Origin of Mass and a unified theory for four fundamental forces in nature

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Atoms have the stationary orbits. Our solar-system also have the stationary orbits. Question arises that is there any similarity between atoms and our solar system? If yes then how do we know that? Can we prove it using some very fundamental rules which nature follows? Also, can we prove that what is the origin of mass? Can we provide one lines of thought and unified all forces (including the four fundamental forces) in nature? In this paper we will discuss about the origin of stationary orbits in an atom, origin of mass and origin of all forces (including the four fundamental forces name; gravitational, electrical, magnetic and nuclear force) in nature. We shall use Max Planck black-body idea, Brillouin zones construction rules and Bragg’s diffraction conditions and will show that the origin of stationary orbit, origin of mass and origin of every force in nature arises due to quantum mechanical effect. We will use quantum mechanical rules and will explain that why Venus, Uranus, Neptune and Pluto rotates clockwise about their axis while other planets rotates anti-clockwise.

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I. INTRODUCTION

Atom has stationary orbit. Neil Bohr in 1913 uses stationary orbit concept and explain the various quantum mechanical phenomenon that arises in hydrogen atom. In this paper we will discuss about the origin of stationary orbit using Max Planck black-body idea. Max Planck uses black body vibrations along the three principal directions (X, Y, Z) and explained the experimental data of solar spectrum. His idea revolves around the different mode of vibrations of a black body along the three principal directions (X, Y, Z) in real space or k_x, k_y, k_z direction in inverse k-space. We will use his idea in our stationary orbit discussion. We will use one statement that emptiness (space) is everywhere. It is connected (in mathematical sense) and infinitely elastic. We will deal origin of mass problem first, then origin of stationary orbit in an atom or in our solar system, and finally we will discuss the origin of every forces in nature.

II. ORIGIN OF MASS

To understand the origin of mass, we will use crystal structures, full Brillouin zones constructions and Bragg’s diffraction conditions. For simplicity we will use 2d-square-lattice, and 2d-hexagonal-lattice. Take a 2d square lattice crystal structures. Do not put anything (do not put any mass) on the lattice points. Construct the full Brillouin zones using the Brillouin zones construction rules. One such Brillouin zone has shown in figure 1. If one look closely the 2d-square lattice (see in Figure 1), then one realize that mass can only appear at those points where more than one Bragg’s planes intersect. In 2d- square lattice case, at lattice point more than Bragg’s plane intersects. In-fact the number of Bragg’s planes which intersect at the lattice point form a sequence. Since square has four corner therefore sequence can be generated as; 1, 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48 .... Now subtract 1 from each elements. Then the sequence forms as; 0, 3, 7, 11, 15, 19, 23, 27, 31, 35, 39, 43, 47.... These sequence elements are the number of Bragg’s
plane intersection at the lattice points. So in square lattice mass only appear at those points where these number of Bragg’s plane intersect. If one see figure 1 closely, then one notice that there are the some points (just after the first Brillouin zones) where 3 Bragg’s planes intersects but mass does not appear. These points in-fact fall on the mid point of face diagonal in 2d-square lattice. It seems to the author that these are the exceptional point (this will become clear in 2d-hexagonal lattice).

Now let see the 2d-hexagonal lattice (see in Figure 2). If one see closely the 2d-hexagonal lattice then one notice that at lattice points more than Bragg’s plane intersect and it form a sequence. The sequence can be generated as follows;

Since hexagonal has 6 corner therefore sequence goes like 1, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72,... Now subtract 1 from each elements, then sequence goes; 0, 5, 11, 17, 23, 29, 35, 41, 47, 53, 59, 67, 71...... These are the number of Bragg’s planes which intersect at the lattice points where mass appear. We do not have the full visualization of 3d lattice in k-space with number of Bragg’s planes intersections, but we are very confident that similar sequence can be generated for 3d lattice using some software-package. What we can conclude with our discussion is that mass only appear at the nodal-point in space vibrations. The vibration of k-space along the lattice points (or along the principal directions) form the band structure in solids. This vibration is exactly the same as the Max Planck black body cube vibration along the three principal directions. What we can further conclude with our discussion is that mass only exist at the nodal point of space vibration and locus of nodal points form the stationary orbit (we will discuss it in next section).

Since crystal lattices are translational invariant due to the infinite extension of identical lattice points in space, we are concluding that the space is infinite.

III. ORIGIN OF STATIONARY ORBIT IN ATOM

Take a space of length $L$. Vibrates it with different modes of vibrations as shown in figure 4. If one see 2nd mode, 4th mode, and 6th mode of vibrations then one will notice that node point of second mode of vibration overlap with one node point of 4th mode and one node point.
of 6th mode vibrations (except the end point). One will further notice that the node point of 2nd mode of vibration (middle-one) always overlap with the $2 \times n$ mode of vibrations. Where $n$ is a positive integer greater than or equal to one. Since space is isotropic and homogeneous, therefore, one can rotates this linear vibration (assume this vibration in $z - x$-plane) around the $z$-axis. Now the middle node-point ($N$) of the 2nd mode of vibration form the locus around the $z$-axis. The locus of $N$ (N from the 2nd mode of vibration, see in figure [4]) form the stationary orbit. Similarly, the right end point (denoted by “Nodes”) will also form the stationary orbit. The left end “Nodes” point fall on the $z$-axis itself. Thus the two stationary orbit generated. Stationary orbit has the property that “node” should always remain stationary even in the higher mode of vibration. This put further restriction on mode of space vibrations. Space can only vibrates with $2n$ loop, where $n$ is a positive integer greater than or equal to one. And thus stationary orbit originate in nature. In our previous section “origin of mass”, we have discussed that the mass only appear at the nodal point (lattice-point) in space-vibration (more than one Bragg’s plane will intersect at this point), therefore mass can also appear in these stationary orbit. Now lets take the hydrogen atom example. Hydrogen have one proton and one electron. Now put one proton in a stationary orbit generated by the nodal point “N” (see in Figure [4] 2nd mode of vibration). Put electron in another stationary orbit which generated by extreme right point denoted by “Nodes” in figure [4]. Proton and electron revolves around the left $z$-axis in their respective stationary orbits and generates net angular momentum. Since hydrogen system has net angular momentum and it point along the $z$-axis, therefore, hydrogen shall be reactive. The net angular momentum in any system is the cause of reactivity.

Now take space of total length $3L$. Take extra length $2L$ is in the left side of figure [4] Vibrates left space in a same fashion as the right space (as shown in figure [4]). Now focus on the second mode of vibration in individual left and right space. There will be seven nodal points in space. One nodal point will fall on the extreme left space, three in the left space, one is common between left and right space and two in the right space. Now take the extreme left $z$-axis as a rotation axis and rotate the complete space-vibration (left and right both space) around this $z$-axis. There will be six stationary orbit appears (one “nodal” point will fall on the extreme left $z$-axis itself) in which the six particle can revolves around this $z$-axis. Now lets take the helium atom. Helium has two electron, two neutron and two proton. Put one proton in a first stationary orbit generated in the left space denoted by “N”. Revolves this particle around the extreme $z$-axis as anticlockwise. Put one neutron in a stationary orbit generated by the another nodal point “N”. Revolves this neutron clockwise around the extreme left $z$-axis. Now put second proton in a third stationary orbit generated in the left space by “N” in figure [4]. Revolves this proton in anticlockwise around the extreme left $z$-axis. Put second neutron in the stationary orbit generated between the left and right space. Revolves this neutron in clockwise around the extreme left $z$-axis. Now put first electron into the 5th stationary orbit generated in right space by nodal point “N”. Revolves this electron in anti-clockwise around the extreme left $z$-axis. Put second electron in the 6th stationary orbit generated in right space by the nodal point “N”. Revolves this electron in clockwise around the extreme left $z$-axis. Thus helium nucleons and electrons configuration completed. What we see that both protons and electrons revolves in their respective stationary orbits around the extreme left $z$-axis. Always, proton revolves anticlockwise whereas neutron revolves clockwise in their stationary orbit. If both proton and neutron revolves anti-clockwise around the extreme left $z$-axis, then neutron must rotate clock-wise around it axis to accommodate the orbital clockwise effects (for more elaboration, see next section). This helium system is very stable with minimum angular momentum along the left
extreme z-axis. This is the precise reason that why helium is non-reactive in normal conditions while hydrogen is very reactive. This also suggest that proton and neutrons are also revolving around the extreme left z-axis. Filling of the stationary orbit in left panel by the protons and neutrons follow the Aufbau principle. Similarly, the right panel stationary orbit which fills by the electrons also follow Aufbau principle. This also give the reason that why the atomic size of an atom increases as the atomic number increases. This also give the reason that why the first ionization energy of helium is smaller than the second ionization energy, because both the electrons revolves in different stationary orbits and not in same orbit as presently used model suggests. This also suggest that the reactivity and non-reactivity of any atom is purely depends on the net angular momentum that it preserve in ground state about any axis (lets say z-axis). If system has net angular momentum then it will be reactive. The similar procedure can be used for other atom as well. The bottom line is that the nucleons and electrons are revolving around the common z-axis. They revolves anti-clockwise in their respective stationary orbits. They (nucleons and electrons) also rotate about their axis either anti-clockwise or clockwise depends that whether they revolves anticlockwise or clockwise around the extreme left-z axis during the ideal formation as discussed above. If they revolves anticlockwise around the extreme-left z-axis, then they also rotate anti-clockwise. If they revolves clockwise then they rotate clockwise (for more detail see next section).

Let's use the same procedure in our solar system. Put Sun at extreme left z-axis, because mass only appear at the nodal point (as we have discussed in our previous section) and extreme left nodal point fall on the extreme left z-axis. Now generates sufficient stationary orbit after taking sufficient space length. In this case 5L space length, where L is a fundamental length constant for this system (see in Figure 4). Now start filling the stationary orbits one by one using Aufbau principle. First stationary orbit fills by Mercury and it revolves anticlockwise around the Sun. Mercury behaves like a proton in atomic system. Second stationary orbit fill-up by Venus and it revolves clockwise around the Sun. Venus behaves like a neutron in atomic system. Third stationary orbit fill-up by the Earth and it revolves anticlockwise around the Sun. Fourth stationary orbits fill-up by Mars. It should revolves clockwise around the Sun according to Aufbau principle. It seems nature fills 2s, and 2p orbitals simultaneously, at-least in this solar system case. If we fill 2s, and 2p orbitals together then fourth orbit fill-up by the Mars and it revolves anti-clockwise around the Sun. Fifth stationary orbit fill-up by Jupiter and it revolves anti-clockwise around the Sun. Sixth stationary orbit fill-up by Saturn and it revolves anti-clockwise around the Sun. Seventh stationary orbit fill-up by Uranus and it should revolves clockwise around the Sun (because 2s, and 2p orbital has been half-filled in each orbital (revolving anti-clockwise) and now pairing of 2s and 2p orbitals starts. It start first from 2s orbital). Eight stationary orbit fill-up by Neptune and it should revolves clockwise around the Sun, but it revolves anti-clockwise. Ninth stationary fill-up by Pluto and it should revolves clockwise around the Sun but it also rotates anti-clockwise. If one see closely the solar system then one notice that Venus, Uranus, Neptune and Pluto are rotating clockwise about their axis but revolving anticlockwise around the Sun. It seems to author that planets rotation about their axis and revolution around the Sun are entangled to each other (author have no doubt because space is every where, it is perfectly connected and infinitely elastic and mass come after close mode vibration of space where more than one Bragg’s planes intersect (stationary point)). Venus, Uranus, Neptune and Pluto should have revolved around the Sun in clockwise manner without rotation about their axis. What we see that they all rotate clockwise about their axis but revolves anticlockwise around the Sun. In fact all planets revolve anti-clockwise around the sun. Venus, Uranus, Neptune
and Pluto clockwise rotation about their axis and anti-clockwise revolution around the Sun are purely arises due to the quantum mechanical effect by which the net angular momentum of the system can be minimized around the z-axis (assume z-axis is passing through the Sun and pointing it in vertical direction). To clarify this point further lets take the Sun, Mercury and Venus only. Sun stay at the nodal point and nodal point falls on the z-axis which pass through the Sun. Put Mercury in first stationary orbit and revolve it anti-clockwise around the Sun. Put Venus into the second stationary orbit and revolve it clockwise around the Sun. Now, if Mercury and Venus are not rotating around their axis and only revolving around the Sun then their will be a net orbital angular momentum which points either along the +z direction or −z direction. Now the only way though which the net angular momentum can be counter balanced is by rotation of both planets around their axis. If one see the solar system (see in Figure 3), then one notice that Venus rotates clockwise and absorb the clockwise orbital angular revolution effects in their rotation but revolves anticlockwise around the Sun. If one calculate the total angular momentum of the system (Sun, Mercury and Venus) around the z-axis which pass through the Sun, then one notice that net angular momentum should be zero if this system is stable. Lets calculate the total angular momentum of system (Sun, Mercury and Venus) around the axis passing through the Sun using center of mass and parallel axis theorem for moment of inertia calculation. Let Mercury mass $M_m$, and Venus mass is $M_v$. Let Mercury distance from Sun is $R_M$ and Venus distance is $R_V$. Let Mercury and Venus as a sphere having radii $r_m$ and $r_v$ respectively. Let Mercury and Venus have orbital angular velocity around the Sun is $W_M$ and $W_V$ respectively. Let Mercury and Venus have rotational angular velocity about their axis $w_m$ and $w_v$ respectively. Now Mercury has intrinsic positive angular momentum (pointing along +z direction) around it axis $\frac{2}{5}M_m \times r_m^2 \times w_m$. Similarly Venus has intrinsic negative angular momentum (pointing towards −z direction) around it axis $\frac{2}{5}M_v \times r_v^2 \times w_v$. Use parallel axis theorem and calculate net moment of inertia around the Sun for Mercury and Venus. For Mercury, $I_M = \frac{2}{5}M_m \times r_m^2 + M_m \times R_M^2$, whereas for Venus, $I_V = \frac{2}{5}M_v \times r_v^2 + M_v \times R_V^2$. The orbital angular momentum of Mercury around the Sun is $I_M \times W_M = (\frac{2}{5}M_m \times r_m^2 + M_m \times R_M^2) \times W_M$, whereas the orbital angular momentum of Venus is $I_V \times W_V = (\frac{2}{5}M_v \times r_v^2 + M_v \times R_V^2) \times W_V$. Both these orbital angular momentum are points along the +z-axis. Take Sun mass $M_S$, radius $R_S$ and rotational angular velocity about it axis is $W_S$. The Sun angular momentum then equal to $\frac{2}{5}M_S \times R_S^2 \times W_S$. We believe that Sun also revolves around some singular point but we will ignore this information in our discussion (one should use this information during complete solar-system angular momentum calculation). Now the total angular momentum of the system (Sun, Mercury and Venus) around the z-axis which pass through the Sun is $\frac{2}{5}M_S \times R_S^2 \times W_S + I_M \times W_M = (\frac{2}{5}M_m \times r_m^2 + M_m \times R_M^2) \times W_M + I_V \times W_V = (\frac{2}{5}M_v \times r_v^2 + M_v \times R_V^2) \times W_V - \frac{2}{5}M_v \times r_v^2 \times w_v$. This total angular momentum should be zero for the solar system which only made of from Sun, Mercury and Venus.

What we are concluding about our discussion on solar system is that it total angular momentum must be zero so that solar system remain stable. If this is not zero then solar system will be unstable. Solar system analysis also suggest that in atom like helium both protons, neutrons and electrons are revolving anti-clockwise in their stationary orbits. Also, both proton are rotating anti-clockwise around their axis but both neutrons are rotating clockwise around their axis. Also, one electron rotating anti-clockwise while other rotates clockwise around it axis. Both electron revolving anti-clockwise in their stationary orbit around the extreme left z-axis. Why nature only chose anticlockwise revolution around the extreme left z-axis should be investigated further. What we are concluding here is that our solar system also follows the
IV. ORIGIN OF FORCES

In our previous paper “Alternative explanation of magnetism without spin”, we have shown that the origin of magnetism arise when two connected Brillouin zones are coupled and vibrate with different magnitude of wave-vector $k$ and have $180^\circ$ phase difference. We have discussed in great details about the condition for paramagnetism, diamagnetism, ferrimagnetism and ferromagnetism. We have concluded that magnetism purely arises due to coupled mode of vibrations of two Brillouin zones (for example in case of iron, it is $5^{th}$ and $11^{th}$ Brillouin zone which are coupled and vibrates). Similarly we have concluded that the electrical field or electric force arises due to the linear mode of vibrations of space between two points. One end point has the higher electrochemical potential than the other. Electric filed only generates due to space vibrations between these two points. The gravitational force also arises due to the linear mode of vibrations of the space but in this case vibration wave vector $k$ has smaller magnitude than the electrical force case. We have already discussed in our previous section that mass can only appear at the nodal point in space vibration and locus of nodal points form the stationary orbit. The space is curved around the mass due to linear mode of space vibration. So, gravity is nothing but the consequence of the space vibrations. In our previous section we have discussed that how the nucleons are distributed in different stationary orbits and they revolves around the extreme left $z$-axis. Nuclear force is also arises due to linear mode of space vibration but with very high wave-vector $k$. Thus the origin of all four fundamental forces in nature arises due to the vibrations of space. In gravitational, electrical and nuclear case, space vibrates in linear fashion between two stationary nodal points, whereas in magnetism case space vibrates in close modes (as in iron case in which $5^{th}$ and $11^{th}$ Brillouin zones are coupled and vibrates with different wave-vector $k$ with $180^\circ$ p phase difference).

In Vanderwall case, space between the two masses, or in 2d-layered material like graphene or MoS$_2$, vibrates linearly with very small magnitude of wave-vector $k$. One layer of 2d-layered material communicate with the other layers using Vanderwall forces. Due to the small wave-vector $K$, Vanderwall forces are very very weak forces in nature. In nature friction force appear due to the interlocking of two material media with the certain mode of space vibrations which presents between them and it also connected to the outsides space . One material media move over the other and changes the mode of space vibrations (this space penetrates both the materials media and perfectly connected with outer space). Changing the mode of space vibration cost energy which come from the moving material media, and this is a precise quantum-mechanical reason for the generation of heat-wave when one material media moves over other.

V. CONCLUSION

In this paper we have tried to address the long lasting problem in physics that how and why mass has been created. We have shown that the mass only appear at the nodal points in space vibration. At nodal points (stationary points) more than one Bragg’s plane intersects. We have developed a sequence for 2d-square and 2d-hexagonal lattice whose elements are the number of
FIG. 4: Different mode of vibrations of space of length $L$. The end point of length $L$ always remains stationary and represented as a “Nodes”. $N$ stands for node and $A$ stands for anti-node.

intersections of Bragg’s planes at the lattice points. We have shown that the origin of mass is purely arises due to the quantum mechanical effect. We have explain that why atom must have stationary orbit and how it arises due to the different length of space vibrations. We have explain that how the nucleons are distributed into the different stationary orbits and revolving around the extreme $z$-axis which pass through the extreme-left “Nodes” point (also called singular point). We have shown that the generation of stationary orbit principle can be applied in our solar system as well and can be explained that why Venus, Uranus, Neptune and Pluto are rotating clockwise, whereas the other planets are rotating anticlockwise around their axis in their stationary orbit around the Sun. We have shown that rotation is purely arises due to quantum mechanical effects. We have explained that why hydrogen is reactive while helium is not in normal situations. We have shown that the origin of every forces in nature (including the four fundamental forces, namely; gravitational, electrical, magnetic and nuclear) have the quantum mechanical origin. Now we can conclude nature with this statement: space is every where. It is perfectly connected (in mathematical sense), infinitely elastic and expanded all over the place (infinite). It is stationary!

Mass come from the close mode vibration of space. Everything that is happening in nature have the quantum mechanical origin. Nature only follows quantum mechanical rule both at microscopic as well as macroscopic level. We hope that this paper will put the scientific community in right direction so that they will start looking the physical observations using the quantum mechanical effects rather than the various models.

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