International Journal of Physics and Mathematical Sciences ISSN: 2277-2111 (Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jpms.htm
2014 Vol. 4 (1) January-March, pp. 102-112/Singh
Research Article

CHARGES, MASSES OF ELEMENTARY PARTICLES AND THEIR STRUCTURES

***R. J. Singh**
Department of Physics, Aligarh Muslim University, Aligarh, India
**Author for Correspondence*

ABSTRACT
New explanations have been given for the charges and masses of elementary particles. Neutrinos are the fundamental constituents of matter. They are responsible for providing charge and mass to the particles belonging to their generations. A neutrino has distributed charge over its body but the sum total of the charges is equal to zero. Neutrinos produced by vacuum fluctuations are split into various fragments by violent collisions among them. The split fragments carry fractional charges which act as the seeds of different particles. Neutrinos of the same generation as that of the particle gather around the seed layer by layer on spherical shells and the total mass of the gathered neutrinos becomes the mass of that particle. Neutrinos around the seeds are bound by so strong electrostatic forces that the particles appear as strong, structureless independent particles.

Keywords: *Elementary Particles, Neutrinos, Fractional Charges*
PACS NO. : 12.39,-x; 12.15.Ff; 95.30.Cq

INTRODUCTION
Most of the theories in particle physics are formulated as relativistic quantum field theories such as, quantum electrodynamics, quantum chromodynamics and the standard model with Higg's mechanism. Higgs mechanism is often presented as spontaneous breaking of local gauge symmetry. But a local gauge symmetry is rooted in redundancy of description: gauge transformations connect states that cannot be physically distinguished. Other theories are string theory and superstring theory. All these theories are so much dipped in intricate mathematics that physical picturization of the problem is lost. Here an attempt has been made to explain the properties of elementary particles as the charges and masses of elementary particles and also their structures in simple, transparent and in physically understandable way.
Standard model of particle physics is now the most acceptable theory of fundamental interactions (strong, electromagnetic, weak and partly gravitational) which mediate the dynamics of known subatomic particles. It explains the formation of hadrons and leptons, which form atoms, molecules and all kinds of matter. According to this model, there are 6 quarks and 6 leptons. Out of 6 leptons, there are 3 neutrinos linked with the other 3 leptons. In the table 1a and 1b are given all types of quarks and leptons respectively along with their properties.
But in the standard model, there are many how's and why's, for example,
When was the universe created? 2) Are all the particles in the table1 are fundamental constituents of matter or there is only one fundamental constituent which forms all the particles? If there is only one constituent, how did it get mass? (3) How did the particles get fractional charges which is not found in any atom, ion, radical which form matter. 4) How did the particles get masses which they have? 5) How is the stability of elementary particles achieved if they are made of neutrinos only? Now we will try to answer these questions in a way which has not been tried earlier.
Q.No.1. When was the universe created? To this question, there is no answer and probably answer cannot be found. Time has infinite past and also infinite future. Infinity cannot be quantified. It certainly cannot coincide with the Big Bang explosion which many people believe. Big Bang theory might have provided answer to many questions regarding the creation of the universe, but its occurrence is doubtful. By which law of physics, such a dense particle of the size of a proton was formed which when exploded created the whole universe. For no reason and from nowhere it suddenly appeared and formed everything which we

can think of. It is like one of the versions every religion has proposed regarding the beginning and mode of the birth of universe.

Q. No.2. Multiple or a single fundamental particle? Why there should be several fundamental particles? Can it not be achieved by a single fundamental particle? We assert that it can be achieved by a single particle. Pair of neutrino and anti-neutrino is the fundamental particle shown in the Figure 1a and 1b.

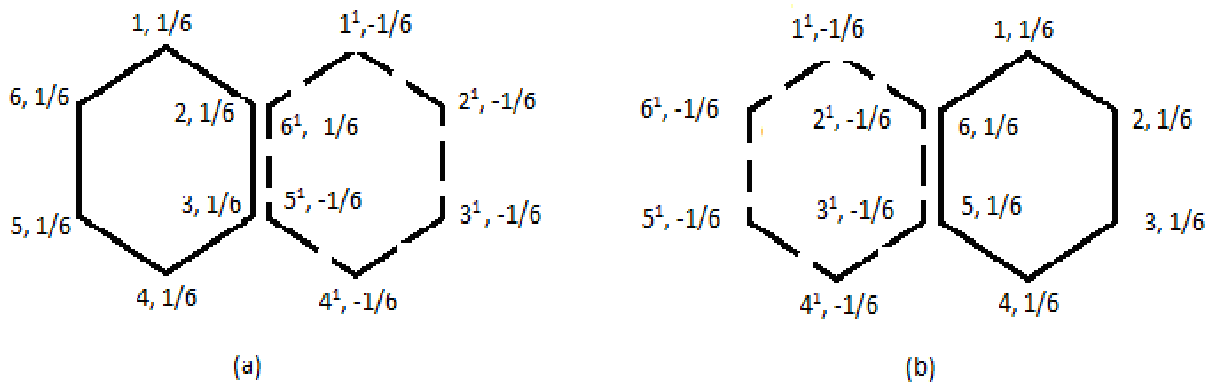

Figure 1: (a) Neutrino; (b) Anti-neutrino

The structure of neutrino or anti-neutrino consists of two benzene rings held together by electrostatic attraction between them, especially because of attraction between the positive and negative charges situated at the two ends of the joining edge. In neutrino, in the left ring, at every corner is situated a positive charge equal to 1/6 e (e =quantum of charge which is the charge of an electron). In the right ring, at every corner is situated a negative charge equal to 1/6 e. There is mirror symmetry along the joining edge between neutrino and anti-neutrino. A very unique structure has been proposed for neutrino in the sense that a body has holes on one side and electrons on the other side. Unless the two benzene rings are separated by some violent action, the positive and negative charges sitting on the joining edge of the two rings will neutralize each other. This structure has proved very useful in solving many problems which we are trying to solve here.

The Figures of neutrinos have been shown in two-dimensions only (x,y) for clarity. In actuality, there is z-dimension also, where x=y=z. The total picture can be approximated to a sphere with protruding cones at the same places where two edges have been shown to meet in the two-dimensional Figure s. In three-dimensional Figure s, the seats of the charges are at the tips of the cones.

There is no previous work on structures of neutrino and anti-neutrino. The present structures have been proposed to explain the fractional charges of the sub-atomic particles (see table1a, b). The spherical shape of the neutrinos have been proposed for the ease of the calculation of masses of the sub-atomic particles.

Quarks and Leptons have been divided into three generations and so also the neutrons divided into three generations. It will be shown next that the mass of a particle is the mass of neutrinos deposited around the seed of that particle. It is expected that the neutrinos deposited around the seed of a particle of a particular generation will also belong to the same generation.

The three generations of neutrinos are: 1) electron neutrino, 2) muon neutrino and 3) tauon neutrino. The question arises whether these three generations of neutrinos are produced independently or only one is produced and others come into existence by a phenomenon called neutrino oscillations? The most probable option is that electron neutrino was produced first and others came into being due to neutrino oscillations. The reasons for this option is that electron neutrino are most abundant and are lightest of all the neutrinos. It will be discussed shortly that the particles which are produced by vacuum fluctuations are electron neutrino and anti-electron neutrino pairs. Now the question is how neutrino is produced and how and from where it acquires mass.

International Journal of Physics and Mathematical Sciences ISSN: 2277-2111 (Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jpms.htm
2014 Vol. 4 (1) January-March, pp. 102-112/Singh
Research Article

Table 1a: Quarks, generations, charges and masses according to different references and average mass of particles. References for Tables 1a and 1b: 1) Quark-Wikipedia, the free encyclopedia, 2) Current quark masses -Wikipedia, the free encyclopedia, 3) The standard model of elementary particles-Internet, 4) List of particles, the free encyclopedia, 5) The elementary particle masses, http:// spacemath.gandfc,nasa.govt, 6) Quarks-Hyperphysics[xxxxx] Quantum physics R Nave

Particles	Generations	Charges	Mass Ref.1	Mass Ref.2	Mass Ref.3	Mass Ref.4	Mass Ref.5	Mass Ref.6	*Average Mass(MeV/c^2)*
Up quark	1	+2/3	1.7-3.1	2.8	1.5-3	1.5-3	2.0	1.7-3.3	*2.37*
Down quark	1	-1/3	4.1-5.7	5-7.5	3-7	3.5-6.0	4.0	4.1-5.8	*4.975*
Charm quark	2	+2/3	1290	1000-1600	1250	1160-1340	1200	1270	*1260*
Strange quark	2	-1/3	100	100-300	70-120	70-130	120	101	*119.33*
Top quark	3	+2/3	172900	168000-192000	170900	169100-173300	170000	172000	*172833*
Bottom quark	*3*	*-1/3*	*4190*	*4100-4500*	*4200*	*4200*	*4130-4170*	*4190-4690*	*4230*

Table 1b: Leptons, generations, charges and according to different references and average mass of particles. References given in the table 1a

Particles	Generations	Charges	Mass Ref.1	Mass Ref.2	Mass Ref.3	Mass Ref.4	Mass Ref.5	Mass Ref.6	*Average Mass*
Electron	1	-1	0.5	0.51	0.510	-	-	0.5	*0.505MeV*
Electron neutrino	1	0	<2.2eV	<2.2eV	<2.2eV	-	-	-	*2.2eV*
Muon	2	-1	105.7	106	105	-	-	-	*105.6MeV*
Muon neutrino	2	0	<0.19MeV	<0.17	<0.2	-	-	-	*0.169MeV*
Tauon	3	-1	1777	1777	1700	-	-	-	*1751*
Tauon neutrino	*3*	*0*	*<18.2*	*<15.5*	*<16*	-	-	-	*0.015GeV*

Universe might have started from nothingness, which can be interpreted as empty space or vacuum. Absolute vacuum can not occupy space unless there is matter in it, because it is matter that occupies space. So during the birth of the universe, some form of matter must have been necessarily present. Presence of mass means presence of energy, because the two are related by Einstein equation ($E = mc^2$). When energy is present in the universe along the ever present time, the famous uncertainty principle must be applicable, which means $\Delta E.\Delta t = h/2\pi$, where ΔE and Δt are uncertainty in the measurement of energy and time and h is Planck constant. It implies that vacuum energy exists throughout the universe. Contribution of vacuum energy in terms of virtual particles which are thought to be particle pairs that blink into existence and then annihilate in a time span too short to observe.

Vacuum energy is associated with zero point energy, which is a corollary of uncertainty principle. Vacuum energy is a measurable energy and has been measured by Casimir (Scientific American, 2013; and Philip Gibbs, 2002). It has been inferred from the experiment that vacuum, far from being empty is full of fluctuating electromagnetic waves that can never be completely eliminated. Virtual particles, noted above are interpreted as energy of the particles in the lowest energy state.

There are other strong indications which show that vacuum has mass or energy as 1) non-availability of absolute zero temperature. According to the relation PV= RT, absolute zero temperature will be obtained, only when P or V or both are zero. Because absolute zero temperature can not be obtained means that never P or V becomes zero or even in vacuum, there is some mass which occupies some volume and exerts some pressure., 2) Velocity of light is limited to 2.99792×10^8 and not more. It means that there is some mass hindering the velocity of light. So there is enough proof to accept that mass is always present in the vacuum. But the question is which is that pair of virtual particles that blink into existence and annihilate in very short time. These particles must be pair of electron neutrinos because it is lightest of all and most abundant in nature.

Q. No.3. Fractional charges of particles and seeds of particles. In the world we live, only the multiples of electronic charge (which is the charge quantum =e) with negative and positive signs are observed. Question is how quarks have fractional charges $\pm$ 2/3 and $\pm$ 1/3 (table1a,b). Electron neutrino and anti-electron neutrino which are produced from vacuum energy or vacuum fluctuations annihilate each other in very short time. But there is strong conjecture that virtual particles can stay for longer time if external field like electric field is applied on them. There is great possibility that two or more pairs of neutrino and anti-neutrino pairs are produced at very close places simultaneously. The distributed charges on these particles will exert electric field on one another and thus lengthen the life times of all or of a few pairs. Just after the production of neutrinos or during the lengthened life times of neutrino pairs, neutrinos and ant-neutrinos flying with the velocity of light may suffer violent collisions between neutrino and neutrino and between anti-neutrino and anti-neutrino, as a result of which neutrinos and anti-neutrinos will be split in various fragments. The fragments produced from the collisions between neutrinos have been shown in the Figure 2.

From the Figure 2, it is observed that the total of the charges on all the fragments is zero as on a neutrino which satisfies the principle of charge conservation. The fragments $2a_1$ and $2a_2$ with charge 1 and -1 respectively will form the seeds of leptons. Charge on a seed of particle becomes the charge of that particle. The fragments $2b_1$ and $2b_2$ with charges +2/3 and -2/3 respectively will be seeds of quarks. The fragments $2c_1$ and $2c_2$ with charges +1/3 and – 1/3 respectively will also be the seeds of quarks (see table 1a,b). The fragments $2b_3$ and $2c_3$ each with charge =0, will vanish in space. In the fragments $2a_1$ and $2a_2$ there is good chance that the charges will not be stationary but will be circulating around the benzene frame and produce magnetic field. In actual benzene molecule the bond order of carbon atoms is 1.5, which means that C-C bonds are alternately single and double or the charges are circulating around the ring. In neutrino there are two benzene rings held together by electrostatic forces but the charges in the two rings will be circulating in the opposite directions so that magnetic fields produced will be nullified. Electron has been described as rotating charge cloud which behaves like a wave in interference experiments (Christophcaesar, 2009). Neutrinos do not posses magnetic field. In fragments $2b_1$, $2b_2$ and $2c_1$ and $2c_2$, where loops are not closed, charges remain localized at the joining points of the any two

edges. At the hanging edges, there will be no charge, because they have no route open for them to be delocalized. Charges stay only on the junctions of two edges.
Fragments of anti-neutrinos will be similar to those shown in the Figure 2 with sides of positive and negative charges interchanged.

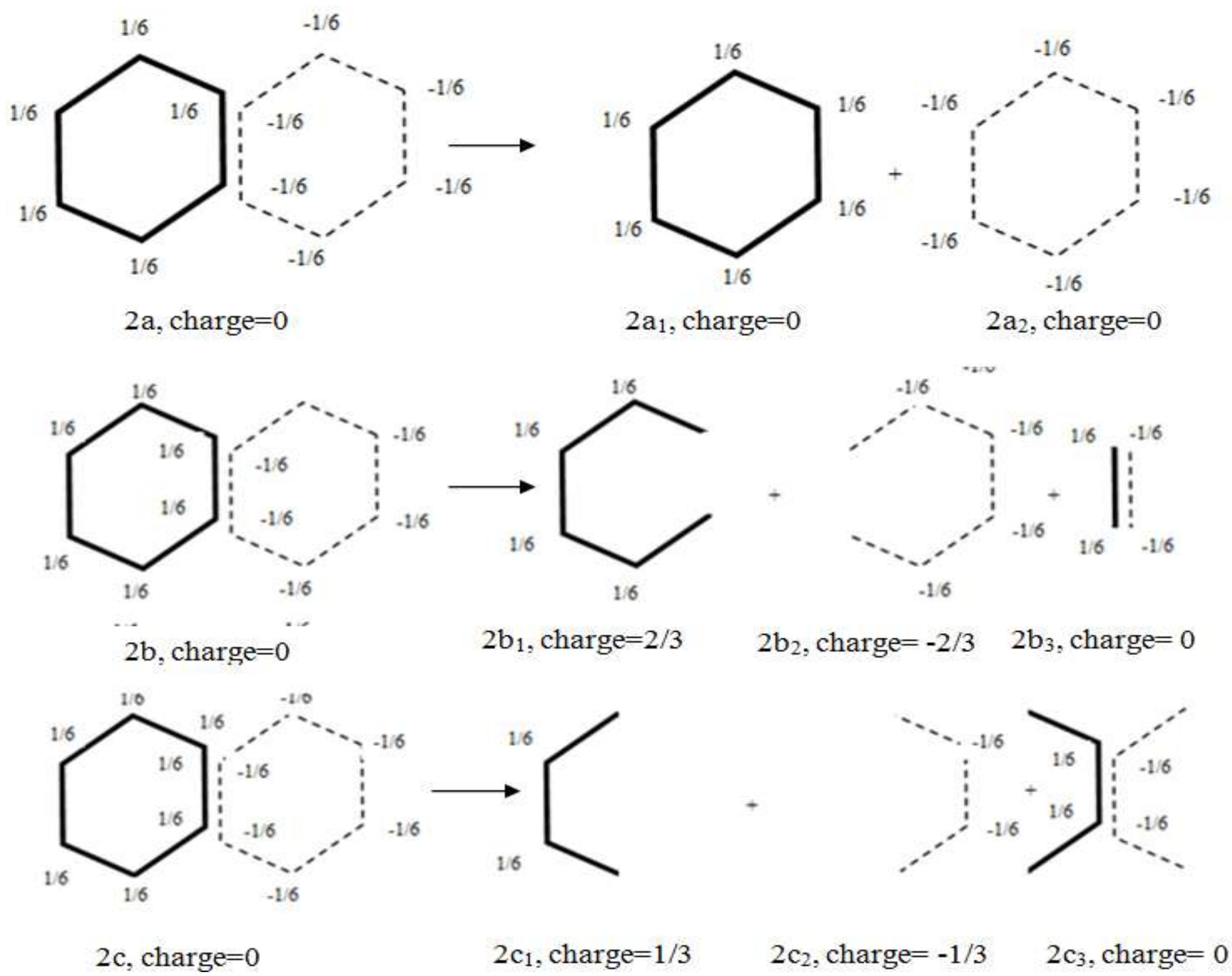

Figure 2: Possible fragments of neutrinos which are seeds of particles

Q. No.4. Masses of particles: According to Higgs (1964 and 2007).
] particles acquire mass by interacting with an all pervading field spread throughout the universe. He further argued that that a Boson particle was needed to carry and transmit the effect of the field. This Boson (Higgs Boson) has already been detected in the large Hadron Collider in Cern. But the questions still remain: a) what is the origin of the field?, b) how Higgs Boson decides how much mass is to be given to a particular particle. In short, Higgs mechanism has been applied successfully for explaining the masses of particles, but the conceptual back ground is not clear.
According to the present work, the mass of a particle is determined by the mass of the neutrinos (of the same generation as that of the particle) which are deposited around the seed of a particle. When charged seeds are formed by violent collisions among neutrinos (explained in answer to Q. no..3), they attract neutrinos around them layer by layer on spherical shells till that layer when the mass of all neutrinos deposited equals the mass of the particle. The last layer is supposed to be that layer after which the

electrostatic field of the seed vanishes or becomes unable to attract any more neutrino. Neutrinos are neutral particles but have distributed charges over them; so they are attracted by the charge of the seed.
For calculating the masses of particles, the method is as follows. First, particle was decided whose mass is to be determined; then the neutrino of the same generation as that of the particle was selected which will gather around the seed of the particle whose total mass will be the mass of the particle.
In the table 1b, the exact values of the masses of neutrinos have not been given, but it has been given that the masses are less than a particular value. In literature, it has been often given that the mass of electron nucleus is less than 2.2 eV. In our calculation, the mass of electron neutrino has been taken to be equal to 2eV, i.e., 20/22 of the average value. In the same way, 20/22of the average mass of other neutrinos (table 1a,b) has been fixed. The mass of the muon neutrino has been fixed at 0.169 MeV and that of tauon neutrino fixed at 0.015 GeV.
The scheme of deposition of neutrinos is as follows. It is to be noted that that the mass of any particle is much bigger than the mass of the neutrino of the same generation. The mass of a seed which is a part of neutrino is still smaller. In our calculation of the mass of particle, the mass of the seed has been taken to be zero. But the volume of the seed has been taken to be equal to the volume of a neutrino. Size of neutrinos has been estimated to be $\approx 10^{-20}$meter. It has been safely assumed that neutrinos of all generations have the same volume. Though all neutrinos are supposed to occupy the same value, but their masses differ by orders of magnitude. These approximations about the volume and mass of seeds have been done for the ease of calculation of masses of particles. These approximations will not introduce any error in the calculation of masses of particles.
As has been mentioned earlier,3-dimensional neutrinos have been taken as spheres. These spheres are deposited on spherical shells around the seed one after the other in the closest packing manner. In condensed matter physics, this packing is known as hexagonal close packing (hcp) or face centered cubic (fcc) packing. The packing scheme has been shown in the Figure 3.

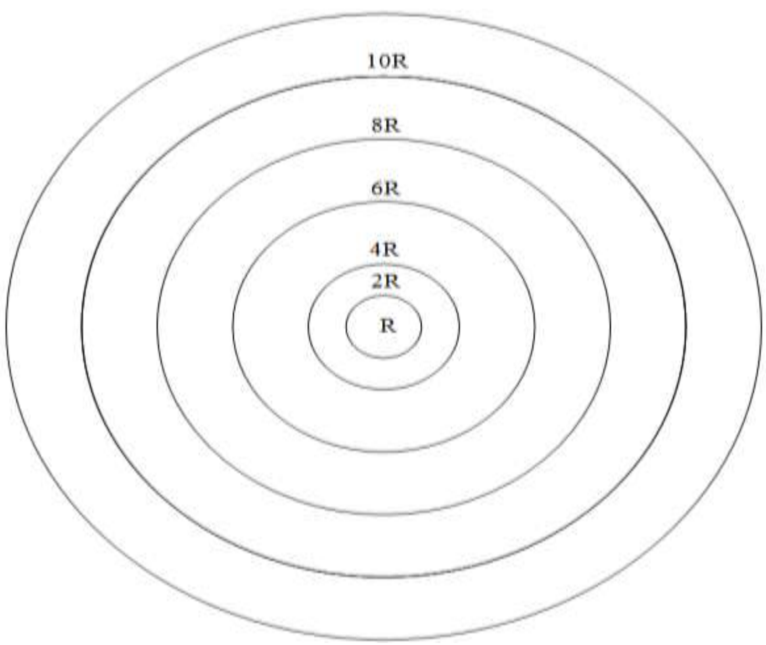

Figure 3: Spherical shells around the seed on which neutrinos have been deposited. The shells have been represented in 2- dimensions by circles. In actual cases, the number of shells will be much larger The radii of consecutive shells are 2R,4R.6R.8R,10R etc, where R= radius of neutrino

The number of neutrinos in the shape of spheres that can be deposited on surfaces of different radii can be calculated as follows. The first sphere of radius =R contains seed of the particle and has the same volume as that of a neutrino but it has no mass. The first spherical shell on which neutrinos can be deposited has the radius =2R. Actually, the centers of the neutrino spheres will lie on the spherical surface of radius =2R, which means that a neutrino sphere will occupy space extending over distance from R to 3R from the center of the Figure 3.The centers of the neutrino spheres of the second layer will lie on the spherical surface of radius=4R. Centers of the neutrino layers of third layer on spherical surface of radius =6R and so on.. Centers of consecutive layers will lie on spherical surfaces of radii= 8R, 10R, 12R, 14R ……R multiplied by (successive even numbers).
The surface area of of the spherical shell of radius 2R = $4\pi(2R)^2$ =16 πR^2. The cross section of neutrino sphere = πR^2. So the number of neutrinos that can be deposited on this surface = 16 $\pi R^2 / \pi R^2$ =16. On the spherical surface of radius 4R, the number of neutrinos deposited = $4\pi (4R)^2/ \pi R^2$ =64. Similarly, for radii =6R, 8R, 10R ………… upto the nth spherical shell of radius =2nR, the number of neutrinos will be 144, 256, 400, ………… $4(2n)^2$. So the total number of neutrinos deposited upto nth layer = $4 [2^2 + 4^2 + 6^2 + 8^2 + 10^2 + \ldots\ldots (2n^2)]$. The quantity under big bracket is the sum of the squares of first even numbers upto 2n, which by mathematical formula = [n (n+1) (2n+1)] / 6. So the total number of neutrinos deposited upto nth layer of radius 2nR =
4x[n (n+1) (2n+1)] / 6 = 2/3x [n (n+1) (2n+1)] …………………………… ……..(1)
With the help of the equaton (1), the masses of quarks and leptons have been calculated. So the mass of any particle = number of particles deposited, multiplied by mass of one neutrino of the same generation as that of the particle. Calculated masses of 6 quarks and 3 leptons using the masses of the three generations of neutrinos have been calculated and shown in the table 2.

Table 2: Calculation of masses of particles. Calculated masses have been compared with the average values of masses collected from various references (given in the table 1). Percentage errors between the calculated and average masses have been given. Particles whose masses have been nailed down to small uncertainty (Adrian Cho (No date); and Giorgi Cortiana, 2013) and also electron, whose mass has been determined with accuracy have been marked with asterisk and mentioned first in the table

Particles	Calculated masses	Nailed down and average masses	Error (%)
Electron*	2x2/3x57x58x115 =0.507 MeV	0.505 Mev	+ 0.4%
Up quark*	2x2/3x91x92x183= 2.043 MeV	2.01 MeV	+ 1.6%
Down quark*	2x2/3x121x122x243= 4.782 MeV	4.78 MeV	-.04 %
Top quark*	2/3x.015x20x20x41= 172.2 GeV	173.2 GeV	- 0.58%
Strange quark*	2/3x0.169x7x8x15= 94.6 MeV	≈ 92 MeV	- ≈ 2.8%
Charm quark	2/3x0.169x17x18x35=12o6.7 Mev	1260 MeV	- 4.2 %
Bottom quark	2/3x0.015x5x6x11 =3.3 GeV	4.23 GeV	- 22 %
Muon	2/3x0.169x 7x8x15=94.64MeV	105.43 MeV	- 10.2 %
Tauon	2/3x0.015x4x5x9 =1.8 GeV	1.751 GeV	+2.8 %

Reported masses of quarks and leptons vary very much sometimes upto 300%. In many cases, the masses of quarks have been pinned down to 1-2% uncertainty as in up and down quarks, strange quark, top quark (Adrian Cho (No date) and Giorgi Cortiana, 2013). The mass of electron has been estimated in several works and the error is not more than 1 %.
It is observed from the table 2 that for those quarks and also electron whose masses have been pinned down to very small uncertainty, are very well reproduced from our calculations (see the particles with the asterisks and electron also). In the case of particles whose masses has not been nailed down to small uncertainty, there is large difference between the reported average mass and our calculation. From the above observation, it can be concluded that our method of calculation of masses of particles is correct and there is need for nailing down the masses of particles which have not been tried till now. For the particles

which have not been tried for minimizing the range of uncertainty, their masses have been predicted from our calculations within small uncertainty range. Predicted masses of particles according to our calculations are as follows. Charm quark (1200.6 MeV), bottom quark (3.3 GeV), Muon (94 Mev) and tauon (1.8 MeV). Reported average mass of these particles can be seen from the table 2.

Q.No. 5. How the stabilities of particles attained if they are made of neutrinos only.

Here the structures of particles have been described as a seed carrying charge, surrounded by layers of neutrinos. But as neutrinos has been supposed as neutral particles, it is to be doubted how neutrinos can form stable particles.

To answer this question, let us copy the distribution of neutrinos on a spherical surface around a particle on a plain paper which will look like as that in the Figure 4.

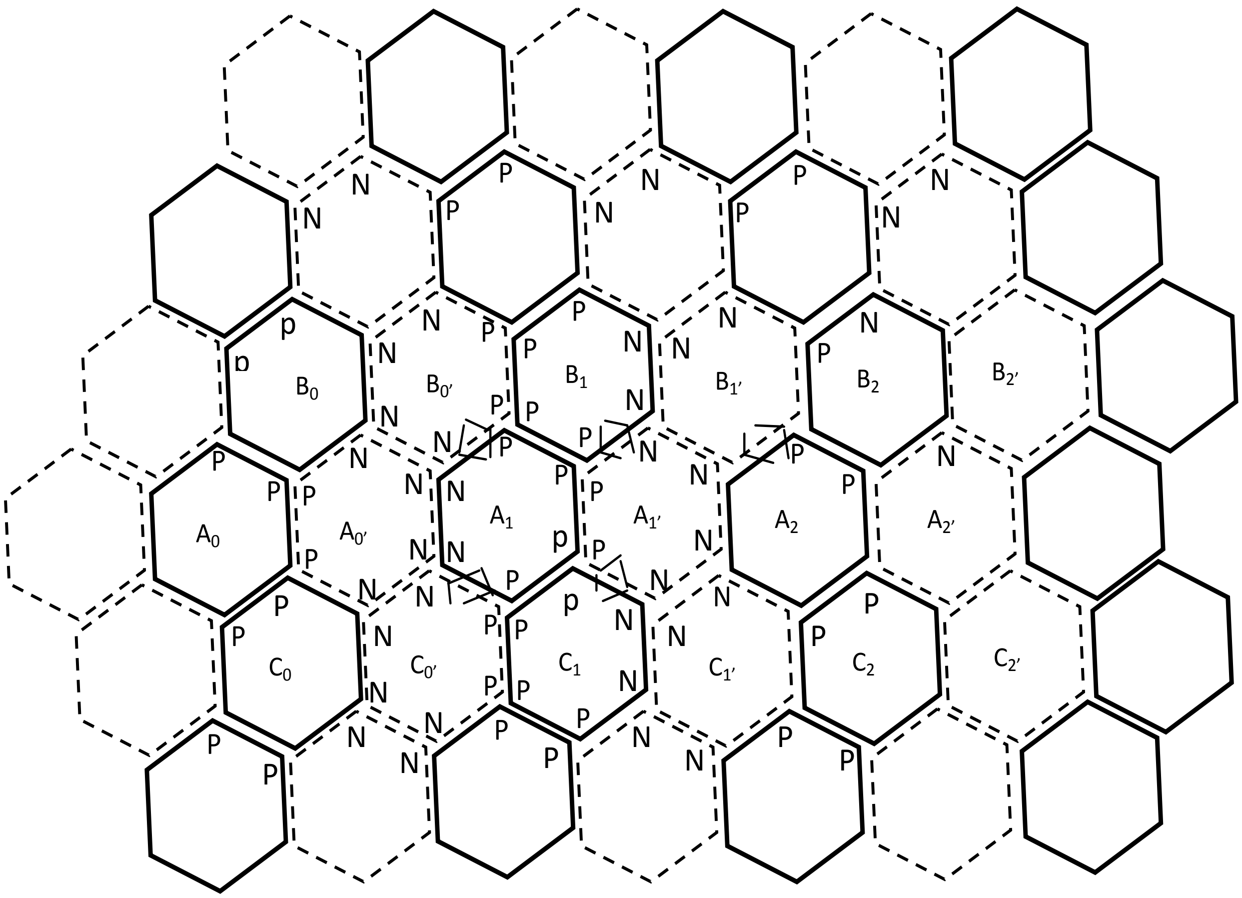

Figure 4: Distribution of neutrinos on spherical surface of a particle shown on a plain paper.. The 2-dimensional Figure s of neutrinos have been shown for clarity. The numbering of corner point in the neutrino rings have been shown in the Figure 1. Rings have been named as (A_0, A_0'; A_1, A_1': A_2,A_2'), (B_0, B_0'; B_1,B_1'; B_2, B_2'); (C_0,$C_{0'}$; C_1, C_1' ; C_2, C_2') etc. P and N represent the seats of positive and negative charges respectively. At each point, there is junction of three corners. If two junctions are from positive charges and one from negative charges, then it is marked P (+ve) and if the reverse, then it is marked N (-ve)

Charge of +1/6 e is situated at each corner of the ring shown by solid line and charge of -1/6 e on each corner of the ring shown by dashed ring. In the Figure 4, every charge on the corners is affected by electric fields generated by other charges, most importantly charges situated in the immediate neighbourhood of the charge under consideration. They will ultimately decide the force on the charge under consideration. In our calculations, only charges in the immediate neighbourhood will be taken into consideration. We show the direction of forces acting on charges on each corner of the ring marked A_1 in the Figure 5.

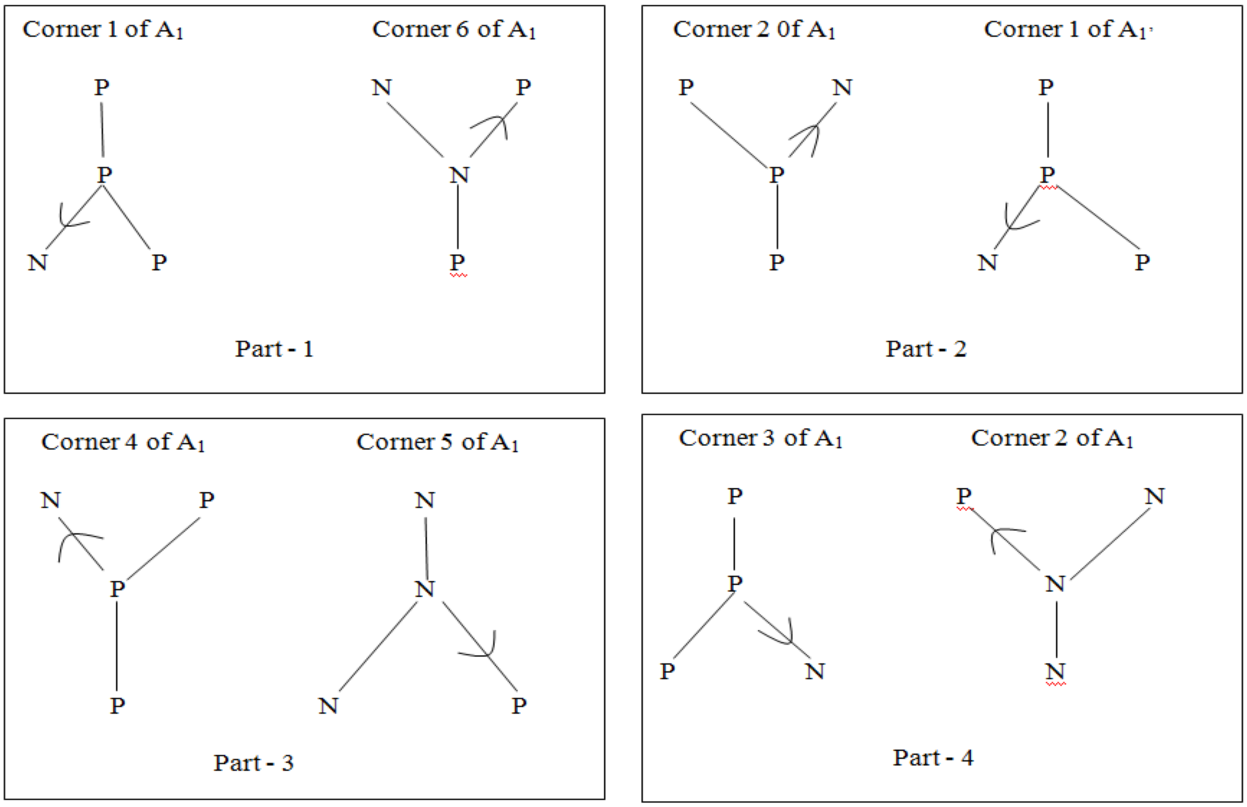

Figure 5: Immediate environment of all six corners of the ring A_1 and direction of resultant force

In the Figure 5, the direction of forces on each relevant points deciding electrical forces on the six corners of the ring A_1 has been shown.On examining the corners 1 and 6 in the ring A_1 of the Figure ,4, it becomes clear that the charge N at corner 6 attracts charge P at corner 1 with the same force as P at 1 attracts N at 6. T see the numbering of corners, consult the Figure 1. Same thing is shown in the Figure 5 (part 1), where forces on P at corner 1 of A_1 and N at corner 6 of A_1' are exactly in opposite directions. So the charges at the corners 1 and 6 are in equilibrium. Corners 2 of A_1 and 1 of A_1' are in equilibrium (Figure 5,part-2). Charges on corners 4 and 5 of A_1 are in equilibrium (Figure 5, part-3) Charges at corners 3 on A_1 and that on corner 2 of C_1 are in equilibrium (Figure 5, part-4). Thus, it is seen that charges on all the 6 corners are in equilibrium. The same thing can be shown for charges on 6 corners of all the rings. If only one or two rings of charges are considered, stability can not be attained. It is the cluster of neutrinos that surround the seeds layer after layer ensures stability. The stability of charges on a ring is attained by the participation of at least 6 rings adjoining the 6 sides of a particular ring. If any number of rings around a particular ring (e.g., ring A_1) will be considered, the stability of the ring will be intact.

From the above consideration, the force on any charge in a cluster of neutrinos is zero, but there is tremendous force between any two adjacent charges in a neutrino network. Let us calculate this force. Quark size has been estimated to be $\approx 10^{-19}$ meter. Quarks and leptons have been proposed to be made of layers of neutrinos surrounding their seeds. If on an average of 10 layers of neutrinos are supposed to be needed in the formation of a particle, then the size of neutrino $=10^{-20}$ meter. Distance between charges on

Research Article

adjacent corners of a neutrino may be taken as half of the neutrino size i.e., $5x10^{-21}$ meter. Thus the force between two charges each of value 1/6 e (e= charge on an electron)
$= (9x10^9x1.6x10^{-19}x1.6x10^{-19}) / (6x6x5x10^{-21}x5x10^{-21}) = 2.56x\ 10^{11}$ Newton.
If one tries to remove one charge from its position, force of the magnitude $2.56x\ 10^{11}$ Newton will spring into action to oppose it. The force is so great that it seems extremely difficult to remove a charge from it or break a neutrino. Let us calculate potential energy between a charge =+1/6e and a charge =-1/6e situated at a distance of $5x\ 10^{-21}$ meter, which is equal to
$(9x10^9\ x1.6\ x10^{-19}x1{,}6\ x10^{-19})/\ (5x\ 10^{-21}\ x1.6) = 288x10^9$ eV=288 GeV. So the energy of binding is greater than that of Top Quark. But the formation of the seeds of neutrino has been attributed to very violent collisions between neutrinos. But how this much energy was available at the time of formation of the universe. For this, again we go to the Heisenberg uncertainty principle, $\Delta E.\ \Delta t. = h/2\pi$. In this expression, if Δt is very very small, energy E can be so great that neutrinos can be broken by mutual collisions. This much energy is not available in our accelerators. One obvious question can be asked whether ordinary rules of electrostatic interactions will be valid at such small separation between charges. It should be valid because the separations between the charges on neutrinos is of the same order.
In p-p collisions at LHC in Cern, no neutrino was detected, the reason being that 1) there was very small statistical probability of neutrino production, 2) No neutrino detector was used at the spot. However, if accelerator energies are enhanced to more than the binding energy of neutrinos, it is advisable to use neutrino detector in the vicinity of p-p or heavier particle collision sites.

Conclusion

Many how's and why's were raised regarding the standard model of particle physics. In all, 5 questions were raised, which were answered in a simple but convincing way. These answers led to the irrefutable conclusion that universe was created by the laws of physics. Another conclusion that becomes compulsive is regarding the quantum of mass. In this paper, all the particles have been shown to be made of neutrinos only. The lightest of all the neutrinos is the electron neutrino having mass=2eV. As the mass of all quarks and leptons which constitute matter is made of neutrinos, so the mass of neutrino should be taken as quantum of mass. But there are three types of neutrinos : electron neutrino (mass =2eV), muon neiutrino (mass = 0.169 MeV), tauon neutrino (mass =0.015GeV). These three types of neutrinos are three flavours of neutrinos which interchange among themselves due to neutrino oscillations. So the mass of electron neutrino should be considered as quantum of mass. In magnitude, the quantum of mass or mass of the electron neutrino $= (2\ x\ 1.6\ x\ 10^{-12})\ /\ (9\ x\ 10^{20}\ ) = 3.555\ldots x\ 10^{-33}$ grams. It is already known that the quantum of charge = "e" (= charge on an electron) Thus we have come to know the quantum of charge and mass both.
On perusal of the Figure 2, we come across charges =+ 1/6 e and -1/6 e and mass of 1/6 of electron neutrino. But $1/6^{th}$ of charge "e" and 1/6 th of mass of electron neutrino can not be considered as quanta of charge and mass respectively, because they are distributed charges and masses of electron neutrino. Mass of a neutrino is the sum of masses of all the 12 edges of a neutrino. Charge though shown to be localized on the corners of a benzene –like structure are in reality are circulating along the framework of neutrino.

REFERENCES

Scientific American (2013). What is the Casimir effect. 20-22 October, 2013, Sunway Pyramid Convention Center, Malaysia.

Philip Gibbs (2002). What is the Casimir effect" [Physics Faq] Copyright. Calculation by Don Koks, 2002, Original by Philip Gibbs.

Christophcaesar (2009). Electromagnetic model of the electron. Dr. Christoph, http:// www. Ccaesar.com/eng structure of the electron.html, 2009 copyright Dr.Christophcaesar.

Peter W Higgs (1964). Broken symmetries and and the masses of Gauge Bosons. *Physics Review Letters* **13**(16) 508 -509.

Higgs Peter (2007). Prehistory of the Higgs Boson; *Compts Rendus Physique* **8**(9) 970-972.

Adrian Cho (No date). Mass of common quark finally nailed down *Science* (Now)

Giorgi Cortiana (2013). Experimental and theoretical uncertainties in top quark mass measurements at the tevatron and the LHC. By, *5th international workshop on Top quark, Physics* (Top 2012) *Journal of Physics, Conference Series* 452 012021, IOP Publishing.