Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 19 January 2021 doi:10.20944/preprints201701.0028.v11

Heat and Photon Energy Phenomena: Dealing with Matter at Atomic and Electronic Level

Mubarak Ali

Department of Physics, COMSATS University Islamabad, Islamabad Campus, Park Road, 45550, Pakistan, E-mail: mubarak74@mail.com, mubarak74@comsats.edu.pk

Abstract: Technology is achieving its climax, but the basic understanding of science in numerous phenomena is still required. Misconception using terms such as photon and electron exists in different areas of science. When the electron of outer ring in silicon atom executes interstate dynamics for only one cycle, it generates force and energy of a unit photon. Interstate dynamics of the electron for one forward and reverse cycles generate the overt photon having the least measured length. When the photon of suitable length interacts with the side of laterally orientated electron of an atom, it converts into heat energy. Under the approximate angle of 90º, when a photon interacts with the tip of laterally orientated electron, it divides into the bits of energy having a shape like integral symbols. In silicon atom, electrons of the outer ring execute confined interstate dynamics on exerting forces along the poles; the centre of atom acts as the reference point for electrons executing interstate dynamics and the lateral lengths of the electrons are along the north-south poles. In neutral-state silicon atom, the involved heat energy wraps around the force shaping along the tracing trajectory of electron dynamics in both forward and reverse cycles. A force is being shaped from the sides of electron not experiencing the exertions of forces. In interstate dynamics, electron of the outer ring first reaches the 'maximum limit point', where energy of one bit is engaged wrapping around the shaping force along its tracing trajectory. From the 'maximum limit point', electron completes the second half cycle dealing with relevant forces, where again energy of one bit is engaged wrapping around the shaping force along the tracing trajectory. In this way, an electron depicts the force and energy relation forming a unit photon. The shape of unit photon is like 'Gaussian distribution of turned ends'. Under uninterrupted supply of heat energy to the silicon atom, an electron dynamics generates the photon having a shape like wave. Path independent but interstate dependent forces take over the control of electron. Hence, that electron executes dynamics nearly in the speed of light. In confined interstate dynamics, naturally viable conservative forces exert to the position-acquiring electron. A photon can be in the continuous and unending length if the electron dynamics remains uninterrupted. Having not made contact with states limiting forces at work, the changing aspect of electron recalls auxiliary moment of inertia at each point of turning. By executing electron dynamics, atoms under neutral states generate photons of different shapes, so revealing the phenomena of heat and photon energy.

Keywords: Heat energy; Photons; Fundamental forces; Electron dynamics; Atomic scale phenomenon; Electronic scale phenomenon

1. Introduction

The creation of earth has been benefited by heat and photon energy since its existence. Again, different phenomena such as electrical discharges have been the subject of many studies since long. Catching fire in different materials and burning of various commodities are the usual phenomena that have been under observation.

Many studies are discussed in the literature studying light-matter interaction, where it is mainly covered under a phenomenon known as surface plasmons. The origin of plasmons has been explored in some early published reports [1-4]. A plasmon is a quantum of plasma oscillating and representing the collective oscillations of the free electron gas density.

The interaction of light (photon) with matter is recognized in the form of various terminologies, such as phonon, excitons and plasmons. A study based on reviews discussed light-matter interaction considering the properties of polariton modes in materials of two-dimensional [5]. The concept of excitons (electron-hole pairs) was first proposed by Frenkel [6]. It deals with an excited state of the atom (in a lattice) travelling in particle-like fashion without the net transfer of charge. Excitons can be formed due to the absorption of photon by a semiconductor (quantum dot) [7]; a phonon is a collective excitation in a periodic and elastic arrangement of atoms or molecules in condensed matter.

Various studies deal with different developing processes involving tiny-sized particles. The tiny-sized cluster is a simple chemical compound, which has a variety of important applications in diversified areas [8]. The unique nature of nanocrystals solicits the fabrication of new materials having controlled features [9]. The likely development of nanoparticle technology is an obvious long-term benefit [10]. With the success of assembling colloidal matter in a useful structure, the atoms and molecules would be treated as materials in near future [11]. The investigation of the dynamics of individual nanoparticle should be taken as a prime concern prior to go for sound deliberations [12].

A good understanding about the surface features of nanoparticles would lead to the development of high order materials [13]. Tiny-sized clusters possess molecule-shaped electronic and non-face centered cubic geometric structures [14]. Chemical properties of gold nanoparticles change with size [15]. The development process of various tiny-sized and large-sized particles under varying concentration of gold precursor was studied while employing the pulse-based electron-photon/solution interface process [16]. It has been discussed that localized dynamics of the process is one of the causes that contributes in developing the structure of tiny-sized particles of gold [16-20], silver [20] and carbon [21, 22].

The study of tiny-shaped particle dealing with the elongation of atoms of arrays was also studied [23]. When the stretching of energy knots clamped electrons in atom is uniform, it is related to elongation of the atom [24].

Sir Isaac Newton explained gravity, which is called Newtonian Physics. The theory of General Relativity was explained by Sir Albert Einstein. Bohr proposed that electrons move around the nucleus in allocated orbits, where they have fixed energy in ground state. Thus, the concept of levitational force (exerting at the electron level) in atoms remains beyond understanding, and the study of band gap, valence band and conduction band prevails in different phenomena. The configuration of atomic structure remained only associated with the studies of orbits and shells. The concepts of atomic structures with quantum states are also studied.

A recently published study discussed the atomic structure in different gaseous and solid elements with new insights [25]. However, the conventional studies kept the researchers away from thinking about the force and energy behaviors of atoms. Huge efforts were made to explore the technological advances and breakthroughs. The efforts put forth towards exploring the basic and fundamental sciences remained less. Nevertheless, fundamental aspects of structure evolutions in suitable atoms were studied in a separate study [26]. Again, fundamental aspects of binding different state carbon atoms have been discussed [27].

Interactions of photons with electrons occupied by the energy knots of the hypothesized solid atoms are discussed here. Conversion of heat energy into the photon energy is clarified by considering the silicon atom as a model system. The exerting force to electrons of the outer ring of silicon atom is pinpointed. Generating photons of different shapes is discussed, and the analogy between photon and electron is singled out. Hence, matter at atomic and electronic level reveals the phenomena of heat and photon energy.

2. Results and Discussion

Splitting electrons carry forcing energy of chasing photons and impingement of such electrons either elongate or deform the underneath solid atoms [24]. Solid atoms can also deform under the process of synergy, where interaction of the medium plays a vital role [16]. Deformation of the atoms formed arrays of different tiny particles have been discussed [16-20]. The deformation of atoms in tiny grain carbon films has also been discussed [21, 22]. A uniform elongating behavior of gold atoms related to the tiny-shaped particle was discussed in a separate study [23].

Photonic current is stated featuring photons that propagate through the structure of atoms having suitable width of interstate electron gap [24]. Hence, photonic current does not relate to the flow of electrons or charged particles. However, electrons of the suitable atoms can transform heat energy into photon energy when executing the confined interstate dynamics. Thus, photonic current is based on the propagation of featured photons through a suitable medium.

For solid atoms, the force and energy show a direct relationship, which is not the case in gaseous atoms [25]. Three different ground points of atoms having different elements were discussed, where conservative forces got involved to execute the confined interstate electron dynamics [26]. Depending on the state of carbon atom, different forces engage in the formation of different carbon structures [27].

Supplied heat energy to atoms can be utilized to generate photons under confined interstate electron dynamics. However, an interstate gap of electron dynamics in atoms of different elements can determine the nature/shape of conserved energy. Such photons can propagate through the interstate electron gap of atoms. Hence, the generated force and energy can be transported from generation point to consumption end. Such photons can diffract when they interact with the sides of electrons in solid/semi-solid atom. Such photons can also reflect when they interact with the tips of electrons in solid/semi-solid atoms. Such photons can also deal with a different phenomenon when they interact with the electrons depending on their incidence angle.

2.1 Heat energy phenomena at atomic and electronic level

Photons travel in the air medium despite propagation. A long length photon called overt photon carries more energy as compared to the energy of short length photon. By constructing the required angles when the photons interact with suitable solid medium, they divide into pieces. Photons are no more with nodes and antinodes. In solids atoms, heat energy of dismantled photons dissipates while force of the dismantled photons permeates.

A single cycle of electron dynamics of silicon atom generates force and energy, which is termed as a unit photon. Thus, the unit photon possesses the least length of conserved force and energy, where it has a shape like 'Gaussian distribution of upwardly turned ends' as shown in (1) of Figure 1; an inverted unit photon has a shape like 'Gaussian distribution of downwardly turned ends', and is also shown. Under the suitable angle, interaction of the unit photon with electron results in its division into two equal parts shapes like integral symbol and opposite integral symbol, which are related to one bit of energy in each case as shown in (2) and (3) of Figure 1, respectively. The heat energy is generated when a photon, even in the length of the unit photon, is divided.

When a unit photon interacts with electron of hypothesized solid atom at suitable incidence, despite its division into two, a merged energy shaped like a fish can be resulted as shown in two ways in (4) of Figure 1. The merged energy of unit photon is a bunch of compressed or folded energy. When the unit photon interacts with the side of electron of hypothesized solid atom, it divides into several pieces. Due to a dedicated interaction with the electron, unit photon divides into two pieces, which can further sub-divide. Nevertheless, in the divided unit photon, where it is converted into tits and bits, it yet keeps a minute element of force. In case where the arms of unit photon neither folded nor divided into two pieces, the unit photon is divided into several pieces. Two unit photons dividing into pieces are shown in (5) of Figure 1; in each case, unit photons are divided into several pieces. These pieces can relate to tits and bits of heat.

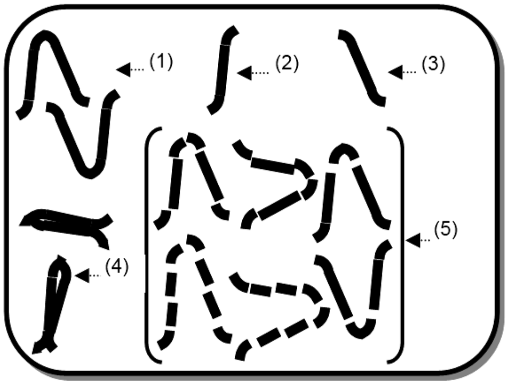

Figure 1: *(1) Unit photons shape like 'Gaussian distribution of turned ends', (2) the division of unit photon in shape like integral symbol and (3) the division of unit photon in shape like opposite integral symbol, (4) merged energy of unit photons and (5) the division of unit photons into the tits and bits of heat*

The length of photon depends on the number of cycles executed by the electron under confined interstate dynamics. If the interstate changing aspect of electron remained uninterrupted, the generation of photon also remained in the continuous length. A force and energy relationship that has shape like a wave is shown in (1) of Figure 2. This is called overt photon. That overt photon was generated by the three forward direction cycles and three reverse direction cycles of the electron of silicon atom.

When a photon interacts with the side of electron (occupied by the energy knot in hypothesized solid atom) under suitable incidence, it is folded by the impact of absorption. This is shown in (2) of Figure 2. That photon got converted into the tits and bits of heat as shown in (3) of Figure 2. Element of force in the pieces of tits and bits is almost diminished. The different pieces of photon are now related to the heat energy.

By constructing the approximate angle of 90°, the photon interacts with the tip of laterally orientated electron (occupied by the energy knot in hypothesized solid atom), where it divides into the bits of energy. This is shown in (4) of Figure 2. That overt photon got converted into the integral symbols dividing at the points of nodes and antinodes. This is shown in (5) of Figure 2, where single photon was converted into several bits of energy having a shape like integral symbols. A bit energy is partially related to the heat energy as the force is still there to keep the integral symbol.

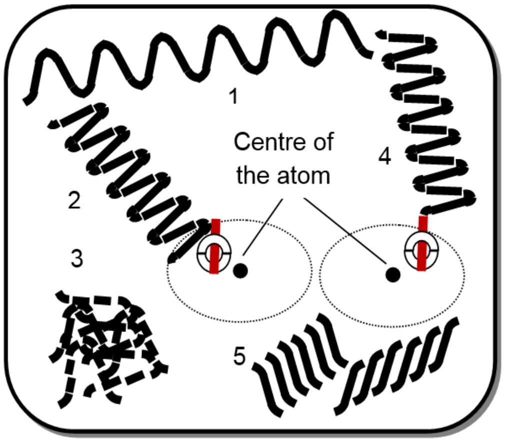

Figure 2: *(1) Overt photon, (2) interaction of overt photon with the side of laterally orientated electron occupied by the energy knot in hypothesized solid atom, (3) tits and bits of heat, (4) interaction of overt photon with the tip of laterally orientated electron occupied by the energy knot in hypothesized solid atom and (5) several bits of energy*

A bit energy can further divide into the tits and bits of heat. It can be deduced that an overt photon is a combination of several unit photons, where division under miscellaneous interactions converted it into tits and bits of heat. By combining the two unit photons, an overt photon of least measured length is formed. Thus, an overt photon involves a minimum of two nodes and two antinodes. Thus, a unit photon is a subset of the overt photon.

2.2 Photon energy phenomena at atomic and electronic level

In semisolid atoms, electrons deal with the zone of impartial force at 0° orientation along the north-south poles [25]. When the electrons (of the outer ring) of semisolid atoms keep orientation of 0° along the normal lines drawn from the centers, they deal with an impartial force along the north-south poles. In silicon atom, electrons of the outer ring also keep half-lengths above the middle of occupied energy knot and half-lengths below the middle of occupied energy knots. In this way, electrons deal with force along the opposite tips at equal levels. It means that electrons also deal with the equal force along east and west poles. Hence, the electrons of the outer ring deal with the neutral force. Thus, a supply of heat energy triggers the confined interstate electron dynamics to change in the photon energy, where forces of all four poles remain conserved. This is not the case with electrons of the inner rings.

An electron deals with the forces exerting along its relevant poles. The forces exerting to relevant poles of the electron introduce a moment of inertia in auxiliary manner at each point of its turning. When the suitable electron is lifted from the occupied state without touching it, the energy of one bit is engaged along the tracing trajectory of electron in the first half-cycle. The engaged energy wraps around the force shaping along the tracing trajectory of the electron. Electron deals with the forces of relevant poles in a conserved manner. The force is shaped from the sides of electron not facing the exertion of remaining two forces. The energy of one bit is also engaged along the tracing trajectory of electron in the second half-cycle. In silicon atom, electrons of the zeroth ring and the first ring do not execute dynamics to entertain the exertion of forces. Only the electrons of the outer ring execute interstate dynamics.

In Figure 3 (a), a top left-sided electron of silicon atom is studied to execute interstate dynamics. Under confined interstate dynamics of that electron, the conversion of heat energy into the unit photon energy is shown in Figure 3 (b). At the 'maximum limit point' of the lifted electron, one bit energy is engaged along the traced trajectory. Energy of the one bit wraps around the force shaping along the tracing trajectory of electron in the first half cycle. The trajectory of electron in first half cycle is up to the 'maximum limit point' as shown in Figure 3 (b). The turning of electron deals with the auxiliary moment of inertia. In the second half cycle, another energy of one bit is engaged along the tracing trajectory of electron to wrap the shaping force. The trajectory of electron in second half cycle is up to the last point of cycle, where again the turning of the electron deals with the auxiliary moment of inertia. Thus, a unit photon is due to the force and energy that is generated from one complete forward direction cycle of interstate electron dynamics. That electron recalls moment of inertia at each point of

 doi:10.20944/preprints201701.0028.v11

turning, which is in auxiliary manner. A complete forward direction cycle of confined interstate dynamics of electron is shown in Figure 3 (b).

Interstate electron dynamics of the neutral-state silicon solid completes six cycles – three in the forward direction and three in the reverse direction. Thus, it shapes the energy of twelve bits in shape like a wave. Energy of six bits have a shape like the opposite integral symbol, and energy of six bits have a shape like straight integral symbol as shown in Figure 3 (c). Electron does not touch the energy knot in forward direction cycle or in reverse direction cycle. Hence, under uninterrupted forward and reverse direction cycles, the execution of confined interstate dynamics of electron generates forcing energy having connected unit photons. The connected unit photons results in the manner just like that of continuous sketching on a strip of paper along with pulling of paper simultaneously without picking pencil from the initial position. In the semisolid atoms, electrons deal with half-length above and half-length below to the occupied energy knots, so they remain orientated at zero degree along the north and south poles [25]. A force is mechanically exerted to the electron. In silicon atom, forces only treat electrons of the outer ring to execute dynamics.

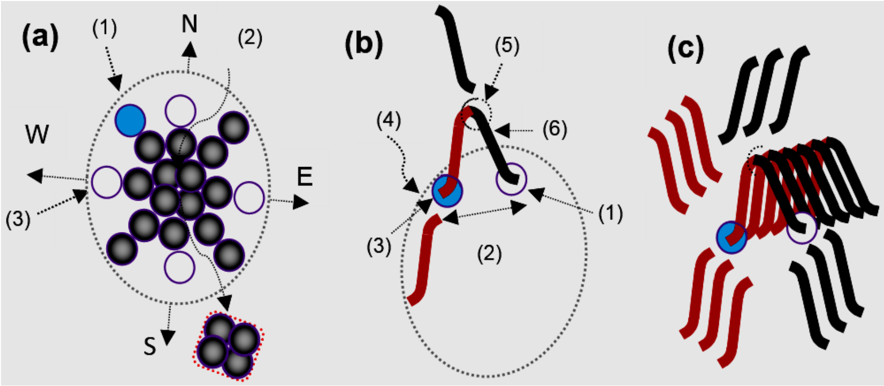

Figure 3: *(a) Neutral-state silicon atom: (1) targeted electron; (2) zeroth ring; (3) unfilled energy knot. (b) Electron dynamics of silicon atom in the forward direction cycle: (1) unfilled state; (2) interstate electron gap; (3) filled state; (4) one bit energy is engaged to wrap the force shaped along the trajectory of electron in first half cycle; (5) maximum limit point; (6) one bit energy is engaged to wrap the force shaped along the trajectory of electron in second half cycle. (c) Three forward direction cycles and three reverse*

direction cycles of interstate electron dynamics engage twelve bit energy to generate the overt photon having length of six unit photons

The continuous supply of heat energy to silicon atom would increase the length of photon that is generated by the electron executing confined interstate dynamics. The turning positions of the electron exhibiting auxiliary moment of inertia are responsible to force the energy of photon from one point to other. In this context, the exerting forces to electron along the relevant poles remained path-independent. However, the exerted forces remained confined to the interstate gap of electron executing dynamics. Figure 3 (b) clearly validates that the electron executing confined interstate dynamics does not possess any other way to regain the state.

The overall shape of the engaged energy along the traced trajectory of electron dynamics for the first half cycle is like straight integral symbol (ʃ). The overall shape of the engaged energy along the traced trajectory of electron dynamics for the second half cycle is like opposite integral symbol (ʅ). For left and right half cycles of electron dynamics, two shapes of integral symbols connect at the centre of 'maximum limit point' resulting in the overall shape of force and energy shaped like 'Gaussian distribution of turned ends' as shown in Figure 4. The force and energy relationship along the trajectory of electron dynamics in the forward direction cycle is shown in Figure 4 (a), (1) to (6). The force and energy relationship along the trajectory of electron dynamics in the reverse direction cycle is shown in Figure 4 (b), (6) to (1). In Figure 4, the maximum limit point denoted by (7) in both trajectories falls exactly over the midpoint of interstate electron gap.

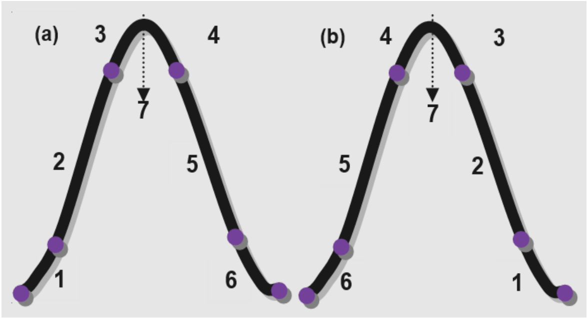

Figure 4: *Sections of the unit photon generated by interstate electron dynamics of silicon atom in (a) forward direction cycle and (b) reverse direction cycle; (7) maximum limit point where left and right half cycles of electron dynamics get connected*

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 19 January 2021 doi:10.20944/preprints201701.0028.v11

The motion to rest and rest to motion state of the electron at the centre of 'maximum limit point' is due to the disappearing of the forcing exertion at that point. However, from that point, due to the appearance of the forcing exertion, that electron turns towards the nearby unfilled state to occupy it. Therefore, by recalling the moment of inertia in the auxiliary manner, that electron deals with the next exerting forces. Forces of two poles act together but from the opposite sides, which causes that electron to turn. Thus, there is coupling of force and energy shaped in the first half cycle dynamics of electron and shaped in the second half cycle dynamics of electron. The recalled moment of inertia also remained legible during less turning of electron. In less turning behavior, the traced trajectory of electron has a shape like '/' or '\' as obvious in both (a) and (b) of Figure 4.

In Figure 5, electrons of four quadrants trace the trajectories of confined interstate dynamics in both forward and reverse direction cycles. In Figure 5 (a), an electron leaves the state from the rear side (tail) and enters the nearby state from the front side (head) while executing forward direction interstate dynamics. Therefore, that electron leaves the state from the rear side (tail) and enters the nearby state from the front side (head) while executing reverse direction interstate dynamics. To keep the equilibrium state of atom, opposite is the case in electron displayed in Figure 5 (b). In Figure 5 (c), an electron leaves the state from the front side (head) and enters the nearby state from the rear side (tail) while executing forward direction interstate dynamic, so it leaves the state from the front side (head) and enters the nearby state from the rear side (tail) while executing reverse direction interstate dynamic. Therefore, to keep the equilibrium state of atom, opposite is the case in electron shown in Figure 5 (d). Thus, the electrons shown in Figure 5 (a) and 5 (d) execute their rise and fall while in confined interstate dynamics. However, the electrons shown in Figure 5 (b) and 5 (c) execute their fall and rise while in confined interstate dynamics.

The executions of electrons in confined interstate dynamics shown in Figure 5(a) and 5 (d) and the executions of electrons in confined interstate dynamics shown in Figure 5 (b) and 5 (c) can be in fall and rise and rise and fall, respectively, depending on the reference point of observer. Forward direction and reverse direction cycles of electron dynamics in all four quadrants of the silicon atom are symbolically shown in

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 19 January 2021 doi:10.20944/preprints201701.0028.v11

Figure 5 (a-d). The pair of forces exerted to electron at each point of turning is also labelled in Figure 5 (a-d).

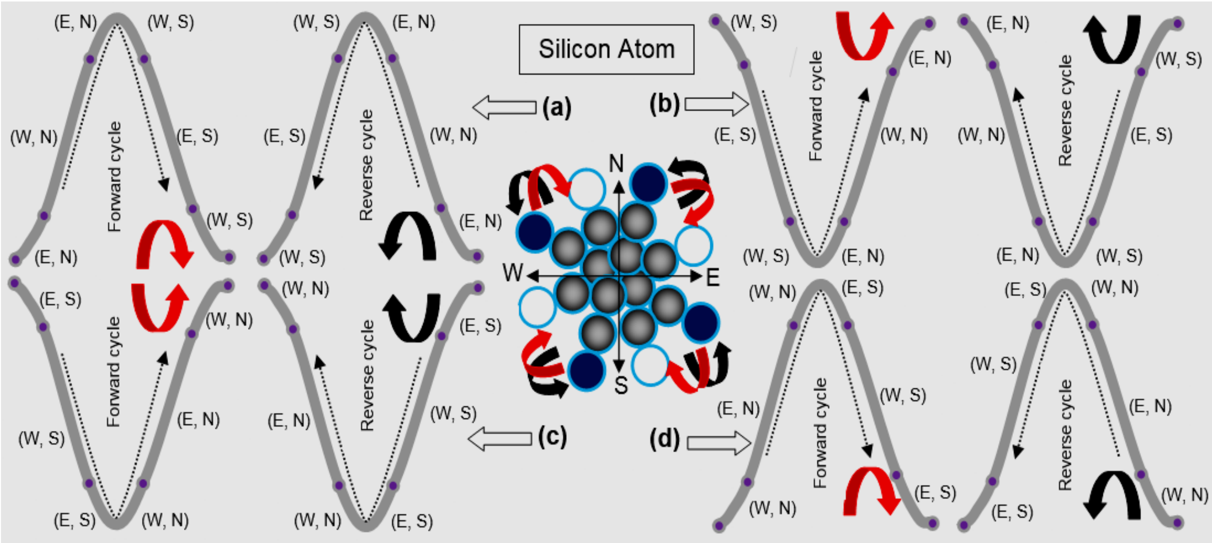

Figure 5: *Blue colored electrons of quadrants (a), (b), (c) and (d) deal with the east (E), west (W), north (N) and south (S) forces along relevant poles while executing confined interstate dynamics in forward (red colored round arrows) and reverse (black colored round arrows) direction cycles*

A propagating photon through the interstate electron gaps deals with forcing energy in a wave like fashion. This is the case of silicon atom discussed above. However, depending on the interstate electron gap of atoms, they can also generate photon energy having a shape other than the wave like shape. In atoms of suitable elements where four conservative forces are involved to exert, an electron dynamics transforms heat energy into the photon energy having a shape like a wave. In the atoms of those elements where three conservative forces are involved to exert, interstate electron dynamics transform heat energy into the photon energy having a shape like a connected integral symbols. In the atoms of those elements where two conservative forces are involved to exert, interstate electron dynamics transform heat energy into the photon energy having a shape like a connected tick symbols. Heat energy converts into the photon energy having a shape like a connected '*L*' alphabets in atoms where two conservative forces involve to exert in such a manner that the electron under dynamics attempts to cross the pole of its atom. Photons shapes like connected integral symbols, tick symbols and *L*-like symbols are shown in Figure 6 (a), (b) and (c), respectively. In Figure 6 (d), a generating photon shows both the elements of force and heat.

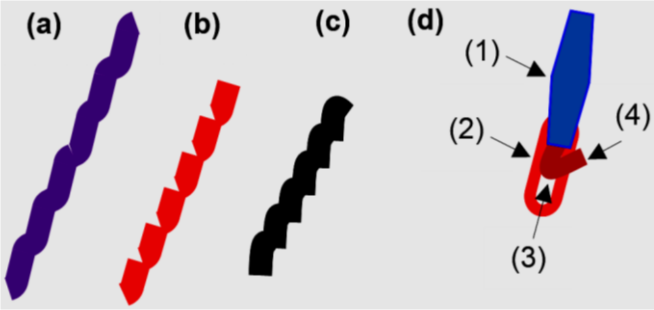

Figure 6: *Overt photon of connected (a) integral symbols, (b) tick symbols, (c) L-like symbols and (d) force and energy shaped along the tracing trajectory of electron; (1) electron dynamics, (2) wrapped energy, (3) shaped force, (4) shaped force in the removed region of wrapped energy*

Where there is no specific interaction of a photon with matter (at atomic level or electronic level), it divides into the tits and bits of heat. Heat energy of a divided photon dissipates in the structure based on atoms and electrons. However, the resulted heat energy of divided photon can utilize to wrap force shaping along the tracing trajectory of an electron once its atom in the structure enables the execution of interstate dynamics. In this context, the conversion of one form of energy into another form of energy depends on the type and characteristics of the structure.

2.3 General discussion

In the solar panel, each silicon cell connected in the series adds up to the generating number of photons under suitable fabrication procedure. The heat dissipation at the rear side surface of solar cell is controlled by using silver paste or through other means. In the laminated panels of solar cells, the generating photons are collected at the suitable points. As observed in solar panel, solar cells can generate the maximum power when setting is under the suitable inclination. The cycles of confined interstate electron dynamics of silicon atoms remain uninterrupted for a longer period, where on titling the

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 19 January 2021 doi:10.20944/preprints201701.0028.v11

solar panel at suitable orientation with respect to base results in varying efficiency. Depositing silicon atoms in a few layers at a substrate can generate high power.

When an overt photon interacts with suitable electron of the hypothesized solid atom by constructing an approximate angle of 90°, it is mainly converted into the bits of energy where each unit photon is divided into the energy of two bits. The bits of energy surround atoms of silicon lattice on entering laminated glass. So, bits of energy process work for the heat energy. However, when that overt photon interacts with the side of electron occupied by energy knot, that photon converts into tits and bits of heat. When featured photons interacted with the tips of laterally orientated electrons of elongated atom by constructing the suitable angles, the reverted element of force prints the pattern [28]; photons print the effects in the form of dots for multidimensional particles and print the effects in the form of lines for one-dimensional particles.

An amorphous material does not have an ordered structure. When the photons having characteristics of X-rays interact with such type of material by constructing the suitable angles, energy of photons mainly converts into the heat energy. The XRD scan is not obtained with discernable peaks of the structure. In some cases, photons having characteristics of photonic current are utilized to split the matter like inert gas atoms [24]. However, when suitable population of the photons propagates through the interstate electron gaps, they work as a photonic current [24]. Electrons possess the different mass under different energy and force when their atoms undertake different transition states [25]. Atoms of suitable elements evolve structures under the exertions of conservative forces to electrons [26]. A carbon atom converts into another state, where involved energy at the electron level engages the partially conserved force [27].

The set modalities of photons depend on the origin of generation, so establishing the roles set by the manufacturer. In this context, structural design is crucial to target the specific application and many studies are now targeted to explore the structure [29-38]. However, it has been disclosed elsewhere [18] that size and shape of the structure in various metallic colloids are owing to the controlled behavior of force and energy [18]. However, this is different in the structures of semisolid atoms [21, 39].

When the atoms execute electron dynamics only for one cycle, the generated shaped energy binds the atoms [26]. However, atoms once execute electron dynamics for many cycles, photons of different shapes are generated as shown in Figure 3 (c) and Figure 6 (a-c). When the atoms keep their non-functioning interstate electron dynamics, a tiny particle cannot work effectively for the chosen nanomedicine application [40]. The development of particles under predictor packing is also studied, where photons shaped like wave get converted into the tuned pulses optimizing the whole process [41]. To measure the temperature of such materials is an integral part of research, and some of the studies have also shed light on it [42-44]. A study explained the role of van der Waals interactions in isolated atom by considering the induced dipoles [45] which can be attained when fluctuations of charge density are in wave-like nature [46].

3. Conclusion

Heat energy wraps around the force shaping along the tracing trajectory of the electron dynamics. In executing confined interstate dynamics, the force is being shaped from the sides of electron not experiencing the forces of remaining two poles. In neutral-state silicon atom, a unit photon having a shape like 'Gaussian distribution of turned ends' is generated by one forward or one reverse direction interstate electron dynamics. Under uninterrupted supply of heat energy, a long length photon can be generated.

On executing the interstate electron dynamics, a silicon atom transforms the heat energy into the photon energy. A unit photon involves energy of two bits only, whereas a long length photon involves energy of several bits. A photon in the least measured length forms the connection of two unit photons. Photon energy gets converted into the heat energy when interacted with the electron of hypothesized solid atom at suitable angle. When a photon interacts with the side of laterally orientated electron (occupied by the energy knot in hypothesized solid atom), it gets divided into the tits and bits of heat. When a photon interacts with the north sided tip of laterally orientated electron by constructing the approximate angle of 90°, it gets divided into the bits of energy. Bits of energy further get divided into the tits and bits of heat.

The exerting forces to electron change the aspects by restricting it in the interstate gap. Supplied heat energy to the atom wraps around the force shaping along the tracing trajectory of electron executing interstate dynamics. In this way, the force shaping along the trajectory of an electron preserves its features. Hence, generated force and energy

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 19 January 2021 doi:10.20944/preprints201701.0028.v11

remain conserved. Force first involves to exert along the poles of electron; second, instantaneously energy engages to wrap the force shaping along the tracing trajectory (of electron which executes interstate dynamics). This is how a photon is formed. In the atoms, charisma of conserved forces enables the charisma of conserved energy.

Electron of the outer ring of silicon atom deals with forces along the relevant poles in such a manner that it recalls auxiliary moment of inertia at each point of the turning. (An outer ring means the outer most ring of the atom.) The centre of the silicon atom acts as the reference point of electrons of the outer ring executing confined interstate dynamics.

The exerting force to electron functions only in the width of photonic band gap or interstate electron gap of the silicon atom. Before crossing the 'maximum limit point', the electron is examined by the opposite forces to pull it downward. First the electron of outer ring gets lifted in a lateral manner by turning upward. To turn it back, it gets relief from the effect of upward force to join exerting force in the adjacent manner. So, in order to turn downward, a force in lateral manner to downward is exerted to electron. The path independent (conservative) forces exerting to the electron to acquire its different lateral and adjacent positions are under their natural viability. Hence, the speed of electron under confined interstate dynamics nearly reaches the speed of light.

Depending on the built-in interstate gap of electron dynamics, different atoms generate different shaped photons. In addition to shapes like waves, photons shaped like connected ticks, integral symbols and '*L*' symbols are also generated. So, a mechanism of photon generation indicates that atomic structure is different to the existing one. Conversion of heat energy into photon energy shows that atoms of different elements keep different shapes.

Now, a photon has a strong analogy to electron in such a manner that the latter forms a photonic band gap or interstate gap enabling the former to propagate through the gap to work as a photonic current. A travelling photon transports the force and energy. Photons when interact with the sides of electrons in a solid atom, they diffract to divide into tits and bits, where heat energy dissipate and force permeate in the solid medium. The forced electrons impinge on solid atoms underneath, so atoms deal with different modifications. Heat energy and photon energy are not the ones that impinge.

References

[1] D. Bohm, D. Pines, A Collective Description of Electron Interactions. I. Magnetic Interactions, *Phys. Rev.* **82**, (1951) 625-634.

[2] D. Pines, D. Bohm, A Collective Description of Electron Interactions: II. Collective *vs* Individual Particle Aspects of the Interactions, *Phys. Rev.* **85**, (1952) 338-353.

[3] R. H. Ritchie, Plasma Losses by Fast Electrons in Thin Films, *Phys. Rev.* **106**, (1957) 874-881.

[4] D. Bohm, D. Pines, A Collective Description of Electron Interactions: III. Coulomb Interactions in a Degenerate Electron Gas, *Phys. Rev.* **92**, (1957) 609-625.

[5] T. Low, *et al.*, Polaritons in layered two-dimensional materials, *Nat. Mater.* **16**, (2017) 182-194.

[6] J. Frenkel, On the Transformation of Light into Heat in Solid. I, *Phys. Rev.* **37**, (1931) 17-44.

[7] O. D. D. Couto Jr. et al., Charge control in InP/(Ga,In)P single quantum dots embedded in Schottky diodes, *Phys. Rev.* B **84**, (2011) 125301-7.

[8] M. Brust, M. Walker, D. Bethell, D. J. Schiffrin, R. Whyman, Synthesis of Thiol-derivatised Gold Nanoparticles in a Two-phase Liquid-Liquid System, *J. Chem. Soc., Chem. Commun.* (1994), 801-802.

[9] R. L. Whetten, J. T. Khoury, M. M. Alvarez, S. Murthy, I. Vezmar, Z. L. Wang, P. W. Stephens, C. L. Cleveland, W. D. Luedtke, U. Landman, Nanocrystal Gold Molecules, *Adv. Mater.* **8***,* (1996) 428-433.

[10] M. Brust, C. J. Kiely, Some recent advances in nanostructure preparation from gold and silver particles: a short topical review, *Colloids and Surfaces A: Physicochem. Eng. Aspects* **202***,* (2002) 175-186.

[11] S. C. Glotzer, M. J. Solomon, Anisotropy of building blocks and their assembly into complex structures, *Nature Mater.* **6**, (2007) 557-562.

[12] S. Link, M. A. El-Sayed, Shape and size dependence of radiative, nonradiative and photothermal properties of gold nanocrystals, *Int. Rev. Phys. Chem.* **19**, (2000) 409- 453.

[13] C. P. Shaw, D. G. Fernig, R. Lévy, Gold nanoparticles as advanced building blocks for nanoscale self-assembled systems, *J. Mater. Chem.* **21**, (2011) 12181-12187.

[14] Y. Negishi, T. Nakazaki, S. Malola, S. Takano, Y. Niihori, W. Kurashige, S. Yamazoe, T. Tsukuda, H. Häkkinen, A Critical Size for Emergence of Nonbulk Electronic and Geometric Structures in Dodecanethiolate-Protected Au Clusters, *J. Am. Chem. Soc.* **137**, (2015) 1206-1212.

[15] A. Moscatelli. Gold nanoparticles: Metallic up to a point, *Nature Nanotechnol.* (2015), DOI:10.1038/nnano.2015.16.

[16] M. Ali, I –Nan. Lin, Effects of the Electronic Structure, Phase Transition and Localized Dynamics of Atoms in the Formation of Tiny Particles of Gold. (2020), http://arxiv.org/abs/1604.07144 (last version)

[17] M. Ali, I –N. Lin, Development of Gold Tiny Particles and Particles in Different Sizes at Varying Precursor Concentration, *Adv. Nat. Sci: Nanosci. Nanotechnol.* **11**, (2020) 015006 (13pp).

[18] M. Ali, I –N. Lin, Controlling morphology-structure of gold tiny particles, nanoparticles and particles at different pulse rates and pulse polarity, *Adv. Nat. Sci: Nanosci. Nanotechnol.* **10**, (2019) 025015 (14pp).

[19] M. Ali, I –N. Lin, Formation of tiny particles and their extended shapes: origin of physics and chemistry of materials, *Appl. Nanosci.* **9**, (2019) 1367-1382.

[20] M. Ali, I –N. Lin, C. –J. Yeh, Tapping Opportunity of Tiny-Shaped Particles and Role of Precursor in Developing Shaped Particles, *NANO* **13**, (2018) 1850073.

[21] M. Ali, I –N. Lin, Phase transitions and critical phenomena of tiny grains carbon films synthesized in microwave-based vapor deposition system, *Surf. Interface Anal.* **51**, (2019) 389-399.

[22] M. Ali, M. Ürgen, Switching dynamics of morphology-structure in chemically deposited carbon films -A new insight, *Carbon* **122**, (2017) 653-663.

[23] M. Ali, Tiny-Shaped Particles Developing a Mono Layer Shape Dealing with Localized Gravity and Levity at the Solution Surface. (2020), http://arxiv.org/abs/1609.08047 (last version)

[24] M. Ali, Atoms of None of the Elements Ionize While Atoms of Inert Behavior Split by Photonic Current. (2020), http://arxiv.org/abs/1611.05392 (last version)

[25] M. Ali, Atoms in Gaseous and Solid States and their Energy and Force Relationships under Transitional Behaviors. https://doi.org/10.21203/rs.3.rs-88120/v2 (2020)

[26] M. Ali, Structure Evolutions in Atoms of the Elements Executing Confined Interstate Electron Dynamics. (2020), http://arxiv.org/abs/1611.01255 (last version)

[27] M. Ali, Atomic Structure and Binding of Carbon Atoms. (2021), https://www.preprints.org/manuscript/201801.0036/v11

[28] M. Ali, I –N. Lin, Gold Nanostructures and Microstructures with Tunable Aspect Ratios for High-Speed Uni- and Multidirectional Photonic Applications, *ACS Appl. Nano Mater.* **3**, (2020) 9410-9424.

[29] J. Zhao, L. Yang, Structure Evolutions and Metallic Transitions in In_2Se_3 Under High Pressure, *J. Phys. Chem. C* **118**, (2014) 5445-5452.

[30] V. N. Manoharan, Colloidal matter: Packing, geometry, and entropy, *Science* **349**, (2015) 1253751.

[31] J. Park, *et al*., 3D structure of individual nanocrystals in solution by electron microscopy, *Science* **349**, (2015) 290-295.

[32] D. Jacobsson, *et al*., Interface dynamics and crystal phase switching in GaAs nanowires, *Nature* **531**, (2016) 317-322.

[33] T. Tuma, A. Pantazi, M. L. Gallo, E. Eleftheriou, Stochastic phase-change neurons, *Nature Nanotech.* **11**, (2016) 693-699.

[34] J. Rensberg, *et al*., Active Optical Metasurfaces Based on Defect-Engineered Phase-Transition Materials, *Nano Lett.* **16**, (2016) 1050-1055.

[35] Y. Suzuki, G. Cardone, D. Restrepo, P. D. Zavatteri, T. S. Baker, F. A. Tezcan, Self-assembly of coherently dynamic, auxetic, two-dimensional protein crystals, *Nature* **533**, (2016) 369-373.

[36] C. H. J. Evers, J. A. Luiken, P. G. Bolhuis, W. K. Kegel, Self-assembly of microcapsules via colloidal bond hybridization and anisotropy, *Nature* **534**, (2016) 364-368.

[37] I. R. Epstein, B. Xu, Reaction–diffusion processes at the nano- and microscales, *Nature Nanotech.* **11**, (2016) 312-319.

[38] A. Azizi, Spontaneous Formation of Atomically Thin Stripes in Transition Metal Dichalcogenide Monolayers, *Nano Lett.* **16**, (2016) 6982-6987.

[39] M. Ali, M. Ürgen, Morphology and Structure of Carbon Films Deposited at Varying Chamber Pressures. (2020), https://arxiv.org/abs/1802.00730 (last version)

[40] M. Ali, Nanoparticles-Photons: Effective or Defective Nanomedicine, *J Nanomed. Res.* **5**, (2017) 00139.

[41] M. Ali, I –N. Lin, C. –J. Yeh, Predictor Packing in Developing Unprecedented Shaped Colloidal Particles, *NANO* **13**, (2018) 1850109 (15 pages).

[42] M. Mecklenburg, W. A. Hubbard, E. R. White, R. Dhall, S. B. Cronin, S. Aloni, B. C. Regan, Nanoscale temperature mapping in operating microelectronic devices, *Science* **347**, (2015) 629-632.

[43] L. Ye, D. Hou, X. Zheng, Y. Yan, M. D. Ventra, Local temperatures of strongly-correlated quantum dots out of equilibrium, *Phys. Rev. B* **91**, (2015) 205106-8.

[44] F. Menges, P. Mensch, H. Schmid, H. Riel, A. Stemmer, B. Gotsmann, Temperature mapping of operating nanoscale devices by scanning probe thermometry, *Nat. Commun.* **7**, (2016) 10874.

[45] S. Kawai, A. S. Foster, T. Björkman, S. Nowakowska, J. Björk, F. F. Canova, L. H. Gade, T. A. Jung, E. Meyer, Van der Waals interactions and the limits of isolated atom models at interfaces, *Nat. Commun.* **7**, (2016) 11559.

[46] A. Ambrosetti, N. Ferri, R. A. DiStasio Jr., A. Tkatchenko, Wavelike charge density fluctuations and van der Waals interactions at the nanoscale, *Science* **351**, (2016) 1171-1176.

 doi:10.20944/preprints201701.0028.v11

Author's biography:

Mubarak Ali graduated from University of the Punjab with BSc (Phys & Maths) in 1996 and MSc Materials Science with distinction from Bahauddin Zakariya University, Multan, Pakistan (1998); his thesis work completed at Quaid-i-Azam University Islamabad. He gained PhD in Mechanical Engineering from the Universiti Teknologi Malaysia under the award of Malaysian Technical Cooperation Programme (MTCP;2004-07) and postdoc in advanced surface technologies at Istanbul Technical University under the foreign fellowship of The Scientific and Technological Research Council of Turkey (TÜBİTAK, 2010). He completed another postdoc in the field of nanotechnology at the Tamkang University Taipei (2013-2014) sponsored by National Science Council now M/o Science and Technology, Taiwan (R.O.C.). Presently, he is working as Assistant Professor on tenure track at COMSATS University Islamabad (previously known as COMSATS Institute of Information Technology), Islamabad, Pakistan (since May 2008) and prior to that worked as assistant director/deputy director at M/o Science & Technology (Pakistan Council of Renewable Energy Technologies, Islamabad, 2000-2008). He was invited by Institute for Materials Research, Tohoku University, Japan to deliver scientific talk. He gave several scientific talks in various countries. His core area of research includes materials science, physics & nanotechnology. He was also offered the merit scholarship for the PhD study by the Higher Education Commission, Government of Pakistan, but he did not avail himself of the opportunity. He also earned Diploma (in English language) and Certificate (in Japanese language) in 2000 and 2001 respectively, in part-time from the National University of Modern Languages, Islamabad. He is the author of several articles available at the following links; https://scholar.google.com.pk/citations?hl=en&user=UYjvhDwAAAAJ & https://www.researchgate.net/profile/Mubarak_Ali5