 1000 tons of heavy water in an acrylic vessel encircled with 9600 photomultiplier tubes. The neutrinos are detected by the Cherenkov radiation of high speed electron emitted by the reactions with the neutrinos. The detector could distinguish between the electron neutrinos and the muon and tau neutrinos and could determine their ratio. The SNO detector found that the sun emits strong flux of muon and tau neutrino and the number of them is about two thirds of the number of the electron neutrinos. The total number of the neutrinos was found to be near the prediction by the SSM. The SNO experiment is considered therefore the ultimate proof for neutrino oscillations. However, according to the MST, the sun energy is not from fusion and the muon flux is not from oscillating electron neutrino, but from internal nuclear interactions. The muon neutrino flux indicates the complex nuclear reactions and the diversity of particles inside the sun. The agreement between the total number of neutrinos from the sun and the SSM is only a coincidence.

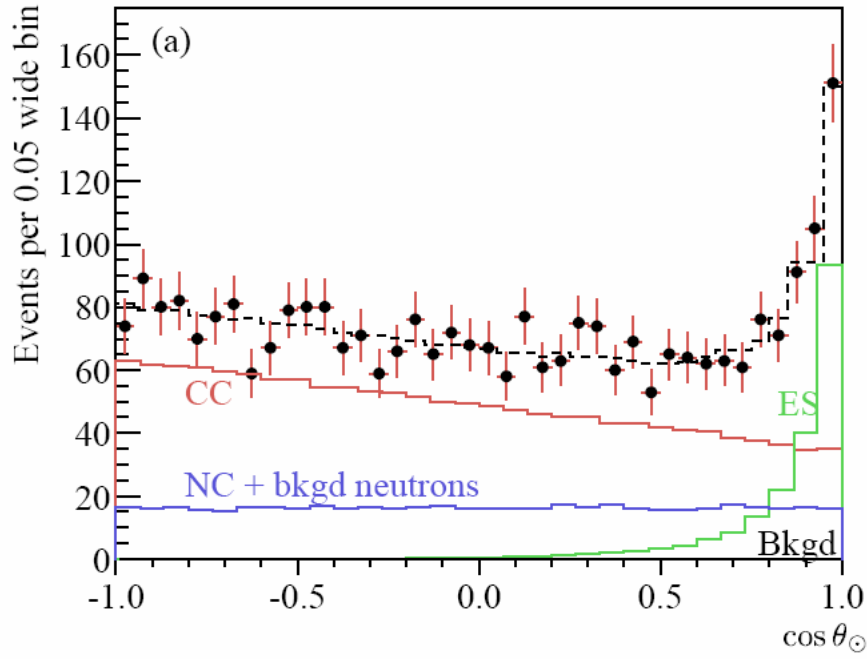


Figure 11 – Distributions of selected events according to the cosine between the Cherenkov radiation direction and the sun direction. The elastic scattering and the charged currents interactions has the maximum events pointing toward the sun. This indicates the production of muon and tau neutrinos by the sun. (Image by the SNO Collaboration)

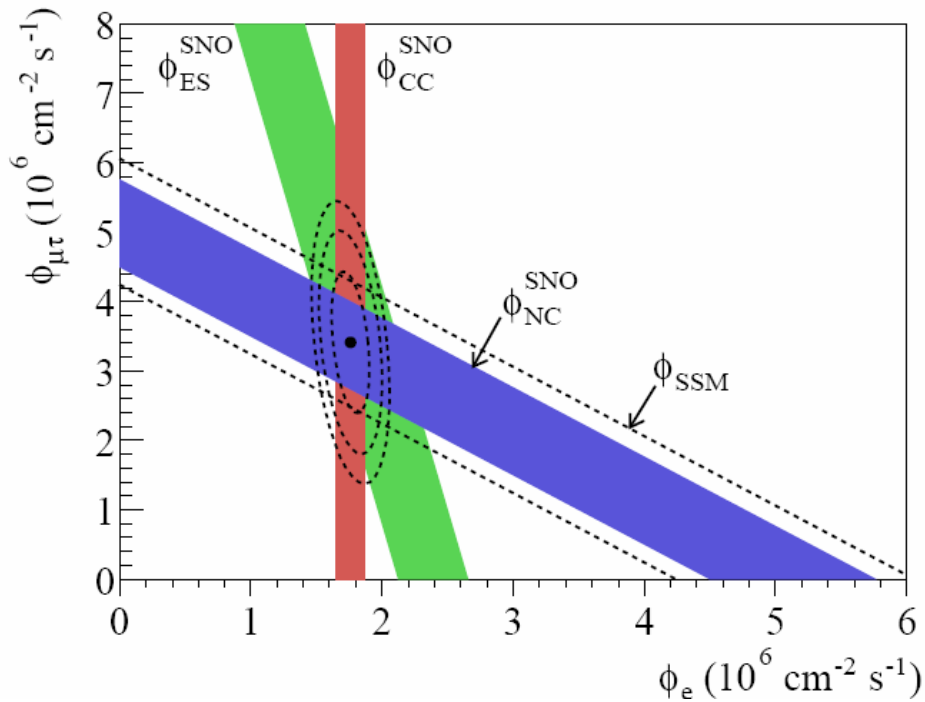


Figure 12 – The flux of muon and tau neutrinos versus the flux of the electron neutrinos of the three reactions detectable by SNO. Each of the reactions has different sensitivity to the neutrino types. In the Charged Current interactions the neutrino converts a neutron to a proton and an electron. This reaction can detect only electron neutrinos. In the Neutral Current Interactions the neutrino break the Deuteron into its components neutron and proton. The three types of neutrino are equally participating in this interaction to give the total number of neutrinos. The total number of neutrinos agrees with the electron neutrino flux according to the SSM, but it is only a coincidence, since neutrino oscillations are not possible. In the Electron Scattering interaction the neutrino hits electrons that recoil at high speed. This

interaction is dominated by electron neutrino but include muon and tau neutrinos. (Image by the SNO Collaboration)

The particle interactions inside the sun

The flux of electron neutrinos from the various neutrino experiments finds that for specific energies or spectrum of the neutrinos, there is a different ratio between the measured number of neutrinos to the SSM predictions. This cannot be settled by the SSM and imply an entirely different solar model then the SSM.

A further argument against neutrino oscillation is the conservation of the lepton numbers the electron number and muon number. The violation of the lepton number was never observed in accelerators. Giving a neutrino mass means violations of the lepton number, for instance, an electron can be converted to electron neutrino this electron neutrino can oscillate into muon neutrino and this muon neutrino can produce a muon.

The oscillation theory was developed to explain the deficit in electron neutrinos. According to the SSM the sun must emit certain amount of neutrinos to explain the heat and luminosity of the sun. A deficit in the electron neutrino means, according to the SSM, that the fusion reaction is much lower then expected, hence, the sun cannot be hot and luminous as observed. To save the SSM and get an agreement between the SSM predictions and the actual measurement, the neutrino oscillations were proposed. However, the sun energy is not from fusion and the SSM is not correct. The sun energy source is from magnetic fields in the galactic disk that propagate by the dynamo effect of the falling material in the accretion disk of the supermassive black hole at the center of the galaxy. If the sun energy is not fusion then there is no need to a threshold amount of electron neutrino to explain the sun heat and luminosity, thus the flux of electron neutrino can be as directly measured by the neutrino experiments like Homestake, Gallex, Sage, SK and SNO. The smaller flux of electron neutrino relative to the SSM suggest that the fusion reaction in the MST is a much limited process that is only partially and indirectly producing the sun heat and luminosity. The fusion rate in the MST is required only to explain the helium abundance in the sun. If there is no mandatory flux of electron neutrinos and the oscillations theory is not required to explain the deficit, then it is obvious that the muon and tau neutrinos measured by SNO and SK are produced internally in the sun out of particles interactions. This means that the conversion of the magnetic fields energy to mass in the sun encompass interactions that produces both electron and muon neutrino. The production of muon neutrinos in the sun indicates strong activity of particles from the second family of the standard model of particles. This requires very complicated and diverse particles interactions inside the sun that encompass hundreds of distinct interactions involving a broad range of participating particles. The overall neutrino flux should explain the baryogenesis in the sun of hydrogen and the nucleosynthesis of heavier elements and isotopes like helium, deuterium, lithium and carbon. The production of deuterium in the sun is clear from the fact that the solar wind contains He^3 .

Since SNO cannot distinguish between muon and tau neutrino, it is unclear how many tau neutrinos are produced. However, the particles required to produce the tau

neutrino are both extremely heavy and unstable so the tau neutrino flux should be much lower than the muon neutrino flux.

According to the MST the sun evolution is entirely different. The sun is believed incorrectly to be born out of a large cloud of gas and dust that gravitationally collapsed. The gas and dust was heated up by the collapse to ignite fusion inside the new star. According to this model much of the matter of the star is supplied from outside by the cloud. The cloud therefore predetermines the Elemental abundance of atoms in the new star. According to the MST the evolution of the star is much different. The star starts as a red dwarf or even a smaller object of several Jupiter masses. This red dwarf is heated up by magnetic fields in the galactic disk (mainly in nebulae or in the galactic arms). The magnetic fields heat the star and its particles kinetic energy increase. The particles participate in high speed collisions to create new particles and increase the star mass. By this process the star mass and heat are increasing and the red dwarf is turned into a main sequence star. In this process the star baryogenesis and nucleosynthesis is determined mainly by internal interactions and particles high speed collision. The star elemental abundance is therefore determined internally with small outside contribution of matter from the initial red dwarf and meteorites and asteroids that fall to the star. The hydrogen in the star is created internally in the star from high speed collisions and does not arrive from the outside. The neutrino flux from the star must reflect the baryogenesis of large quantities of hydrogen and the nucleosynthesis of smaller quantities of helium and other heavier elements.

The particle interactions in the sun are much more complex in the MST than the SSM and encompass hundreds of distinct interactions. To reveal the dominating particle interactions and the internal working of the sun, we can use a new model according to the following guidelines.

1. The sun energy source is the changing magnetic fields of the solar cycle.
2. There is loose connection between the neutrino flux and the sun luminosity because the sun energy is not from fusion.
3. The energy from the solar cycle changing magnetic fields creates new matter inside the sun.
4. The creation of new matter the baryogenesis and the nucleosynthesis create the neutrino flux.
5. The elemental abundance in the sun is mainly from the internal baryogenesis and nucleosynthesis.
6. The flux of neutrinos from the sun can be measured in the neutrino detectors to match the theoretical neutrino flux from the internal baryogenesis and nucleosynthesis. On the other hand the baryogenesis and nucleosynthesis can be developed and researched based on the neutrino flux from the detectors measurements.
7. The sun has internal particle reactions that eliminate the antimatter in the sun in favor of ordinary matter. This requires the breaking of the charge and parity symmetries or the CP-Violation.
8. The production of muon neutrinos in the sun indicates strong activity of particles from the second family of the standard model of particles.
9. The energy absorbed by the sun from the magnetic fields must be efficiently converted to new matter inside the sun. Wasteful interactions that waste

energy by emitting high energy neutrinos are less likely than interactions that produce low energy neutrinos.

A starting point in finding the sun particles interactions is to collect all the possible interactions according to the first and second families of the standard model. Then to apply a filter that determines the probability of each interaction. Each specific interaction can be filtered by the following questions: Does it explain the elemental abundance of the sun? Does it fit the neutrino flux as measured by the neutrino detectors? Does it avoid high energy neutrinos?

Specific interactions should be assembled into chains that accomplish specific task. For instance, the following chains can be used: creation of Hydrogen chain, creation of Deuterium chain, creation of Helium chain, eliminating antimatter chain, fusing heavy elements chain, electron neutrinos chain and muon neutrino chain.

The creation of new matter inside stars according to the MST requires the CP-violation. CP violation is observed particularly for the kaon particle. Hence, interactions involving the kaon particles are required in order for the sun to remove the antimatter in favor of ordinary matter. The kaon is a meson that contains pair of quark and anti-quark. The negatively charged kaon contains strange quark and up anti-quark. Interactions of kaon inside the sun confirm that there are interactions of particles of the second family of the standard model. They also prove that the sun produces muon neutrinos since many kaon interactions involve muon neutrinos. The presence of mesons also indicates existence of antimatter inside the sun.

The sun energy source is the changing magnetic field from the solar cycle so a small change in the neutrino flux should be observed between solar maximum and solar minimum with a period of 11 years. The Homestake experiments is the only one that run long enough to reveal this periodicity but it does not show any definite correlation of the neutrino flux with the solar cycle. The reason is that the energy supplied to the sun by one solar cycle is very small compared to the overall heat capacity of the sun. Hence, one solar cycle can increase the temperature of the sun only slightly, with no effect on the neutrino flux.

Conclusion

The SNO results interpreted literally without neutrino oscillation show that the sun produces large flux of muon neutrinos. The sun has strong activity of particles from the second family of the standard particle model. The solar neutrino problem is incorrectly solved with neutrino oscillations. Neutrino oscillations are impossible and the solution to the neutrino problem is a new solar model based on the sun new energy source from magnetic fields. The SK results without neutrino oscillations reopen the atmospheric neutrino problem. Upcoming neutrino experiments will show that neutrinos cannot oscillate, for instance, the Katrin experiment will find zero mass for the neutrino and the CERN neutrino to Gran Sasso will not find any tau neutrino in the muon neutrino beam.

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Written by Dan Bar-Zohar

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To contact me please use the following email:

danbz@isdn.co.il

dan@pixelphase.com

Or call me by Skype: danbarzohar

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