Article

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

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Abstract: There is a misconception about using the terms photon and electron. When the electron of the outer ring in the silicon atom executes interstate dynamics for only one cycle, it generates force and energy for the unit photon. The unit photon has a shape similar to a Gaussian distribution with turned ends. When a photon of suitable length interacts with the side of the laterally orientated electron of a semisolid or solid atom, it converts into heat. At an approximate angle of 90°, when a photon interacts with the tip of a laterally orientated electron, it divides into bits of energy with shapes similar to integral symbols. Solid or semisolid element atoms can reveal the phenomenon of heat energy if their electrons address the interactions of photons. In the neutral state silicon atom, the center acts as the reference point for electrons executing interstate dynamics, and the north-south tips of the electrons remain along the north-south poles. The energy shapes around the force tracing along the trajectory of electron dynamics. Two forces are exerted on the electron at one time. In interstate dynamics, the electron of the outer ring first reaches the maximum limit point, where the one-bit energy is shaped. In the remaining half cycle, that electron also generates energy of one bit. When there is an uninterrupted supply of heat energy to the silicon atom, electron dynamics generate photons with a shape-like wave. Path-independent but interstate-dependent forces assume the control of an electron. This electron executes dynamics nearly at the speed of light. In dynamics, conservative forces are exerted on position-acquiring electrons. A photon can be unending in length if the electron dynamics remain uninterrupted. The changing aspect of the electron reflects the auxiliary moment of inertia at each turning point. Atoms of suitable elements generate differently shaped photons when executing dynamics for the outer ring electrons. Thus, they can also reveal the phenomenon of photon energy.

Keywords: heat energy; photon energy; fundamental forces; electron dynamics; atomic-scale phenomenon; photon-matter interaction

1.0. Introduction

Technology is achieving its climax, but a basic understanding of science still awaits. The creation of Earth has benefited from heat and photon energy since its existence. Catching fires to different materials and burning various commodities are the usual phenomena under observation.

Many studies in the literature have discussed light-matter interactions involving the phenomenon of surface plasmons. The origin of plasmons has a long history of exploration [1–4].

In the literature, various terminologies such as phonons, excitons, and plasmons explain the interaction of light or photons with matter. A study based on reviews discussed light-matter interactions considering the properties of polariton modes in two-dimensional materials [5].

In 1931, Frenkel proposed the concept of excitons or electron-hole pairs [6]. It deals with an excited state of the atom in a lattice traveling in a particle-like fashion without the net transfer of charge. Excitons can form due to photon absorption by a quantum dot [7], where the phonon is a collective excitation in the periodic arrangement of atoms or molecules.

Various studies dealing with different development processes involve tiny-sized particles. Tiny clusters are simple chemical compounds with various essential applications in diverse areas [8]. The unique nature of nanocrystals demands the fabrication of new materials with controlled features [9]. The development of nanoparticle technology has provided obvious long-term benefits [10]. Upon successful assembly of the tiny-sized particles into larger particles, they can be the atoms and

molecules of future materials [11]. Understanding the dynamics of the development of nanoparticles enables us to understand larger particles [12].

Studying the surface features of nanoparticles can lead to the development of high-order materials [13]. Tiny-sized clusters possess molecule-shaped electronic and non-face-centered cubic geometric structures [14]. Geometric and distorted particles deal with different forces to amalgamate in solution [15]. The localized dynamics of the process contribute to developing the structure of gold [16–19], silver [19], and carbon [20,21] atoms.

Atomic elongation in arrays of the tiny-shaped particle has been discussed elsewhere [22]. A solid atom elongates by stretching the energy knots uniformly [23].

Sir Isaac Newton explained gravity, as it mainly covers Newtonian physics. Sir Albert Einstein discussed the theory of General Relativity. Bohr proposed that electrons move around the allocated orbits, where they have fixed energy in the ground state.

Generally, discussions on the orbits and shells largely remain to describe the electronic structure of different element atoms. Some earlier studies also describe the atomic structure in light of quantum states.

However, these studies and other related studies have kept researchers far from thinking about different atomic behaviors. The efforts put forth toward exploring fundamental science have less of an intention.

A study given elsewhere [24] discussed the atomic structure differently from previous ones. Under conservative forces, a study discussed elsewhere [25] also explored the fundamental aspects of structural evolution.

Moreover, a study given elsewhere [26] also discussed the fundamental aspects of binding different state carbon atoms. The interaction of a photon with the clamped energy knot electron of any semisolid or solid atom is studied here. The electron dynamics of a silicon atom that converts heat energy into photons are discussed here.

The generation of photons under the electron dynamics of suitable element atoms other than silicon atoms is also discussed in preliminary detail. Here, the phenomena of heat and photon energy at the atomic and electronic levels are discussed.

2.0. Experimental Details

This work does not contain specific experimental details. However, all of those studies on photon-matter interactions or light-matter interactions, heat energy, photon energy, fundamental forces, renewable energy, photovoltaics, bandgap, semiconductors, energy science, energy application, energy materials, physics and chemistry of materials may refer to this study. This study also counters general physics and chemistry.

In the published literature, there are also other types of materials for studying the generation of photon energy. Therefore, the mechanisms of photon generation by the electron dynamics of different element atoms discussed here can also be compared to the mechanisms of photon (energy) generation by the dye-synthesized, organic, and perovskite solar cells.

3.0. Models and Discussion

In the process of synergy, atoms of nanoparticles or particles deform via different interactions [15]. A tiny-shaped particle develops due to the elongation of its atoms [22]. A photonic current occurs because of the propagation of featured photons rather than the flow of electrons or charged particles [23]. However, electrons from suitable atoms can transform heat energy into photon energy when executing their interstate dynamics.

The photonic current should be related to the propagation of featured photons in a suitable medium. The force and energy are directly related when solid atoms are in transition states [24]. The different ground points at which atoms execute the confined interstate electron dynamics have been discussed [25]. Carbon atoms involve energy to form a structure, whereas they engage in force [26].

The atoms of those elements, which generate photons, need energy depending on the characteristics of those generated photons. Therefore, suitable element atoms can execute electron dynamics to generate photons.

A photon can diffract when it interacts with the side of the clamped energy knot electron of a semisolid or solid atom. Photons can interact with electronic tips at suitable angles for reflection.

3.1. Heat Energy Phenomenon

By dissipating heat in the air medium, photons travel through the air medium [23]. A long-length photon carries more heat energy than a short-length photon. Short- and long-length photons can be called overt photons. However, a very long or unending-length photon is only a single photon. When a photon breaks into pieces under suitable interactions, it does not retain nodes and antinodes. The heat of the photon dissipates, and the force of the broken photon permeates the connected medium.

For a silicon atom, the execution of electron dynamics for one forward or reverse cycle generates the unit photon. Thus, the unit photon has the minimum conserved force and energy. In Figure 1, label (1) shows the minimum length of the photon. This photon is similar to a Gaussian distribution with upwardly turned ends.

An inverted unit photon with a shape similar to a Gaussian distribution with downwardly turned ends is also shown by label (1) in Figure 1. When the unit photon interacts with an electron at a suitable angle, it is divided into two equal parts. Each integral symbol relates to one bit of energy, as shown in labels (2) and (3) of Figure 1.
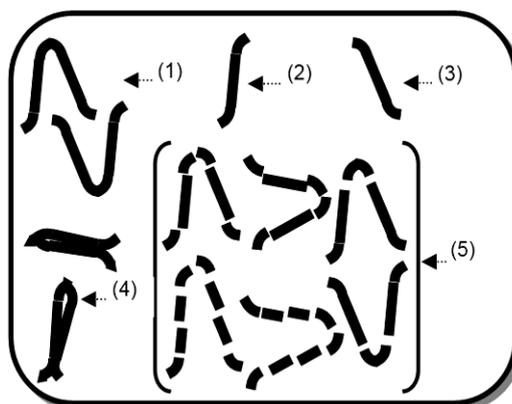

Figure 1. (1) Unit photons shape like Gaussian distribution having turned ends, (2) division of unit photon in shape like integral symbol and (3) division of unit photon in shape like opposite integral symbol, (4) merged energy of unit photons and (5) broken pieces of unit photons.

When a unit photon interacts with the electron of a hypothesized semisolid or solid atom at a suitable incidence, the folded energy shaped like a fish can result. Label (4) in Figure 1 shows this. The folded energy of a unit photon is a bunch of merging energy. A unit photon is converted into many pieces when interacting with the electron side of the hypothesized semisolid or solid atom.

The broken pieces of the unit photons are related to heat, as labeled by (5) in Figure 1. It is possible to validate these models from the experimental data.

If the changing aspect of an electron within an interstate executes uninterruptedly, then a photon of unending length results. A wave-shaped photon is labeled by (1) in Figure 2. The generation of that overt photon is achieved by three forward and reverse direction cycles of the silicon atom electron.

Depending on the potential energy and orientation force, the interaction of photons with an embedded electron can vary. The momentum of traveling or propagating photons can also alter the nature of interactions with electrons.

Photons of different characteristics can also alter the nature of interactions with an electron. In a specific interaction with an electron, photons can merge into the bed of heat energy. The converted

heat energy can work when suitable element atoms execute electron dynamics to generate photons. The different options available for photon-matter interactions indicate that this approach can open a new field of research.
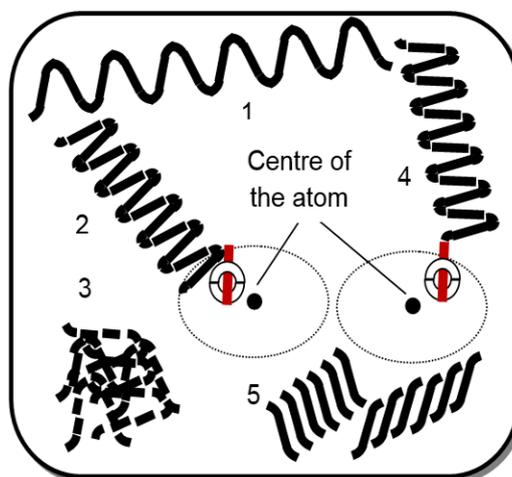

Figure 2. (1) overt photon, (2) interaction of an overt photon with the side of laterally orientated electron of a hypothesized semisolid or solid atom, (3) pieces of heat, (4) interaction of an overt photon with the tip of laterally orientated electron of a hypothesized semisolid or solid atom and (5) bits of energy.

When a photon interacts with the side of the electron of the hypothesized semisolid or solid atom at a suitable incidence, it folds by the impact of absorption. The label (2) in Figure 2 indicates the incidence. That photon is converted into many pieces of heat. Label (3) in Figure 2 shows many pieces. They are now related only to heat.

By constructing an approximation angle of 90°, the photon interacts with the tip of the laterally orientated electron of the hypothesized semisolid or solid atom, dividing it into bits of energy. Figure 2 shows this incident, as labeled by (4). In Figure 2, many energy bits shaped like integral symbols are labeled by (5). It is also possible to validate these models from the experimental data.

3.2. Photon Energy Phenomenon

In the atoms of semisolid elements, electrons maintain a half-length above and a half-length below the middle of the occupied energy knots [24]. Therefore, suitable electrons from silicon atoms should address the forces of two poles for each time-changing aspect.

The electrons of the outer ring of a silicon atom systematically handle conserved forces. Heat energy can trigger the interstate dynamics of suitable electrons for conversion into photon energy.

The forces exerted on the relevant poles of the electron introduce a moment of inertia, which occurs in an auxiliary manner at each point at which that electron is turned. When a suitable electron of the silicon atom executes dynamics for the first half-cycle, the energy of one bit engages along the tracing trajectory.

The energy of one bit also engages along the tracing trajectory of the electron in the second half-cycle. In a silicon atom, electrons of the zeroth ring and the first ring do not execute dynamically. To execute interstate dynamics, forces from all four poles are exerted on the outer ring electron of a silicon atom. However, two forces exist at a time to turn an electron. Energy covers the force from the remaining two forces' poles.

Force traces along the electronic tip. In Figure 3a, the top left electron of a silicon atom is considered for the execution of the interstate dynamics. Figure 3b shows the conversion of heat energy into photon energy for the forward cycle of electron dynamics.

At the maximum limit point, the energy of one bit engages along the traced trajectory. Thus, one bit of energy shapes around the tracing force in the first half cycle.

The trajectory tracing by the electron for the first half cycle is up to the maximum limit point, as shown in Figure 3b. The turning of electrons addresses the auxiliary moment of inertia. In the second half cycle, another energy of one bit engages along the tracing trajectory of an electron to shape around the shaping force.

The tracing trajectory of the electron in the second half cycle is from the maximum limit point. The electron again addresses the auxiliary moment of inertia. Thus, a unit photon is due to the force and energy of one complete forward direction cycle of interstate electron dynamics. This electron recalls the moment of inertia at each turning point, which occurs in an auxiliary manner. Figure 3b shows a complete forward cycle of the confined interstate dynamics of the electron.
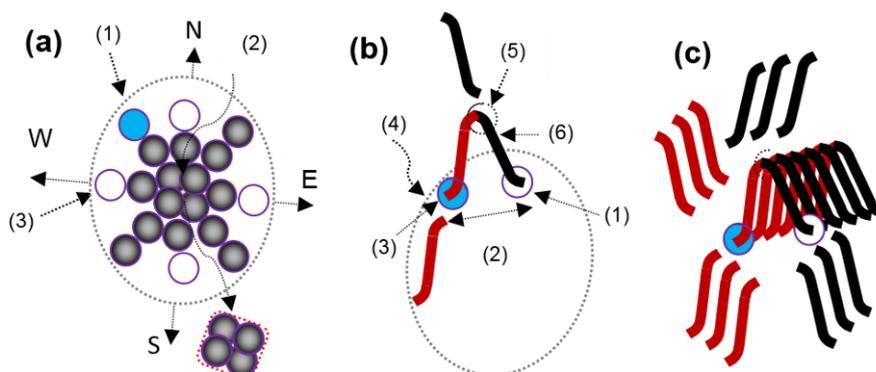

Figure 3. (**a**) Neutral-state silicon atom: (1) targeted electron; (2) zeroth ring; (3) unfilled energy knot. (**b**) Electron dynamics in the forward cycle: (1) unfilled state; (2) interstate electron gap; (3) filled state; (4) one-bit energy shaping around the force tracing along the trajectory of an electron in the first half cycle; (5) maximum limit point; (6) one-bit energy shaping around the force tracing along the trajectory of an electron in the second half cycle. (**c**) Three forward cycles and three reverse cycles of interstate electron dynamics engaging the energy of twelve bits to generate an overt photon with a length equal to the length of unit photons in six.

The turning positions of the electron under the auxiliary moment of inertia are responsible for forcing the energy of a photon from one point to another. The forces exerted on the electron remain independent of the path. In Figure 3b, the electron executing confined interstate dynamics does not possess any other way to regain the state.

When the interstate electron dynamics of the silicon atom complete six cycles, three forward and three reverse direction cycles, the energy of the twelve bits forms a wave shape. The electron does not touch the energy knot in the forward or reverse cycle.

Hence, under three uninterrupted forward and reverse direction cycles, the execution of interstate electron dynamics configures the force and energy to generate that overt photon. The shape of the energy engaged along the trajectory of the electron dynamics for the first half cycle is similar to a straight integral symbol (∫).

The shape of the energy engaged along the trajectory of the electron dynamics for the second half cycle is similar to the opposite integral symbol (ɿ). Figure 3c shows the energy bits of both shapes.

For the first half and second half of the forward cycles of electron dynamics, two shapes of integral symbols connect at the center of the maximum limit point. These factors give rise to an overall shape of force and energy, such as a Gaussian distribution with turned ends. Figure 4 shows these shapes.
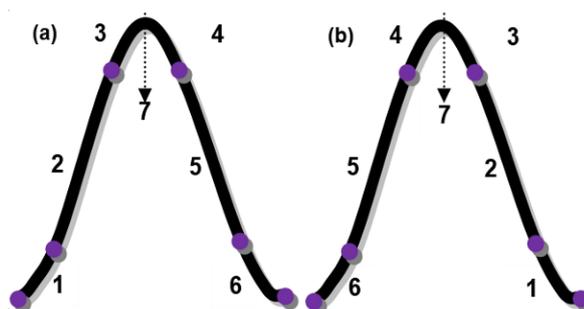
Figure 4. Sections of the unit photon generated under the electron dynamics of silicon atom in (**a**) forwarding and (**b**) reverse cycles; (7) connected left and right half-cycles at the maximum limit point.

Figure 4a plots the relationship between the force and energy in the forward cycle of the electron. Labels (1) to (6) denote the different steps in Figure 4a. Figure 4b shows the reverse cycle of the electron and the relationship between force and energy. Labels 1, 2, 3, 4, 5, and 6 also show the different steps in Figure 4b. In Figure 4, label (7) denotes the maximum limit point. From that point, the electron turns toward the nearby unfilled state to occupy it due to the appearance of the opposite end exerting forces.

Therefore, by recalling the moment of inertia in an auxiliary manner, that electron deals with the following exerting forces. In each step of interstate electron dynamics, the forces of two poles act together but from opposite sides, which causes that electron to turn.

Figure 5a–d shows the forward and reverse cycles of electron dynamics in all quadrants of the silicon atom symbolically. Figure 5a–d also shows the forces exerted on the electron at each turning point. Electrons in four quadrants trace the trajectories of confined inter-state dynamics in both forward and reverse cycles.

Figure 5a shows that an electron leaves the state from the rear side or tail and enters the nearby state from the front side or head while executing forward interstate dynamics. Therefore, this electron will also leave the state from the rear side or tail and enter the nearby state from the front side or head while executing reverse interstate dynamics. However, the tail becomes the head, and the head becomes the tail now.

The electron in Figure 5b has the opposite effect on the dynamics to maintain the equilibrium state of the atom. In Figure 5c, an electron leaves the state from the front or head and enters the nearby state from the rear side or tail while executing forward interstate dynamics. Therefore, this electron will leave the state from the front side or head and enter the nearby state from the rear side or tail while executing reverse interstate dynamics.

In Figure 5, the electrons can also execute the dynamics in reverse order. In Figure 5, electrons 'a' and 'b' can also execute dynamics from the front side, and electrons 'c' and 'd' can execute dynamics from the rear side (or vice versa). In this manner, electrons executing confined interstate dynamics still maintain the equilibrium state of the atom. However, the forces involved at each turning point of an electron are required to maintain its confined interstate dynamics.
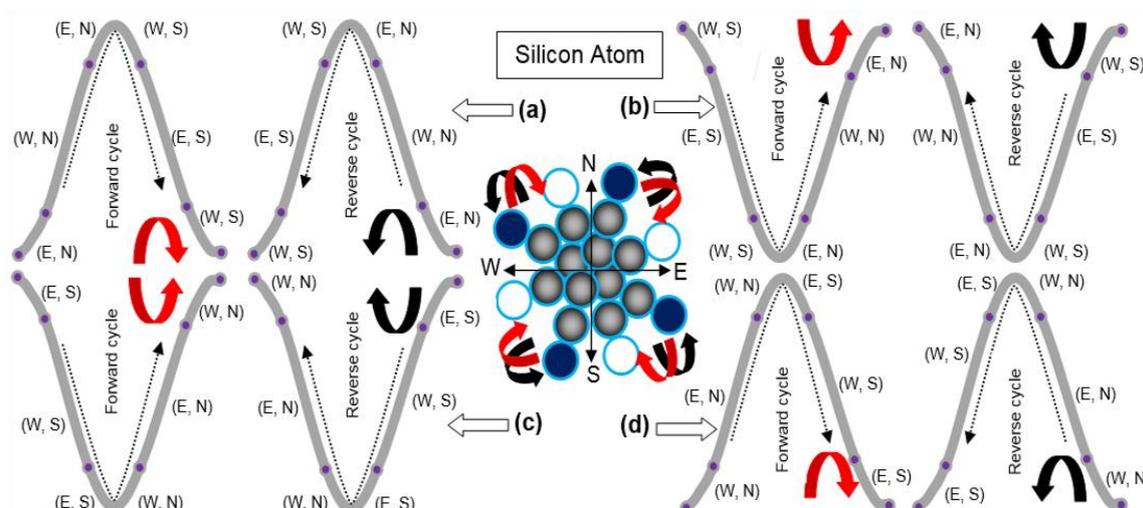
Figure 5. Electrons in four quadrants denoted by (**a–d**) correspond to the east (E), west (W), north (N), and south (S) forces, respectively, along the relevant poles while executing confined interstate dynamics in forward (red-colored round arrows) and reverse (black-colored round arrows) cycles.

In atoms where conservative forces from three poles exist, interstate electron dynamics transform heat energy into a photon energy shape similar to connected integral symbols. However, it is pertinent to mention that an electron deals with the forces of only two poles at a time to execute interstate dynamics. It is necessary to determine which element atoms convert heat energy into integral symbol-connected photon energy.

In the atoms of those elements where conservative forces from only two poles occur, interstate electron dynamics transform heat energy into photon energy resulting in a shape similar to connected tick symbols. It is necessary to determine which element atoms are suitable for converting heat energy into tick symbol-connected photon energy.

In those atoms where forces from three poles are exerted at the electron level, a photon is generated due to the connecting shapes of the *L* alphabet. It is necessary to determine which element atoms are suitable for converting heat energy into *L* alphabet-connected photon energy. However, an electron deals with the forces of only two poles at a time.

Figure 6a–c shows the shapes of the photon-like connected integral symbols, tick symbols, and *L*-like symbols, respectively. In Figure 6d, a photon shows both portions of force and energy.
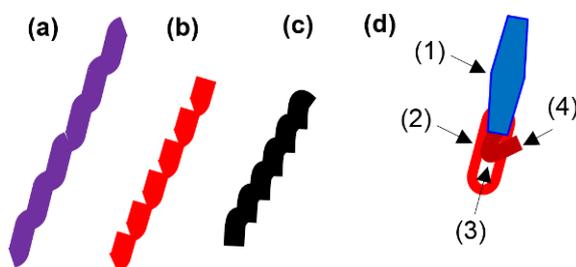

Figure 6. Overt photons of connected (**a**) integral symbols, (**b**) tick symbols, (**c**) L-like symbols, and (**d**) shaping force and energy along the trajectory; (1) electron dynamics, (2) shaping energy, (3) shaping force, (4) the removed, red-colored energy region showing the force in white color.

Suitable element atoms can generate photons with different characteristics. Generated photons of a different nature can open new areas of research. The mechanisms of generating photons in semi-behavior materials are studied again.

3.3. General Discussion

The number of photons generated by each silicon cell connected in series in the solar panel increases. As observed in solar panels, atoms of solar cells can generate maximum power when the setting is under the proper inclination.

The cycles of confined interstate electron dynamics of silicon atoms remain uninterrupted for an extended period, where titling the solar panel at a suitable angle concerning the base results in varying efficiency. Depositing silicon atoms for a few layers can generate high power.

It appears that one or three electrons of the outer ring cannot execute interstate dynamics. Generating photons by confined interstate electron dynamics can also disturb the center of an atom, thus preventing one or three electrons from executing dynamics. However, additional work is required to obtain a complete picture. Figure 5d shows that the opposite operation of the electron has a dynamic effect on the equilibrium state of an atom.

When the featured photons interact with the tips of laterally orientated electrons of elongated atoms, the reverted element of force prints the pattern [27]. Structural design is crucial for introducing specific applications [28–37]. The structural shape is due to the controlled behavior of force and energy [17].

When there is no specific interaction between a photon and an electron, the photon divides into pieces of heat. The heat of a divided photon dissipates in the structure of atoms. The conversion of energy from one form to another depends on structural characteristics.

The forces and energies of depositing carbon films are different [20,38]. The development of particles under predictor packing has also been studied, where photons shaped as waves are converted into tuned pulses [39]. Measuring the temperature of such materials is an integral part of related research, and some studies have also shed light on this topic [40–42].

One study explained the role of van der Waals interactions in isolated atoms by considering the induced dipoles [43]. Dispersion forces or van der Waals interactions occur when charge density fluctuations behave in a wave fashion [44].

4.0. Conclusion

A unit photon contains the energy of two bits, whereas a long-length photon has several bits. Two-unit photons constitute the least length photon. When an overt photon interacts with the north-sided tip of a laterally orientated electron at an approximately 90° angle, it is divided into bits of energy.

When a photon interacts with the side of the electron of a semisolid or solid atom, it diffracts, dividing into pieces. Pieces of broken photons dissipate heat and permeate the force.

When an outer ring electron of a silicon atom executes confined interstate dynamics, two forces apply at a time. However, those forces introduce an auxiliary moment of inertia. In a silicon atom, energy shapes around the force tracing along the trajectory of an electron. The energy in each electron dynamics shape is not from the sides of two forces exerted for each turning point. When the electron dynamics are for one forward or reverse cycle, they generate a unit photon in shape similar to a Gaussian distribution with turned ends.

The forces exerted on the electron change its aspects by restricting it to the interstate gap. The force and energy shaping along the trajectory of the electron remain preserved. The auxiliary moment of inertia is at each point of the turning electron. For a silicon atom, the reference point at which the electrons execute dynamically is the center of the atom. In the first stage, the electron lifts laterally.

The forces exerted on the electron remain conserved within the interstate electron dynamics. Before crossing the maximum limit point, the electron is examined by the opposite forces pulling it. By returning to complete the second half-cycle, the effect of the forces for the first half-cycle of the electron was relieved. Therefore, the forces of the opposite poles are now exerted on the electron.

Path-independent conservative forces exerted on the electron acquiring its lateral and adjacent positions are within natural viability. The electron executes interstate dynamics nearly at the speed of light. Electrons of suitable atoms build a bandgap where photons propagate to define the photonic band gap. During the propagation of photons, the force energy transfers to one of the other ends.

Suitable element atoms generate photons of different shapes depending on the built-in interstate gap of electron dynamics. Therefore, suitable element atoms can generate photons other than a waveform depending on their built-in interstate electron gap. Such investigations open up new horizons in energy science and materials science.

Conflicts of interest: The author declares no conflicts of interest.

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. M. Ali, I-Nan Lin, Forces driving amalgamation of nanoparticles and particles in solution, *Forces in Mech.* **7**, (2022) 100076.
16. 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).
17. 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).
18. 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.
19. 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.
20. 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.
21. M. Ali, M. Ürgen, Switching dynamics of morphology-structure in chemically deposited carbon films -A new insight, *Carbon* **122**, (2017) 653-663.
22. M. Ali, Tiny-Shaped Particles Developing a Mono-Layer Shape Dealing Localized Gravity and Levity at the Solution Surface, (2024). http://arxiv.org/abs/1609.08047v34
23. M. Ali, Atoms of None of the Elements Ionize While Atoms of Inert Behavior Split by Photonic Current, (2024). http://arxiv.org/abs/1611.05392v33
24. [24] M. Ali, Atoms in Gaseous and Solid States and Their Energy and Force Relationships under Transitional Behaviors, (2023). **https://doi.org/10.21203/rs.3.rs-88120/v7**

25. M. Ali, Structural Evolutions in Atoms of the Elements Executing Confined Interstate Electron Dynamics, (2023). **http://arxiv.org/abs/1611.01255v32**

26. M. Ali, Atomic Structure and Binding of Carbon Atoms, (2023). https://www.preprints.org/manuscript/201801.0036/v17

27. 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.

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

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

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

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

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

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

34. 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.

35. 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.

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

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

38. M. Ali, Etching of photon energy into binding energy in depositing carbon films at different chamber pressures, *J. Mater. Sci.: Mater. Electron.* **34**, (2023) 1209.

39. [39] M. Ali, I-N. Lin, C.-J. Yeh, Predictor Packing in Developing Unprecedented Shaped Colloidal Particles, *Nano* **13**, (2018) 1850109 (15 pages).

40. 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.

41. 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.

42. 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.

43. 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.

44. 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.

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