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Photon Is a Building Block of Matter

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Abstract: As it shown here, photon is another building block of matter. Hydrogen atom is not just a single electron revolving about the positively charged of proton as the nucleus but the proton is covered with a cloud; consist of about 12 thousands of photons. A new look to the difference temperature is presented here as changing the density of photons in the domain of infrared that are named here as the Heat Photons. For example, the number of the Heat Photons should be added to the already exist the other infrared photons in one cubic centimeter of water to raise one Kelvin is obtained here: $n= 6.3143313\times10^{20} cm^{-3}{}^{\circ}K^{-1}$. By changing the density of heat photons in any media the temperature within that media is changed. Based on this paper the maximum temperature degree could not be infinitive and estimation of the Maximum Degree of Temperature yields here about one hundred trillion degrees Kelvin ($T_{maximum}$=$966.644\times10^{11}{}^{\circ}K\cong1\times10^{14}{}^{\circ}K$) that can be interpreted as the primary and the maximum temperature of the Big Bang moment. It is discussed here the hypothesis of photons affecting to the heat energy that photons are stored or transmitted as the variation of temperature in atoms and molecules. Foods and all biological forms are storages and capacitors of photons. Burning all kinds of materials is interpreted here as the realization of stored photons to the environment. The Specific Heat Capacity of substances is discussed as the capacity of storing heat photons. Then the Specific Heat Capacity of Atoms is introduced for showing how some of the molecules like water (acts as the agent of preventing fast variation of temperature in biologic bodies) and sugars like sucrose with chemical formula of $C_{12}H_{22}O_{11}$ are storage of photons that trapped by Chlorophyll from sun rays or other light sources.

Keywords: Photon as a Building Block, Temperature as the Photon Density, Maximum Temperature

1. Introduction

Quantic View of Heat Energy

Different forms of mechanical, electrical, radiation and nuclear energy change to heat energy naturally, but reversing the direction of these processes are not simple. Changing the heat to another form of energy like electrical energy (in large scale) needs different series of machineries and installations. It needs fuel, boiler, piping, heat exchanger like cooling tower, turbine, electric generator, voltage transformers, electrical transmission lines, controllers, etc. In this process also large fraction of heat is dissipated to the environment and just very small percentage of primary heat energy from fuel is received as electrical energy by the customers. Visible light is a narrow band in electromagnetic waves ($aproximately\ 400\ \mu m - 700\ nm$) [11], and the heat as emitting of Infrared is narrower band close to that band. Infrared rays have huge effects in the life on Earth. All of creatures feel this narrow band; some of them like snakes even could see the infrared beams. *Snakes possess a unique sensory system for detecting infrared radiation, enabling them to generate a 'thermal image' of predators or prey*.,[2]

Some of the effects of infrared radiations are as below:

a. It has proportional relation to the temperature.
b. Tolerating temperatures for most of plants, species and creatures is a limited range. *Our results suggest that species at mid-latitudes are most susceptible to large performance declines under a future climate scenario.,* [3]. For plant growth four basic elements of water, nutrients, light and temperature are needed. Green plants not only need right temperature, water and other nutrients to grow and survive, but also they need suitable amount of light to grow. Artificial light like LED (Light Emitting Diode)also are used these days for growing plants but studies showed the combination of LEDs lights are needed for the best results. *The combination of LED 60% red and 40% blue light was*

best effect on the differentiation, development and rooting of tissue culture seedlings,[4].

c. The comfort zone of temperature for human being is a narrow band. *Thermal Environmental Conditions for Human Occupancy, notes that for thermal comfort purposes, temperature could range from between approximately 67 and 82 °F.*[5].
Maintaining the right temperature needs to live or work indoor most of the days year around and use energy especially electrical energy in summer for cooling and mostly fusil energy for heating in winter.

d. No chemical reaction at a certain temperature happens unless some amount of heat energy per molecule grams of mass absorbs (increasing the solubility of salts in water) or some heat releases (combination of cement and water, reaction of sodium with water, combination of oxygen and hydrogen).

In this paper, the new aspects of the heat energy emphasising on infrared rays or heat photons on quantic view are studied.

2. Method

Let us briefly take a new look to the relations of heat energy with the other Physical quantities from the view of Quantum Physics:

As the view of radiation thermodynamics,

$density\ of\ photons = f(x,k,t)dk$, *and the photon transport equation:*

$\frac{\partial f}{\partial t} + Cn_k \frac{\partial f}{\partial x_K} = S(f)$, *where S is the density of production of photons which is due to absorption, emission and scattering. All three phenomena occur only by interaction of photons with matter, so that S is zero when the space is free of matter [6].*

2.1. Temperature Degree

Temperature degree already has been defined as one of 7 primary quantities in Physics. As is shown here, it is a secondary quantity not a primary.

The relation between heat energy and the difference of temperature has been introduced as:

$$\Delta Q = mC\Delta T \tag{1}$$

When the difference of temperature is discussed, at least two enclosed environment are compared. Comparing the temperature between these two places of a and b may results:

(1) $T_a > T_b$, The density of heat photons at the place of a is more than the place of b.

(2) $T_a < T_b$, The density of heat photons at the place of a is less than the place of b.

(3) $T_a = T_b$, The density of heat photons at the place of a and the place of b are the same.

2.1.1. Dimension of the Temperature

For the dimension of temperature let's use:

$$RT = PV \tag{2}$$

Where in SI system: R as the Gas Constant,

$$\mathrm{R} = 8314\ {}^{J}/_{Kmol.K} = 1.9872\ {}^{Kcal}/_{Kmol.K},$$

T is temperature in Celsius, p is pressure in Pascal, and V is Volume in cubic meter.

Rewriting (2) gives;

$$T = \frac{PV}{R} \tag{3}$$

For pressure we have:

$$P = \frac{F}{S} \tag{4}$$

Substituting in (3) yields:

$$T = \frac{F.V}{R.S} \tag{5}$$

Assuming the enclosed volume is in spherical shape with the radius of r, then:

$S = 4\pi r^2$ and $V = \frac{4}{3}\pi r^3$, Substituting these in (5) gives:

$$T = \frac{F.\frac{4}{3}\pi r^3}{R.4\pi r^2} = \frac{F.r}{3R} = \frac{W}{3R} \tag{6}$$

The product of $F.R$ is the work (energy) of heat photons for the force of average of F to move at the distance of r, it could be outward, inward or zero and R is constant.

Therefore,

a) If the direction of r to be outward, it is concluded the inside temperature is more than the environment.

b) If the direction of r to be inward, it is concluded the inside temperature is less than the environment.

c) If r or F to be zero, it results that there is temperature equilibrium between inside and outside.

2.1.2. Measuring the Temperature

Measuring the temperature is normally a process of heat evaluating of a system which measuring temperature is sought compared to a system of reference. Different kinds of thermometers (analogue or digital) graduated to show the temperature as a number of Celsius or Fahrenheit degrees. The mechanisms of all are based on the exchange of heat energy to the desired environment. Heat transfer by all kinds of conduction, convection and radiation is considered.

Let us review the first generation of thermometers that a little liquid like Mercury (Hg) or Alcohol (C_2H_5OH) inside a bubble with graduated narrow pipe is a temperature measurement device. Changing the environment temperature causes the level change of the liquid that it interpreted to new temperature. The liquid volume change because of temperature change is already known as:

$$V = V_\circ(1 + \gamma\Delta T)$$

$\gamma =$ Volume thermal expansion coefficient

The difference of the liquid volume change is:

$$\Delta V = \gamma V_\circ \Delta T \tag{7}$$

This change is because of the heat transfer to thermometer from the environment that measuring temperature is desired. At the steady state between two systems, the exchange amount of heat is the same, if other parameters like the volumes remain unchanged.

For changing the number in any kind of thermometer there should be difference in exchanging heat energy between the desired environment and thermometer that depends on the difference density of energy between them. Now, it is said, the difference density of heat energy causes the difference volume of liquid in thermometer. In other words, the difference density of heat energy is proportional to the difference volume of liquid in the tube of thermometer. Let's indicate the difference density of heat energy as the difference energy of the quantums of heat photons divided to the volume of environment desired for measuring temperature and the proportional coefficient as C. In the new look to the changing of the liquid volume because of heat transfer of the environment can be introduced as a new formula:

$$h\nu.\Delta n_{HP}/_{V_{en}} = C\Delta V \quad (8)$$

Where;

$h\nu$ = Average energy of each photon in the domain of infrared rays:

Δn_{HP} = The number of infrared or Heat Photons transferred for producing ΔV of liquid of the thermometer.

V_{en} = The volume of the environment as a closed system that measuring temperature in it is sought

ΔV = The liquid volume change of thermometer

$V_\circ$ = The primary volume of thermometer

C = Constant as the proportional coefficient

Substituting from (8) to (7):

$$h\nu.\Delta n_{HP}/_{V_{en}} = C\gamma V_\circ \Delta T$$

$$\Delta T = {h\nu.\Delta n_{HP}}/{C\gamma V_{en} V_\circ} \quad (9)$$

This formula shows that the difference temperature showing by thermometer:

(1) Has proportional relation with the difference number of heat photons exchanged

(2) Has reverse relation with the volume of the environment (V_{en}) . For increasing the difference temperature it is needed to reduce the volume of V_{en} . In anther words, as squeezing the orange gives up some juice, reducing the volume of gas results raising its heat energy density and gives some extra heat photons to the environment. Expanding the volume of a gas reduces its density of heat energy. For the heat equilibrium of an expanded gas with the environment it needs to absorb some heat photons from the environment.

As we see:

Temperature in any place can be defined as the density of heat photons in that place.

As already known:

The temperature difference is defined as the driving force by which heat is transferred from a source to receiver [7].

Now, it could be said: The temperature difference is defined as the difference density of heat photons and is the driving force by which heat is transferred from source to receiver naturally from the higher density to the lower density.

The Place here is defined as mostly a three dimensional volume which is studied.

As an example, focusing a sun beam on the paper by a magnifier makes it to burn in a short period of time. When the density of heat photons increases, the regional temperature of paper exposed to beam raises too. At the time of exceeding its photon storage capacity or reaching to the flash point, substance (the three-dimensional volume of paper) starts to burn.

With the same logic, it is concluded:

No insulated black body can absorb light forever.

In the daily experiences, the remaining of full burning of combustible materials is white ash (ignoring its minerals) or gases mostly Carbon Dioxide. At the moment of burning and before increasing their volume or changing the other chemical and physical conditions, they can't absorb heat photons anymore. Therefore:

Temperature is the density of Infrared photons energy.

2.2. Calculating the Number of Heat Photons Raise One Degree of Kelvin for One Cubic Centimeter (Specific Heat Capacity) of Water

The Specific of Heat Capacity of water is $4.184\ Jg^{-1}K^{-1}$ [8].

For the medium frequency of infrared band on electromagnetic wave, let us indicate the medium frequency of Infrared light 10^{13} (Hz) , figure 27.7 of reference: [8].

Energy of each Infrared photon:

$$E = h\nu$$

$$h = Plank's\ constant = 6.6261965 \times 10^{-34} Js$$

$$E_{HP} = 6.6261965 \times 10^{-34} \times 10^{13} = 6.6261965 \times 10^{-21} J \quad (10)$$

By dividing the Specific of Heat Capacity of water to the medium energy of Infrared of each Photon, the total number of Infrared Photons can raise one Kelvin degree in one cubic centimeter or the density of Thermal Photons for one degree of temperature is obtained:

$$n = {4.184 Jcm^{-3}K^{-1}}/{6.6261965 \times 10^{-21} J} = 6.3143313 \times 10^{20} cm^{-3}K^{-1} \quad (11)$$

This can be interpreted to the density of Infrared photons if adds to the already existence of other infrared photons in one cubic centimeter of water for one degree of Kelvin. Based on the black body emitting curves, the density of total photons for all frequencies is much higher, [1]. As the temperature

changing of the body does not yield the uniform curve of the emitting frequencies, therefore the mentioned number is an approximate number.

2.3. Photons Interact with Matter

Absorption, Reflection and Transmission of light show that photons interact with the matter. If Big Bang Theory be right, then the repelling of photons with high intensity shows not only they interact with matter but also they have interaction themselves.

The sources of heat energy within matter

a) Kinetic energy of the atoms and molecules
b) Radiation from nucleus of atoms
c) Radiation from electronic layers of atoms

Here the c part is discussed:

Already known that transition of electron from a layer to another layer leads to absorption or emitting a photon depends on the level of energy of electron.

If photons interact with matter they could not be a single building block of matter.

2.4. Photon is Another Building Block of Matter and Around the Nucleus Is Covered by the Cloud of Photons

Let's consider Hydrogen the simplest atom with the rest masses:

$$Electron\ rest\ mass, m_e = 9.10953 \times 10^{-31}\ kg\ Proton\ rest\ mass, m_p = 1.67265 \times\ 10^{-27}\ kg \text{ [9]}$$

$$Addition\ of\ two\ masses = 1.672910953 \times 10^{-27} kg \tag{12}$$

$$Hydrogen\ atom\ mass, m_H = 1.67356 \times 10^{-27} kg = 1.007825\ u \tag{13}$$

Comparing (12) to (13) shows there is a difference between the hydrogen atom mass and the addition the masses of electron and proton.

The difference between the addition of one electron to one proton mass and hydrogen atom mass:

$$\Delta m = 9.53 \times 10^{-34} kg \tag{14}$$

It belongs to the energy within the atom which for the unique particle of hydrogen nucleus, it is associated just to the orbits around the nucleus.

2.5. Calculating the Heat Photons Around the Hydrogen Atom

Considering (14) for equivalent energy using Einstein Equation, we have:

$$E = \Delta m.C^2 = 9.53 \times 10^{-34} \times (3 \times 10^8)^2 = 8.577 \times 10^{-17} Joule \tag{15}$$

The total energy of hydrogen atom based on the Bohr Theory:

$$E_{n_1} = -13.6\ eV = -13.6 \times 1.602189 \times 10^{-19} = -2.17877704 \times 10^{-18} J$$

$$\Delta E = E - E_{n_1} = 83.59122296 \times 10^{-18} J \tag{16}$$

ΔE , The remaining energy associated to the photons which exist around the nucleus.

$$N_{Photons\ around\ Hydrogen\ atom} = {}^{\Delta E}/_{E_{HP}} = (83.59122296 \times 10^{-18} Joule)/(6.6261965 \times 10^{-21} Joule \approx 12{,}615.26 \tag{17}$$

It shows that Hydrogen Atom is not just association of one proton and an electron circulating around it, but also including a cloud of about 12 thousands photons. Therefore, Photon is Another Building Block of Matter.

Density of photons reduces by increasing the radius from proton.

Average density of photons at the time of Hydrogen atom creation:

$$r_1 = 0.53 \times 10^{-10} m$$

$$V_{Hydrogen} = {}^4/_3\, \pi r^3 = 1.4887710^{-31} m^3$$

$$d_{photons} = \frac{N_{Photons\ around\ Hydrogen\ atom}}{V_{Hydrogen}}$$

$$d_{photons} = \frac{12{,}615.32}{1.4887710^{-31} m^3} = 8.473647 \times 10^{25} cm^{-3} \tag{18}$$

By changing the temperature this density will also change.

2.6. Specific Heat Capacity (SHC) of Substances and Infrared Photons

Now, it could be said, the specific heat capacity of substances is proportional to the accumulation of infrared photons within the matter. For some substances which biologic bodies consists the most the atoms, molecules as the below; and hydrogen with the relative abundance percent of 99.85, [10]

The Specific Heat Capacity (SHC) of Some Substances are:

SHC of Hydrogen (H): $14.3\ Jg^{-1}K^{-1}$
SHC of Carbon (C): $0.710\ Jg^{-1}K^{-1}$
SHC of Nitrogen (N): $1.040\ Jg^{-1}K^{-1}$
SHC of Oxygen (O): $0.920\ Jg^{-1}K^{-1}$ [14]
SHC of Water (H_2O): $4.184\ Jg^{-1}K^{-1}$ [8].

The scalar addition of the specific heat capacity of water atoms yields:

$$SHC_{(2H+O)} = \frac{2g\times14.30Jg^{-1}K^{-1}+16g\times0.920Jg^{-1}K^{-1}}{18} = 2.40666Jg^{-1}K^{-1} \quad (19)$$

This is less than reality amount of SHC of Water (H_2O): $4.184\ Jg^{-1}K^{-1}$

As it is shown, the specific heat capacity of water is less than hydrogen's, but it will be considered that in the scale of atom and molecule is much larger.

Specific Heat Capacity per Atom or Molecule (SHCAM)

Let's introduce for the first time, The Specific Heat Capacity per Atom or Molecule (SHCAM), which is the heat energy, is needed to raise the temperature of one atom or molecule, as the rate of one Kelvin degree.

The specific heat capacity per atom (SHCA) or molecule (SHCM) is given by the specific heat capacity (SHC) and the Avogadro constant by using the below relation that is introduced here:

$$SHCA\ = \frac{SHC\times mole_{(gr)}}{n_{(the\ number\ of\ atoms\ per\ molecule)}\times L} \quad (20)$$

The Avogadro constant: $L = 6.02204\times10^{23}mol^{-1}$

Now, it is calculated:

$$SHCA_{(Hydrogen)} = \frac{14.30Jg^{-1}K^{-1}\times2.0158g.mole^{-1}}{2\ atom\times6.02204\times10^{23}mole^{-1}} = 2.39337\times10^{-23}JK^{-1}atom^{-1}$$

With the same method of computing, these are given:

$$SHCA_{(Carbon)} = 1.39601\times10^{-23}JK^{-1}atom^{-1}$$

$$SHCA_{(Nitrogen)} = 2.33654\times10^{-23}JK^{-1}atom^{-1}$$

$$SHCA_{(Oxygen)} = 2.44401\times10^{-23}JK^{-1}atom^{-1}$$

$$SHCM_{(2H+O)} = \frac{2\times2.39337+2.44401}{3}\times10^{-23}JK^{-1}atom^{-1} = 2.41025\times10^{-23}JK^{-1}atom^{-1} \quad (21)$$

$$SHCM_{(H_2O)} = 12.49335\times10^{-23}JK^{-1}molecule^{-1} \quad (22)$$

Comparing between the last two amounts shows there exists big difference between the special heat capacity per molecule of water and the special heat capacity of addition the two hydrogen atoms and one oxygen atom before combining together. This can be interpreted that the molecules like water (acts as one of the metabolism agent and also the most affecting agent of preventing fast variation of temperature in biologic bodies) and sucrose ($C_{12}H_{22}O_{11}$) one of the sources of energy with the food value about 4 cal/g can store more infrared photons or quantums of energy.

It seems energy in the form of photons store within the molecules. Chlorophyll acts as a factory for trapping photons from sun or artificial lights to the combined atoms of carbon, hydrogen and oxygen in the form of sucrose molecule.

2.7. The Role of Photons for Stability of Atom

Photons also act as the glue for maintaining and attaching the electrons around the atoms in spite of repelling each other because of their negative charges. Therefore, photons also act as an insulating medium to reduce the electrical forces of electrons to each others. For example, let's calculate the force between electrons in the atom of helium. For estimating the size of hydrogen atom, we have;

$$r = n^2\frac{h^2\epsilon_0}{\pi me^2}\ ,n = 1,2,3\ ...$$

The two electrons reside in the innermost of the available orbits, that is the orbit with n=1. The obtained value is:

$$r_1 = 0.53\times10^{-10}m\ [9].$$

Assuming helium atom size be the same as hydrogen atom with two electrons. The maximum distance of those two electrons could be:

$$r_2 = 2\ r_1 = 1.06\times10^{-10}m$$

The acting electrical force between two electrons of helium is:

$$F_{2\ (between\ two\ electrons)} = \frac{e^2}{4\pi\epsilon_0 r_2^2} = \frac{e^2}{4\pi\epsilon_0(2r_1)^2} = \frac{e^2}{16\pi\ \epsilon_0\ r_1^2}$$

The acting electrical force between electron and the nucleus with two protons of helium is:

$$F_{1(between\ electron\ and\ nucleus)} = \frac{2e\times e}{4\pi\epsilon_0 {r_1}^2} = \frac{e^2}{2\pi\ \epsilon_0\ r_1^2}$$

$$F_1 = 8\ F_2$$

The repelling force of multi electrons atoms without the presence of photons threatens the stability of atoms.

Ionisation:

By raising temperature, the density of photons increases that results separating electron from outer layer. This shows that increasing of photons happens not only among the atoms and molecules but also inner layers of atoms. Ordinary rising of temperature mostly effects the increasing of photons on the outer layer of atoms. This is one of the reasons for the stability of atom.

2.8. The New Definitions of Maximum and Minimum Temperature

Zero Temperature:

Based on the above definition of temperature, if a place is empty of any heat photons, then the temperature within that place should be zero. Therefore, it is needed:

a) The place is empty of any kind of matter, because atoms and molecules, also nuclei have radiations.
b) The place is enclosed from any kind of outsider radiations.

As in reality, there is no place has been known of matter or radiation emptiness and no barrier with thermal conductance of zero exists, therefore, The possibility of reaching to the temperature of absolute zero degree is almost impossible.

Estimation of the Maximum Degree of Temperature

Assuming the radiation is like the blackbody radiation spectrum and The integration for increments of wavelength $d\lambda$ from $\lambda = 0$ to $\lambda = \infty$, is given by the Stefan-Boltzmann equation:

$W_b = \sigma T^4$, where W_b is in units $^{W}/_{m^2}$ and is the total rate of energy emission per unit of surface area over all wavelengths from a blackbody at a temperature T, Kelvins. The constant σ has the value $5.670 \times 10^{-8}\, ^{W}/_{(m^2.K^4)}$, [1].

Based on the monochromatic radiation from a blackbody at various temperatures, estimating one tenth of this energy is converted to the heat photons.

By increasing the number of heat Photons in the unit of volume, it reaches the moment and the threshold that accumulation of more photons in that volume is impossible. That is the maximum temperature could be reached. If the density of thermal photons has limitation, the maximum temperature can be reached is not infinitive. This threshold of photons density can be defined as similar to the moment of explosion in the theory of Big Bang for creation of the universe.

Using Wien's equation for black body radiation:

$$\lambda_m T = 2898 \tag{23}$$

λ_m = Wavelength of maximum intensity, micrometer, T = Kelvins, [1].

$$\lambda_m = cT = {}^{c}/_{\upsilon} \tag{24}$$

$c = 2.998 \times 10^8 m^{-1}$, Speed of light in free space

$\upsilon = 1 \times 10^{25}\, Hz$ the maximum known gamma rays frequency, from figure 2.2 of reference: [10].

Substituting (24) in (23) yields:

$$T_{maximum} = {}^{2898 \times 10^{25} s^{-1}}/_{2.998 \times 10^8 m s^{-1} \times 10^6 m^{-1}} = 966.644 \times 10^{11} °K \cong 1 \times 10^{14}\, °K \tag{25}$$

This temperature of about one hundred trillion degrees Kelvin can be interpreted as the primary and the maximum temperature of the Big Bang moment.

2.9. Photon Absorber and Releaser Machines

All refrigeration systems and heat pumps (Figure.1) work like lung that breaths air for absorbing oxygen and releasing carbon dioxide to the environment with the difference that for example in heating cycle of heat pump, the outside unit inhales (absorbs) heat photons from outdoor and the condenser exhales (dissipate) heat photons to indoor.

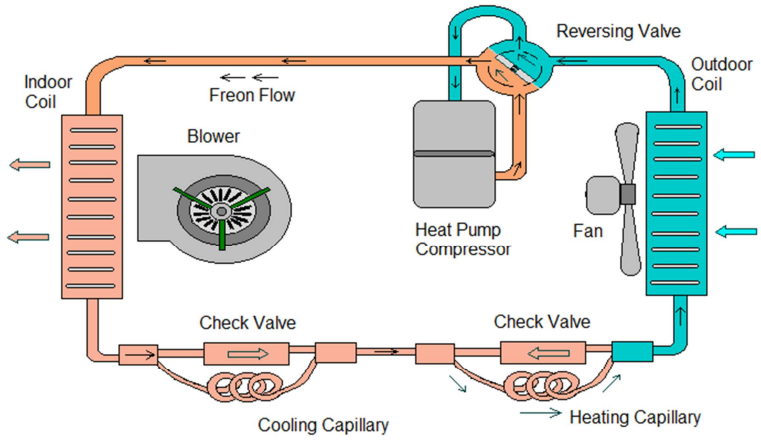

Figure 1. *(Is drawn by author Ensan), In the heat pump heating cycle, refrigerant in the closed system absorbs heat energy (Heat Photons) from outdoor and releases them to indoor by the work of compressor. The metallic parts especially copper parts are transparent to heat photons. Details like wiring and controllers like thermostat is not shown in the figure. The picture already presented in author Master Degree's program project in Concordia University, Montreal, Canada, 2004.*

Refrigerants (CFC's (Colure Fluorine Carbon) or HFC, s) act as medium for this transition. The walls of the pipes mostly made of Copper are transparent to the heat photons like the glass that is transplant for the visible light photons.

2.10. The Release of Heat Energy from Cars into the Atmosphere by Burning the Fuels in the Form of Carbon Dioxide in Global Scale per Day

Calculating the amount of the energy released:

a. The total number of cars around the world is *One Billion* [12].
b. Assuming each car consumes one gallon of fuel per day.
c. Assuming the Average BTU Content of their fuel is like Kerosene that the Number of Btu/Unit is 135,000 /gallon, [13].
d. Calculating the total energy released per day to the global environment from cars fuel:

$$W = 10^{9}_{Cars} \times 1\,{}^{gallon}/_{day} \times {}^{135{,}000\ Btu}/_{gallon} \times 778.26\ (foot-pounds) \times {}^{1\ Jule}/_{0.7376\ (foot-pounds)} =$$

$$1.42441 \times 10^{18}\ {}^{jules}/_{day} \tag{26}$$

We have the energy of each heat photon from (10):

$$E_{HP} = 6.6261965 \times 10^{-21} J$$

Dividing (26) to (10):

$$N_{HP} = {}^{W}/_{E_{HP}} = {}^{1.42441 \times 10^{18} J day^{-1}}/_{6.6261965 \times 10^{-21} J} = 2.149666 \times 10^{38}\ {}^{Heat\ photons}/_{day}$$

$$M_{water} = {}^{1.42441 \times 10^{18}\ {}^{J}/_{day}}/_{4.184\, Jg^{-1}K^{-1} \times 100K \times 10^{12} Mt^{-1} g} = 3{,}404.42\ {}^{Million\ Tons\ of\ water}/_{Day} \tag{27}$$

(27) Shows, this energy is equal to raise the temperature of about 3.5 Billion Tons of water from freezing point to the boiling point, or zero to hundred degrees Celsius (32°F to 212°F) per day.

Heat transfer:

All kinds of heat transfer of conduction, convection and radiation could be interpreted as the transferring of heat photons or infrared photons, Figure 2.

Figure 2. *At the picture taken by author Ensan, the 3 kittens are enjoying of heat transfer by conduction and radiation manner in a cold day in the author's mother house in Neyshaboor, Iran, autumn, 2010.*

3. Result

A new look to the temperature that is the density of heat photons presented in this paper. This new look is about energy associated especially to the layers of atom and the energy stored in molecules like sugar. Comparing the mass of hydrogen atom with the mass of adding its parts shows the difference mass cannot be associated to the formation of its single particle nucleus. The difference mass is related to cloud of photons that computed about 12,000 of heat photons. Therefore photon is a building block of matter.

4. Discussion

According to the existing knowledge; *Heat energy is intimating connected with the random motion of atoms and molecules*, [4]. This kind of definition of heat although explains some effects of heat but cannot explain: The heat transfer in the absence of atoms and molecules in vacuum. Also, random motion of atoms and molecules definition cannot support stored energy specially heat energy within the atoms and molecules of frozen foods, fuels, organisms, etc. As known; Radiation carries heat photons which are the agents of heat. Based on this paper; Freezing foods, etc. although highly reduce the random motion of atoms and molecules but has no effect on the stored energy within their molecules which are heat photons stored within the molecules. Therefore, stored energy (heat) within the foods, fuels etc. are almost independent of the random motion of atoms and molecules. The accumulated energy in the form of heat photons releases to the environment at time of burning.

5. Summary and Conclusion

Until now, manifestation of photons when travelling as light and also their effect on the media, property of electromagnetism

related to them, etc. have been studied. As it discussed in this paper, temperature has the dimension of energy and changing the density of infrared photons named here as the Heat Photons cause changing the temperature of matter. For example, the number of the infrared photons should be added to the already exist the other infrared photons in one cubic centimeter of water to raise one degree of Kelvin is obtained here:

$$n = 6.3143313 \times 10^{20} cm^{-3} K^{-1}$$

A new look to the difference temperature is presented here as changing the density of photons energy in the domain of infrared: $\Delta T = {h\nu.\Delta n_{HP}}/{C\gamma V_{en} V_{\circ}}$ that are named here as the Heat Photons. Hydrogen atom is not just a single electron revolving about the positively charged of proton as the nucleus but the proton is covered with a cloud; consist of about 12 thousands of photons. Then is concluded that photon is another building block of matter.

Changing the density of heat photons in any media results the changing the temperature within that media. This is the hypothesis of photon affecting to the heat energy with new look from Quantum Physic. As it is discussed in this paper, photons are stored or transmitted as the variation of temperature in atoms and molecules. The maximum temperature degree discussed and an estimating for it is about $T \cong 1 \times 10^{14}\ ^{\circ}K$. Foods, fuels and all biological forms are storages and capacitors of photons. Burning all kinds of materials is interpreted here as the realization of stored photons to the environment. The Specific Heat Capacity of substances discussed as the capacity of storing heat photons. Then the Specific Heat Capacity of Atoms is introduced for showing how some of the molecules like water (acts as the agent of preventing fast variation of temperature in biologic bodies) and sugars like sucrose ($C_{12}H_{22}O_{11}$) with food value about $4\ cal/g$ are storage of photons that trapped by Chlorophyll from sun rays or artificial lights.

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