THEORETICAL DERIVATION OF CHARGE OF QUARKS & STRENGTH OF ALPHA – THE FINE STRUCTURE CONSTANT.

It is generally **assumed** that atoms are charge neutral - with protons and electrons having equal and opposite charges. While the charge of electron has been measured in oil drop experiments; the charge of a proton has **not** been directly measured, as it could not be isolated. Though this can explain atoms, it cannot explain molecules as charge neutral atoms could not be held together. When neutrons were discovered, it was **assumed** to be charge neutral. The equation of Coulomb's law does not apply to interaction between a charged body like proton or electron with that of a charge neutral body. This would make the atom unstable. Experiments have put a non-zero electric charge on neutrons, which has been measured and found to be $q_n = (-1.5 \sim 2.2) \times 10^{-20}$ electron charges (aps.org/pdf/10.1103/ PhysRevD.25.2887). Particles have a weak charge, analogous to the electric charge that describes a particle's propensity to have weak interactions with other particles. This weak charge is predicted by the Standard Model to be about -0.989 for neutrons, about -0.071 for electrons and about +0.071 for protons, as measured in elementary charge units (Source: Jefferson Accelerator Laboratory). Similarly, **charge of electrons** and **protons** are found **not** to be **equal**. The upper limit to the electron proton charge difference is $(0.8 \pm 0.8)\ 10^{-21}\ e$ (Physics Letters B, Volume 137, Issues 5-6, pages 439-442 - http://dx.doi.org/10.1016/0370-2693(84)91752-0).

Since Coulomb's law says that equal charges repel, the concept of binding energy had to be postulated to explain the presence of multiple protons in the nucleus. But this does not explain the residual negative charge of neutrons and how they are held within the nucleus. When quarks were discovered, their charge was assumed to be $+ \frac{2}{3}$ and $- \frac{1}{3}$ through indirect evidence as they cannot be isolated due to confinement. Till date the values of these charges and the value of alpha, the fine structure constant (that gives the strength of the electromagnetic charge), have only been experimentally measured indirectly. There is no theory to derive these values.

We have theoretically derived the charge of quarks according to Vedas and found that the modern value contains an error element of 3%. Instead of $+ \frac{2}{3}$ and $- \frac{1}{3}$, the charges would have to be +7/11 and -4/11 respectively. This would explain the slight residual negative charge of neutrons. It will make the atom charged - with a residual negative charge. But being directed towards the nucleus, it would not be apparent in measurement from outside. Rather, this way it would hold the atom together without the need for any extra binding energy. We have also theoretically derived the value of fine structure constant alpha from the Vedas, which is 7/960 (1/137) at the ground level and 7/900 (1/128) at the Z-boson, i.e., 90 GeV level. These are close to the modern experimental values as shown below.

INTERPRETING THE VEDAS:

It is necessary to point out some peculiarities of the Vedas. Though it is written in a language called छान्दस, mostly in poetic style, it follows the practice of the Sootras (सूत्र) – not a letter extra than minimum necessary at that stage. When the same subject is discussed again, nothing that has been mentioned earlier is repeated. It continues about the subject further till the local context requires and then stops leaving other parts for future reference. Thus, the whole of the Vedas have to be analyzed to get any idea about any particular theory. For this reason, only the Vedic

stanzas are called Mantra (मंत्र मननात), whereas all other writings in poetic form are called Shloka (श्लोक). Also, all texts excluding the Vedas are called commentaries (भाष्य), because they deal with some or the other subject contained in the Vedas. Hence only Mantras start with ॐ, whereas all other texts start with अथ (implying next - आनन्तर्य) or prayers (मंगल वाक्य).

The words in the Vedas have been chosen most carefully. Changing a word for its synonym changes the meaning totally. This is because the Vedic names indicate their interactive characteristics (कर्म). Many objects may have similar characteristics (साधर्म्य) or common opposite characteristics (वैधर्म्य). In such cases, a word is carefully chosen to select a group that reflects only the desired common characteristic, even though individually they may otherwise differ. For example, in Braahmana texts we find descriptions like ईन्द्रो वै वारुणः. Since Indra and Varuna have totally different characteristics, how to interpret this sentence? According to Shatapatha Braahmanam 6-1-1-2, Indra is the repository of all forces at equilibrium, which resolves into two equal and oppositely directed force pairs (स यो अयम मध्येप्राणः एषएवेंद्रः) like the pulsars as an extreme example (वृत्राण्यप्रतिष्कृत - Rhk Veda 1-84-13: वृत्राणि - those that encompass everything nearby like black holes - Rhk Veda 3-33-6. अप्रतिष्कृत – अनाहितसंस्कार). This is the defining feature of Indra (बलस्य निखिलाकृतिः). Varuna similarly occupies a central position, but only in fluids or cold places. This 'restricted commonality' of 'centrality' has been described here. Thus, sometimes we find apparently contradictory statements and unless we are careful, it will mislead.

Another problem is the use of technical terms. Increasingly, people have forgotten their meaning and total implication. For example, the word "साम्परायगति" is often interpreted as the cycle of birth and death. But this is too restricted a meaning. It belongs to a class of interactions in particle physics. In Vedic physics, the weak nuclear interaction has two divisions, where beta decay is treated as a separate category. Interaction indicates the type of motion induced by the nature of the two interacting bodies. Neutrinos (अश्विनौ - Rhk Veda 6-69-7) play an important role in the proton-neutron conversion, which keeps the atom together. A similar interaction at the quark level gives protons and neutrons their identity. This is the proximity-proximity interaction, where both tend to be strongly confined. Hence a quark cannot be further divided. This motion is called नित्यगति. The proximity-distance motion leading to proton-neutron conversion is called सम्प्रसादगति because it keeps the atoms and molecules intact making creation of objects possible. The distance-proximity interaction that moves from higher concentration to lower concentration is the electromagnetic interaction that leads to interaction between objects; hence called यज्ञगति. The distance-distance interaction where one is repelled by the other is beta decay and is called साम्परायगति. The gravitational interaction, which stabilizes the orbits of two bodies against a common barycenter is called उरुगायप्रतिष्ठा. These are linked to the five types of fundamental relationships (सम्बंध): अंतर्याम, वहिर्याम, उपयाम, यातयाम, and उद्याम seen frequently in YajurVeda.

Vedas do not describe most theories directly, but mention them indirectly in the form of prayers (स्तुति). Shaunaka in his बृहद्देवता 1-7 says: "prayers describe classification and nomenclature,

physical characteristics and interactive potential" (स्तुतिस्तु नाम्ना रूपेण कर्मणा बांधवेन च). However, Vedas also contain statements other than prayer. The word Deva (देवाः) has been used in the Vedas as observables in the indirectly perceivable quantum world (दिवति भाषति इति देवम). Their number is 33 (त्रयत्रिंशत वै देवाः). Of these, 16 change flavor like neutrino oscillation; taking the effective number to 17 (सप्तदश वै प्रजापतिः). The 17th is the nodal point (यूप). The description "koti" for Deva (देवाः) does not mean ten million, but "types" only. The number of imperceptible (dark) particles is three times their number, i.e., 99 (नवतिर्नव Rhk Veda 1-84-13). Incidentally, though there is no position devoid of Indra (नेंन्द्रात ऋते पवते धाम किंचन) it is not one, but according to the nature of the body and its center of mass, it has 14 divisions. The all pervading one is called Shoona (शून हुवेम मघवानमिन्द्रम). The one in massive solids is called वासव. The one in space is called मरुत्वान. The one in stellar and galactic bodies is called मघवा, etc.

The word Rishi (ऋषि) has been used in the Vedas as defined by Shatapatha Braahmanam (शतपथ ब्राह्मणम-6-1-1). These are different forces (प्राणाः वा ऋषयः). Though the observables came into being only due to these forces (ऋषिभ्योः पितर याता पितरो देवमानवाः – Manu, also शतपथ ब्राह्मणम 10-2-7-1&2), they are observed only indirectly through their effect on observables. Hence Rhk Veda 1-164-15 says the forces are derivatives of the observables (ऋषयोः देवजा).

All descriptions in the Vedas are in universal terms. For example, let us take the word प्रवर्ग्य. It is generally interpreted as something that comes out of sacrificial fire - होमाग्नि. But it includes everything that leaves one main hot body and comes out in what is called in scientific circles as beta decay including beta decay for neutrinos. Hence these are called leftovers - उच्छिष्ट. Neutrinos are electrically non-interacting, weakly interacting, shape-shifting, light particles that come out of supernova explosions in macro scale to nuclear reactions in micro scale. Vedic descriptions of it include the intermediate scale also. Neutrinos have chirality – handedness like mirror image, but not helicity; and move at sub-luminal speeds. They are important in the conversion of protons and electrons into neutrons and vice versa (अहमन्नमन्नमदन्तमद्मि - ऐतरेय आरण्यक), which stabilizes atoms and makes the object formation possible. Hence Vedas say: atoms combine with each other to produce everything in the universe only because of this interaction - "eating" – and the "leftovers" (उच्छिष्ठात जज्ञिरे सर्वम - अथर्ववेद - 11-9-11). We enjoy the objects that are its "left over" - प्रवर्ग्य. For this reason, the Isha Upanishad says: ईशावास्यमिदम सर्वम.

DERIVATION OF THE CHARGE OF QUARKS:

Though about 200 sub-atomic particles have been catalogued by the Standard Model of particle physics, there are only 17 known fundamental particles including the so-called Higgs boson (which belongs to a different class). However, if we consider the color charges separately and include the anti-quarks and anti-leptons, the number goes up to 61 (48 fermions and 13 bosons including 8 gluons). There are no anti-bosons, as they are energy particles. The above list does not include force carriers for gravitation. Veda puts this number at 33, as explained below.

According to ऋक वेद 1-45-2 (also शुक्ल यजुर्वेद - त्रयत्रिंशत वै देवाः), the total numbers of quantum particles are only 33, which give rise to 3306 other particles. The 33 are 8 वसु (8 अग्नि of तैत्तिरीय आरण्यक 1-8, also the same as the 8 gluons of the Standard Model of Particle Physics), 11 रुद्र (varieties of electromagnetic radiation) and 12 आदित्य (आददानां याति - stellar radiating bodies from stars to globulars to galaxies that radiate photons) besides 2 अश्विनौ. According to तैत्तिरीय आरण्यक 1-8, the 11 रुद्र are 'महादेवाः' and 'गन्धर्व गणाः' called 'स्वानभ्राट' etc. According to the definition 'गन्धर्वाः सोमरक्षकाः', and their characteristic (सुषिर), these provide magnetic moment to the particles. According to प्रश्नोपनिषद 3-8, the 12 आदित्याः are the forces that reach out externally - 'वाहयप्राण' - that radiate out and make objects observables - 'चाक्षुषं प्राणमनुगृण्हाणः' (also तैत्तिरीय आरण्यक 1-7). The अश्विन pair represents the two spin states of Standard Model. Of the 33, only up to 21 अहर्गण (एकविंश स्तोम) belong to nucleus (अग्नि) that moves outwards from the center indicating positive charge. The rest are the opposite (सोम) moving in from periphery to center (पृष्ठ्य स्तोम), indicating negative charge. According to योगकुण्डलिन्युपनिषद - 3/7, confinement is the state between अग्नि and सोम (चन्द्रार्कमध्यस्था शक्तिर्यत्रस्था तत्र बन्धनम). This makes a band of three-fold structure which शतपथ ब्राह्मणम 14-8-4-1 and 14-8-5-1 describe as प्रजापति or हृदयम. These, according to गोपथब्राह्मणम, are the central mass (ऋक), the intra-nucleic field (यजुष) and the energy levels (साम). These make up the protons and neutrons. Thus, according to ऋग्वेद, the magnitude of positive charge of quarks, which are त्रिबृत, is +21/33 or +7/11. That of the negative charge component is -12/33 or -4/11. The 3% difference from modern value can explain observations described earlier. This is better than the modern value.

Now we will give evidence in support of the above interpretation. The atomic nucleus is a stable structure. Thus, the total mass of the nucleus or the atom should be same as or more than its constituents. It is known that the observed atomic mass of all know isotopes (except oxygen) is always less than the sum of the masses of nucleons and electrons present in them. This difference is called mass defect and is expressed in atomic mass units. For example, let us consider the helium atom, which is most abundant in the universe after hydrogen atom, and since hydrogen in its natural state does not have a neutron. The calculation below is not exact, but approximate. However, since most calculations in atomic level are not exact (for example, the electron orbit is not exactly circular or the value of π could be more precise, etc), it will not materially affect the outcome. The pure natural helium atom consists of 2 protons, 2 neutrons and 2 electrons.

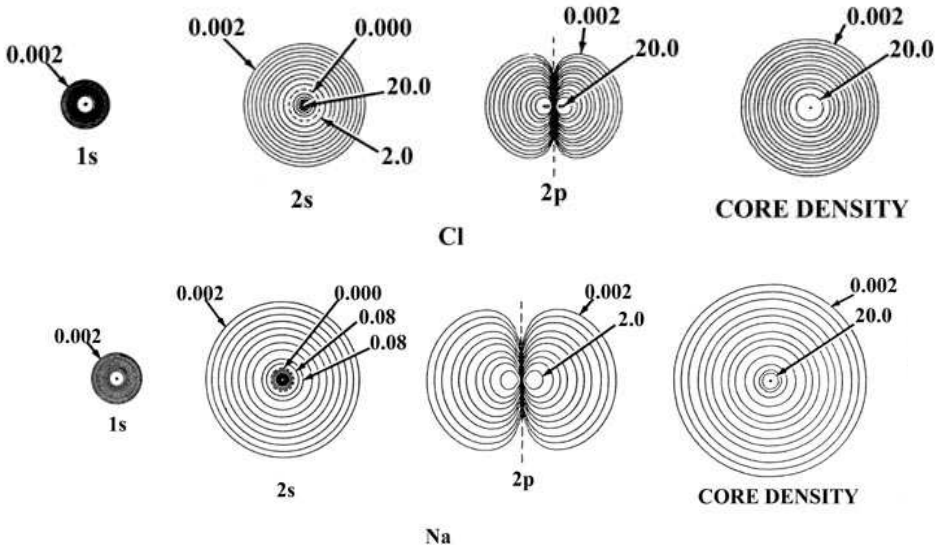
Mass of 2 protons = 2 x 1.00785 a.m.u = 2.01516 a.m.u (1 a.m.u = 931.5 MeV).
Mass of 2 neutrons = 2 x 1.00893 a.m.u = 2.01786 a.m.u.
Mass of 2 electrons = 2 x 0.000543 a.m.u = 0.001086 a.m.u.
Thus, the total expected mass of helium atom should be: 4.03410 a.m.u.
However, the observed mass of helium atom is: 4.00390 a.m.u.
Difference between the expected mass and actual mass of one helium atom is: 0.03020 a.m.u.
This difference could be 1 unit (a.m.u.) in 1/0.03020 or a little over 33 helium atoms. The excess over 33 will be explained later. The mass defect multiplied by the a.m.u is said to give the binding energy. Thus, to put it differently, the binding energy of helium nucleus is about 1/33 of one a.m.u. If we discard the hypothetical concept of binding energy, then stability of the atom

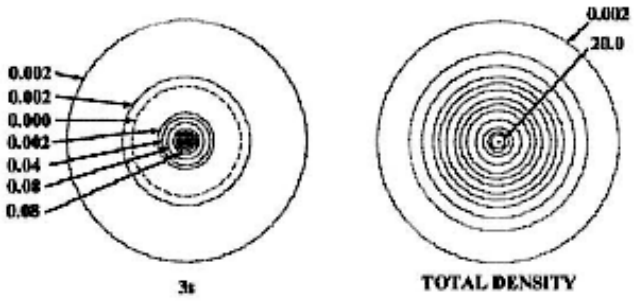
can be described by this 1/33 of the mass difference or average atomic mass unit is a little over 33 times of this difference. This proves the Vedic concept, where 17th or सप्तदश स्तोम is the fulcrum (यूप), and the अहर्गण after reaching 33 reverses (from पुराण गार्हपत्य to नुतन गार्हपत्य), making it a closed and stable unit.

DERIVATION OF THE FINE STRUCTURE CONSTANT:

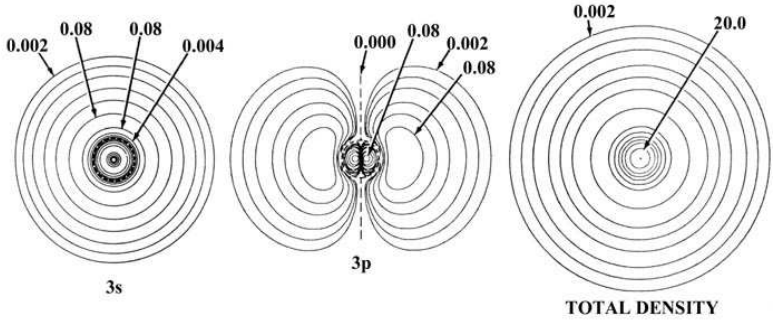
ऋग्वेद 6-69-8 talks about the competitive interaction (स्पर्धा) between Indra and Vishnu, which leads to त्रेधासाहस्री – three thousands. ऐतरेय आरण्यक defines these as: the spheres (systems), the observables and the objects - "इमेलोकाः इमेवेदाः अथवागिति बृयात". The former is the base (प्रतिष्ठा) for the other two. Every conceivable object has two parts: the चित्य or the fixed central part is called by गोपथब्राह्मण and तैत्तिरीयब्राह्मण 3-12-9 as ऋक (ऋचा मूर्तिः). Its radiation part (वितान) is the चितेनिधेय part, which is साम (तेजोमय साम). For explanation, let us consider Na and Cl atoms.

The diameter or the spread of an atom is difficult to define precisely as the density distribution tails off at large distances. However, there is a limit as to how close two atoms can be pushed together in a solid material. *The size of the atom in general decreases as the number of electrons in the quantum shell is increased*. The total density distribution for the atom is obtained by summing the individual orbital densities. The figure below shows the Atomic orbital charge densities for the Na and Cl atoms. Only one member of a 2*p* or 3*p* set of orbitals is shown. The nodes are indicated by dashed lines. The inner node of the 3*s* orbital is too close to the nucleus to be indicated in the diagram. When two neighboring contours have the same value, as for example the two outermost contours in the 3*s* density of Na, the charge density passes through some maximum value between the two contours, decreasing to zero at the nodal line. In terms of the outermost contour shown in the total density plots (0.002 au) the Cl atom appears to be larger than the Na atom. The outer charge densities of Na is, however, very diffuse and in terms of density contours of value less than 0.002 au the Na atom is indeed larger than the Cl atom.





Cl



Na

The summation of just the 1*s*, 2*s* and three 2*p* densities yields the spherical inner shell densities indicated as "core densities". It is the core density which shields the nuclear charge from the valence electrons. The outer density contour indicated for the inner shell or core densities defines a volume in space containing over 99% of the electronic charge of the inner shell electrons, i.e., the same proportion as the Sun has in the Solar system. Notice that the radius of the core density is smaller for chlorine than it is for sodium and thus the attractive force exerted on the valence electrons by each of the unscreened nuclear charges will be greater in chlorine than in sodium. Both the above descriptions show that the density from the core to the periphery of the nucleus is not uniform, but falls gradually through various layers. This decrease of charge density from core to periphery is not continuous, but along discreet gradients in layers or orbitals. The maximum numbers of these layers are 1000 (सहस्रवृदियं भूमिः - तैत्तिरीय आरण्यक - 1-10).

The radiating part is also called Vaak (वाक), as we perceive the object through this radiation only (अनवर्णे इमे भुमिः - तैत्तिरीय आरण्यक – 1-7) and describe both the object and its concept through speech form (शतपथ ब्राहमण 10-5-1-1). Vaak (वाक) comes in two types: those arising out of vibration (stationary) - 'कम्प' - generate waves and those arising out of consolidation (mobile) (चिति) generate matter (अर्थ). The former leads to sounds of speech form (सरस्वति वाक) and the later to mass (आम्भृणी वाक) described in ऋक वेद 10-125 and शतपथ ब्राहमण 4-5-6-3 that generates all particles (अतो हि देवेभ्यः उन्नयति). Indra, as defined by शतपथ ब्राहमण, is the force moving from the center to periphery of a system (मध्य प्राण). Similarly, Vishnu – one of the आदित्य, is defined by प्रश्नोपनिषद as the force moving from the periphery towards the center of a system (वाहय प्राण). According to शुक्ल यजुर्वेद 8-61, the 1000 divisions are arranged in 34 lots (तन्तव) that also contain one partial lot (छिन्न). There are a total of 30 strands in each lot, so that there are a total of 33 divisions totaling 990 with the central lot having only 10 strands (छिन्न).

Before we discuss the subject further, it is necessary to determine **WHAT** an electron is? Though this question is central to the development of quantum theories, till date the scientists are not sure about the answer. Bohr's complementarity principle (it behaves sometimes as a particle and sometimes as a field) is questionable, as according to the uncertainty relation, both states are mutually exclusive. The "practical electron" used in chemistry, bio-chemistry and micro-electronics; is a structure-less particle, which possesses an intrinsic angular momentum, or spin. Just two numbers: the electron's mass and electric charge, describe fully the equations related to its behavior. The "practical electron" is not an approximation to reality in the usual sense of fuzziness; rather, it is a precise description that applies under limited conditions. But to a high-energy positron (anti-electron), an electron is a cornucopia. Collisions of electrons with positrons carried out at the Large Electron-Positron collider (LEP) at CERN near Geneva, produce streams of quarks, gluons, muons, tau leptons, photons and neutrinos. All the esoteric resources of modern physics must be applied to understand the complexity of an electron. To understand the electron is to understand the world. How can a point particle explain the world? It is sought to be explained by a process called quantum censorship.

Bohr had restricted electrons to a set of discrete quantized states within the atom, in which the lowest or ground level with the lowest energy has a finite size. The equations that govern electrons in atoms are similar to those for vibrations in musical instruments, which produce scales of discrete tones. Hence, proper quantum mechanical description of electrons involves wave functions, whose oscillation patterns are standing waves. The same ideas apply to complex, bound systems - such as atoms made of many electrons and larger nuclei. If there is little energy input, the system in its ground state tends to remain quiet, betraying no evidence of its internal structure. Only when it is excited into a higher state, complexities emerge. This is the essence of Quantum Censorship. Thus, below an energy threshold, atoms appear to be the "hard, massy, impenetrable" units. Above it, their components can be torn out. Similarly despite the fecundity they showed at LEP, electrons themselves betray nothing of their inner workings at low energies. When one supplies energy above 1 MeV, corresponding to a temperature of 10^{10} K to unleash electron-positron pairs, the electron's structure is revealed.

Mass, a real-valued parameter, and spin, a discrete one, which occur as the Casimir operators for the inhomogeneous Lorentz group, is said to uniquely classify all possible realizations of special relativity by particles. Electric charge, a conserved quantity, classifies realizations of the gauge symmetry of electromagnetism. Once the parameters of how the 'practical electron' responds to those symmetry transformations is specified, determining its physical behavior is simple. In that sense, the electron is an embodiment of symmetry. The spin of the electron provides an axis, with which dipole fields can be associated. Though in principle, both magnetic and electric fields are allowed, their status is totally different. While the strength of the electron's magnetic field provides some comparison of theory and experiment, **the value of the electric field has never been measured, and is a mystery even to the theorists**.

The strength of the electron's magnetic field - in terms of a gyro-magnetic ratio or "g factor", suggested by Dirac is g=2. Experiments such as E821 (also neutrino mass) had raised doubts about the SM based on muon's g-factor. The magnetic moment of the electron is one of the most closely verified predictions of the SM. Inside the particle accelerator, the spinning muon behaves like a tiny magnet. Muon's magnetic field interacts with field of the accelerator's electromagnet.

This knocks the muon's spin axis off course by an amount that depends on its magnetic moment. If its *g*-factor were exactly 2, the spin axis would always point in the same direction as the muon's path. But the virtual particles supposedly popping in and out of existence around it should make the muon's *g*-factor slightly larger. This would cause the muon's spin axis to drift as it revolves around the ring. In fact, the magnetic moment is so sensitive that it is affected by the presence of quarks, W and Z bosons and may be the Higgs bosons. Experimenters came up with values that varied so widely that it put the probability of the SM's predictions matching reality at 0.27%. This shows that either the SM is wrong or the current understanding of the muon's g-factor (and its interaction with virtual particles suggested by the uncertainty principle) is faulty. Some accelerators at Tevatron have hinted at a fourth generation of heavy quarks with mass of around 450 GeV beyond the three generations postulated by the SM.

Regarding the wave motion of the electron, it may be noted that the motion of the wave is always within a narrow band and directed towards the central line between crest and trough, which is the equilibrium position. But after reaching the line, it over-shoots it due to inertia. This implies that there is a force propelling it towards the central line and beyond. The reason for the same is that, systems are probabilistically almost always close to equilibrium. But transient fluctuations to non-equilibrium states could be expected due to inequitable energy distribution in the system and its environment independently and collectively. Once in a non-equilibrium state, it was highly likely that both after and before that state the system was closer to equilibrium. But all such fluctuations are confined within a boundary. The exact position of the particle cannot be predicted as it is perpetually in motion. But it is somewhere within that boundary only. This is the probability distribution of the particle. It may be noted that the particle is at only one point within this band at any given time and not smeared out in all points (superposition). Because of its mobility, it has the possibility of covering the entire space at some time or the other.

Bohr's concept of stationary state of electrons, even though goes against the uncertainty relation, successfully explains the emission and absorption spectra of hydrogen like atoms. The value of the Reydberg's constant calculated by Bohr ($1.097 \times 10^7\ m^{-1}$) comes very near the experimental value ($1.09677 \times 10^7\ m^{-1}$). Thus, his description cannot be brushed aside lightly. While Lyman series in hydrogen atoms appear in the ultra-violet range (6562Å), the Balmer series appear in the visible range (4861Å) and the others in the beyond visual infra-red range (4340Å, 4102Å and 3646Å). Here we find a big difference between the Lyman series and others. Similarly, the energy of electron in a hydrogen atom in the first to the fifth energy levels in electron volts per atom is found to be: -13.6, -3.4, -1.51, -0.85 and -0.544 respectively. Here also the same pattern is repeated; i.e., the difference between the first and the second energy levels is much more than the other levels. This shows that the first energy level is different from other energy levels. This hints at a different classification to account for all energy levels, like the Vedic classification.

To understand the Vedic principle, let us consider bound or confined structures that generate energy through nuclear reactions (प्रतृर्ण्ण) like environment of Stars or Galaxies. These are called "Dyoh – द्यौः". Bound or confined structures that do not do so are called "Prithwi - पृथ्वी".Their intermediate fields are called Antariksha – अन्तरिक्ष (अन्तरा क्षान्तं भवति) ". In systems like the Sun-Earth, the triad is called Udoodhaa (उदूढा त्रैलोकी). But in systems like the Earth-Moon, the triad is called Ukhyaa – उख्या त्रैलोकी ". In the second case, the Antariksha (अन्तरिक्ष) extends up to 21

अहर्गण (एकविंश स्तोम). The Earth (Prithwi - पृथ्वी) is called Chitya Pinda (चित्य पिंड). The Antariksha (अन्तरिक्ष) is called Chitenidheya Pinda (चितेनिधेय पिंड). This has three further divisions at अहर्गण Nos.1-9 (त्रिणव), 10-15 (पंचदश) and 16-21 (एकविंश). The solar radiation is called solar wind, the Eath's radiation is called magnetosphere and the Moon's radiation is called exosphere. The same can be picturized for atoms also: nucleus, intra-nucleic field and energy levels or orbitals that bound a system. The radiations of Sun and Earth first decrease and then increase to decrease again. For example, Sun's corona is hotter than the photosphere like the Earth's thermosphere is hotter than the Troposphere. But it does not extend infinitely. The Earth's influence is limited by the Moon's orbit like the Sun's influence is limited by the heliopause. If a body which is not energized by nuclear reactions (निर्भुज) orbits the other body like an electron around a proton, such a body is called Moon (चंद्र). Though it orbits the central body in a fixed orbit or energy level, it can only be found at one place at any one time but has no fixed position. Incidentally, this also explains the other characteristics of electron. Energy from proton's positive charge flows out to be confined by an energy level. Since the proton also has spin, such emissions chart out a path before energy from other local influences neutralize it and creates something like a heliopause that restricts the solar wind. Where a single quantum of the radiation wave meets the energy level, it is called an electron.

According to शुक्ल यजुर्वेद 34-12, these are derivatives of अंडिरस. Only because of these, the interactive forces - मरुत become activated. The मरुत (called ऋषि in ऋग्वेद 1-164-15 and defined as प्राण in शतपथ ब्राह्मण 6-1-1-1) are of 7 categories called आवह, प्रवह, सम्वह, विवह, अनुवह, परावह, परिवह. These are arranged in 4 layers of one and three twin layers (एकजं षड्दयमा). Thus, we have only 4 atomic orbitals called s, p, d, f. Though some scientists talk of more number of orbitals, it could not be demonstrated. These 7 divisions cover the 1000 divisions of वाक, i.e., the radiating body or energy levels (शुक्लयजुर्वेद 34-55 - सप्तऋषयः प्रतिहिताः शरीरे सप्तरक्षन्ति सदमप्रमादम), out of which the first division ends at 40 units (10 of the incomplete तन्तु and one lot of remaining 33 तन्तव), leaving 960 units. Since these seven energize the 1000 divisions, the strength of interaction at that stage would be 7/960 or 1/137, which matches the modern value of alpha. Similarly, because of two types of spins of particles, we have to take 900 units of the 1000 as the next level jumping two lots. The strength of interaction at that stage (weak interaction or 90 GeV), would be 7/900 or 1/128, which is close to the modern value (1/127) as explained below.

In quantum field theory, a beta function $\beta(g)$ encodes the running of a coupling parameter, g. If a beta function is positive, the corresponding coupling increases with increasing energy. An example is Quantum Electrodynamics, where by using perturbation theory; the beta function is found positive. In particular, at low energies $\alpha \approx 1/137$, whereas at the scale of the Z boson, about 90 GeV, measurement shows that $\alpha \approx 1/127$. Moreover, the perturbative beta function tells that the coupling continues to increase, and QED becomes strongly coupled at high energy. In fact the coupling apparently becomes infinite at some finite energy (छिन्न). This phenomenon is called the Landau pole. However, one cannot expect the perturbative beta function to give accurate results at strong coupling, and so it is likely that the Landau pole is an artifact of applying perturbation theory in a situation where it is no longer valid. The true scaling behavior of α at large energies is not known to modern science. This needs further research.