Available online at www.worldscientificnews.com

World Scientific News

WSN 70(2) (2017) 189-200 EISSN 2392-2192

SOURCE'S and SINKs in Phases of Matter

Gabriel James Tambunga

Stevens Institute of Technology,
1 Castle Point Terrance, Hoboken, New Jersey 07030, U.S.A.

E-mail address: mexicanengineer911@gmail.com

ABSTRACT

The space-time geometry around a photon was held constant despite the photon sources speed relative to a reflector, in a previous publication [1]. This resulted in the conservation of energy and momentum being balanced for a reflection, when motion of a reflector occurs after a reflection, relative to a reflector and a photon sources perspective, for the first time, to the author's knowledge. As a result, photons from moving sources have energies that are not equal to the energies observed. As photon sources moving towards and away from a reflector reflects photons, there may be mechanisms where energy deficient photons and photons with excess energy, compared to what is observed, acquire energy and disperse energy from and to its surroundings, respectively, so a reflection can occur. A reflector can be in a solid, liquid or a gas, where each phase presents possible sources of energy, for energy deficient photons, and possible sinks for photons with excess energy. No discreet and non-discreet energies associated with the phases of matter are disregarded as a possible source or sink, as this may delay detection of energy deficient photons and photons with excess energy, where tests for their detection are suggested.

***Keywords*:** Phases of Matter, Conservation of Energy, Conservation of Momentum, Energy Deficient Photons, Energy Excess Photons, Space-Time Geometry

1. INTRODUCTION

In a previous publication [1], the conservation of energy and momentum were balanced for a reflection when motion of a reflector occurs after a reflection, relative to a reflector and a photon sources perspective, for the first time, to the author's knowledge. To obtain the results, the space-time geometry around a photon was required to remain the same despite the photon sources speed relative to the reflector. A consequence to this resulted in calculations that indicated there was greater or less energy associated with the photon, for a photon source moving away and toward a reflector from the reflectors perspective, respectively, than what was associated with the observed wavelength. It is only when the photon source and reflector are not moving, relative to each other, is when the energy associated with the space-time geometry and the observed wavelength coincide with the current quantum wavelength-energy relation of $E = hc/\lambda$., where E is energy, h is planks constant and λ is the observed wavelength. The calculations indicated there is excess energy at the reflector, during absorption, for a photon source moving away from a reflector. The calculations also indicated for a photon source moving toward a reflector there is insufficient photon energy to excite an atom or molecule to the available energy state; and for a reflection to occur, energy at a value equal to the difference between the energy needed to excite the atom or molecule and absorbed photon energy would be required. The following is the derived equation for the excess energy at the reflector for a photon source moving away from a reflector, and the energy required for a reflection to occur for a photon source moving toward the reflector:

$$\left(\frac{\sqrt{1+\beta}}{\sqrt{1-\beta}}hf_r - hf_r\right) \tag{1}$$

where β is the relative velocity of the reflector or photon source divided by the speed of light, and where β is negative for a photon source moving toward a reflector.

Observations by Edwin Hubble [2, 3] contain examples of photon sources moving toward a reflector that acquired the energy needed to excite the atom or molecule for detection despite the insufficient energy of the photon sources photons. That is, the blue-shifted heavenly bodies were observed. Further, experiments indicated a slowing or reversal of atoms when atoms are moving toward a photon source and reflecting the photon sources photons [4, 5]. The results of these experiments indicate energy may have been acquired from the reflectors surrounding to make-up for the deficient energy of the photon sources photon to fully excite the reflector. In this paper an attempt will be made to determine the possible ways energy can be acquired from the reflectors surroundings for a photon source moving toward a reflector, to determine the possible ways excess energy can be applied to its surroundings for a photon source moving away from a reflector, and with this knowledge determine tests that will show the effects of these energy excess and energy deficient photons with its surroundings that will have results that are unique compared to results from tests that are used in current theory and practice. For simplicity, only parallel vectors will be used in this paper. As this paper is an introduction to the interaction of photons with excess energy and photons with deficient energy with atoms and molecules, performing the suggested experiment is beyond the scope of the current paper.

2. SOURCE'S AND SINKS AND PHASES OF MATTER

For simplicity, the word SOURCE will be used to describe the energy that will be supplied to an atom or molecule, which absorbed an energy deficient photon that originated from a photon source moving toward the atom or molecule, which will put the atom or molecule its fully excited state. And SINK will be used to describe energy that will dispel from an atom or molecule, which absorbed a photon with more energy than what is observed that originated from a photon source moving away from the atom or molecule. An AFFECTED ATOM or AFFECTED MOLECULE will be referred to an atom or molecule that absorbed an energy deficient photon or a photon with excess energy. To determine possible SOURCE's and SINK's different types of reflectors will be discussed. That is, a reflector is composed of matter that can be represented in three phases: solid, liquid and gas; where for each phase SOURCE's and SINKs will be discussed.

3. GAS

3. 1. Energy Originating from Within an AFFECTED ATOM or AFFECTED MOLECULE

The types of kinetic energy associated with a molecular gas are translational motion, vibrational motion and rotational motion. However, vibrational motion and rotational motion are discreet values, as the energy associated with electronic transition and nuclear transition. So, if one of these discrete forms of energy had the same value as the energy needed to serve as a SOURCE, then the SOURCE could be satisfied, and at the same time de-exciting the discrete forms of energy it borrowed from.

As the ideas presented in this paper are new, to the author's knowledge, rules have not been established that can prevent the possibility of having a combination of the same type of discreet energy and/or a combination of the discrete energies serving as a SOURCE. Conversely, if the discreet energies were to serve solely as a SINK, the discrete available energy states must individually, or in combination, be the same value as the energy needed to serve as SINK. Atoms do not have the vibrational or rotational motion as molecules, so electronic transitions and nuclear transitions are the only discrete energies that can be used as a SOURCE or a SINK.

Translational motion of an affected atom or molecule can serve as a possible SINK. However, to not violate the Conservation of Energy, translational motion cannot serve as a SOURCE of an affected atom or molecule. That is, an atom or molecule cannot change its own motion, as this would show an increase in energy from a perspective that is parallel to the atom or molecule before the change. Instead, as the atom or molecule that absorbed an energy deficient photon still has an increase in energy, that increase in energy may serve as a SINK if no SOURCE's are available to the affected atom or molecule. The translational energy would be the same value as the space-time bending represents, and not the value of the observed photon.

The aforementioned SOURCE's and SINK's caused changes in energy to the AFFECTED ATOM or AFFECTED MOLECULE, where the energy originated from the AFFECTED ATOM or AFFECTED MOLECULE.

3. 2. Energy Originating Externally from an AFFECTED ATOM or AFFECTED MOLECULE

There are other possible SOURCE's and SINK's that are external to the AFFECTED ATOM or AFFECTED MOLECULE. One possibility is particle absorption for a SOURCE. For example, a photon can serve as a SOURCE, if the photon energy is the same value as the energy needed to serve as a SOURCE. This MAY be a discreet value, as it is unknown that a SINK may be required if the SOURCE value is exceeded. Further, mass particles will not be eliminated as a possibility, but can be eliminated if experimentation does not provide positive results. The creation of mass and mass-less particles can serve as a SINK; however, there is currently no mechanism that can provide an understanding of how particles would be created. The need for a SINK, due to excess energy, is the only conviction that a particle can be created. Again, experimental results can eliminate this possibility.

Vibrational, rotational, nuclear and electronic energy states of molecules that are external to the AFFECTED ATOM or AFFECTED MOLECULE can serve as a SOURCE or a SINK. To serve as a SOURCE, and as there is no current limitation to the amount of molecules that can serve as a SOURCE, the total occupied vibrational, rotational, nuclear and electronic energy states must add to the value needed to serve as a SOURCE. Further, for un-occupied vibrational, rotational, nuclear and electronic energy states to serve solely as a SINK, the total value of the un-occupied energy states must equal to the energy needed to serve as a SINK.

Translational motion of atoms or molecules that are external to the AFFECTED ATOM or AFFECTED MOLECULE can also serve as a SINK and a SOURCE. The conservation of momentum and energy can be satisfied from all perspectives by including all bodies associated with the energy exchange. For example, from a perspective that is parallel to an atom or molecule that will serve as a SOURCE, prior to a change in kinetic energy, the perspective would observe a gain in energy due to a change in kinetic energy. However, if the AFFECTED ATOM or AFFECTED MOLECULE is included in the observation, the speed of the atom or molecule, which will serve as a SOURCE, toward the AFFECTED ATOM or AFFECTED MOLECULE would be decreased and the electronic energy level of the AFFECTED ATOM or AFFECTED MOLECULE will increase. Using parallel vectors indicates the conservation laws are satisfied. No limitations can be determined, as to a minimum or maximum translational motion that can serve as a SINK. However, for translational motion to serve solely as a SOURCE, the total translational energy acquired from the external atoms and/or molecules must be greater than or equal to the energy required to serve as a SOURCE.

For all possible external SOURCE's and SINKs, experiments may be able to determine the maximum distances particles, atoms and/or molecules can serve as SOURCE's and SINKs. Further, as there are no current restrictions to prevent any combination of SOURCE's and SINKs, SOURCE's and SINKs that are internal and external to the AFFECTED ATOM or AFFECTED MOLECULE can be combined.

3. 3. Summation Equations of Possible SOURCE's and SINKs

The following is a general equation, based on the discussion above, for the possible SOURCE's or SINKs that are internal to the AFFECTED MOLECULE:

$$E_{v_l} + E_{r_m} + E_{e_n} + E_{z_y} + E_t$$

In the equation above E_{v_l} is the summation of the total possible occupied or unoccupied vibrational energy states for SOURCE's and SINKs, respectively, and where there are a total number of l vibrational energy states. E_{r_m}, and E_{e_n} and E_{z_y}, are the summations associated with the rotational energy states, electronic energy states and nuclear energy states, respectively, which are similar in mathematical structure to the summation of the vibrational energy states. E_t is associated with translational energy. The equation for an atom will not have the first two summations.

The following is the general equation for the possible molecular SOURCE's or SINKs that are external to the AFFECTED MOLECULE:

$$E_{v_{l_a}} + E_{r_{m_a}} + E_{e_{n_a}} + E_{z_{y_a}} + E_{t_a} + E_p \qquad (2)$$

In the summation equation above a is the total number of molecules that provide SOURCE's and SINKs to the AFFECTED MOLECULE. For each of these molecules, the remaining portions of the summation equations are similar to the summation equations for the possible SOURCE's or SINKs that are internal to the AFFECTED MOLECULE. An atomic gas will not contain the first two terms. E_p is associated with particle energy.

4. LIQUID AND SOLID

Translation motion is not as prevalent in a liquid compared to a gas, but the possible SOURCE' and SINKs indicated above can be used. For a solid, there is no rotational or translational motion of an AFFECTED ATOM or AFFECTED MOLECULE within the solid. However, if the overall solid is small and there are several AFFECTED ATOM's or AFFECTED MOLECULE's then translational motion may be used as a SINK. This results in a general equation for an AFFECTED ATOM or AFFECTED MOLECULE in a solid equal to:

$$E_{v_l} + E_{e_n} + E_{z_y} + E_t$$

E_t may not be used as a SOURCE, as this would indicate an increase in energy from the perspective of the solid. Also, each AFFECTED ATOM or AFFECTED MOLECULE in a solid can acquire its SOURCE's and SINKs from its surrounding atoms or molecules bound within the same solid.

5. COMBINATIONS OF SOURCE'S AND SINKS

As the AFFECTED ATOM and AFFECTED MOLECULE can be in any phase of matter, the SOURCE's and SINKs can also vary in multiple combinations. The following are AFFECTED ATOM's and/or AFFECTED MOLECULE's in the three phases of matter, where the many combinations SOURCE's and SINKs are in different phases of matter than the AFFECTED ATOM's and AFFECTED MOLECULE's phase of matter.

5. 1. An Affected Solid with SOURCE's and SINKs in a Molecular Gas

The AFFECTED ATOM or AFFECTED MOLECULE in a solid has internal combinations of SOURCE's and SINK's and other combinations of SOURCE's and SINK's from molecules or atoms within the solid surrounding the AFFECTED ATOM or AFFECTED MOLECULE. The total combinations of SOURCE's and SINK's within a solid is as follows:

$$E_{v_l} + E_{e_n} + E_{z_y} + E_{v_{l_i}} + E_{e_{n_i}} + E_{z_{y_i}} + E_t \tag{3}$$

In the summation equation above, i is the total number of molecules and/or atoms that provide SOURCE's and SINKs to the AFFECTED MOLECULE and/or AFFECTED ATOM. The total SOURCE's and SINKs of a molecular gas that are external to the solid is stated in equation (2), re-written as:

$$E_{v_{l2_a}} + E_{r_{m2_a}} + E_{e_{n2_a}} + E_{z_{y2_a}} + E_{t2_a} + E_p \tag{4}$$

$l2$, $m2$, $n2$, $y2$, and $t2$ indicate the transcriptions for the external vibrational, rotational, electronic, nuclear and translational energies.

The total SOURCE's and SINKs, equations (3) plus (4), must be at the same value as in equation (1). That is,

$$\frac{\sqrt{1+\beta}}{1-\beta} hf_r - hf_r = E_{v_l} + E_{e_n} + E_{z_y} + E_{v_{l_i}} + E_{e_{n_i}} + E_{z_{y_i}} + E_t + E_{v_{l2_a}} + E_{r_{m2_a}} + E_{e_{n2_a}} + E_{z_{y2_a}} + E_{t2_a} + E_p \tag{5}$$

There are many combinations of these energies, where the total possible combinations are as follows:

$$\left((2^{l+n+y})^{i+1} + 3\right)\left((2^{l2+m2+n2+y2+a})^{a+1} + 3\right) \tag{6}$$

Equations (3) to (6) can be used for a solid inside a molecular liquid.

5. 2. An Affected Solid with SOURCE's and SINKs in an Atomic Gas

The possible SOURCE's and SINKS of a solid, within an atomic gas, will not change, so equation (3) remains. The total SOURCE's and SINKs of an atomic gas that are external to the solid is as follows:

$$E_{e_{n3_a}} + E_{z_{y3_a}} + E_{t3_a} + E_p \tag{7}$$

$n3$, $y3$, and $t3$ indicate the transcriptions for the external electronic, nuclear and translational energies of the atomic gas.

The total SOURCE's and SINKs, equations (3) plus (7), must be at the same value as in equation (1). That is,

$$\frac{\sqrt{1+\beta}}{1-\beta}hf_r - hf_r = E_{v_l} + E_{e_n} + E_{z_y} + E_{v_{l_i}} + E_{e_{n_i}} + E_{z_{y_i}} + E_t + E_{e_{n3_a}} + E_{z_{y3_a}} + E_{t3_a} + E_p$$

The total possible combinations are as follows:

$$\left((2^{l+n+y})^{i+1} + 3\right)\left((2^{n3+y3+a})^{a+1} + 3\right)$$

5. 3. An Affected Molecular Liquid with SOURCE's and SINKs in a Molecular Gas

The total combinations of SOURCE's and SINK's within a molecular liquid is as follows:

$$E_{v_l} + E_{r_m} + E_{e_n} + E_{z_y} + E_{v_{l_i}} + E_{r_{m_i}} + E_{e_{n_i}} + E_{z_{y_i}} + E_t \qquad (8)$$

In the summation equation above, i is the total number of molecules that provide SOURCE's and SINKs to the AFFECTED MOLECULE. The total SOURCE's and SINKs of a molecular gas that are external to the solid is stated in equation (2), re-written as:

$$E_{v_{l2_a}} + E_{r_{m2_a}} + E_{e_{n2_a}} + E_{z_{y2_a}} + E_{t2_a} + E_p \qquad (9)$$

$l2$, $m2$, $n2$, $y2$, and $t2$ indicate the transcriptions for the external vibrational, rotational, electronic, nuclear and translational energies.

The total SOURCE's and SINKs, equations (8) plus (9), must be at the same value as in equation (1). That is,

$$\frac{\sqrt{1+\beta}}{1-\beta}hf_r - hf_r = E_{v_l} + E_{r_m} + E_{e_n} + E_{z_y} + E_{v_{l_i}} + E_{r_{m_i}} + E_{e_{n_i}} + E_{z_{y_i}} + E_t + E_{v_{l2_a}} + E_{r_{m2_a}} + E_{e_{n2_a}} + E_{z_{y2_a}} + E_{t2_a} + E_p$$

There are many combinations of these energies, where the total possible combinations are as follows:

$$\left((2^{l+m+n+y})^{i+1}+3\right)\left((2^{l2+m2+n2+y2+a})^{a+1}+3\right)$$

5. 4. An Affected Molecular Liquid with SOURCE's and SINKs in an Atomic Gas

The total combinations of SOURCE's and SINK's within a molecular liquid remains as in equation (8). The total SOURCE's and SINKs of an atomic gas that are external to the molecular liquid is as follows:

$$E_{e_{n2_a}}+E_{z_{y2_a}}+E_{t2_a}+E_p \tag{10}$$

$n2$, $y2$, and $t2$ indicate the transcriptions for the external vibrational, rotational, electronic, nuclear and translational energies.

The total SOURCE's and SINKs, equations (8) plus (10), must be at the same value as in equation (1). That is,

$$\frac{\sqrt{1+\beta}}{1-\beta}hf_r-hf_r = E_{v_l}+E_{r_m}+E_{e_n}+E_{z_y}+E_{v_{l_i}}+E_{r_{m_i}}+E_{e_{n_i}}+E_{z_{y_i}}+E_t+E_{e_{n2_a}}+E_{z_{y2_a}}+E_{t2_a}+E_p$$

The total possible combinations are as follows:

$$\left((2^{l+m+n+y})^{i+1}+3\right)\left((2^{n2+y2+a})^{a+1}+3\right)$$

For possible tests, it could be a goal to reduce the amount of possible combinations.

6. TESTS

6. 1. Vibrational Energy Within a Solid as a SOURCE or SINK

The energy possibilities can be large unless some possibilities are restricted. For example, a large solid eliminates translational and rotational motion, leaving only vibrational energy, nuclear energy and electronic energy as the only SOURCE's and SINKs that are internal to an AFFECTED ATOM or AFFECTED MOLECULE within a solid. Further, the solid can be in a vacuum to further restrict SOURCE's and SINKs that are external to the AFFECTED ATOM or AFFECTED MOLECULE.

A single vibrational energy state can be the focus, where the vibrational energy state must not equal to any other individual electronic state or in combination. Experiments can consist of a reflection of a photon sources photons from the surface of this solid in a vacuum, where one experiment will consist of a photon source moving toward the solid and a second experiment consisting of a photon source moving away from a solid. For the experiment consisting of a photon source moving toward a solid, the vibrational energy would reduce as it will be serving as a SOURCE for an AFFECTED ATOM or AFFECTED MOLECULE if there is an occupied vibrational energy state at or possibly around the AFFECTED ATOM or AFFECTED MOLECULE.

For the vibrational energy to serve as a SOURCE, the vibrational energy must equal to the energy needed to fully excite the AFFECTED ATOM or AFFECTED MOLECULE. That is, using equation (1):

$$\frac{\sqrt{1+\beta}}{1-\beta} hf_r - hf_r = E_v \tag{11}$$

where E_v is the single vibrational value in focus, and hf_r is the energy that is to be reflected and the value observed by the solid. The velocity needed for the photon source is the following

$$v = c\,\frac{\left(\frac{E_v}{hf_r}+1\right)^2-1}{\left(\frac{E_v}{hf_r}+1\right)^2+1} \tag{12}$$

However, as the photon source is moving toward the solid, v would be negative and the equation becomes

$$v = c\,\frac{-\left(\frac{E_v}{hf_r}+1\right)^2+1}{\left(\frac{E_v}{hf_r}+1\right)^2+1} \tag{13}$$

This experiment will result in photons with an energy value hf_r reflecting and atoms or molecules in the solid having a decrease in the vibrational energy of E_v, where the amount of reflected photons is equal to the number of decreased vibrational energy states within the solid.

The reverse would happen with a photon source moving away from a solid, where equation (11) is used. That is, hf_r will be reflecting and atoms or molecules in the solid will have an increase in the vibrational energy of E_v.

6. 2. A Second Photon Source as a SOURCE

In the same experimental setup, a second photon source can be used as a SOURCE, where if the energy of the photon from the second photon source is known, equations (12) and (13) can be used. However, E_v will be replaced by the photon energy from a second photon source. If the velocity of the primary photon source is known then the energy of the photon from the second photon source can be determined via equation (11). This experiment may result in the energy value of hf_r from the AFFECTED ATOM or AFFECTED MOLECULE reflecting and a photon from the second photon source disappearing.

6. 3. A Phase of Matter as a SOURCE

As the atoms or molecules within a solid have no translational or rotational motion, it may be possible to change the phase of a liquid to a solid. This can be performed by reducing all three forms of kinetic energy of a molecular liquid. This can be performed by reducing all three kinetic energies of a molecular liquid or the translational energy of an atomic liquid.

The vibrational and rotational energies can be reduced by using the methods mentioned in the previous section. However, to reduce translational motion, the kinetic energy of the molecules or atoms would need to be determined, as the AFFECTED ATOM or AFFECTED MOLECULE would be using the kinetic energy of the surrounding atoms or molecules as a SOURCE. The density of the atoms or molecules may need to be increased as the minimum distance need for the AFFECTED ATOM or AFFECTED MOLECULE to acquire the kinetic energy is unknown. Determining all of the kinetic energy of the molecules and applying all the necessary velocities to the photon sources can be cumbersome, as there may be many photon sources. However, considering fewer kinetic energies may result in fewer photon sources and accomplish the same change in the phase of matter. Further, if rotational motion and vibrational motion can acquire its energy from translational motion, then greatly decreasing the vibrational and rotational energy states, via aforementioned methods, can be beneficial.

The same method can be used to change the phase of matter from a gas to a liquid. As translational motion is the most prevalent form of kinetic energy in a gas, the amount of the photon sources can be large and the density of the gas may also be large.

7. DISCUSSION

The proposition that photons can contain deficient energy or excess energy compared to what is observed was presented in a previous publication [1]. The proposition was obtained by maintaining the space-time geometry around a photon as constant despite what the observed wavelength is by a reflector, which is influenced by the speed of the photon source relative to the reflector. The proposition was generated due to the lack of the balancing, in previous publications [7, 8], of the conservation of energy, from the perspective of a reflector, where the conservation of momentum was balanced adequately, when motion of a reflector occurs after a reflection. Further, previous publications were observed to not consider basic Quantum Theory in balancing the conservations laws; however, this was considered in the publications that were the foundations to this paper [1, 9].

When considering conservation of energy, conservation of momentum, Quantum Theory, and maintaining space-time geometry around a photon as a constant despite what the observed wavelength is by a reflector, results in kinetic energy of a reflector, if all the excess energy is used for translational motion, for a photon source moving away from a reflector, as indicated in the graph below.

Figure 1 is a plot of β (X-axis), and the excess energy, in hf_r, of a single atom or molecule applied to a reflector (Y-axis), when a source is moving away from a reflector, via equation (1). This plot indicates that the velocity of the source must be at approximately 0.8 times the speed of light for the excess energy to be twice the energy of a single photon. Current beliefs indicate that twice the momentum of a photon [7, 8], at minimum, will be applied to reflector despite the speed or direction of the source. This graph is also a correction to the graph indicated in reference [1], which contains an incorrect graph used.

In this paper suggestions for tests have been presented that can show the possible existence of photons with deficient energy or excess energy compared to what is observed. To determine these tests many SOURCE's and SINKs were considered as a possibility, and no possibilities were eliminated. However, though possibilities were not eliminated the conservation of energy and conservation of momentum were still applied, and elimination of a SOURCE still occurred. This elimination also corrects a statement indicated in reference [1]. That being from reference [1], "That is, when a source and reflector are moving towards each other, this results in a reflector increasing its velocity towards the source, according to the viewpoint presented in this paper. However, current beliefs, such as Doppler Cooling [8], indicate the atom or molecule would slow down in this same situation." The reference for [8] in reference [1] is the reference [6] in this paper. Section 3.1 of this paper indicates that "an atom or molecule cannot change its own motion, as this would show an increase in energy from a perspective that is parallel to the atom or molecule before the change." This elimination also conflicts with the stated resons why atoms slow in references [4] and [5]. From this paper, there are only three possible explanations for the slowing of the atoms, where atoms are moving toward a photon source. These are: (a) due to the energy of the absorbed photon, where translational motion acts as a SINK, at the value that is represented by the space-time, (b) by the absorbtion of translational energy, a SOURCE, of atoms outside of the affected atom, (c) a combination of (a) and (b).

As the ideas presented in this paper are new, to the author's knowledge, eliminating possibilities may delay proof of the existence of these photons. For the presented experiments, the photon source and the reflectors must not have any perturbations between the two (e.g. funneling, reflecting, re-directing, …etc.), as rules for the interactions between the energy deficient or energy excess photons and a reflector have not been determined.

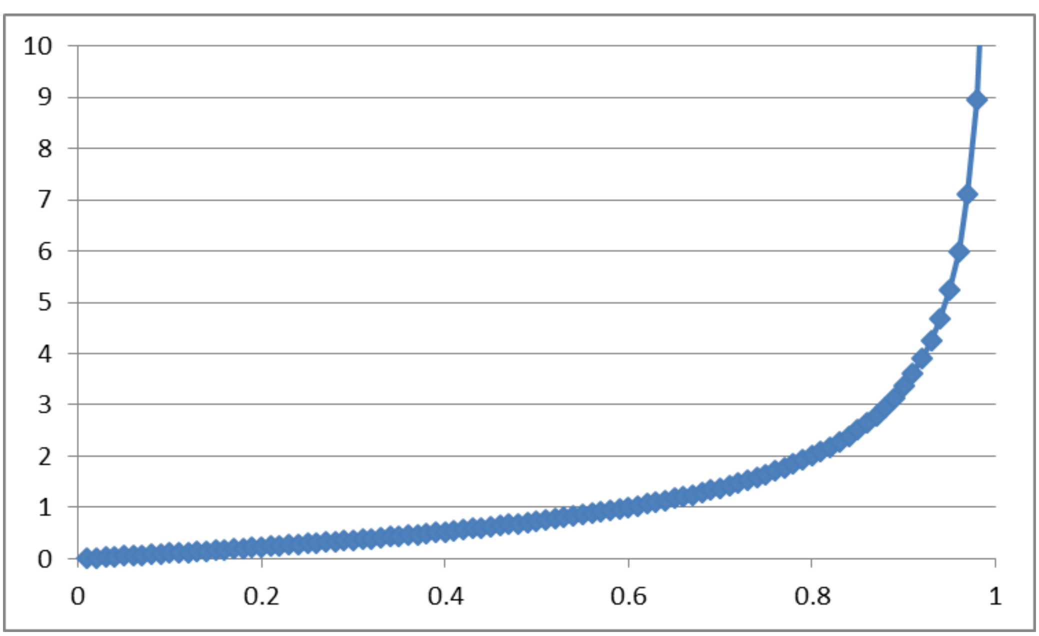

Figure 1. Excess Energy.

8. CONCLUSION

When a photon with excess or deficient energy is reflected by an atom or molecule, there can be several possibilities where energy can be dispelled or where energy can be acquired, respectively. The possibilities considered in this paper can provide several opportunities of testing that can prove the possible existence of energy deficient or energy excess photons.

Generating equations to describe the interactions of photons and SOURCE's and SINKs is possible now. However, if no experimental results are positive then the effort of generating equations would be wasted labor. Therefore, the proposed experiments can open a gate to a new science or prevent un-necessary labor.

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(Received 01 April 2017; accepted 17 April 2017)