DARK HEAT

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New Heat Theory
Remodeling of Black Body Radiation
Photon's Expansion Energy
Dark Matter as Heat
Aether
Absolute Matrix
Lots of Discussions

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ABSTRACT

To understand the relation between heat and temperature, physicists are modeling them as radiation and average kinetic energy, however in this thesis we will explain them as heat particles in the eyes of particle physics by analyzing the energy density functions. In thesis, this heat particle becomes the energy itself and carries constant mass, conservative forces and potential energy that is dependent to the distance between particles. Moreover, we will assume that the interaction between these particles result a radiation as blackbody distributed photons, in addition, interaction of these particles with other particles that we know result kinetic and other types of potential energy exchanges as we know as photon exchange.

We will start with analyzing laws and theories that we trust, then we will try to find how these heat particles behave and how they interact with each other by modeling heat inside the black body box and heat inside photons as smallest particles and we will discuss how energy density changes in vacuum. By working with many particle systems, we will assume that energy density of the vacuum is dependent to conserved potential and we will try to find some proportionality about it. After finding constants and proportionalities, we will try to predict how every physical interaction happen and we will discuss every biggest physical problem in the eyes of our theory. Finally, we will be discussing one particle physics model in which everything made from just one particle.

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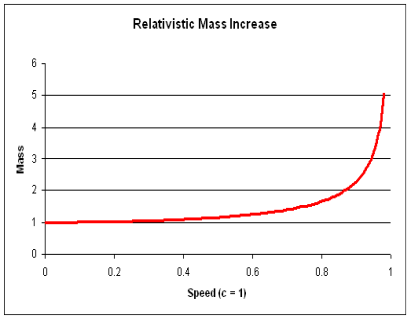
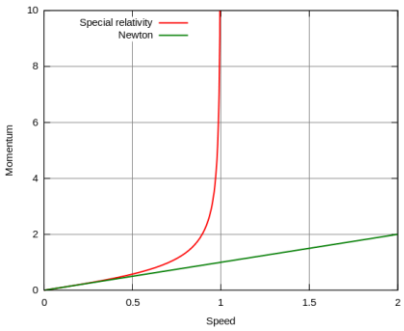
INFORMATION

As you know with the ***Newton's laws*** we can understand the relationship between force, acceleration, mass, speed, momentum energy etc. and for the Newton physics, mass of an object cannot change because energy was related with speed and all of interactions must happen with the ***infinite interaction speed*** that means there is no delay for interaction. Another thing is speed always increases with increasing energy and momentum and it has no limit. However, we have a problem in calculations because we must have a one reference frame to calculate everything otherwise we cannot say anything about interactions or properties like particle momentum or energy. This problem comes from the observer that we cannot change. Nevertheless, even if we cannot know particles energies with respect to different observers we can still calculate particles momentum because it is not dependent to the observer. Therefore, we can easily say that Newton physics is momentum physics in which we use particles as momentum carrier, and we can only use it to calculate the speed differences between coordinates or observers. In addition, we know that we can only use it in real physics for smaller distances and lower speeds. We can say that, conservation of momentum is the most important thing that we should know, found and developed with Newton mechanics because it is conserved in every case, in every physical interaction and there is no exception in all physics.



However, after we look at the ***modern physics***, we can see that energy of particle can change the mass of the particle. (*However, some physicist says that only momentum increases and mass is not. Because, this is still not proven because of the weakness of gravity of masses of speeded particles, even if we speeded up a small particle we can measure its momentum but we cannot measure its mass. In addition, it is hard to speed up a bigger particle as to increase its mass and measure.*) We will accept the idea that ***energy increases particles mass*** and even the energy itself should have gravitational force. For this reason, we will make an assumption that we will find the ***smallest energy*** and it becomes our ***smallest particle*** which have a ***constant mass*** and we will assume that when these particles absorbed by bigger particles like electron, proton, molecule etc. with ***photon exchange process*** they become a kind of potential energy for us.



Now the important question is what the smallest particle is and how small it is. This part becomes like Newton's heat theory in which heat is the smallest ***indestructible particle*** and energy itself. Because when we speak about heat, it is a form of energy and heat generating is an always efficient process meaning that every form of energy can easily become heat by simple methods like friction etc. and at the end, every form of energy turns into the heat. However, when we look at the theories about heat, the only logical theory of heat says that it is just the ***light*** so, ***electromagnetic radiation*** or with other name, it is ***photon***. Moreover, only possible theory says that photon carries energy and momentum but it has ***no mass***. Because physicists trust and use a simple formula in standard model that says only massless particles can go with the speed of light and if a particle has a rest mass than its mass becomes infinite while going with speed of light. Nevertheless, we should think the energy, mass and momentum conservation for photons otherwise; we cannot explain the energy and momentum relation with mass.

With Lorentz transformations we had started a new model of physics that we call as standard model and with this model we have combined ***three forces*** and it became a good explainer of energy. By combining the three forces, we know energy transformation is a ***photon exchange*** process and we can understand all the energy transformations except the problem with gravitational force that has no logical explanation about its energy or source with other forces. For this reason, some physicists do not accept gravity as a force and they consider it as a source of energy that changes ***space-time*** and particles momentum. For this reason, they are rejecting the mass increase because, for same particles having different masses makes no sense for calculations then they are saying that mass is always rest mass and only momentum increases so, mass not. But still there is no relation between the three forces and gravity and for this reason still we have problems about space-time because in Newton mechanics everything lives inside the ***Euclidian geometry*** and ***time is absolute***, however, in modern physics due to useless philosophy some calls time is not absolute, space is not flat and everything is ***uncertain***. Moreover, another big problem of standard model is it can only explain $\mathbf{4}$ percent of universe in mass and $\mathbf{96}$ percent is still a question for us.

Now if we turn back our question again ''*How small the smallest energy is*?'' we cannot speak about ***smallness of a wave***, because it is not ***discrete*** in value and it can shift its wavelength that is proportional to its energy in every value. Wave has ***continuous nature*** and does not take discrete values like integer $\mathbf{1}$, for this reason, we should make our assumptions on the other process that we can see on particles that are carrying discrete energies. The smallest energy levels come from ***Heisenberg's uncertainty principle*** and other thermodynamic and quantum mechanical expressions in which smallest discrete energy level is $\boldsymbol{\hbar\omega}$ and levels are multiples of $\boldsymbol{\hbar\omega}$. We have said that photon is wave and wave has no discrete value but we will model it as a particle-carrying wave that carries heat particles inside the ***aether*** in later. We should understand that it is the smallest energy level, which we can see it as smallest angular momentum on particles in thermodynamics and quantum mechanics. After this assumption we will take $\boldsymbol{\omega = 1}$ as the smallest particle but first we should translate its energy to mass and its energy equals to $\mathbf{1.054571800 * 10^{-34}}\ \boldsymbol{joule}$. From the ***energy-mass equivalence*** $\boldsymbol{E = mc^2}$ we know that $\mathbf{1}\ \boldsymbol{kg}$ equals to $\mathbf{89875517873681764}\ \boldsymbol{joule}$ and with a simple dividing $\mathbf{1.054571800 * 10^{-34}}\ \boldsymbol{joule}$ is equals to $\mathbf{1.173369 * 10^{-51}}\ \boldsymbol{kg}$. Therefore, for a photon, its mass is proportional to its energy and frequency that is proportional to carried number of our heat particles.

$$\Delta\chi\Delta\rho \geq \frac{\hbar}{2}$$

Now we will take this mass as a smallest mass to think gravitation and ***inertia*** balance on our forces and we have a new ***quasi-particle*** that is not working with relativity. Meaning that, it has a constant mass, not divisible, point particle that is smallest energy itself (*but it should have a finite interaction speed*). However, importance of our model will be about the distance between these particles because we will try to understand the energy density functions dependencies but not thermodynamic energy itself.

Now we will continue with thermodynamics and we will discuss heat, temperature and radiation to learn how these events dependent to the each other. As we know from thermodynamics, current heat theory says ***heat is the light*** and ***temperature is the average kinetic energy of particles*** with respect to ***kinetic theory***. However, we will assume that heat is a particle that produces every kind of energy exchanges on the other particles and results temperature while it is in static condition moreover, motion of these particles produces wave as light.

Therefore, unlike the current theory, we will accept heat as a particle standing inside vacuum and interaction of these particles result an energy distribution on other particles like in the ideal gas and we should ask the question what results the ***Brownian motion*** in which particles have a speed, energy and momentum distribution. There must be a reason for particles to act like this, but for the easiest version of it, we can start with black body radiation because it is independent from the chemical interactions and potentials. For this reason, we will start with remodeling black body box and light then we will try to understand the interactions and properties of our particles that results ***black body radiation***, which is a continuous, distributed, photon radiation.

The first important equation of quantum mechanics is the ***Planck Law***, which gives the intensity or energy per frequency with respect to the temperature only. By using the law, we can calculate how much energy produces a hot object at any frequency and how heat flows as light form hot to cold. Then by integrating the Planck law at every wavelength and in every direction there is ***Stefan-Boltzmann law***, which gives the total radiation power of a surface area A at temperature T. Afterwards multiplying the Stefan-Boltzmann law by $4/c$ there is ***radiation constant*** which gives the total radiation energy or internal energy of a constant volume even if there is no particle except photons inside volume.

$$B_\omega(\omega, T) = \frac{\hbar\omega^3}{4\pi^3 c^2} \frac{1}{e^{\hbar\omega/(k_\mathrm{B}T)} - 1}$$

$$j^\star = \sigma T^4 \qquad \sigma = \frac{\pi^2 k_\mathrm{B}^4}{60\hbar^3 c^2} = 5.670373(21) \cdot 10^{-8}\ \mathrm{J\,m^{-2}\,s^{-1}\,K^{-4}}$$

$$a = \frac{4\sigma}{c} = 7.5657 \times 10^{-15} \mathrm{erg\,cm^{-3}\,K^{-4}} = 7.5657 \times 10^{-16} \mathrm{J\,m^{-3}\,K^{-4}}.$$

In thermodynamics, these laws result a new topic that is ***photon gas***. In photon gas theory, all the radiation inside the box or volume modeled as light that carries energy and momentum, no mass and goes with speed of light. We know all the information about photon gas because it is modeled as a simple classical ideal gas however; we still cannot explain some ideas like ***entropy***, because it must be increase with time but it decreases with decreasing the temperature or increasing the volume. Important thing we have to know about photon gas; it is a collection of photons inside a box and we assume that box has no chemical potential energy, and it has no chemical interaction and for this reason, we will assume the box as a finite vacuumed volume. As we said before, we know that radiation constant gives us the total radiation energy or internal energy inside the constant volume at constant temperature and we can say that this internal energy is the amount of heat. So, in our theory light inside the box will become the heat inside the box and we can calculate everything only with respect to temperature but, the problem is; it must be in constant temperature and the result is the distributed light which has continuous property means it includes all wavelength photons. For photon gas, we have a photon distribution that is dependent to the internal energy that is dependent to the ***absolute temperature*** of the box. However, in our theory to find a relation between the temperature and the heat particles position, or density of the particles ***we should change the internal energy with time*** and it becomes a ***non-equilibrium thermodynamic system***. (*So, in present theory, radiated light energy equals to incoming or produced heat and it results a constant temperature but, we will change it and we will assume that it only radiates and cools down with time because we cannot find an equation without changing the temperature of the box.*)

The important thing for us is to see how the energies or intensities of photons change at every wavelength with respect to the temperature. The solution comes as in a constant temperature, in black body distribution every photons energies proportional to the temperature T and the number of the photons is proportional to the T^3. Because total energy comes as T^4 and with respect to the temperature every photon changes its energy in constant volume. With a known temperature known photons become other photons because distribution is always constant and it does not change. Therefore, blackbody distribution and its shape which gives the spectra is always conserves itself and it is simply comes as $x^3/(e^x - 1)$.

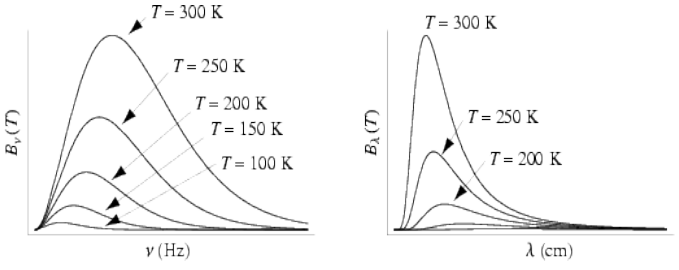
As you can see both the total energy is proportional with T^4 and the power is proportional with T^4, and from this proportionality if we assume that ***if box is not supplied with heat*** we can say that with a constant surface area, radiation power and the internal energy changes ***exponentially with time*** because both of them dependent to each other with T^4. If the total energy of the box changes ***exponentially*** with time than we can say that temperature's fourth power changes ***exponentially*** which means temperature is still changing exponentially, as you know, fourth power of exponential decrease dependency is still an exponential function.

Thermodynamic state functions for a black body photon gas

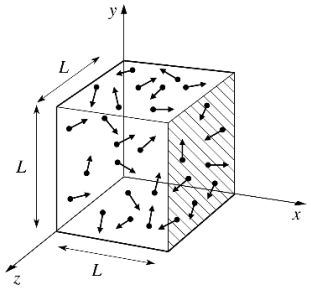
	State function (T,V)
Internal energy	$U = \left(\frac{\pi^2 k^4}{15 c^3 \hbar^3}\right) VT^4$
Particle number	$N = \left(\frac{16\pi k^3 \zeta(3)}{c^3 h^3}\right) VT^3$
Chemical potential	$\mu = 0$
Pressure	$P = \frac{1}{3}\frac{U}{V} = \left(\frac{\pi^2 k^4}{45 c^3 \hbar^3}\right) T^4$
Entropy	$S = \frac{4U}{3T} = \left(\frac{4\pi^2 k^4}{45 c^3 \hbar^3}\right) VT^3$
Enthalpy	$H = \frac{4}{3} U$
Helmholtz free energy	$A = -\frac{1}{3} U$
Gibbs free energy	$G = 0$

Another important thing in the Planck law is it always conserves its shape in every condition, which is only dependent to the temperature. If you compare the spectra of the two temperatures with respect to the intensity and frequency of light you can see number of photons increase with T^3 and average photon energy increase with T which says simply ***every photon become another photon*** with changing temperature inside the box.

If we continue with our logic, which is simply heat particle theory, we should explain some phenomena in eyes of our logic and it is better to start with ***ideal gas theory***. $k_B T$ is a kind of energy unit which comes as molecular scaling factor for energy in the form of kinetic energy because of temperature of the system. Boltzmann has derived it to explain the temperature and all thermodynamics written on this constant k_B. This constant '' k_B ''gives us the one free particles average kinetic energy, which is related with the temperature in kinetic theory and all the energy for the ideal gasses explained by this method. However, there is some more energy when we look at the energy on the ***volume or vacuum*** it was different from the ideal gas. Because our black body box holds the energy related to T^4 and to explain this we should give some basic examples about both of them.

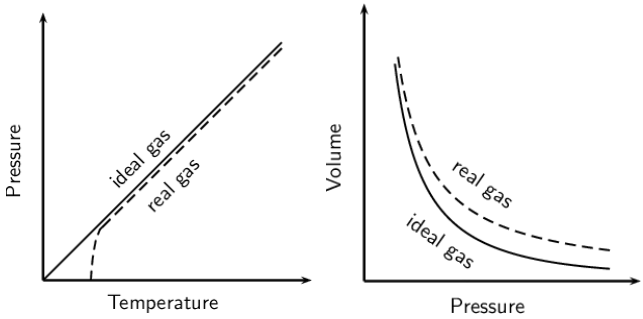


For $\mathbf{1}\ \boldsymbol{Kelvin}$ temperature, a simple free particle holds average energy of nearly about $\boldsymbol{k_B T}$ and its energy is proportional to $\boldsymbol{T}$, and in our theory it makes about $\mathbf{1}\ \boldsymbol{Kelvin} = \mathbf{1.3092029580} * \mathbf{10^{11}}$ heat particles on a one free particle (or it is equal to $\mathbf{1.380648} * \mathbf{10^{-23}}\ \boldsymbol{joule}$). (*Sometimes it is explained as* $\mathbf{3/2} * \boldsymbol{k_B T}$ *but it is not important because we are only looking for the proportionality.*) And for $\mathbf{1}\ \boldsymbol{Kelvin}$; with radiation constant we have $\mathbf{7.174213475} * \mathbf{10^{18}}$ ***heat particles in*** $\mathbf{1}\boldsymbol{m^3}$ (or it is equal to $\mathbf{7.565723} * \mathbf{10^{-16}}\ \boldsymbol{joule}$) and this energy is proportional with $\boldsymbol{T^4}$. When we think that there are lots of free particles inside a volume like the air in earth in $\mathbf{1}\ \boldsymbol{m^3}$, the radiation constant becomes not important and it is neglected. (*Its pressure is usually neglected because it is too weak in low temperatures.*) Because, important one is the energy on the free particles, that makes more than the $\mathbf{99\%}$ ***of the total energy***. However, if we increase the temperature of the box, we can understand that with a constant density free particles inside the constant volume, energy on the vacuum increases too fast with respect to energy on the free particles, because it increases with the ***fourth power of the temperature***.



For 1kelvin $\boldsymbol{k_B T} \rightarrow$	$\mathbf{1.380648} * \mathbf{10^{-23}}\ \boldsymbol{J}$	
For 1m^3 volume $\boldsymbol{U} \rightarrow$	$\mathbf{7.565723} * \mathbf{10^{-16}}\ \boldsymbol{J}$	$\boldsymbol{number\ of\ heat\ particles}\ \mathbf{7.174213475} * \mathbf{10^{18}}$
For 300kelvin $\boldsymbol{k_B T} \rightarrow$	$\mathbf{4.141944} * \mathbf{10^{-21}}\ \boldsymbol{J}$	
For 1m^3 volume $\boldsymbol{U} \rightarrow$	$\mathbf{6.128235} * \mathbf{10^{-6}}\ \boldsymbol{J}$	$\boldsymbol{number\ of\ heat\ particles}\ \mathbf{5.8111129147} * \mathbf{10^{28}}$
For 6000kelvin $\boldsymbol{k_B T} \rightarrow$	$\mathbf{8.283888} * \mathbf{10^{-20}}\ \boldsymbol{J}$	
For 1m^3 volume $\boldsymbol{U} \rightarrow$	$\mathbf{9.805177} * \mathbf{10^{-1}}\ \boldsymbol{J}$	$\boldsymbol{number\ of\ heat\ particles}\ \mathbf{9.2977806636} * \mathbf{10^{33}}$

As you can see, energy of the volume is smaller than the energy of the free particles. Because, we have lots of free particles, that is around Avogadro's number inside a $\mathbf{1}\ \boldsymbol{m^3}$ volume. Even for the sun both the pressure of the photon gas and the energy of the vacuum are still smaller because sun has very high free particle density. However, with higher temperatures we can understand that in one-point energy density of the volume passes the kinetic energy of the particles for inside the same volume. And this results the ***collapse of the ideal gas theory*** because our ideal gas theories only work for the free particles and not for the vacuums or volumes energy densities. As you can understand in an adiabatic process with decreasing the volume, pressure increases and temperature increases and with increasing temperature, volume energy density increases. Therefore, compressing ideal gas results different energy exchanges between the vacuum and free particles inside it. And if we decrease the temperature then we can see that there is less pressure on the walls of the box with respect to the average temperature which is seen on the other graph. Moreover, if we decrease the temperature too much there is an event, which named as **Bose-Einstein condensation** and in this case, even light cannot be transferred with the speed of light.



Now we should discuss another effect of the temperature, which is the result of the temperature difference, radiation that we call as black body radiation. If we compare the temperature and the photons energy, we should see the average energy of the photons is proportional to $\boldsymbol{T}$ (*average energy of photon comes from the total energy divided by number of photons that is about* $\mathbf{3} * \boldsymbol{\zeta}(\mathbf{4})/\boldsymbol{\zeta}(\mathbf{3})\boldsymbol{k_B T}$).

We can understand this from the Wien's law that gives the peak point of the graph of the black body radiation. Again if we give the same examples;

For 1kelvin $k_B T \rightarrow$	$1.380648 * 10^{-23}\ J$	
Max intensity photon	$3.895415 * 10^{-23}\ J$	$\omega \rightarrow number\ of\ heat\ particles\ 3.693836 * 10^{11}$
Average photon energy	$3.729377 * 10^{-23}\ J$	$\omega \rightarrow number\ of\ heat\ particles\ 3.536390 * 10^{11}$
For 300kelvin $k_B T \rightarrow$	$4.141944 * 10^{-21}\ J$	
Max intensity photon	$1.168624 * 10^{-20}\ J$	$\omega \rightarrow number\ of\ heat\ particles\ 1.108150 * 10^{14}$
Average photon energy	$1.118813 * 10^{-20}\ J$	$\omega \rightarrow number\ of\ heat\ particles\ 1.060917 * 10^{14}$
For 6000kelvin $k_B T \rightarrow$	$8.283888 * 10^{-20}\ J$	
Max intensity photon	$2.337248 * 10^{-19}\ J$	$\omega \rightarrow number\ of\ heat\ particles\ 2.216300 * 10^{15}$
Average photon energy	$2.237626 * 10^{-19}\ J$	$\omega \rightarrow number\ of\ heat\ particles\ 2.121834 * 10^{15}$

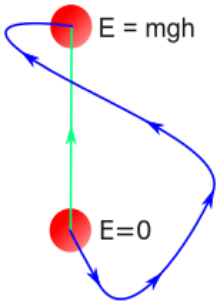
All of them are proportional to T therefore, we can say the Wien's peak point energies are about 2.8 times and average photon energy 2.7 times greater than $k_B T$, moreover photon number is proportional to T^3.

While we are discussing how we should drive our theory, ***we should neglect the present photon gas theory and we should remodel it as the heat gas theory*** because it is the logic behind the heat and we should change it little bit. Simply photon gas theory says ***light bounces between everything*** and its energy distribution is related with the temperature of the surface that is average incoming light on the surface of the black body box. However, we should think this ***box is black enough to stop the light*** even if it is infinitely small or thin so, it stops the light and turns it into heat on itself as standing particles in vacuum.

After this, we will go systematically and we will make assumptions about heat and light however, we still need some information because this part includes many body interactions that are not known enough for the most physicists. Best examples are worked inside the ***solid-state physics*** and ***fluid dynamics*** because we will think ***heat as a stationary particles*** and ***photon as a collection of particles*** going with speed of light. Therefore, our particles that we called as heat or energy should carry these properties because we should find what causes photons to be distributed as black body distribution and it is the ***only key*** for us.

While we are remodeling black body box, initially our particles must stop at rest and has no motion and we will use smallest energy scale as particle which is a kind of quasi-particle we discussed in information part which is simply $\hbar\omega$. So, initially we have ***standing waves*** because this particles interactions behaves like waves on the other particles and finally we have photons which are going with constant speed that is speed of light ''c'' and it is a collection of heat particles again which should carry the same properties in the standing wave as a ***moving wave***.

It is better to start with conserved force and potential because these forces should give the motion to the heat as light. But before this we must say that these heat particles are not relativistic particles because these particles are energy itself and cannot carry more mass while they are in motion and they can only go with speed of light. (*In reality these particles are carried by the waves but for now we will accept they are going with speed of light*). And the most important thing in this part is we should create a ***new energy*** which results heat to move as light and ***this energy has no meaning for thermodynamics*** because it has no known property on the normal particles that we are made from.

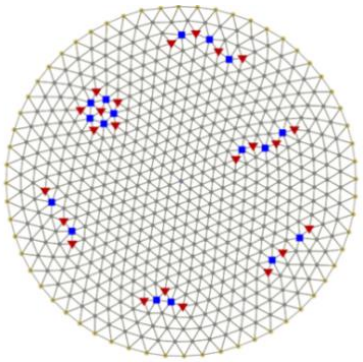


This new energy is the ***reason for heat to move as light*** and it is the ***reason for energy to flow from hot to cold body*** or in the end, we will be saying that it is the ***reason for our universe to expand***, and this energy and force must be ***only dependent to the distance between the particles***. We should know some examples of conserved force and potential to understand the model that we will use but the problem is our model is a many-body system because, heat or temperature is not a result of one or two particles interaction and it cannot be explained easily like gravitation. For this reason, we should work many body interactions and we should start discussing the best example which is ***Wigner crystal*** which is theoretically constructed and proved by experiments in ***1-D***, ***2-D*** and of course in ***3-D***.

If force is attractive like gravity we use **+** sign to show the force and if force is repulsive like in our box we use **-** sign to show the force, moreover, force and the potential energy formulas must have opposite signs. And from the conservative force we can find the conserved energy because it is only ***distance dependent*** or we can find the conserved potential energy from conserved force. There are many examples of these rules inside physics and best known are; spring force, gravitational force, electromagnetic force, piston force etc. However, problem is we cannot use these forces on particles that are filling the vacuum because with that much particles these forces explode quickly and it is impossible to speak about force or potential in one point. To understand this thing, we can discuss the best-known example that is electron gas. Euler Wigner predicted the phase of electrons theoretically and proved by decreasing the electron density because with low densities and with small kinetic energy, electrons formed a ***body centered cubic*** lattice in 3-D to minimize the potential energy. However, the problem is, in 1-D, 2-D, 3-D potential energy of the electrons increases with increasing number of electrons and it is not possible to use too much electrons in experiment because potential energy explodes very fast.

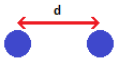
$$-\frac{dU}{dx} = F(x)$$

$$U(x) = -\int_{x_0}^{x} F(x)dx + U(x_0)$$

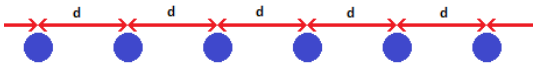


To think heat is a particle we should know that one particle repels all other particles in vacuum and then we can compare distance between the particles for two body interactions like in the gravitation. However, before doing this, it is better to discuss respectively at 1-D then 2-D and finally 3-D interactions because, they are not easy to understand as two body interaction.

To compare potential energy and the force between the two-body interaction and many body interactions ***in 1-D*** we can write the result as a simple function for two-body interaction. $\boldsymbol{F\ or\ P} = ((\boldsymbol{C} * \boldsymbol{X_1} * \boldsymbol{X_1})/\boldsymbol{d^P})$ which gives the total force and potential on one particle. The only possible lattice for 1-D is ***evenly spaced lattice*** because we have ***just one type of particle and a one force that repels every other particle***. And our formula becomes a ***Riemann zeta function*** for a many body systems to find a one particles potential energy or force on a one particle.



We should think that there are infinitely many particles and our formula becomes like;

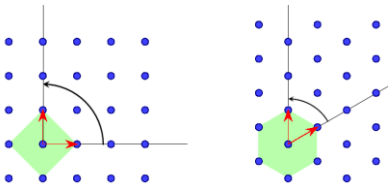


$\boldsymbol{F\ or\ P} = (\boldsymbol{2} * \boldsymbol{\zeta}(\boldsymbol{p}) * (\boldsymbol{C} * \boldsymbol{X_1} * \boldsymbol{X_1})/\boldsymbol{d^p})$.

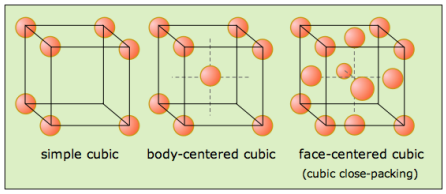
Important thing is Riemann zeta function becomes infinite for power $\boldsymbol{p} = \boldsymbol{1}$ so, to have a finite force we have at least $\boldsymbol{p} > \boldsymbol{1}$.

(*For example if we use two electrons and if we have a force equals to* $\boldsymbol{X}$ *with a distance* $\boldsymbol{d}$*, with infinitely electrons* ***evenly spaced in 1-D*** *and the distance is* $\boldsymbol{d}$ *we have force equals to* $\boldsymbol{2X * \zeta(2) = 3.2898X}$*; we are not looking the net force, just total force.*)

In 2-D our interaction changes little bit because we have to speak that we have ***two possible symmetric lattices*** because our particles must have the minimum potential energy which is still dependent to the power $\boldsymbol{p}$ of the inverse distance. If we think we are going with radius $\boldsymbol{d}$, than we have area proportional to $\boldsymbol{d^2}$ and we have proportional to $\boldsymbol{d^2}$ particles because we are working in a ***constant density***. With this logic like in the 1-D, if we want to calculate the proportionality of force and the potential energy on one particle, we should have at least $\boldsymbol{p > 2}$ because with radius $\boldsymbol{d}$ number of particles increases with $\boldsymbol{d^2}$ and if we sum the total force or potential than we see function for every $\boldsymbol{d}$ like $\sum_{d=1}^{\infty} \boldsymbol{d^1/d^p}$ which reminds formula proportionality in 1-D which is $\boldsymbol{1/d^p}$ and proportionality becomes $\boldsymbol{1/d^{p-1}}$ in 2-D. If we think that one dimension gives particles to one degree of power our power $\boldsymbol{p}$ must be bigger than $\boldsymbol{2}$ to give our total force or potential a finite value in ***2-D***. If we give an example about electrons again; in 1-D potential energy is infinite and force is finite but in 2-D both of them is infinite because force becomes as a function $\sum_{d=1}^{\infty} \boldsymbol{d^1/d^2}$ which is equal to $\boldsymbol{\zeta(1)}$ that is infinite and potential explodes very fast.



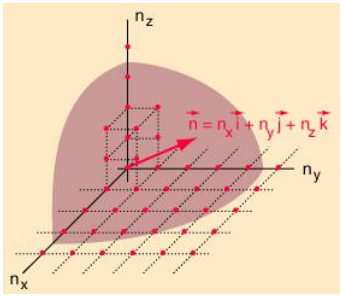
Now we are in 3-D and we have still same logic; if we go to radial distance $\boldsymbol{d}$, we have surface area proportional to $\boldsymbol{d^2}$ $\boldsymbol{(4\pi d^2)}$ and we have volume proportional to $\boldsymbol{d^3}$ $\boldsymbol{((4\pi d^3)/3)}$ and with a constant density we have particles proportional to volume, by same method with respect to the radius $\boldsymbol{d}$ number of particles increases with $\boldsymbol{d^2}$. So; if we sum the force or potential energy for the infinitely many particles again formula for every $\boldsymbol{d}$ becomes $\sum_{d=1}^{\infty} \boldsymbol{d^2/d^p}$ and to find a finite potential or finite force we should have at least $\boldsymbol{p > 3}$, in the end our formula becomes like $\boldsymbol{1/d^{p-2}}$ in ***3-D***. However, problem is we have ***three symmetric lattices in 3-D***, meaning that with respect to potential energy that is dependent to the power $\boldsymbol{p}$ of the inverse distance changes the lattice of the particles. Now we have ***simple cubic, body centered cubic, face centered cubic*** lattices, and we should discuss what results to have three types of lattices. These lattices are important to find the constants to prove our theory and we need to find a way to calculate at which point our particles have which lattice and we need to write and solve geometric series exactly, but for now, we can work numerically to find the lattice by giving the power $\boldsymbol{p}$ to numeric values.

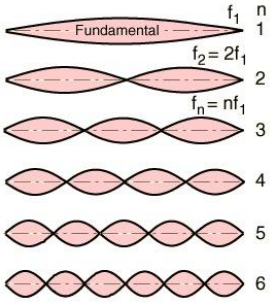


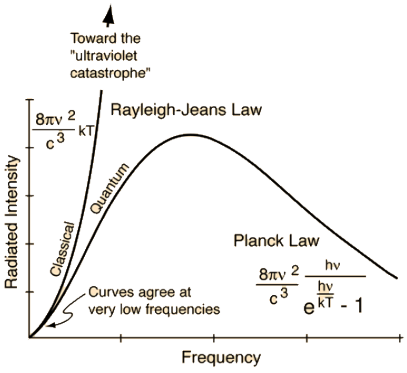
If we ask ourselves why we did all these things, it is because we need to understand how our particles should work in the black body box. As you can understand, we cannot think heat particles like the electrons because we cannot put infinitely many electrons inside a box with a constant density and these electrons will not radiate like black body, because as the box increases in volume with a constant density its radiation is almost constant.

Our radiation should only be dependent to the temperature that is dependent to the density function of energy and in this logic our particles forces should be finite otherwise, we cannot find a relation between temperature, total energy and power of radiation. Therefore, our force that works like $\boldsymbol{1/d^p}$ should take a finite value and inverse power $\boldsymbol{p}$ and must be bigger than $\boldsymbol{3}$ and it can't be $\boldsymbol{3}$ or smaller.

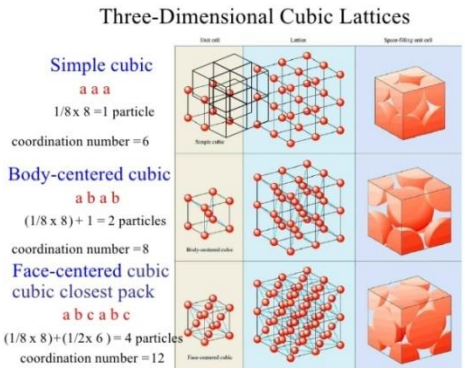
If we discuss again by comparing the known forces with our logic, the force turns the heat into light can't be a simple as ***spring force*** or ***string force*** or ***piston force*** or it can't be like ***electromagnetic force*** which works as c/r^2. Because we cannot think our particles repels all the other particles like these forces, all these forces explode with both number of particles in a constant density. Because, think that every particle are pistons with another particle in the box and if we put more boxes nearly, they will affect the other with divergent force. However, if the ***p the inverse power of the force*** (c/r^p) is smaller than 3, particles total force or power becomes finite number so, force or potential formula with respect to the distance must be decrease faster than the c/r^3 in the long range. There are similar examples of this event and one of them is ***ultraviolet catastrophe*** in the black body radiation, it was a modeling the number of modes in the cavity and as the wavelength decreases or frequency increases, total energy was exploding very fast, at least this problem has ***solved by Planck***. In addition, another example is gravitation that is still a mystery that results singularity. This is known as ***Bentley's paradox*** in which gravitation in 3-D results singular points because gravitational force and potential are always get bigger and bigger in 3-D in the infinite universe. This paradox has not solved because Newton's idea was God prevented the collapse by making ''constant minute corrections'' and Einstein's idea was ***cosmological constant*** which results everything to expand but he said ''***greatest blunder***'' to his cosmological constant moreover, all types of cosmological constants failed. (*The good thing is we have another idea which results expansion but we will discuss in later.*)







Now we will work to find the lattice of the short range forces which results more powerful forces in small distances and too weak in long distances like in the strong force in nuclear physics. For simple cubic we have 1 particle in one cubic volume, and for body centered cubic we have 2 particles in one cubic volume, and for face centered cubic we have 4 particles. Firstly, we should normalize these cubic volumes because our lattices should have constant density particles. If we take volume $V = 1$ for simple cubic than for body centered cubic should have $V = 2$ and for face centered cubic volume $V = 4$. So, our particle which we take as it is in the middle should have different distances with the nearest particles or neighbor particles. For the simple cubic volume is 1, lattice has length 1, first distance is 1 and particle density is 1. For body centered cubic if it has 2 particles, to conserve the constant density its volume must be 2, and lattice has length $\sqrt[3]{2} = 1.259921$ and nearest particles distance is 1.091124. For the face centered cubic volume is 4, lattice length is $\sqrt[3]{4} = 1.587401$ and nearest particles distance becomes 1.122462. Than what will we do is simply to find the lattice that gives the smallest potential.



If we think all the space is filled with particles which repel all other particles with a constant density, we cannot speak about some forces because like we discussed before they explode and become infinite but still we can discuss them for finite number of particles. For example, particles are forming ***simple cubic lattice*** to have the smallest potential energy with the force $\mathbf{1}/\boldsymbol{d}^{\mathbf{1}}$ that is known as piston force. Other long range forces like $\mathbf{1}/\boldsymbol{d}^{\mathbf{2}}$ which is electromagnetic force and like $\mathbf{1}/\boldsymbol{d}^{\mathbf{3}}$, $\mathbf{1}/\boldsymbol{d}^{\mathbf{4}}$ which are short range forces form ***body centered cubic lattice*** and force like $\mathbf{1}/\boldsymbol{d}^{\mathbf{5}}$ ***face centered cubic lattice***. Because as the power $\boldsymbol{p}$ increases like **6 7 8** these forces become a very short ranged and the only important thing becomes nearest particles because increase in the number of nearest particle results little bit more distance increase as we can understand and it results particles to have smallest potential energy.

Simple cubic			Body centered cubic			Face centered cubic		
n. of p.	distance	norm. d.	n. of p.	distance	norm. d.	n. of p.	distance	norm. d.
6	1	1	8	1	1.091124	12	1	1.122462
12	1.414214	1.414214	6	1.154701	1.259921	6	1.414214	1.587401
8	1.732051	1.732051	12	1.632993	1.781797	24	1.732051	1.944161
6	2	2	24	1.914854	2.089343	12	2	2.244924
24	2.236068	2.236068	8	2	2.182247	24	2.236068	2.509901
24	2.44949	2.44949	6	2.309401	2.519842	8	2.44949	2.749459
12	2.828427	2.828427	24	2.516611	2.745934	48	2.645751	2.969755
30	3	3	24	2.581989	2.817269	6	2.828427	3.174802
24	3.162278	3.162278	24	2.828427	3.086164	36	3	3.367386
24	3.316625	3.316625	32	3	3.273371	24	3.162278	3.549537
8	3.464102	3.464102	12	3.265986	3.563595	24	3.316625	3.722785
24	3.605551	3.605551	48	3.41565	3.726897	24	3.464102	3.888323
48	3.741657	3.741657	30	3.464102	3.779763	72	3.605551	4.047094
6	4	4	24	3.651484	3.98422	48	3.872983	4.347277
48	4.123106	4.123106	24	3.785939	4.130927	12	4	4.489848
36	4.242641	4.242641	24	3.829708	4.178685	48	4.123106	4.62803
24	4.358899	4.358899	8	4	4.364495	30	4.242641	4.762203
24	4.472136	4.472136	48	4.123106	4.498818	72	4.358899	4.892699
48	4.582576	4.582576	24	4.163332	4.54271	24	4.472136	5.019803
24	4.690416	4.690416	48	4.320494	4.714193	48	4.582576	5.143767
24	4.898979	4.898979	72	4.434712	4.838819	24	4.690416	5.264814
24	5	5	24	4.725816	5.156449	48	4.795832	5.383139
48	5.09902	5.09902	24	4.760952	5.194788	8	4.898979	5.498919
8	5.196152	5.196152	12	4.898979	5.345392	46	5	5.61231
48	5.385165	5.385165	56	5	5.455618	728 total		
12	5.656854	5.656854	24	5.033223	5.491869			
24	5.744563	5.744563	48	5.259911	5.739214			
24	5.830952	5.830952	10	5.416026	5.909554			
24	6	6	728 total					
24	6.403124	6.403124						
8	6.928203	6.928203						
728 total								

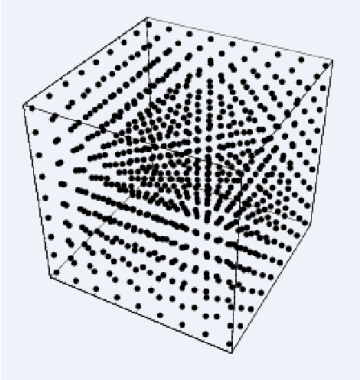
In our work to have a symmetric calculation we have to use same number of particles for all 3-D lattices like we used in the calculation it were **728** nearest particle around the middle one and to be in the smallest potential energy.

(Smallest potential energy lattice is simple cubic, we had take $((\mathbf{9}*\mathbf{9}*\mathbf{9})-\mathbf{1})=\mathbf{728}$ *particles and to be equal we have to use the same number for the others. After the hundreds of particles, the others have similar effect because of constant density of particles in volume, so it is enough to calculate the nearest particles.)*

$\boldsymbol{F}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{1}}$	$\boldsymbol{P.e.}\approx-\boldsymbol{ln}(\boldsymbol{d})$	Long range force		Simple cubic
$\boldsymbol{F}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{2}}$	$\boldsymbol{P.e.}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{1}}$	Long range force		Body centered
$\boldsymbol{F}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{3}}$	$\boldsymbol{P.e.}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{2}}$			Body centered
$\boldsymbol{F}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{4}}$	$\boldsymbol{P.e.}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{3}}$	Short range force		Body centered
$\boldsymbol{F}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{5}}$	$\boldsymbol{P.e.}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{4}}$	Short range force		Face centered or Body centered?
$\boldsymbol{F}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{6}}$	$\boldsymbol{P.e.}\approx\mathbf{1}/\boldsymbol{d}^{\mathbf{5}}$	Very short range force		Face centered

So we need to find a way to create a finite force for our theory because our blackbody radiation is not changing with volume and it never gets different radiation except the temperature change inside the box. We should think this repulsive force as very short-ranged forces or we can think it as the quantum radiation that is the smallest force and potential energy carrier meaning that they are carried inside the photons as ***quanta*** like the Planck said. (*Because I could not write the potential energy function one by one interaction I'm leaving this part unfinished. Therefore I will work about it later.*)

METHODOLOGY AND MODELING



Finally, we can start modeling part in which we should speak our ***assumptions*** first:

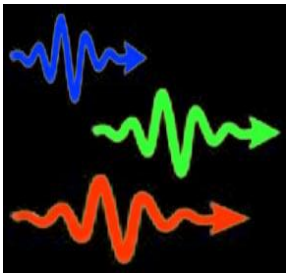
1- *Black body box is black enough to stop the light even if it is infinitely small or thin.*

2- *We have heat particles standing inside the box that is standing inside the ether that is the medium of the reference frame of the light that we discuss in later.* (*So, particles and the box have no motion with respect to the ether.*)

3- *Box has no chemical interaction or internal energy except from heat.*

4- *Black body radiation is a result of conserved force and energy* that is carried by heat particles and which results heat to move as light.

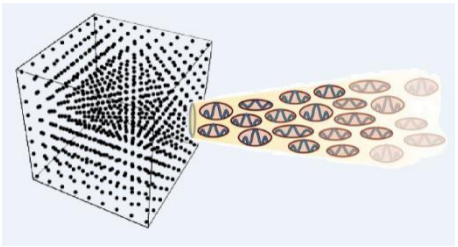
5- *Black body distributed photons are the waves which are made from heat particles and it can move inside the ether only with speed of light with respect to the ether.* (*So, light is a particle carrier wave moreover, like the box, photons are carrying potential energy because of constant movement speed. Due to the constant speed, particles cannot go faster and they have to conserve the remaining potential energy.*)



If we have a new conserved force and conserved potential energy, we must calculate what causes this distribution by using conserved force or by comparing initial and final condition by using conserved potential energy. (*We will ignore the gravitation because it is too weak, but we will discuss it later.*)

The only thing we know about the photon is, its energy proportional to its frequency or inverse wavelength, but we should think it as collection of particles and we should re-model the photon as a 3-D particles. Moreover, only difference between the heat and light is the speed of the particles. Because, in the quantum mechanics heat is standing wave and light is moving wave so, both of them can be calculated in same manner, and if only difference is speed we should calculate initial conditions potential energy and final conditions potential energy so, only difference becomes the kinetic energy of particles that can go only with ''c'' speed of light.

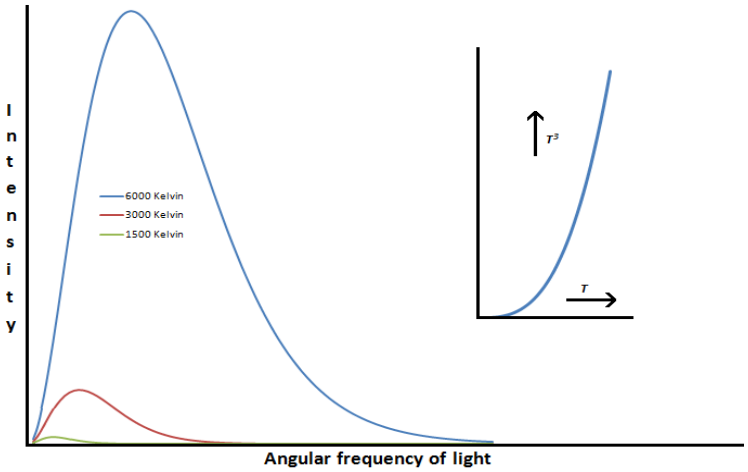
$$E = h\nu = h\frac{c}{\lambda}$$



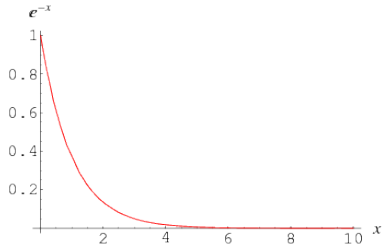
V=volume (=m^3)	***Radiation Constant =a=$\frac{\pi^2 {k_B}^4}{15\hbar^3c^3}$=$\frac{8\pi^5 {k_B}^4}{15h^3c^3}$***
A=area (=m^2)	***Stefan-Boltzmann Constant =σ=$\frac{\pi^2 {k_B}^4}{60\hbar^3c^2}$=$\frac{2\pi^5 {k_B}^4}{15\,h^3c^2}$***

Planck's Law	$= \frac{\hbar\omega^3}{4\pi^2c^2}\frac{1}{(e^{\frac{\hbar\omega}{k_BT}}-1)}$	$= \frac{2\pi h\nu^3}{c^2}\frac{1}{(e^{\frac{h\nu}{k_BT}}-1)}$
Stefan-Boltzmann Law	$P = \frac{\pi^2 {k_B}^4 T^4}{60\hbar^3c^2}A$	$P = \frac{2\pi^5 {k_B}^4 T^4}{15h^3c^2}A$
Internal Energy	$U = \frac{\pi^2 {k_B}^4 T^4}{15\,\hbar^3c^3}V$	$U = \frac{8\pi^5 {k_B}^4 T^4}{15\,h^3c^3}V$

If we examine the ***Planck's law*** which gives the power of the light radiation coming from the constant surface area A, at temperature T, at every frequency, its shape is constant as we discusses before, number of photon increases with T^3 and every photons energy increases with T.



If we look the Wien's law we can understand how number of photons changes with respect to the temperature. Our graphs peak point goes with T^3 but the area under the curve which is the integral of Planck law or simply ***Stefan-Boltzmann law*** radiation power is proportional to T^4 and total energy is proportional to T^4 so, if we ask how energy decreases with time, answer is simply exponential decay function.($U(t) = U_0\, e^{-x\,t}$)



$\frac{d}{dt}(U) = Power = \sigma T^4 = \left(-A\,\frac{\pi^2\,{k_B}^4\,T^4}{60\,\hbar^3\,c^2}\right) = \frac{d}{dt}\left(\frac{\pi^2\,{k_B}^4\,T^4}{15\,\hbar^3\,c^3}V\right)$ From this relation we can understand that temperature must decrease exponentially because its fourth power is proportional to energy. Therefore, we should write temperatures time dependency:

$\frac{dT}{dt} = -\frac{A\,\sigma\,T}{4\,V\,a} = -\frac{A\,\sigma\,T}{4\,V\,\sigma\frac{4}{c}} = -\frac{A\,c\,T}{V\,16}$ so, temperature function becomes $T = T_0 * e^{-\frac{c\,A\,t}{16\,V}}$

Than what will we do is simply use temperature in the Planck's law because we need total radiated light until our box temperature becomes ***zero***.

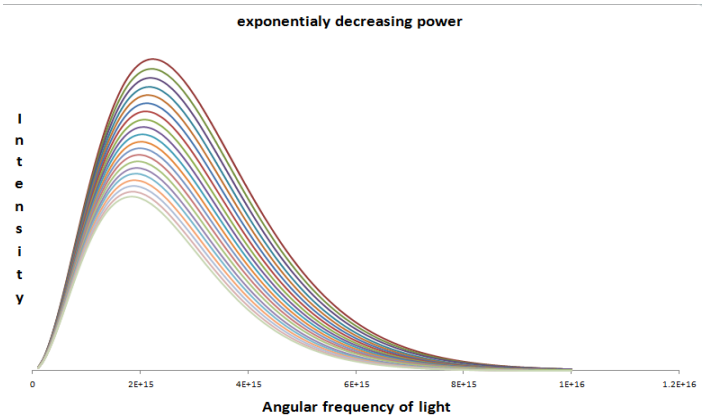
The function of the ***total radiated energy per frequency*** of the cooled black body box:

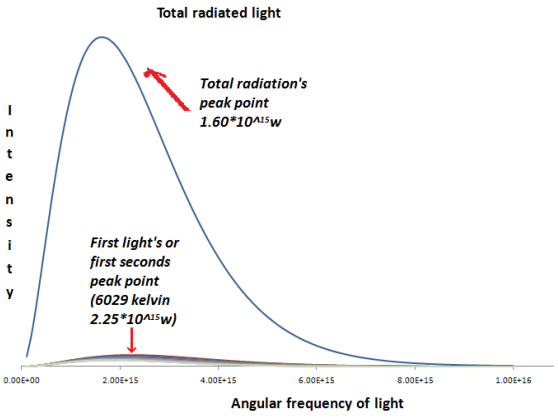
$$\int_0^\infty A\frac{\hbar\omega^3}{4\pi^2c^2}\frac{dt}{e^{\frac{\hbar\omega}{k_BT}e^{\frac{cAt}{16V}}}-1}$$

As we can see integral is only ***time dependent*** and we have lots of constant that are not dependent so, we can write it easily like $\int_0^\infty \frac{dx}{(e^{(\beta\, e^{\gamma\, x})})-1}$ but if we want to write in integral in most simple form it becomes $\int_\alpha^\infty \frac{dx}{(e^{e^x})-1}$.

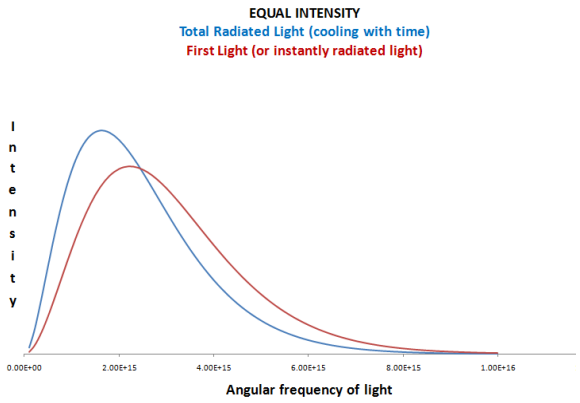
temp klvn	constant	volume m^3	area of cavity	tot energy	power/m^2		
6029.58456	0.6579736	1	5.33705E-10	1.00000001	0.040000172		
exp							
2.71828							
		energy	exp	time	radiation power	rp^(1/4)	instant temperature
1 kelvin Kb in w		1.000000006	0.96	0	0.04	0.4472136	6029.57807
1.3092E+11		0.960000006	0.96	1	0.0384	0.4426728	5968.356151
		0.921600005	0.96	2	0.036864	0.438178	5907.755855
c in m/s		0.884736005	0.96	3	0.03538944	0.433729	5847.770869
299792458		0.849346565	0.96	4	0.033973863	0.4293251	5788.394947
		0.815372702	0.96	5	0.032614908	0.4249659	5729.621905
h-bar in j.s		0.782757794	0.96	6	0.031310312	0.4206509	5671.44562
1.05E-34		0.751447482	0.96	7	0.030057899	0.4163798	5613.860034
		0.721389583	0.96	8	0.028855583	0.4121521	5556.85915
pi		0.692534	0.96	9	0.02770136	0.4079672	5500.437029
3.14159265		0.66483264	0.96	10	0.026593306	0.4038249	5444.587796
		0.638239334	0.96	11	0.025529573	0.3997246	5389.305633
		0.612709761	0.96	12	0.02450839	0.395666	5334.584784
		0.58820137	0.96	13	0.023528055	0.3916485	5280.419548
		0.564673316	0.96	14	0.022586933	0.3876719	5226.804284
		0.542086383	0.96	15	0.021683455	0.3837356	5173.733408
		0.520402928	0.96	16	0.020816117	0.3798393	5121.201392
		0.499586811	0.96	17	0.019983472	0.3759826	5069.202766

This integral has ***no exact solution*** at least it is not known yet so, we have *to solve it numerically, however, we should change the way we go and* ***we should calculate everything from the energy*** *not from the time*. In the end, it is ***convergent function***, and we can solve it by ***numerical analysis*** by starting from the energy calculation because it is too simple for us to understand. To start, we can take initial energy as $\mathbf{1}\ \boldsymbol{joule}$ in $\mathbf{1}\ \boldsymbol{m^3}$ with temperature of about $\mathbf{6029}\ \boldsymbol{Kelvin}$. We should have decreased it exponentially with four percent at every second (*about every* $\mathbf{17}$ *seconds energy becomes half gone*), than we can found the temperature of the every second and we should calculate the time about ***1000 seconds*** when almost there is no energy left. In this calculation our area is very small because as we can understand that cooling rate is dependent to the surface area and our ***area is smaller than needle***, about $\mathbf{5.33 * 10^{-10} m^2}$. After finding the intensity of every interval at every frequency, we have total radiation. In the graph, we can see the ***first*** $\mathbf{20}$***-second*** radiation and it ***exponentially*** decreases. What will we do is to sum up all the data which is the logic of integration. After $\mathbf{1000}$ ***seconds,*** we can say that there is almost no energy left.

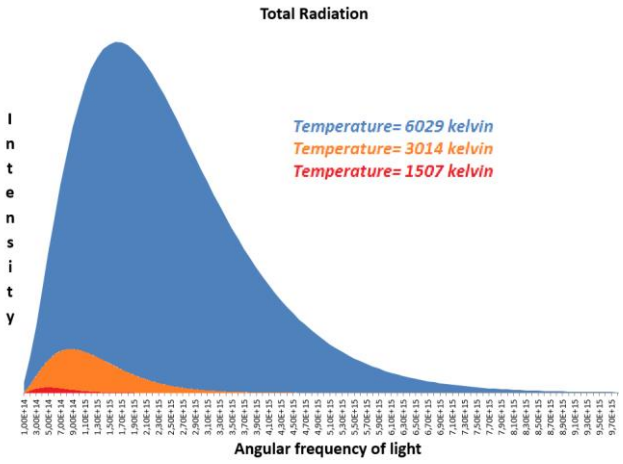




After we sum all the $\mathbf{1000}$ second data we can see a line in the upper part which shows the total radiated light in every angular frequency, and in the lower part of the graph we can see ***first*** $\mathbf{20}$***-seconds*** radiation again (*It is not clearly seen because of* $\mathbf{20}$ *tight lines*). We can see the total radiations peak point is in the lower frequency range than the Wien's peak point of $\mathbf{6029}\ \boldsymbol{Kelvin}$ temperature because with the time passes temperature decreases and peak points of every seconds moves to lower frequency or higher wavelength range. For comparison, we can look at the graph in equal intensity that means thermodynamically two cases have same energy, but frequencies of the photons are different. In current theory, the heat is light as red line inside the box, but for us heat becomes the continuous light until there is no heat inside the box as blue line.



Because of we have calculated everything only for one temperature that is $\mathbf{6029}$ $\boldsymbol{Kelvin}$ so, we should change the temperature and we should try to understand how this graph changes with respect to the temperature. Funny thing is graph's temperature proportionality is same with the Planck's law, most probably the constant coming from the integral have no effect on the Planck's law. The number of photon increases with $\boldsymbol{T^4}$ and energy of every photon increases with $\boldsymbol{T}$ (or we can say average energy of photons increases with $\boldsymbol{T}$) and absolutely the area under this graph gives us $\boldsymbol{T^4}$ which gives the total internal energy that is heat. If we want to give an example; if we ***double the temperature*** again, height of the graph increases $\mathbf{8}$ ***times*** and width of the graph increases $\mathbf{2}$ ***times***.



We should be interested when we see the result because it was good to see an integral of exponential of exponential function becomes ***same type of increase in the graph*** with respect to the temperature. Because again we can have the same distribution function in the integral, thanks to ***Cem Tezer*** and ***Ferit Öktem***, they have find a ***series solution*** and we will continue with that.

Our integral is in the form of $\boldsymbol{I = \int_0^\infty \frac{dx}{(e^{(\beta\, e^{\gamma\, x})}) - 1}}$

and we will assume $\boldsymbol{u = \beta\, e^{\gamma\, x}}$

so, we have $\boldsymbol{du = \gamma\, \beta\, e^{\gamma\, x}\, dx}$ and it is equal to $\boldsymbol{du = \gamma\, u\, dx}$

now we have the form of $\boldsymbol{I = \int_\beta^\infty \frac{\frac{1}{\gamma\, u} du}{e^u - 1}}$ $\rightarrow$ $\boldsymbol{\gamma I = \int_\beta^\infty \frac{\frac{1}{u}\, du}{e^u - 1}}$

$\rightarrow$ $\boldsymbol{\gamma I = \int_\beta^\infty \frac{1}{e^u - 1} \frac{du}{u}}$ $\rightarrow$ $\boldsymbol{\gamma I = \int_\beta^\infty \frac{e^{-u}}{1 - e^{-u}} \frac{du}{u}}$

Note that

$\boldsymbol{\frac{1}{1-x} = \sum_{k=0}^\infty x^k}$, *and* $\boldsymbol{\frac{x}{1-x} = \frac{e^{-u}}{1-e^{-u}}}$,

$$\boldsymbol{\frac{1 - x^n}{1 - x} = \sum_{k=0}^{n-1} x^k}, \quad \text{and if } \boldsymbol{n \rightarrow n + 1} \quad \boldsymbol{\frac{1 - x^{n+1}}{1 - x} = \sum_{k=0}^{n} x^k}$$

$$\boldsymbol{\frac{1}{1 - x} - \frac{x^{n+1}}{1 - x} = 1 + \sum_{k=1}^{n} x^k} \quad \text{and} \quad \boldsymbol{\frac{1}{1 - x} - 1 = \frac{x^{n+1}}{1 - x} + \sum_{k=1}^{n} x^k}$$

$$\boldsymbol{\frac{1 - (1 - x)}{1 - x} = \frac{x}{1 - x} = \frac{x^{n+1}}{1 - x} + \sum_{k=1}^{n} x^k \rightarrow \frac{e^{-u}}{1 - e^{-u}} = \frac{e^{-(n+1)u}}{1 - e^{-u}} + \sum_{k=1}^{n} e^{-ku}}$$

$$\boldsymbol{\gamma I = \int_\beta^\infty \frac{e^{-u}}{1 - e^{-u}} \frac{du}{u} = \sum_{k=1}^{n} \int_\beta^\infty \frac{e^{-ku}}{u} du + \int_\beta^\infty \frac{e^{-(n+1)u}}{u(1 - e^{-u})} du}$$

This integral is in the form of an **Exponential series integral + Residue**
Totally, we have a form of

$$\gamma I = \int_{\beta}^{\infty} \frac{e^{-u}}{1 - e^{-u}} \frac{du}{u} = \sum_{k=1}^{n} E_i(k\varphi) + R_n$$

Because of it is an infinite series and it is not possible to convert it any kind of function or even empirical function, we cannot use it as a function. Only thing we can do is we can use its table value in the book of ''Handbook of Mathematical Functions'' (*Abramowitz & Stegun*) and we can calculate it until the nth and we can calculate its error function which gives the limit of the sum of until the nth. Therefore, if we want to convert it at least an empirical formula we cannot use the series solution.

As we discussed before we have ***same type of increase in the graph*** with respect to the temperature and we can easily understand that the solution must be proportional with the Planck's Law then we can easily say that there must be a function to multiply the Planck's Law and it becomes our solution.

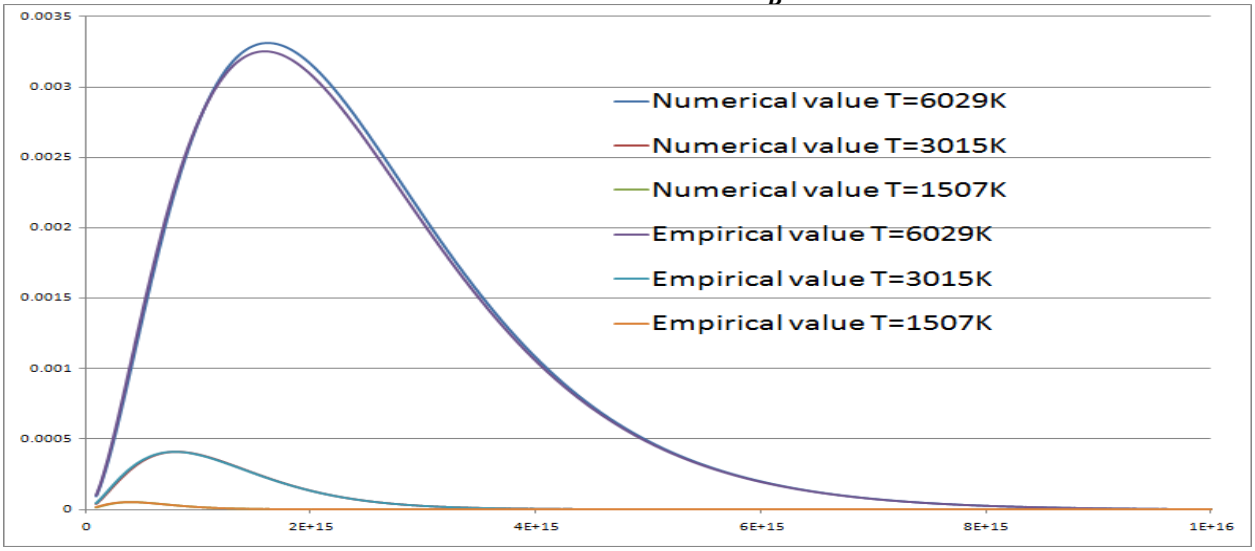
$$A \frac{\hbar\omega^3}{4\pi^2 c^2} \frac{1}{e^{\frac{\hbar\omega}{k_B T}} - 1} * f_0$$

Because, we have ***Area*** A in the function however; our function must be independent from the A. Moreover, it must be dependent to the ***Volume*** V because it will give the height of the graph and it is a linear multiplier for our function and these constants comes from the γ inside the series solution. We should be annihilate the A in the integral and to write an energy function we need to multiply it with '' V/c''. All of them come from γ finally, we have an energy function for volume and our function becomes like

$$A \frac{\hbar\omega^3}{4\pi^2 c^2} \frac{1}{e^{\frac{\hbar\omega}{k_B T}} - 1} \frac{16V}{cA} * f_1 \qquad V \frac{4\hbar\omega^3}{\pi^2 c^3} \frac{1}{e^{\frac{\hbar\omega}{k_B T}} - 1} * f_1$$

Over and above when we divide this function to the numerical values we can find an empirical formula and it is comes as $f_1 = \frac{1}{1 + \frac{\hbar\omega}{k_B T}}$ so in the end our function becomes like:

$$V \frac{4\hbar\omega^3}{\pi^2 c^3} * \frac{1}{e^{\frac{\hbar\omega}{k_B T}} - 1} * \frac{1}{1 + \frac{\hbar\omega}{k_B T}}$$



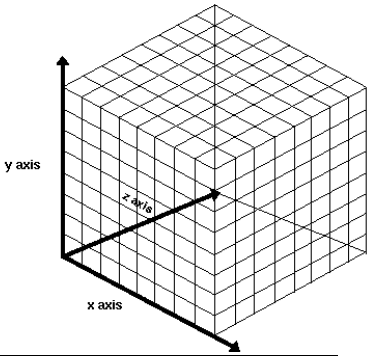
We have to know that the function we found is the empirical formula for the integral. However, our empirical function fits for all temperatures with numerical values because, it increases and decreases with the same proportionality with numerical work. For the graph, ***error is smaller than*** 2% for values with respect to angular frequency and for the ***area under the curve error is smaller as*** 1%, so if we integrate it for all wavelengths we can use it as a radiation constant, and we can use it as an empirical formula.

We can't be sure about the constants because it is not an exact solution, however, when we change the some constants of the function we can see better results, for graphing this function fits better for every point with the numerical analysis;

$$V\frac{4\hbar\omega^3}{\pi^2c^3} * \frac{1}{e^{\frac{\hbar\omega}{k_BT}}-1} * \frac{1.025}{1.04+\frac{\hbar\omega}{k_BT}}$$

(I do not know why it fits better but it is better to use this function for now.)

Now we can speak about our box and its properties. If we want to use math we should use our equations with respect to one parameter that can be number of heat particles or temperature or number of photons or cubic distance between heat particles. To understand the relations we should write all the dependencies before we set up our equation.



Assume that box has X number of heat particles and its volume is V and for every dimension length is l. If the density is constant, X and V must be proportional because in constant temperature density is constant as T^4. But if the number of particle is constant than V is proportional to l^3. Table shows the relation between particles cubic distances and temperature.

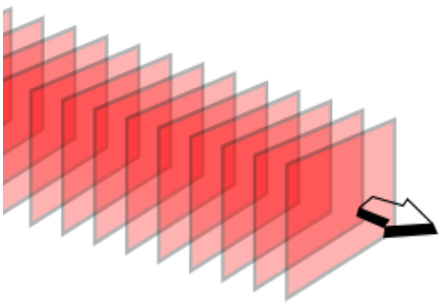
Volume of the box V	$\propto X$	$\propto l^3$	$\propto d^3$
Number of particle inside the box X	$\propto V$	$\propto T^4$	$\propto 1/d^3$
Distance between particles **d**	$\propto V^{1/3}$	$\propto 1/X^{1/3}$	$\propto 1/T^{4/3}$
Temperature **T**	$\propto 1/V^{1/4}$	$\propto X^{1/4}$	$\propto 1/d^{3/4}$

If we ask the initial potential energy in the box, it must be a function of a distance for every particle with others. Because in every case in the eyes of particle physics it is dependent to the conservative force that changes with distance, so, function must be like:

(**Constant** * **Number of particles** * **Function of distance dependency**)

If we want to write this with respect to temperature that is the function of the density, it becomes like; $c_3 * T^4 * Function\ of\ temperature$ for the constant volume. However, it is too hard to model and think the heat or temperature as collection of particles that is standing wave, so we need easier model to speak about it. However, we need to remodel the photon first in the eyes of heat particles to find the relation because it is better known as mowing wave.

We have discussed the photon as a wave of particles and it can be any kind of wave to remodel it (*you can look more about waveforms*), but we will think it as small box like our black body box itself which is 3-D box. However, in 1-D or 2-D waveforms there is no proportionality. (*I tried a lot but I could not find any proportionality for other dimensions.*)



And for the photon which is the final result of the box (*after radiation*);

Length of the photon	$\propto \lambda$	$\propto 1/\omega$	$\propto d^{3/4}$
Volume of the photon	$\propto \lambda^3$	$\propto 1/\omega^3$	$\propto d^{9/4}$
Number of particles inside the photon	$\propto 1/\lambda$	$\propto \omega$	$\propto 1/d^{3/4}$
Distance between particles in photon	$\propto \lambda^{4/3}$	$\propto 1/\omega^{4/3}$	$\propto 1/T^{4/3}$
Particle density in volume	$\propto 1/\lambda^4$	$\propto \omega^4$	$\propto 1/d^3$

As we can see the number of photons changes with the temperatures third power but with the changing temperature all photons energy becomes proportional to temperature than the total number of particle or for thermodynamics energy is $T * T^3 = T^4$. The important thing is how the distance between the particles changes with respect to temperature both for inside the box and the after particles become light.

We know both the heat particles distance dependency and the total lights distributions dependency and we should convert the distances with respect to one parameter which is angular frequency ω. We should start with thermodynamic energy density of one photon which has an angular frequency ω.

angular frequency ω and frequency $\nu = {}^{\omega}/_{2\pi}$

wavelength λ and volume of λ^3

$\lambda = {}^{c}/_{\nu} = {}^{2\pi c}/_{\omega}$ so, volume is $\lambda^3 = {}^{c^3}/_{\nu^3} = {}^{8c^3\pi^3}/_{\omega^3}$

Finally, thermodynamic energy density of the photon is $\frac{\hbar\omega}{\lambda^3} = \frac{\hbar\omega}{8\pi^3 c^3/\omega^3} = \frac{\hbar\omega^4}{8c^3\pi^3}$

Thermodynamic energy density of one photon is proportional to ω^4 so we should find the distance dependency of the particles inside the one photon. As we discussed before every heat particle inside the photon must have the distance dependency and it is proportional to the cube root of the density times some constant. We can calculate it by using equal energy density functions that are radiation constant and ***photon energy density function***. So we can write it easily as;

$$V\frac{\hbar\omega^4}{8c^3\pi^3} = V\frac{\pi^2\, {k_B}^4 T^4}{15\,\hbar^3 c^3} \qquad \left(\approx \int_0^\infty V\frac{4\hbar\omega^3}{\pi^2 c^3} * \frac{d\omega}{e^{\frac{\hbar\omega}{k_B T}} - 1} * \frac{1.025}{\frac{\hbar\omega}{k_B T} + 1.04}\right)$$

Therefore, we can find the relation between $\hbar\omega$ and $k_B T$ energy density to model the expansion energy of the photons and the standing heat. Moreover, it comes as:

$$\frac{\hbar^4\omega^4}{8\pi^3} = \frac{\pi^2\, {k_B}^4 T^4}{15} \quad so, \quad \hbar\omega_0 = \sqrt[4]{\frac{8\pi^5}{15}}\; k_B T \qquad (\hbar\omega_0 \approx 3.574267\, k_B T)$$

This relation is important to calculate the standing heat particles and distance dependency of heat particles inside produced photons so; we will use it to make the densities equal by assuming the particles are standing same cubic lattice which seems simple cubic for now (*at least we can assume that they have same cubic lattice*).

When we take the angular frequency $\omega = 1/sec$ the cubic distance between photons or heat particles becomes $d = 2\pi c * sec = 1883651867 km$ moreover, for our smallest particles it is $1/\omega^{4/3}$ dependent. So distance is proportional to the thermodynamic energy density's cube root and it is equal to $2\pi c/\omega^{4/3}$. This function seems like not true for dimension analysis however we should use it for our distance relations with a simple correction because it is not directly about our energy transformations and we are not using the expansion energy with respect to the smallest particles distance. Finally, we will be modeling the standing heat and temperature as constant wavelength photons.

To find the real distance we can find the number of particles first and then the distance or we should divide thermodynamic energy to the smallest energy that is $\mathbf{1.054571800 * 10^{-34}}$ $\boldsymbol{joule}$ and we can write the distance dependency. We know its value for one point and dependency for every point for any $\boldsymbol{\omega}$ and it must be in distance dimension as meter.

$$\boldsymbol{d = \frac{2\pi c}{\omega^{4/3}} * a_1 \quad and \quad \omega = (\frac{2\pi c}{d})^{3/4} * a_2 \quad (a_1 \; and \; a_2 \; are \; constants)}$$

When we look at the photons at any wavelength we can see that, both the temperature and the light have the same property for distance dependency even for the distribution of the produced light $\boldsymbol{d \propto \sqrt[3]{1/\omega^4} \propto \sqrt[3]{1/T^4}}$. If we want to see it as density function, we can write as $\boldsymbol{1/d^3 \propto \omega^4 \propto T^4}$ so we can say that we have $\boldsymbol{1/d^3}$ proportionality both for heat and the light and we can say that again it is the inverse volume dependency of the one heat particle. In reality with assuming the all distributions dependency we have find the dependency of volume of heat and light after it radiated. Problem is we cannot speak about the total radiated lights volume. Because while $\boldsymbol{\omega}$ goes to zero, wavelength goes to infinity and not the number of particles goes to infinity but the volume of the longer wavelengths goes to infinity. $\boldsymbol{volume \; of \; photon \; at \; frequency \; \omega}$;

$$\boldsymbol{V_\omega = \frac{8c^3\pi^3}{\omega^3} \; and \; for \; our \; distribution \int_0^\infty V \frac{4\hbar\omega^3}{\pi^2 c^3} * \frac{d\omega}{e^{\frac{\hbar\omega}{k_B T}} - 1} * \frac{1.025}{\frac{\hbar\omega}{k_B T} + 1.04}}$$

$$\boldsymbol{as \; \omega \to 0 \; for \; the \; distribution \; volume \to \infty \quad so, total \; volume \; of \; produced \; photons = \infty}$$

Therefore, we can only compare the volumes of the two cases that are in different temperatures. Because we need the proportionality which is constant as $\boldsymbol{d \propto \sqrt[3]{1/\omega^4} \propto \sqrt[3]{1/T^4}}$ the volume for one particle is $\boldsymbol{d^3 \propto 1/\omega^4 \propto 1/T^4}$ and finally we can say that standing heats volume and moving lights volume is always dependent to temperature or initial wavelength $\boldsymbol{\omega_0}$, however, for the light case it is not the linear dependency because it is a multiplier constant inside the distribution of distance function.

We must understand that this distance and energy relation is not simple as inverse distances powers ($\boldsymbol{1/d^p}$) and we need another comparison model to explain the energy and distance relation because we have the distribution.

We have assumed that photon is still a collection of particles and only known difference of photon and heat is its speed that is speed of light. Now with only distance dependency and speed difference we will try to build a function shows the potential energy transfer which result photons to move with speed of light.

Problem is that we do not have monochromatic light so we do not have only one wavelength photon. For this reason, we have to calculate all the distances inside ***all the light produced by black body box until zero temperature*** with respect to initial constant distance which is equal for all the heat particles inside the heat which we modeled as constant wavelength photon as $\boldsymbol{\hbar\omega_0}$. However, before doing this we can try to understand how the distance and the energy changes. We can see two basic proportionalities that are:

Heat always becomes light at what distance, density or temperature we put it.

Light is always going with speed of light with respect to our box (*at least inside the flat space which is not expanding*).

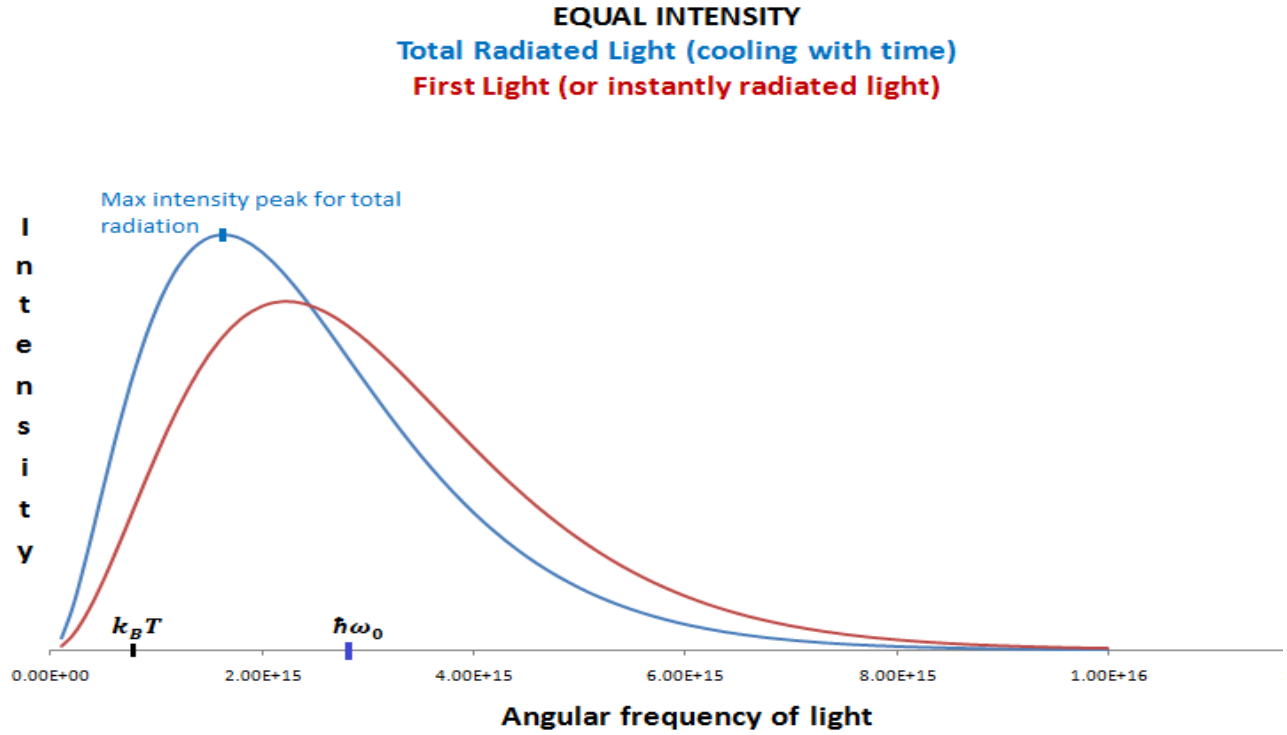
When we try to see the distance change between heat and distributed photons it is always proportional to the initial distance of $\boldsymbol{\hbar\omega_0}$ and always it creates a kinetic energy of $\boldsymbol{1/2mc^2}$ which is the half energy of thermodynamic energy of heat.

So created kinetic energy is always proportional to the initial heat or the total radiated photons integral or simply radiation constant and distance is always distributed as proportional to initial distance. We must understand that the energy function must be logarithmic which can always create a kinetic energy as it increases with same proportionality.

We have initially one-wavelength photons; and finally distributed photons; which have kinetic energy of;

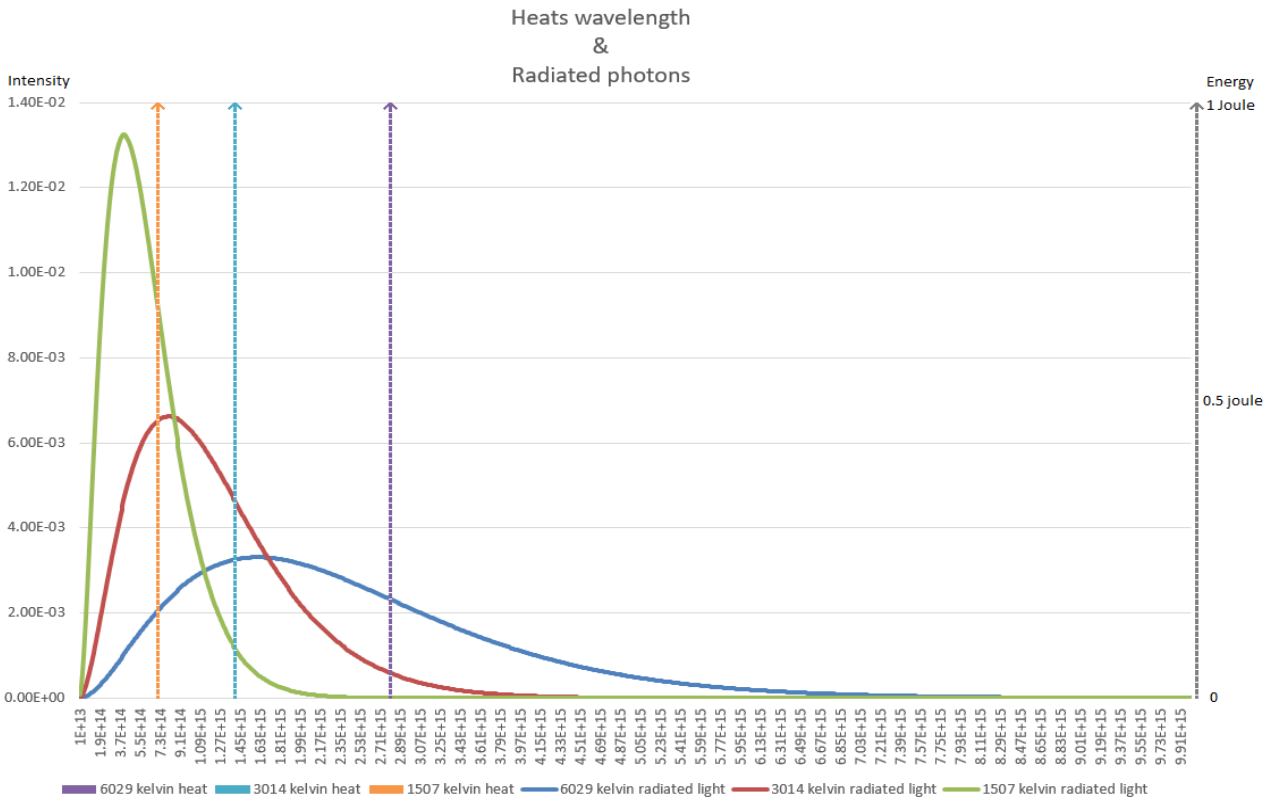
$$V\frac{\hbar\omega_0{}^4}{8c^3\pi^3} \rightarrow V\frac{4\hbar\omega^3}{\pi^2c^3} * \frac{1}{e^{\frac{\hbar\omega}{k_BT}}-1} * \frac{1.025}{1.04+\frac{\hbar\omega}{k_BT}} + V\frac{\hbar\omega_0{}^4}{16c^3\pi^3}$$

With this logic, every photon must have different logarithmic energies that are only dependent to angular frequency of photon. With increasing the angular frequency both, the number of heat particles inside photon increases and the distance decreases so expansion potential energy increases. We can understand this event from the graphic of the radiation.



With respect to instant radiation (for old theory)
For 6029.58455 kelvin $k_BT \rightarrow$ $8.324736984 * 10^{-20}\ J$
Photon at the Max intensity $2.348773 * 10^{-19}\ J$ $\omega \rightarrow number\ of\ heat\ particles\ 2.227229 * 10^{15}$
Average photon energy $2.248624 * 10^{-19}\ J$ $\omega \rightarrow number\ of\ heat\ particles\ 2.132262 * 10^{15}$
With respect to standing heat (for our heat theory)
For 6029.58455 kelvin $k_BT \rightarrow$ $8.324736984 * 10^{-20}\ J$
Photon as standing heat $\hbar\omega_0 \rightarrow 3.574267\ k_BT$ $2.975483 * 10^{-19}\ J$
Standing heat $\hbar\omega_0 \rightarrow 2.975483 * 10^{-19}\ J$ $\omega \rightarrow number\ of\ heat\ particles\ 2.821508 * 10^{15}$
With respect to total radiation cooling with time (for our theory)
For 6029.58455 kelvin $k_BT \rightarrow$ $8.324736984 * 10^{-20}\ J$
Photon at the Max intensity $1.708406 * 10^{-19}\ J$ $\omega \rightarrow number\ of\ heat\ particles\ 1.619999 * 10^{15}$
Average photon energy $1.663561 * 10^{-19}\ J$ $\omega \rightarrow number\ of\ heat\ particles\ 1.577475 * 10^{15}$
Average photon number $6.011200 * 10^{18}$

As we can understand heat always becomes light no matter how big the initial distance is, because distances are related with initial distance that is dependent to $\hbar\omega_0$.



As we can see, for distance relation $\frac{\hbar\omega}{k_BT}$ is the constant and it is the power of the exponential increase inside the Planck's law, so all the distance is dependent to the initial distance which is again dependent to the temperature scaled energy k_BT. Therefore, we need to write a logarithmic energy function that can always create kinetic energy by increasing the distance between particles.

We have initially one-wavelength photons; and finally distributed photons, which have kinetic energy of;

$$V\frac{\hbar{\omega_0}^4}{8c^3\pi^3} \rightarrow V\frac{4\hbar\omega^3}{\pi^2c^3} * \frac{1}{e^{\frac{\hbar\omega}{k_BT}}-1} * \frac{1.025}{\frac{\hbar\omega}{k_BT}+1.04} + V\frac{\hbar{\omega_0}^4}{16c^3\pi^3}$$

We must transform the k_BT into the frequency dependent energy $\hbar\omega_0$ $(k_BT \approx 0.279777\,\hbar\omega_0)$

We have initially one-wavelength photon; and finally distributed photons; which have kinetic energy of;

$$\hbar\omega_0 \rightarrow \frac{32\pi\hbar\omega^3}{{\omega_0}^3} * \frac{1}{e^{\frac{\omega}{\omega_0*0.28}}-1} * \frac{1.025}{\frac{\omega}{\omega_0*0.28}+1.04} + \frac{\hbar\omega_0}{2}$$

If we want to write everything in the eyes of our heat particles, it becomes as:

We have initially one-wavelength photon; and finally distributed photons; which have kinetic energy of;

$$\frac{\hbar\omega_0}{\hbar\omega_0} \rightarrow \frac{32\pi\omega^3}{{\omega_0}^4} * \frac{1}{e^{\frac{\omega}{\omega_0*0.28}}-1} * \frac{1.025}{\frac{\omega}{\omega_0*0.28}+1.04} + \frac{\hbar\omega_0}{2\hbar\omega_0}\,(cosntant)$$

We must be careful because we are not driving a function in this part; we are just trying to understand the relation between the first heat as photon, distributed photons and the kinetic energy. Therefore, we can see the result as the thermodynamic energy of initial photon, the distributed photons and there is a constant energy per our heat particle, and it results the particles to move with speed of light. For the Planck's law we are using an intensity function and we use energy proportionalities as $(\hbar\omega)/(\hbar\omega_0 * 0.279777)$. However, we should think it as energy change which is always around the point $\hbar\omega_0$, because it is the initial energy as photon and we should think it as initial constant distance for the particles. Therefore, everything is distributed around this point and we should think the logarithmic differential function that gives that relation.

If we want to start from beginning, we can start with the rate of the temperature decrease inside our Black Body Box:

$$T = T_0 * e^{-\frac{c\,A\,t}{16\,V}} \quad and \quad k_B T \approx 0.279777\,\hbar\omega_0$$

We can see the exponential decrease and at the same time exponential distance increase between the particles.

Now if we want to write proportionality of the equation;

Initial frequency inside the box: ω_0 decrease rate: $\omega = \omega_0 * e^{-constant}$ (same with temperature)

Initial kinetic energy potential: $V * \hbar{\omega_0}^4 / 16c^3\pi^3$

Created kinetic energy is proportional to total radiated energy that is going with speed of light. Moreover, while temperature decreases exponentially the kinetic energy production power decreases exponentially. Therefore, we need to find a logarithmic energy relation that results one photon to become other distributed photons and to give them the speed of light. For one photon, it's carried heat particle number is proportional to its frequency and remaining part must be logarithmic because we have angular frequency conservation or thermodynamic energy conservation between the initial and final photons.

Let's assume expansion energy of photons is just a function that is only dependent to ω. ($f(\omega)$)

Number of photons times the energy of photons; and finally distributed photons times the energy of photons; kinetic energy;

$$V\frac{{\omega_0}^3}{8c^3\pi^3} * f(\omega_0) = \int_0^\infty V\frac{4\omega^2}{\pi^2c^3} * \frac{f(\omega)}{e^{\frac{\hbar\omega}{\hbar\omega_0 * 0.28}} - 1} * \frac{1.025}{\frac{\hbar\omega}{\hbar\omega_0 * 0.28} + 1.04} d\omega + V\frac{\hbar{\omega_0}^4}{16c^3\pi^3}$$

If we divide everything to constants, we can write it as:

$$f(\omega_0) = \int_0^\infty \frac{32\pi\omega^2}{{\omega_0}^3} * \frac{f(\omega)}{e^{\frac{\omega}{\omega_0 * 0.28}} - 1} * \frac{1.025}{\frac{\omega}{\omega_0 * 0.28} + 1.04} d\omega + \frac{\hbar\omega_0}{2}$$

We have to know that in this point we have linearly proportional kinetic energy dependency with the initial frequency ω_0. Therefore, if we divide all the parts into frequency, our function becomes logarithmically dependent to the frequency. Therefore, there must be a linear multiplier of the thermodynamic energy inside the expansion energy of photon. Now we can understand that the function of the expansion energy has linear and logarithmic parts, because of the number of particles and the distance dependency. Therefore, we should think both parts and we will try to find the functions dependencies and then the constants. We will write an energy function so we should write an energy dimension in one of the parts.

We can start with discussing the dependencies and constants;

$$f(\omega) \propto \hbar\omega * log_b(\hbar\omega)$$

Therefore, we will have an energy function but as we said this energy is the result of the change in the distance and the speed of the particles and it is not a finite energy as we discussed because it can create an infinite energy as logarithmic distance increase. We should think the constants inside the function because of the initial energies and the logarithm's base that is the rate of the energy change with distance.

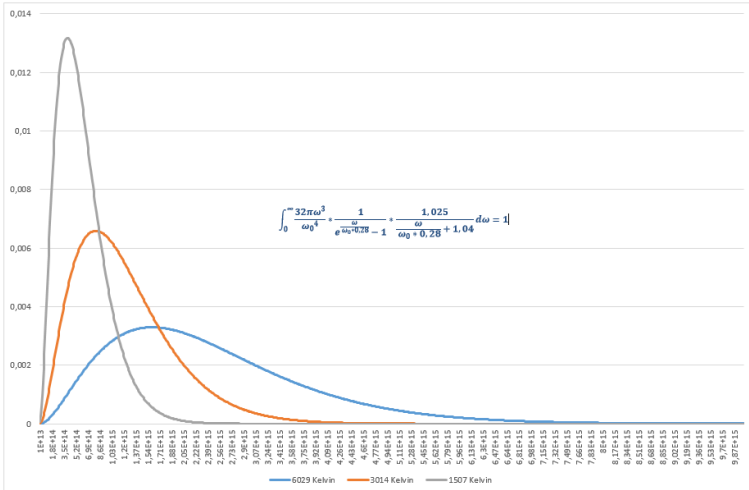
$$f(\omega) = (c_1 * \hbar\omega) * (log_b(c_2 * \hbar\omega))$$

Number of photons times the energy of photons; and finally distributed photons times the energy of photons; kinetic energy;

$$f(\omega) \rightarrow (c_1 * \hbar\omega_0) * (log_b(c_2 * \hbar\omega_0)) = \int_0^\infty \frac{32\pi\omega^2}{{\omega_0}^3} * \frac{(c_1 * \hbar\omega) * (log_b(c_2 * \hbar\omega))}{e^{\frac{\omega}{\omega_0 * 0.28}} - 1} * \frac{1.025}{\frac{\omega}{\omega_0 * 0.28} + 1.04} d\omega + \frac{\hbar\omega_0}{2}$$

If we can exactly find the constants c_1 and c_2 and base of logarithm b then we can speak about this potential energy, because it must be working for every possible temperature. This transformation should give the infinite energy that can always create kinetic motion for the heat that we use as photons that is thermodynamic energy. However, we have many problems as we are using an empirical formula and integrals of it.

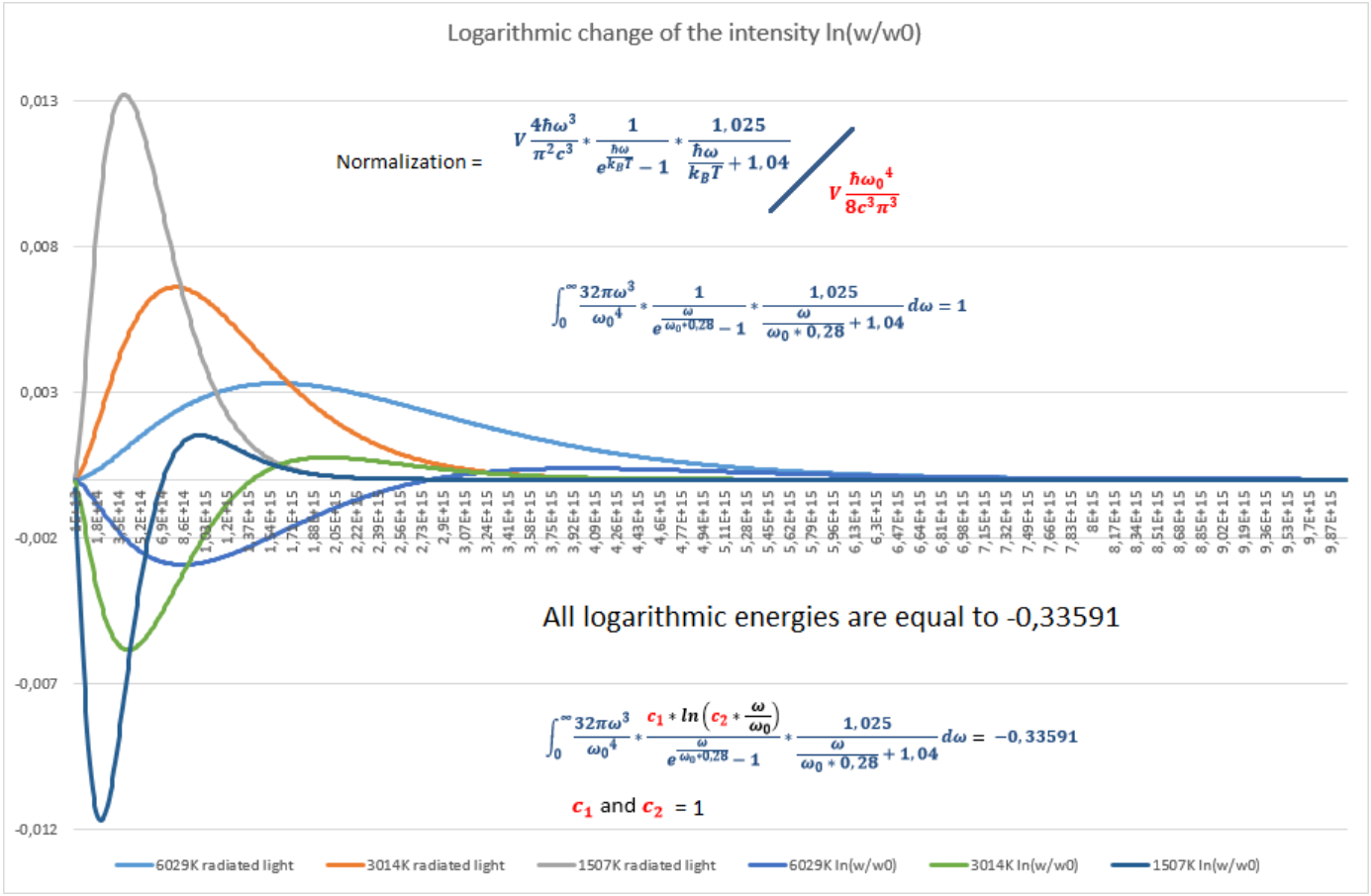
We can easily say that logarithm's base can easily be equal to e which is a natural logarithm ln and with it we should calculate the constants c_1 and c_2. Moreover, we can make some simplifications because of the $\hbar\omega_0$ dependency. We should start with a normalized function that is division of energy densities of heat and produced light. Whatever we take the initial temperature or the frequency ω_0 it becomes always 1 (*but with a little error because we are using the empirical function*).



$$\int_0^{\infty} \frac{32\pi\omega^3}{{\omega_0}^4} * \frac{1}{e^{\frac{\omega}{\omega_0 * 0.28}} - 1} * \frac{1.025}{\frac{\omega}{\omega_0 * 0.28} + 1.04} d\omega = 1$$

And we will compare all the radiated lights angular frequency with the initial frequency ω_0. Therefore, our graph shows the function of;

$$\int_0^{\infty} \frac{32\pi\omega^3}{{\omega_0}^4} * \frac{c_1 * ln\left(c_2 * \frac{\omega}{\omega_0}\right)}{e^{\frac{\omega}{\omega_0 * 0.28}} - 1} * \frac{1.025}{\frac{\omega}{\omega_0 * 0.28} + 1.04} d\omega = -0.33591$$



Now we can speak about the c_1 and c_2. While intensities are constant and normalized, as the angular frequency changes, particles are creating the kinetic energy and we need to write the real energy function to show the relation between the thermodynamic energy and our expansion energy. We have started only with the ω_0 and now we have total radiations logarithmic energy which becomes kinetic energy of the light.

If we can create energy in every case as we did in functions, we do not need to have a constant inside the logarithmic part.

$$c_1 * ln\left(c_2 * \frac{\omega}{\omega_0}\right) \quad is\ equal\ to \quad c_1 * (ln(c_2) + ln\left(\frac{\omega}{\omega_0}\right))$$

We don't need to have linear energy difference inside the function. We can see that we don't need c_2, because we don't have any constant linear energy difference inside the equations, so we can take c_2 as 1 and $ln(1) = 0$.

$$Expansion\ energy\ of\ photon = c_1 * ln\left(\frac{\omega}{\omega_0}\right) = \quad c_1 * (ln(\omega) - ln(\omega_0))$$

If we work numerically, about the constant c_1 it must be half energy of the photon and now we can speak about it. Our functions are the volumetric energy functions and if we normalize them, we can only have the wavelength change inside the same energy. Therefore, we must transform it to the real energy density function or just one photon's energy transformation function. We can create energy by changing the wavelengths of the photons, while the thermodynamic energy is constant. If we have only one photon we should find its energy change with distribution or if we have a volume, we should find its expansion energy function.

By taking an average expansion energy of all distributed photons we have find a constant which is equal to -0.33591. It must be equal to $-1/2$, because it is the difference between the thermodynamic energy and the kinetic energy of the particles.

While we are using $E = mc^2$ as energy transformation our particles or light have kinetic energy of $KE = {}^1/_2\, mv^2 = {}^1/_2\, mc^2$. Therefore, we should increase the result as about 1.488493 times. Because, $-0.33591 * 1.488493 = -0.5$. Therefore, c_1 is about 1.488493. (*I have problems with that numerical solution because of using an empirical function. If we have used the numerical solution for that integral the expansion constant becomes* -0.3316886707 *so, it is in between* 1.47415 *and* 1.50743768.) And we have to know that there must be a function with respect to speed of light to give that particles to kinetic energy here, so, we are speaking about the potential function here and we will speak about the ***expansion shift*** which is seen inside the ***expanding universe***.

Now we can multiply the real energy terms with our normalized function to find the real expansion energy of the vacuum or just one photon. However, as we said before we have a logarithmic energy function and it is different from the inverse distanced functions, because it is an infinite energy while the distance changes. Logarithm has no limit both at zero distance and the infinite distance therefore, we should write and use our function only for compare the wavelengths of the photons have same thermodynamic energy. We can write it as;

$$\int_0^\infty \frac{32\pi\omega^3}{{\omega_0}^4} * \frac{1.5 * ln\left(\frac{\omega}{\omega_0}\right)}{e^{\frac{\omega}{\omega_0 * 0.28}} - 1} * \frac{1.025}{\frac{\omega}{\omega_0 * 0.28} + 1.04} d\omega = -0.5 \qquad (normalized\ function)$$

Alternatively, we can write it as;

$$-V\frac{{\omega_0}^3}{8c^3\pi^3} * 1.5 * \hbar\omega_0 * ln(\omega_0) \; + \; \int_0^\infty V\frac{4\omega^2}{\pi^2c^3} * \frac{1.5 * \hbar\omega_0 * ln(\omega)}{e^{\frac{\hbar\omega}{\hbar\omega_0 * 0.28}} - 1} * \frac{1.025}{\frac{\hbar\omega}{\hbar\omega_0 * 0.28} + 1.04} d\omega$$
$$= expansion\ energy\ of\ volume\ that\ has\ temp\ as\ \omega_0 \quad (V\ and\ \omega_0\ dependent)$$

We can give simple example about expansion energy exchange of heat and light, if we assume the produced light is in just one wavelength (*as monochromatic not as distribution; so, this is just an example for average but not totally true*);

$$1.5 * \hbar\omega_0 * ln({}^\omega/_{\omega_0}) = -\hbar\omega_0/2 \quad so;\ ln({}^\omega/_{\omega_0}) = -1/3 \quad and\ ({}^\omega/_{\omega_0}) = 0.716531311$$

This means that, if we have initially one photon that has frequency as $\omega_0 = 1$ then it becomes 1.39561242 photons having frequency $\omega_0 = 0.716531311$ and gains speed of light.

Now if we want to turn back and find these functions proportionality with the distance we can speak about the real potential energy function about the heat particles. As we can understand these heat particles are lives inside the photons. Because, photons have dependent proportionality about particle number and distance, related with each other. Therefore, we have to write this function as only dependent to the distance. Therefore, we can think it as again normalized function for the distance. If we can write it independent from the volume, we can say something about it and we will try to do it with simple proportionalities. As we have discussed before;

$$d = \frac{2\pi c}{\omega^{4/3}} * a_1 \quad and \quad \omega = (\frac{2\pi c}{d})^{3/4} * a_2 \quad (a_1 \, and \, a_2 \; are \; constants)$$

We are working with a photons potential and we know that it's a moving wave for this reason we should know our dimensions are not true for to write the real potential energy functions but we will try to write or at least understand it.

We have found a function for photons expansion energy as;

$$Expansion\ energy\ of\ photon = 1.5 * \hbar\omega * ln(\omega)$$

$$expansion\ energy\ of\ photon = U = number\ of\ particles * log_{base}(function\ of\ the\ distance)$$

$$Energy\ per\ heat\ particle = c_1 * \hbar * ln(\omega)\ or\ we\ can\ think\ it\ as = c_2 * ln(\omega / \omega_0)$$

Now it becomes only dependent to the initial distance change to find the photons or the volumes expansion energy. Because, as we said before if we decrease frequency by $\%28.34$, we can create enough kinetic energy to turn the heat into the light. So, we can think the distance change like this and the distance is dependent like;

$$Expansion\ energy\ of\ photon = 1.5 * \hbar\omega * ln(\omega)\ and\ per\ particle\ simply = c_3 * ln(\omega)$$

$$and\ if\ we\ think\ the\ transformation\ energy\ per\ particle = c_4 * ln(\omega) = c_5 * ln\left(\left(\frac{2\pi c}{d}\right)^{3/4}\right)$$

$$again\ it\ is\ same\ logartihm\ dependency = c_5 * 3/4 * ln\left(\frac{2\pi c}{d}\right)$$

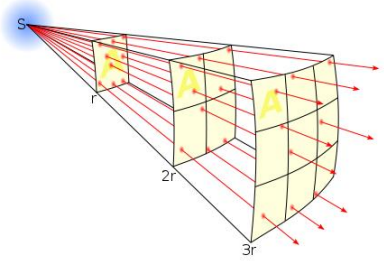
We can see that we have a function that is inverse distance dependency inside the logarithm and it works only inside the photons and dependent from all the other particles we know as heat or light. Because we know, until two photons intertwined or nested they do not affect the other (*except gravitational force*). We need a transformation for from ***3-D logarithmic potential*** to ***1-D function***. More probably we have to write a series function for one particle to interact all other particles and result must be in the logarithmic potential like we find it. It is so hard to think because we should solve an integral again to find for ***1-D function***. Therefore, we still can't speak about this potential and force in the eyes of heat particles or at least two body interaction method. We will speak about this in the discussion part later because I cannot think anything more to write its mathematics.

As we can understand, we should have functions for heat particles to show their forces and potential energies moreover, these forces and potential functions must only be dependent to distance. We are using the potential energy for heat to become light and this potential energy must work for the case when the ***speed of light changes*** with respect to our first reference point. As we know today, our ***universe is expanding faster than speed of light*** and this creates a problem for the modern physics to explain it. Because of our useless theories, functions and expectations we are thinking only the bigger particles and carried energy with them. However, in our case these smallest particles give all the energy to the bigger particles as photons therefore, kinetic and other types of potential energies. If we think the photons inside the expanding space, to write and think how something should happen about our theory, we should speak about all the physics we know and at least we should discuss it. As we can understand we still do not know how everything works and mechanics behind it. Now we are starting the discussion part to think about everything.

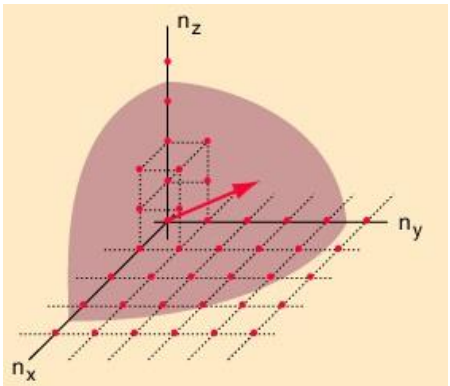
DISCUSSIONS

In our theory, unlike the present photon gas theory we assumed that the heat is standing and it is not just simple as photons. Moreover, we have changed its logic by taking the integral of the temperature with time and we have calculated a potential energy for every photon that has angular frequency $\boldsymbol{\omega}$. If we have assumed all energy becomes the instant light in which $\boldsymbol{\omega_0}$ becomes Planck distribution, we should have calculated $\mathbf{2.75}$ times weaker logarithmic energy change. However, by assuming all the radiation happens with time, we have found a bigger potential energy change inside the photons. We have said that ''*with the radiation, particles total potential energy decreases and this increases the kinetic energy of the particle till they goes with the speed of light*''. Because we build up our functions on the distance between these particles so, we should have transform the wavelength change to the distance change. As we have calculated average expansion energy of photons results an average expansion energy frequency decrease by $\%\mathbf{28,34}$, (*so, it has same energy exchange with the distributions average*). With the same logic we can say that; $\boldsymbol{d \propto \sqrt[3]{1/\omega^4} \propto \sqrt[3]{1/T^4}}$ Therefore, distance increases by $\mathbf{\%55,96}$ for the average energy. $\boldsymbol{for\ \omega = 1\ \ d = 1 \quad and\ for\ \omega = 0.716531311\ \ d = 1.5596}$. We can continue with wavelength of the photon that is inversely proportional to angular frequency;
$\boldsymbol{{\omega}/{\omega_0} = 0.716531311\ \ and\ {\lambda}/{\lambda_0} = 1.39561242}$. And for average energy volume expands as;
$\boldsymbol{V/V_0 = \lambda^3/\lambda_0^3 = 2.7182818}$ (= ***e*** *because we take constant as* $\mathbf{1,5}$)

We started with point that even energy itself has a distance dependency and at least we have found proportionality, but still we don't know what causes that potential in the one by one interaction. What causes one particle to gain in 3-D a logarithmic potential? We can answer this question after we have written the two body interactions function. We should think the geometric series in 3-D space and we should find an equation that results photons expansion energy. Afterwards we can discuss it like the gravitational force.

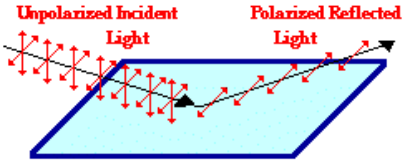


When we think logarithmic potential inside infinitely many particle system, we can think that the total force must be $\boldsymbol{1/d}$ dependent. Because, force is the derivative of the potential energy function which is distance dependent. Therefore, we can think the force as $\boldsymbol{1/d}$ inside the 3-D with infinitely many particles, so, we have a one particle that repels every other particles in three dimension and total force on it is proportional to $\boldsymbol{1/d}$. If we think all the interaction of that one particle, and let's assume it has a force proportional to $\boldsymbol{f(1/d^p)}$ in one by one interaction, and while we are getting away from it the number of particles interacting with it is proportional to $\boldsymbol{d^2}$ and we should have a function like this; $\boldsymbol{\sum_{d=1}^{\infty} d^2/f(1/d^p)}$ and we should find a result that is proportional to $\boldsymbol{1/d}$. (*So, to solve the real one by one or simply two body interaction is very complex for me. I could only find a face centered cubic structure and if we write a series for it, the function becomes kind of zeta function and again interaction becomes like* $\boldsymbol{{x^p}/{e^x - 1}}$. *When we see this function it makes infinite force or potential a finite force or potential inside* ***3-D with infinitely many particles****. It is a division of power versus logarithm and it makes our logarithmic potential to put inside a limited range which is photon again.*)

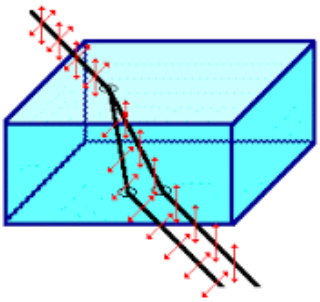


I don't know can we write a simple function to show the distribution of heat inside our universe while there are big masses inside the heat. At least we should find some simple methods to calculate the heat density as cloud modeling that should work around the point masses and at least we should write empirical functions to show radial heat density changes around big masses in big systems. But, to think these we need computer modeling or mathematical series between the forces of expansion and gravitation. At least with an initial minimum temperature at infinity; we should find the rate of change of heat density with respect to radial distance around point masses. We should know the photon expansion potential have no meaning for thermodynamics and gaining mass chapters. Because, heat only expands and we can think the opposite for gravitation which results the heat to become more condensed around point like masses. Moreover, we have to know even heat itself must affected by itself due to gravitation, due to its mass. This ***distribution of heat*** or we can say ***metric heat*** must be related with these two forces which control everything in the bigger radius, and I think these two forces are ***naturally reasonless*** meaning that we don't need to have or create a logic to form these forces with another smaller particles or something. But it is very different for bigger particles, because of the gaining mass with photons or loosing mass with a gravitational field. When we speeded up a small particle like electron its kinetic energy is equal to the difference between total and rest masses and even that mass has a gravitational effect for other particles. Moreover, an electron stays at bigger gravitational potential must lose its some mass to create kinetic energy while it starts to accelerate and when it crushes and stops then there is heat as photons again. Therefore, it is not that easy to speak about the functions of ***bigger particles*** or ***solid particles*** that we made from. We should know in every case the expansion potential energy must be conserved; both for the thermodynamic energy as we know as every kind of potential energy and for the smallest inside bigger particles which made particle itself. Just as we thought, we must accept forces of ***gravitation and expansion*** (*and if there is more*) as the ***natural forces***. However, while our current ***energy*** term is just about thermodynamics, because of heat transfer as photon exchange process, we can accept the forces working as mass transfer force as ***derived forces*** which we know as three forces of the physics; ***weak, strong and electromagnetic forces***.

I still don't know any other way of thinking to model the photons as collection of particles and the functions of these particles. As a wave, photons can be very different and complex waves because of other events we have seen in our universe. If we want to model these heat particles as functional points inside the vacuum we should write it to work in every case we know. We should know that even if our predictions, ideas or theories are true, we are too weak in understanding the real mechanics. We still don't know much about photons properties like; ***polarization, reflection, refraction, dispersion, interference,*** etc. but, if it is true we can write all the mechanics in the eyes of these particles which are the only force and potential carrying particles or points. If we think everything like this, all the physical models become methods and the only real mathematical representation of physics becomes the ***absolute matrix*** which must be the only reason for every operation with functions. We should see the reason-result case in methods we use and then we can try to write the matrix with our knowledge, because, it is not a knowledge came from heaven.



Reflection of light off of non-metallic surfaces results in some degree of polarization parallel to the surface.

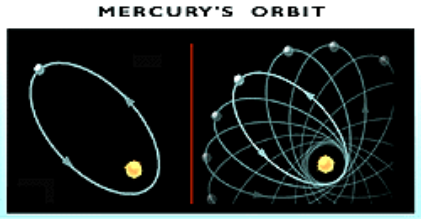

The two refracted rays passing through the Iceland Spar crystal are polarized with perpendicular orientations.

We can continue discussion with the unknown terms we use. In this way, we should try to explain all the unknown events and anomalies with our theory. And it starts when we start to think about the gravitational force in bigger radius. Because in our theory vacuum is not an empty void, it has a mass as heat inside it and that results lots of chapters to work about. We should have heard articles or discussions about the ***zero-point energy*** or ***vacuums energy*** in which vacuum itself is seen as solution of everything.

When we think gravitation inside the quantum mechanics, it doesn't seem like a force because, its explanation on the solid particles forces us to think it is a different effect that attracts and changes the space time and it results slowing down of time. For this reason, physicists rejects mass increase, photons mass and even the mass of the energy, but, we can't accept it as simple as they say. ***Massless logic*** seems like simple but, in quantum mechanics only real variable becomes rest mass and other forces however, to write the real mechanics we should think the time as absolute because it must be the only parameter to calculate everything by changing it as we learned in classical mechanics. Therefore, this logic is the reason behind the classical mechanics but, still we can see some people who think that they can change the time by changing the dependent variable of the functions. We should know that this logic is totally rubbish (*changing of variables does not change the real time*).

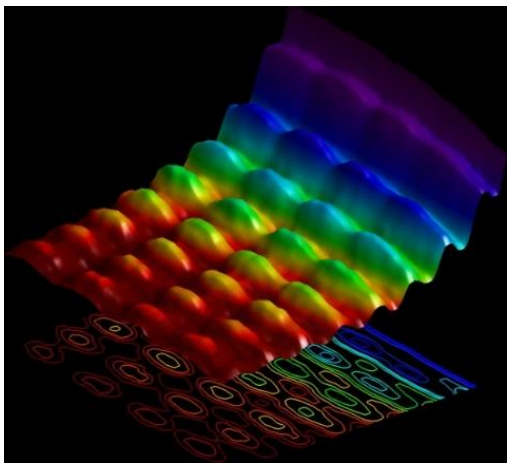
If we turn back and speak about our thesis and gravity, we have a theory about ***indestructible particle*** that has ***constant mass*** which is not changing with the speed of particle with respect to any reference. And we know this particle is just the heat itself which is the thermodynamic energy that results every interaction with the ***photon exchange process***. But, as we said before we do not have only ***three forces*** or we do not need to think everything with ***standard model***. But, we know that, heat can become the only element of the physics, even it has the different forms inside our universe. When we think about the calculations or mathematics, these particles must become the only points that our functions should written on. Interactions of these particles results everything both in smaller and the bigger radius but we should know that, understanding it is very hard and takes long time and it is not easy as Newton mechanics or it should not complex as quantum mechanics. As we can see in our current physics theories, while the radius gets bigger everything changes, because, from the smallest to bigger systems we are modeling everything as charges, quarks, forces, atoms, molecules, etc. and these things must be more complex than the smallest.

While speaking about the gravitation and our expansion potential we should also know that the term ***interaction speed*** which is not spoken much about in popular physics but, its importance is just too big both in smaller and bigger scale of physics and we cannot ignore it by using the Newton mechanics or not expanding modern physics. As we have said smallest particles cannot gain speed more than speed of light and still carries potential energy as photons, because, it is due to the interaction speed of the particles that photons made from or ***perihelion precession of Mercury*** is another example of it. These events are happening due to the interaction speed of the particles and results potential exchanges in smaller scales and it is seen as ***delay*** in bigger scales. Because, we are thinking that everything works like the Newton mechanics, even if we think special relativity we cannot change our way of thinking. We are modeling everything as bigger particles which are limited in speed, but, in reality interaction speed affects everything from the smallest to biggest and it works in every scale inside the physics. Because of it, we think special relativity as an upper chapter of Newton physics and we are neglecting this delay as it is only a limit.

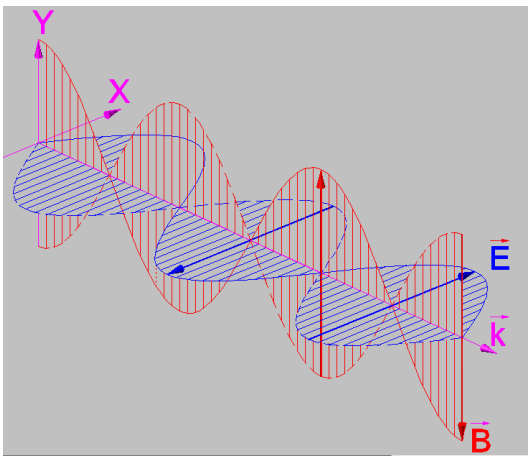


Another problem is our way of thinking the mathematics inside physics. We are trying to write the functions with respect to motion of the bigger particles and trying to guess their paths function with respect to time. However, the only real mathematics must come with the ***numerical analysis*** when we start to work the ***absolute matrix***. Because we will see these interactions are not simple as to thinking the two body interactions. For this reason, we should think everything dependent to the absolute time and the distance between particles or coordinates of them. It is exactly the same thing we do for unknown integrals dependent to time. Another point is, this will not be easy as writing the functions of bigger particles, however, it is not meaning that we will use only that matrix, we will be using the methods we know while we are trying the understand the mathematics of physics. We will start with the methods we know and if we can complete it and write all the elements of the matrix, then we can speak about the unknown methods we should explore.

Now we can say that, we have ***one particle model*** to explain everything, because we know everything can be turn into heat and heat into particles. And there is no need to speak about these particles forms because, we know heat light or temperature are different subjects but, all made from one thing. Therefore, it becomes useless question for photon ''***is it wave or is it particle***'' or ''***is it have mass or not***'' because they are absolutely same thing. Even if there is inflation inside the universe we can think the photons as particle carrying waves. And biggest rules of the physics must work with this logic like; momentum conservation and our photons potential etc..

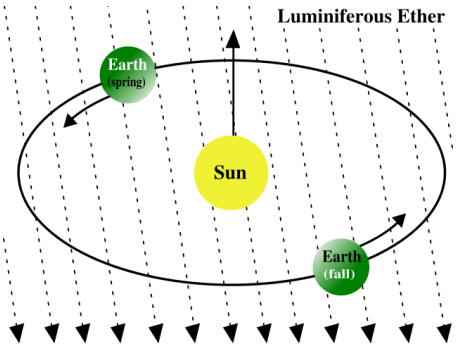


When we think our black body box; initially there was no light inside it. Afterwards, it created the light as forcing heat to move, however, we still should know light or photon is wave and it must have a medium to go inside and this medium is again heat itself that carries the momentum and photon potential inside it with particles. Our black body box was dark enough to stop the light however, when it starts to radiate it turned all the heat into light and light must go inside the ***vacuum*** which has heat inside it again to carry momentum and potential as a wave. Therefore, we should think photons fly inside the heat as an excess heat and so, we can speak about the medium in which light moves is ***aether***. Therefore, we cannot think the light as a particle moves inside the vacuum; vacuum itself has heat to transfer the wave.

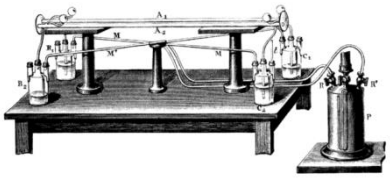


We can say that every bigger particles ***flies or swims inside the heat*** and while there is no light which is the motion of the heat, bigger particles conserve their momentum and they are not interacting with heat. Even light or photon itself is not interacting with heat. (*So, I mean we can see the light which is carried by heat but we can't see the effect of the heat and our sensors measure only the light but not the standing heat.*) Now we should speak about the ***luminiferous aether*** which is simply a medium in which light moves at constant speed ''c'' or decreased speed as ''c/n'' (n *is refractive index*).

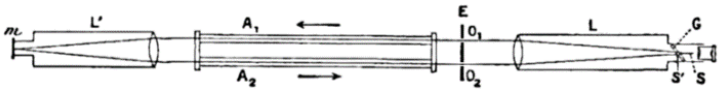
If you speak about the word ''***aether***'' with someone knows physics little bit, generally the conversation ends up very funny and you will probably hear that ''***There is no aether and we have proved it more than million times.***'' But is it that much easy to speak about the Michelson-Morley experiment and its results?



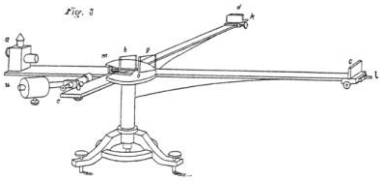
Discussions about aether started with wave properties of light, if it is a wave it must be carried on something or at least its frame of reference should be dependent to something. First assumptions are about the absolute reference frame which is constant in everywhere and there is no inflation or collapse because of infinitely big universe models but then it is easily understood that there is no aether like this. Afterwards it is possible to see lots of aether theories to explain the experiments but none of them become a really working theory. For this reason, people started to perform experiments with a title ***aether drag*** which is said to find the dependency of the aethers motion and still there is no working model.



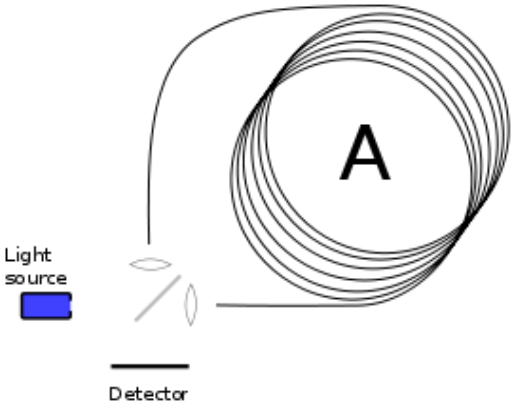
For the important experiments everything starts with modern physics equations which are derived by Lorentz and improved with others. And first attempt came from the Frensnel who have modeled the speed of light inside a speeded medium and first experiment has done by Fizeau as named ***Fizeau experiment***. So, first experiment was at lower speeds and it had said that



lights speed was increasing partially with Fresnel's drag coefficient. Controversies have not finished yet but and at least his findings are suitable with Lorentz's speed addition formula which gives the same results. Aether drag experiments continued with ***Michelson-Morley experiment*** which is constructed to compare the speed of light in perpendicular directions. But result was negative and it became a very popular experiment against aether drag hypothesis. Than experiments continued with ***Ives-Stilwell experiment*** and ***Kennedy-Thorndike experiment*** and still results were negative for aether but, confirming the special relativity.



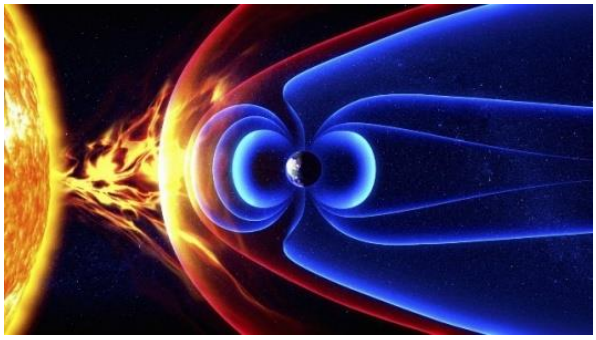
However, there are some exceptions happened due to rotational motion of light inside the earth which is explained in ***Sagnac effect*** which shoved us aether was constant and absolute in rotational motion so, it cannot be changed by rotating something even with bigger gravitational forces like in our earth. We can easily speak about what is turning around and what is not. And still no one has good explanation about the entire universe except the ***Mach's principle***. He was explained the inertia of the turning something by using his hands. ''If something is turning around itself with respect to the distant stars it must be spinning and pulling away from the rest''. We know angular motions reference frame is not possible to be dragged or turned by something.



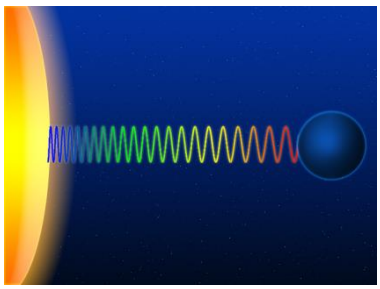
Mach's principle and the ***Sagnac effect*** are very important to understand to physics even for ***Newton*** and ***modern physics*** moreover for the other designed models like ***modified Newton physics*** which is modeled to abolish subjects like ***dark matter*** and ***dark energy*** which are related to 96% of universe. Because, this model does not explain the ***dark mass*** but, it says gravitation is little bit different in long distances in weak field. However, idea in this model becomes more useless with the expansion of universe. Because, with expansion the reference frame of the light must carry the properties we discussed, it must be dragged by linear motion but not with angular motion. It must be dragged because; we know our universe is expanding faster than the speed of light which is not possible in modern physics.

For the moment with our model or idea we can explain it by using the best theory about the aether which is the ***Lorentz ether theory***. His theory simply says that ''***you cannot drag the aether which is the reference frame of motion by using itself***'' because while we are calculating everything with respect to the aether like; particles speed, momentum, mass, energy, etc. which are all gives the physical information about particles, it is not possible to change the reference frame, because, everything happens with respect to it. But there are some exceptions I think and we should think these exceptions inside our heat theory. So, it is

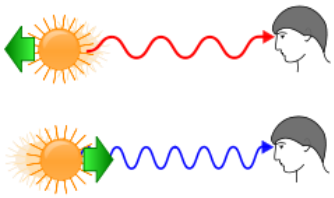
not possible to rotate the aether itself. Because we have only one type of point particle inside vacuum or void as an aether and only important property of these particles is their coordinates and their kinetic motion due to gravitational pull and heat repulsion (*at least in bigger scale*). But as we can understand rotation of the point particles about their axis has no meaning for us (*as we know from the classical mechanics' as point particles cannot turn*). So only property we know is these particles moves with two natural forces which we discussed and for this reason these particles density inside the vacuum should be calculated with these two forces moreover, this distribution should give us the temperature or energy density or volumetric mass density of the vacuum itself. For this reason some people like Lorentz, Stokes, and Planck etc. thought it can be dragged with gravitational force which has a title of ***gravitational aether drag***. But they rejected their theory after they made some calculations and the best reason was aether is not dense enough (*because it is only modeled as photons*).



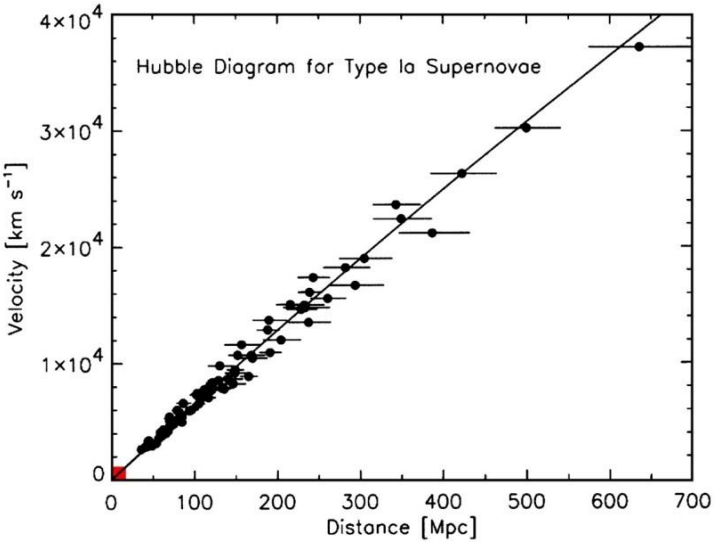
Funny thing starts for our theory while we give a motion to a ***heated object*** in which heat is also transferred with the object we know from experiments and daily life and this event is the result of another aether drag which can take the name heat drag. Because in our theory heat is not only comes from kinetic energy of the particles which is explained by kinetic theory, heat is also comes from the vacuums energy and at the end; this heat thing is dragged even with black body box. So to explain what is aether is very hard question for us, it is must be the dependent to the lots of things partially and the important thing is how our bigger particles behave inside the aether. (*Heat can be dragged by every kind of force and interaction we know inside the atoms*).



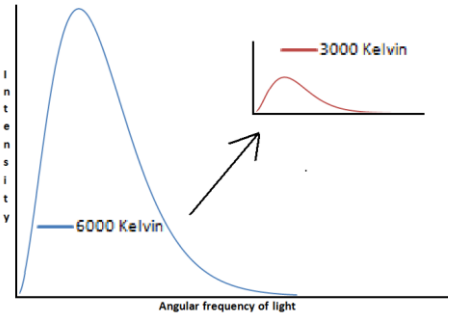
Another important type of experiments are ***light transfer experiments*** which are worked inside the ''***general relativity***''. But even with that theory we can't explain some ideas like energy conservation in expansion because energy loss of light. Problem is not about the ***Doppler shift*** or the ***Einstein shift*** in which a higher frequency light becomes lowered after moving from massive body. We can't explain the energy loss inside the expanding universe. Because, only thing we know is the wavelength of photons increases and its frequency or energy inversely decreases. And also no one explains how light goes inside the universe even if it expands faster than speed of light. We can understand the Doppler shift in flat space which results blue and red shift but, we do not know what happens inside the expanding universe with present theories. Therefore, we should discuss about it with our logic that photon has expansion potential energy. We must conserve both the momentum conservation and the expansion potential conservation at the same time. With the relativistic physics people started to believe that nothing is faster than the speed of light however, observations gives us different results and physicists tried to explain the idea with different logics that changes what we see or how we see. Because they always conserved the idea limited speed in everywhere or every interaction between two points.



When we look at the ***Hubble's constant*** which is about $72km/h\ /Mpc$ it becomes inflation about $2.33 * 10^{-18}\ /sec$, so, this means one meter increases $2.33 * 10^{-18}\ meters$ in one second. But, as we said before this logic is not true while thinking the expansion of the universe because of expanding is not the vacuums expansion or anti-gravity type models or slowing or changing the physical constants. We have to explain the idea by using the potential of photon while it is moving inside the expanding space. The only logical key becomes the redshift of photons, because, everything is getting away from each other in the bigger scale. Therefore, we should think the light transfer experiments and observations and conservations of momentum, thermodynamic energy and photons expansion energy at the same time. While the universe expands total momentum must be conserved with respect to initial point which is the source of the photon and photons expansion energy must decrease as is expanding faster than speed of light. With our theory light must conserve its speed to go with the constant speed which is speed of light with respect to aether (*but, it is very hard to say how aether moves in space, for now*).



So, there must be a mechanic behind the photon transfer and it should increase the speed of the photon with respect to its source as it moves inside the vacuum. Because, we know photon is a wave. The reference frame of photon must change while photons move inside expanding space and only known explanation is ***black body radiation*** again.

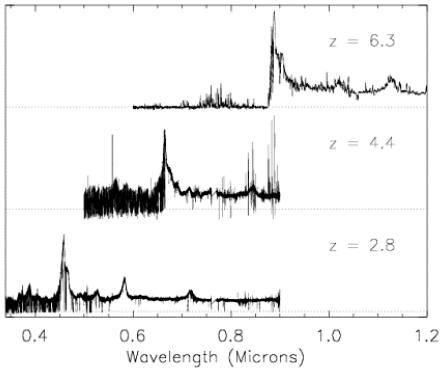


And there are two rules for us to understand the property of the light inside the non-expanding, flat space.

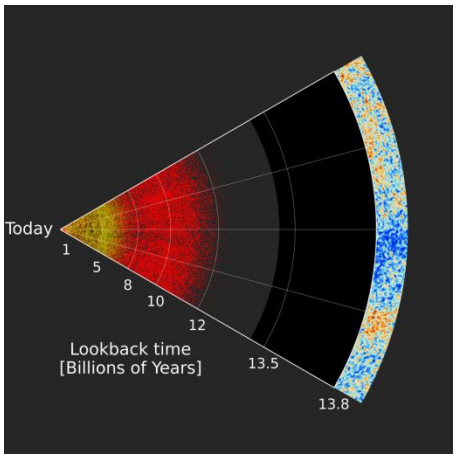
1 - One photon always becomes another one photon. (*So, it does not split or fade away.*)

2 - Black body distribution newer changes. Photon number, intensity and power change with temperature dependency so, temperature changes but, distribution do not.

We know these rules as ***K-correction*** inside the flat space. Moreover, it is conserved quantity in Lorentz transformations. As something moves inside the flat space, temperature of light sources that are moving away from us decreases and they become like colder objects. For example, if we can look at our sun while moving away and if we can see its photons frequency decreases with T, photon number decreases with T^3 and power decreases with T^4. But, we should ask ''*How it is dependent to the distance and speed difference in expanding space?*''. We should know that, when we look at the object that is very far away, we are looking at the past of it and this event clearly shows us slower expansion rates in the past. Therefore, if we look at the past we can see smaller Hubble's constants. For this reason, our theory must explain this event in every condition we know so, it should work both in flat and the expanding space to understand and accept it.

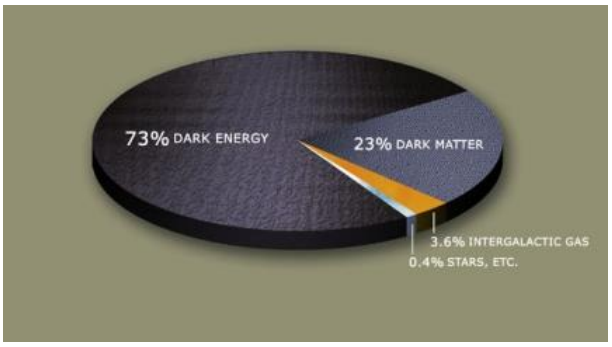


The best example for the photon transfer experiments and observation inside the expanding space is about quasars which are the most distant objects that are noticeable because of its radiation spectrum. When we look at the quasar spectrum we can easily notice the shift of the wavelengths and then we are trying to measure the distance from redshift, but, the problem is we are using special relativity's principles to comment about the distance. When we look at very far away we see younger universe and expansion rate becomes smaller than previous, moreover, again we see higher redshifts. So, the lookback time graph at the right cannot be true. We cannot explain this idea only with special relativity and general relativity. Because, even with a Hubble constant we can see expansion accelerates with time and surpasses the speed of light at very long distances.

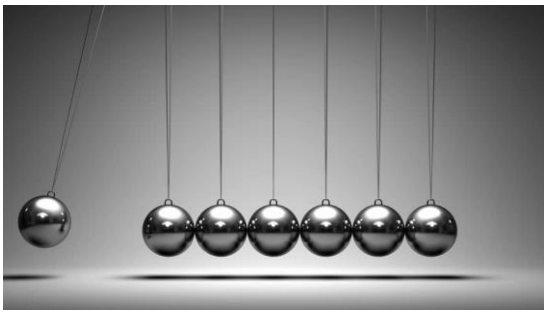


If we accept the universe is almost isotropic and there is no position is preferred; redshift of the light must be dependent to the speed difference between two points therefore this shift must be exponential with respect to distance for equally expanding universe. Because, if redshift is equal both from A to B and from B to C, the total redshift from A to C must be the multiplier of the two and it must be increase exponentially with distance. But, as we said again our universes expansion is dependent to the two forces working in the bigger scale that are gravitation and heat expansion so, we cannot say our universe is expanding uniformly. Moreover, due to the medium dependency we should divide term ***wave*** into two.

When we speak about the expansion of universe we should ask how the distances increase. As we have discussed, the increasing distance between particles increase with the traveling photons inside the universe. Because, radiation with photon can change density of vacuum, moreover, photon can form heat again both by colliding and by dragging the heat they moves on. Therefore, while a bigger mass is moving in universe it starts to drag the things near to it and it results both the less gravitation potential on particles and dragging of the standing heat in vacuum. Over and above, while photon goes further away from its source, as it starts to move inside the **heat** or ***dark matter*** or ***aether***, its wavelength should increase or decrease to transfer the momentum of it. Therefore, light is a wave moves inside the aether with carrying momentum and potential energy and its speed is always ''c'' with respect to aether. Therefore, we should understand that while every photon and standing heat must conserve its expansion potential energy, because, every heat particle has a potential with respect to other particle, even ***heat itself cannot expand like balloon***, and so, it should expand by radiating photons and this potential energy will turn into a kinetic energy as we call it ***dark energy*** which is a ***massless energy***. Even the standing heat should radiate if something changes the gravitational force around it. And more probably we see this event as ***explosion of supernova or quasar*** in which the vacuum itself radiates due to mass deficit. And in the bigger scale we can see the ***background radiation***, in which again the universe radiates while it is expanding. Because, expansion and gravitation of heat is very dominant in the bigger scale, the distribution and the motion of heat determined by these forces, moreover, we can see a very little variation coefficient for microwave background radiation, which is about $\mathbf{2.72548 \pm 0.00057}\ \boldsymbol{Kelvin}$. (*I should have to say that we cannot believe it is a cosmic radiation and we cannot imagine the redshift is about* $\boldsymbol{Z \approx 1100}$ *because, it is not logical for us to see the first proton electron bonds or first hydrogen radiation like this.*) We can see the ***vacuum radiation*** even in our solar system as ***solar flares*** which are not only due to the ***coronal mass ejection*** but also a mass deficit due to higher photon radiation because even photons have mass and this triggers the vacuum to radiate and balance the forces holding the standing heat and the result is about million kelvin temperatures in sun surface. In addition, in the smaller scale we can see this effect as ***sonoluminescence*** which is a smallest radiation by the motion of liquid and noble gas solution but, radiation of vacuum without particles (we must be sure that it cannot be explained as simple as collusion of particles). As if we look at the current theories we can see the only energy density of the vacuum of the universe is modeled as microwave background internal energy which is about $\mathbf{4 * 10^{-14}}\ \boldsymbol{J/m^3}\ (\mathbf{2.72}\ \boldsymbol{K})$ which is too small to explain dark matter.

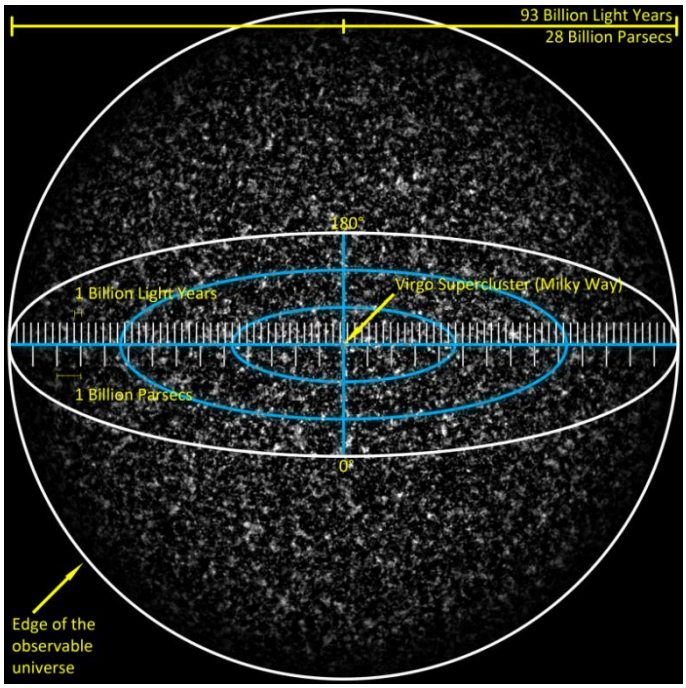


Now if we turn back and speak about the waves, as we have said, we must split the term wave into two which are ***wave moves inside the void*** and ***wave carried on a medium***. As we know, in our theory photon becomes the wave which moves on aether and carries



potential and momentum, the momentum transfer exist between smallest particles inside the void, so there is no force works without void however, sometimes it becomes possible to change speed of medium due to the ***momentum transfer in small distances***. Therefore, we should think ideal **one by one force interaction** which only acts inside void and we don't need to have a force carrier particle like gravitational force (*so, there is no need to* ***gravitons*** *or* ***gravitinos***). Afterwards, we can think the waves moving inside the mediums, like motion of light inside the heat, because, after the photon is created it can go in a different medium due to the momentum transfer in very small distances, if we are right with all previous ideas; it must be possible with gravitation to change the speed of mediums which is called ***aether drag***.

Because the interaction speed of smallest particle should work by the function which must be only dependent to the ***speed difference***, ***distance*** and ***derivatives of these two*** between two particles. If there is no preferred position, physics should work very similarly between in every smaller distances, meaning that, even if universe expands times and times faster than the speed of light, in smaller scales we should be use modern physics due to flat space which is almost not expanding. Because, light transfer experiments in smaller scales is same with modern physics and we have almost only one reference frame, if there is no bigger mass motion or if there is only one mass like in our earth, we can neglect the expansion. It is because, interaction speed of almost everything becomes ''c'' with respect to aether.



To speak about the real mechanics behind everything, all the potentials and forces must be calculated one by one for the smallest particles; moreover, we should find and use the function of interaction speed and at the same time. This function must be conserved for every kind of motion inside the expanding space which can be greater than speed of light.

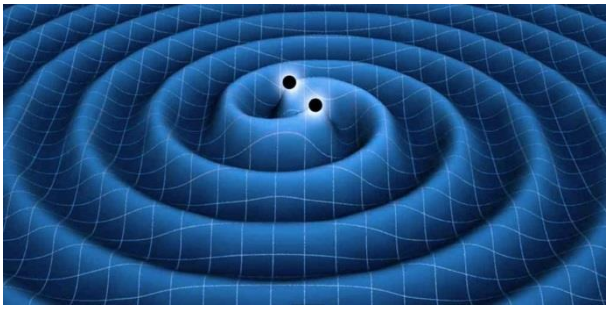
$$\frac{f_s}{f_o} = \sqrt{\frac{1+\beta}{1-\beta}}$$

Doppler factor

For example for Doppler Effect, we are using relative speed difference around reference frame and we do not use Newtonian transformations, because, photon is a medium wave and it is dependent to ''c''. However, in our case we need to calculate the ***function of motion of void waves*** that carries force. It must be independent of any reference frame, must be conserved, two particles must interact at the same time, and maybe it works for faster than speed of light.

If the void wave is not decreases in force it acts, it results ***cosmic waves*** which cannot reach or work inside the expanding universe, because while two particles are moving away from each other faster than speed of light, it cannot carry the force. But, if it always works, meaning that if it has smooth and differentiable force function; we should need to write it to understand the expansion of universe and compare the real universe with the computer modeled universe, because, it is very important for very large scales. Therefore we cannot think the real interaction speed function as a ***delay function***. Fortunately, for smaller speed differences we can accept it as it is just a speed of light and the delay becomes almost time dependent to the distance for force wave to travel (*for very small speed differences*). Then it becomes as a question; ''*What would happen if sun instantly disappeared*?''. It becomes just like the photons which reaches us after 8 minutes and 19 seconds. However, for expanding universe or particles moving away from each other much faster than speed of light, we do not know the wave speed of void waves. Harder part of if to think is, it must conserve the total energy as sum of ***kinetic energy***, ***potential energy*** and ***the potential of coming wave*** inside void but, not the delay and it is very hard to see it in longer distances because this wave can be seen only as gravitational waves but not as photons.

As we have heard about the gravitational waves which is disturbance of gravitational

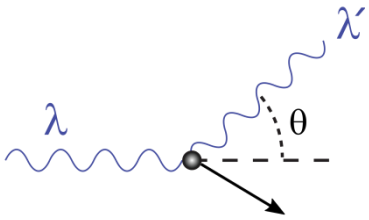


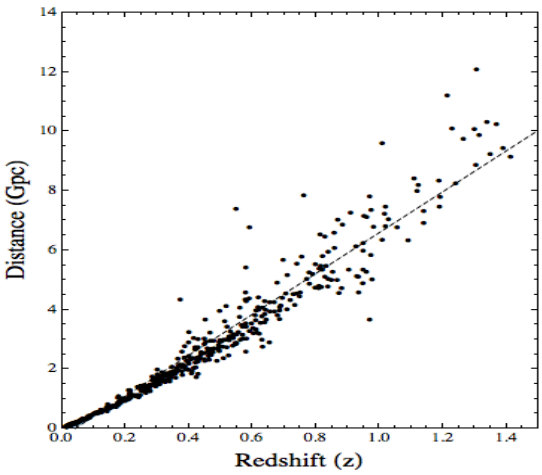
force inside the void affects almost every object in its way and creates energy like the friction. However, when we look at the data of gravitational waves we can see that its effect is more than our expectation and calculations. Biggest effect of it comes with the dark matter which is simply standing heat. Because, heat itself starts to be condensed and loosened in void and this event results a wave but, this wave is not just the gravitational wave. While the initial gravitational void waves were small, the effect of wave transferred by particles is too big and we cannot speak about it before we have detected both of them. The problem is more probably these two waves cannot work at the same time because if two particles acts force each other at the same time wave carried on medium and wave going inside the void can reach its target at different times. Because photon is a wave lives inside smaller distances we cannot see its effect on void but gravitation is a long ranged force and even if it is small, its initial force carrying wave must reach the target. Even people say that ''*First observation of gravitational waves is GW150914 experiment.*'', it is the first observation of ***secondary effect of the gravitational waves***. Because two waves do not have to work at the same time (*I cannot think if there is a possible function for it at least for now*) and we cannot know until we detect both of them maybe a little bit of time difference.

If we turn back to quasars, due to their distance and velocity of retreat, we are using only the modern physics and K-correction we cannot made a comment without them. Therefore, we use K-correction for to normalize the number of photons coming from the quasars and it results we have faint quasars (*faint means normal, because they do not need correction*) in the closer region, and quasars becomes brighter and brighter while we are getting away from the earth. As we can understand, this method only works for the flat space however, we are using it to make correction inside the expanding space which needs a correction dependent to ***expansion shift***. We should write another correction for the photon numbers of distant quasars and at least we have an idea about the expansion shift which is dependent to the expansion potential energy of the smallest particles.

While we thinking about the expansion shift, we should think the mass conservation of the universe at the same time. Because, while photons shifting their wavelengths we can conserve the energy and mass inside the flat space. We use relativistic Doppler shift which results red-shift or blue-shift, meaning that these result photons to gain or lose energy and mass. We can calculate where the photons are, the frequencies of the photons with respect to reference frame in which we use relative speed to calculate everything. Because it is flat space, energy is constant and it does not decrease with shifts. However, for expansion shift; energy which is mass at the same time in thermodynamic expression is lost and for this reason people ask the questions about ***lost energy with expansion shift***.

Our universe is expanding more and faster than before because when we look distant, we can see the Hubble's constant is smaller than today's (*so, it is not constant and universe's age has no relation with* $\mathbf{1/H_0}$, *that is a useless logic*). Because there is an expansion, both the photons moving away from their source and the standing heat starts to moving away from everything. In reality we do not have any reference frame because of there is no position preferred in void, lost energy becomes standing heat again inside the expansion. Because we have expansion potential energy dependent to the frequency, smallest particles start to moving away from each other as becoming photons or standing heat as aether. This event continuously happens, non-stop radiation carries the heat from one point to another as standing heat and there is always a longer wavelength photon. At the end, the conserved total potential energy becomes a very long wavelength photon and its kinetic energy and the rest of the particles or mass becomes standing heat with moving away with respect to source and then we see same event again. Therefore as we said before our universe cannot expand without radiation which we see it as ***Background Radiation*** which is seen in microwave scale today. If we want to work the total conserved potential energy it must be sum of remaining longer photons kinetic and potential energy and potential and kinetic energy of particles turned into heat moving away. This event must be seen for us even in a flat space and it results photons to split even as longer photon and kinetic energy on the particle which is the ***Compton scattering***. If we have a potential for photons we should work this event by ***gamma- gamma physics*** or simply ***non-linear optics*** in which we work what will happen after two photons collide with each other.





If we think the expanding space which is beyond relativistic speed limit, we can think the wavelength change must hold the momentum conservation which should be calculated with respect to source of the light coming. Its function could be like; $\mathbf{1} + \boldsymbol{z} = \mathbf{1} + (\boldsymbol{v}/\boldsymbol{c})$. However, as we can understand this logic is totally rubbish and it does not contain an exponential dependency. Therefore we do not need to conserve the momentum with respect to source even if we can use speeds that are faster than speed of light.

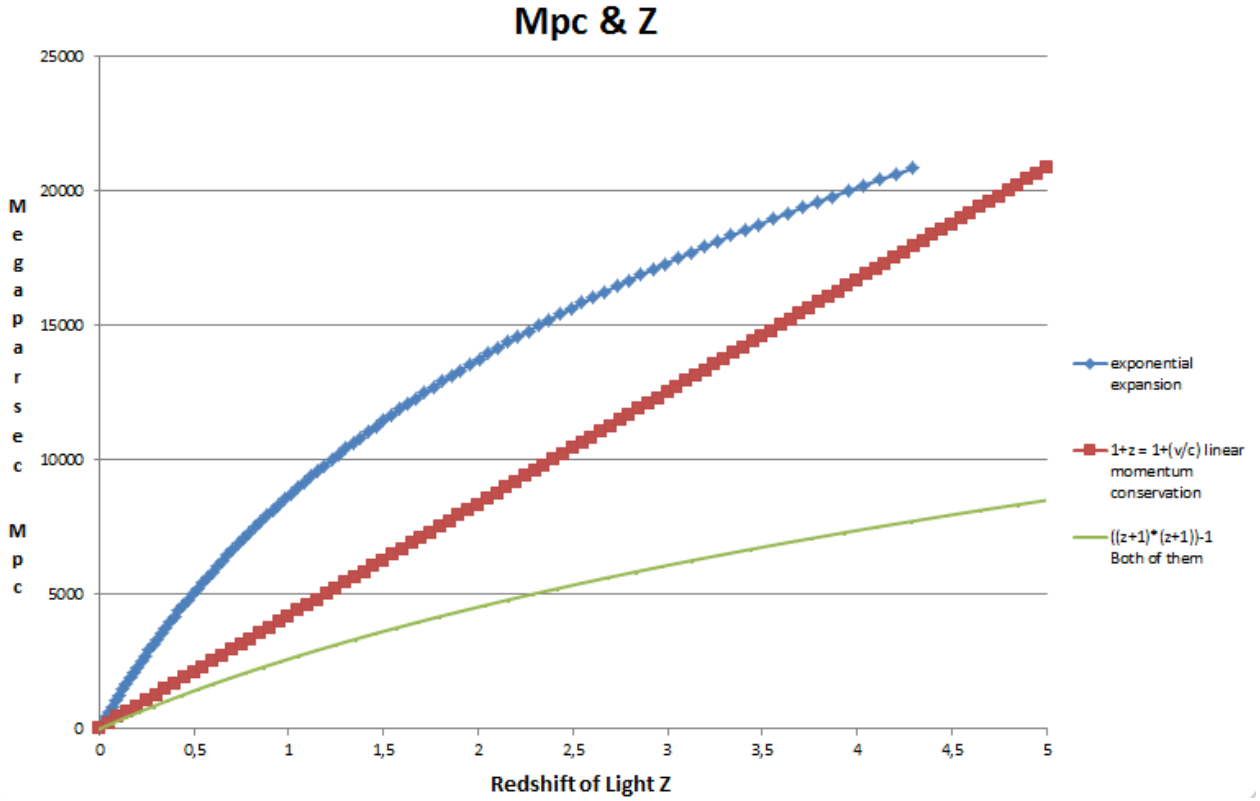
Now we can speak about another idea; a real exponential expansion due to photon expansion potential and we have found a potential energy, standing heat becomes the light;

$$1,5 * \hbar\omega_0 * ln(\omega/\omega_0) = -\hbar\omega_0/2 \quad so;\ ln(\omega/\omega_0) = -1/3 \quad and\ (\omega/\omega_0) = 0.716531311$$

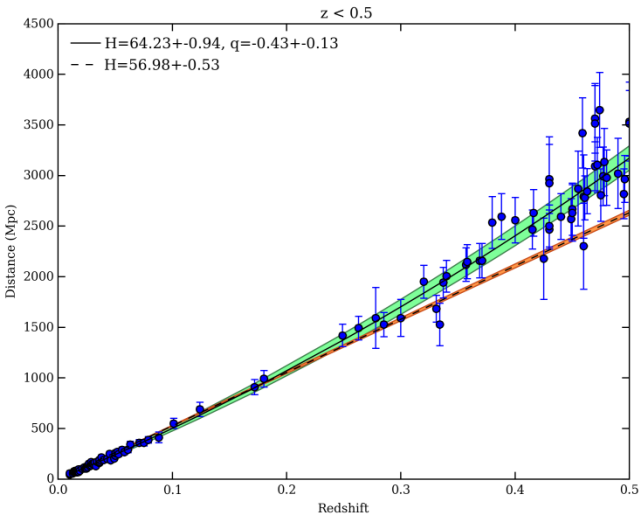
And it results expansion of the photons wavelength as it has gained a speed of light "c".

$$\omega/\omega_0 = 0.716531311\ and\ \lambda/\lambda_0 = 1.39561242 \qquad so,\ 1 + z = e^{(v/3c)}$$

As we can see, the expansion shift is wavelength independent. Therefore, photons becomes longer and longer while they are moving away from its source. We can write a simple transformation about it because it is an exponential expansion with respect to the speed of light. We can compare all the possible idea of redshift versus distance as graph; We have to know that we take a constant Hubble constant ($H_0 = (72km/s)/Mpc$).



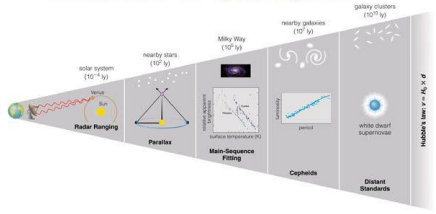
When we try to compare the distance versus redshift graph we have lots of problems like; distance measurement methods, different expansion rates due to looking the past, understanding of redshift corrections. As we can see when we compare the experimental distance & redshift graphs we can see there is no relation between our graphs. We wanted to compare all the possible redshifts (*even **linear z** which is **red line** in the upper graph, is not possible*). But, we should not be confused about any other type of expansion, because, we have an accelerating universe. As we can see, the real graph on the right shows the experimental data and it goes very different than our guess.



The Cosmological Distance Ladder

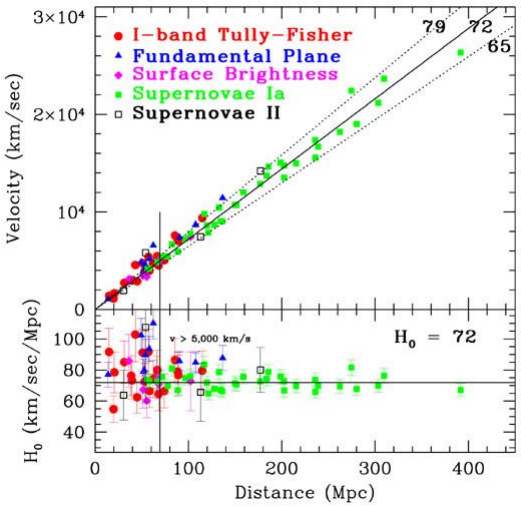
Methods of Measuring Distance and their useful range…

- **Radar ranging** – D < 10^{-4} light-years
- **Parallax** – D < 10^{3} light-years
- **Standard Candles**
  - Main sequence stars – D < 10^{5} light-years
  - Cepheid variables – D < 10^{7} light-years
  - White dwarf supernovae – D < 10^{10} light-years
- **Hubble's Law – 10^{10} ly and beyond…**



If we cannot calculate something because of the accelerating expansion of universe, we still can make a comment about the redshift. (*Because, we don't have enough data about distance and redshifts due to complexity of different methods and corrections, we can create simple data from the graphs we use. When I start to work about expansion redshift I see lots of methods and even worse most of them are totally wrong because of their hypothesis and limitations like; luminous distance and luminosity corrections.)*

Because, there are lots of useless theories and data about the Hubble constant in which even their error margin is not compatible with others we should change the way we think. As we said before it is almost impossible to write the ***function of expansion rate*** of the universe dependent to the time. Because, rate of expansion function is dependent to the lots of interactions happening between smallest particles so, it is not a pure mathematical event which can be written as a solid function; we can write and use it as only an empirical function which can only be calculated by the computers as cloud modeling. For this reason, we can try to guess the rate of expansion and make comment about it. As we know;



1 parsec	$\mathbf{1\,pc \rightarrow 3.085677 * 10^{16} m}$
1 mega parsec	$\mathbf{1\,mpc \rightarrow 3.085677 * 10^{22} m}$
1 giga parsec	$\mathbf{1\,gpc \rightarrow 3.085677 * 10^{25} m}$

If we look at the estimations of Hubble's rate of expansion it is in between $\mathbf{(50km/s)/Mpc}$ and $\mathbf{(90km/s)/Mpc}$. Moreover, previous predictions are too big; because, within time we learned to look further away and increased distance decreased the average value of rate of expansion.

When we look at the graph of redshift we can easily see that;

$$\mathbf{1 + z = e^{(v/3c)}}$$

$$\mathbf{for\ c = 1 \ \rightarrow \ z = 0.39561242}$$

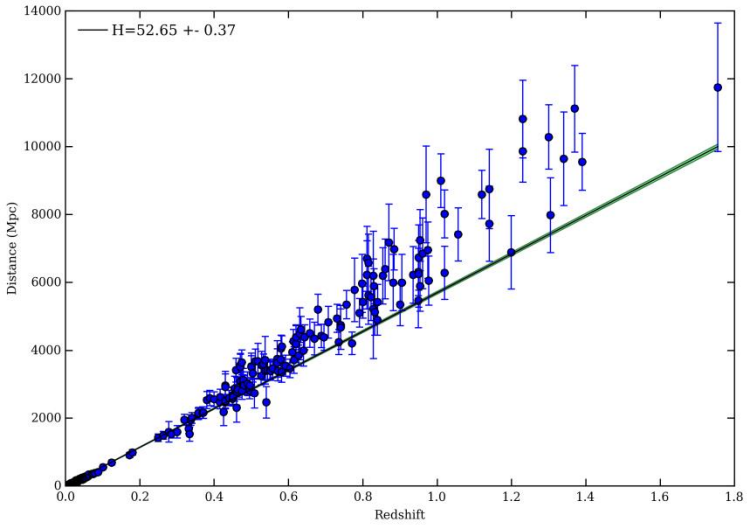
$$\mathbf{for\ c = 2 \ \rightarrow \ z = 0.94773403}$$

$$\mathbf{for\ c = 3 \ \rightarrow \ z = 1.7182818}$$

$$\mathbf{z = 0.39561242 \rightarrow 2500 mpc}$$

$$\mathbf{z = 0.94773403 \rightarrow 6500 mpc}$$

$$\mathbf{z = 1.7182818 \rightarrow 11000 mpc}$$

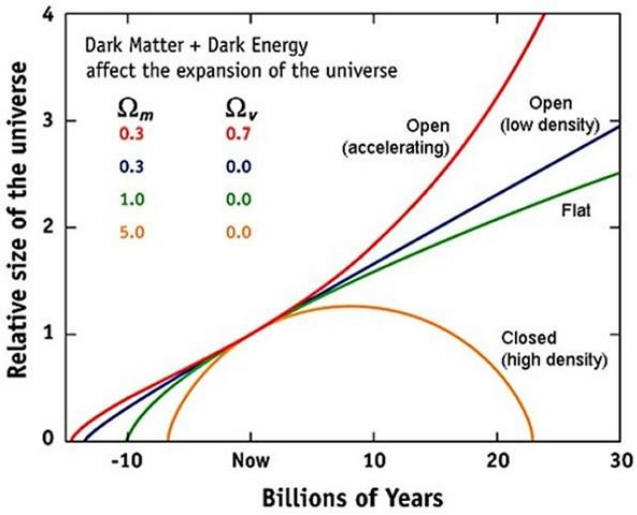


Therefore, to create the recession velocity of multiples of "c"; H_0 can be in between;

$$\mathbf{(120km/s)/Mpc\ for\ 0c < v < 1c}$$

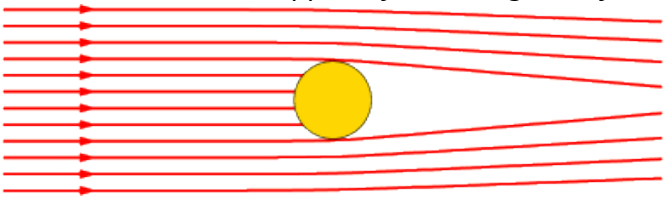
$$\mathbf{(75km/s)/Mpc\ \ for\ 1c < v < 2c}$$

$$\mathbf{(65km/s)/Mpc\ \ for\ 2c < v < 3c}$$



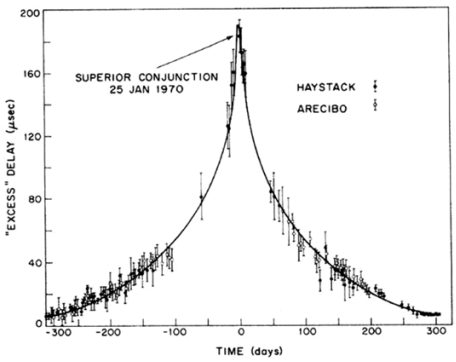
After we have modeled everything, we will be able to speak about Big Bang which is the initial point of everything, but, the problem is even if no one knows the real mechanics and everyone know that something is dark, people can still speak about first seconds of universe. Even if we know the real mechanics, still we cannot know the initial condition of universe but, maybe we can make predictions and estimations about it. Present theories are trying to explain the expansion with the gravitation and the vacuum's metric expansion and people stuck in useless theories and thermodynamic perspective and no one totally explained the ***energy of the energy***. At least we have the photon expansion potential so, we can try to explain the ***dark energy*** without external mass.

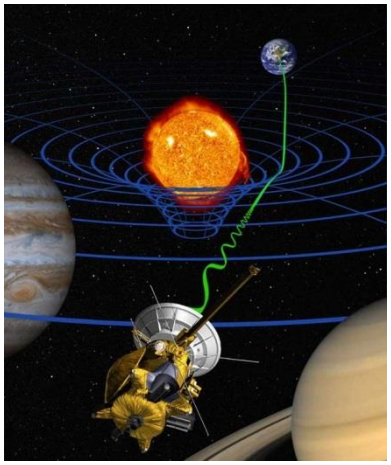
Still we should have to know gravitational potential can result shifts or dragging lights medium and it can be the reason behind interaction speed of particles. Even if we say; there is no relative thing and we have other forces to expand we should see gravitation changes some interactions and acts like a time slower it has a very unique effect on everything. We have gravitational potential field everywhere which means there is nowhere without force which results every solid particle to lose its mass and gain it as kinetic energy so, velocity. While everything is getting close to each other, gravitation changes all. More probably the reason behind this event can be ***unique mathematics*** of nature in which all forces and potentials even the operations must be dependent to each other. Therefore, it makes no sense to ask ''*What happens if we change this force like that?*''.



We can continue with the ***bending of light*** inside the gravitational potential. For this event, the most important and significant thing is; it becomes ***double bending*** with respect to Newton's prediction. If we think Newton mechanics; force, time of light pass and distance gives half of the real angle, gravity changes angle of bending twice at speed of light, which means it acts as double force. So, it is a very important key to write the ***interaction speed function*** of particles that gets closer to each other with speed of light and waves of them.

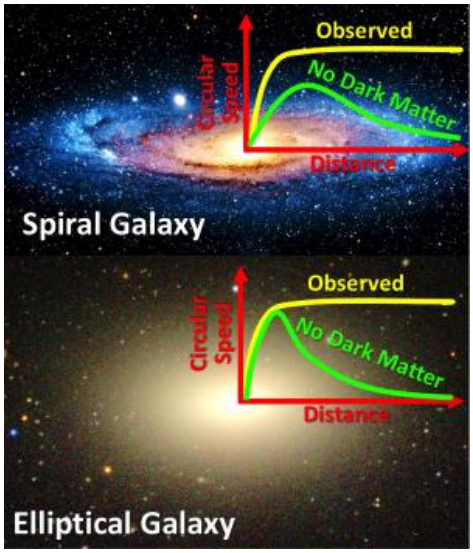
Now we can speak about the ***Shapiro delay*** which is said to be the fourth test of the general relativity. Theoretically, Shapiro delay is caused by ***gravitational time dilation*** and due to this effect, speed of the light is modeled as it becomes slowed. To test this, Shapiro made an experiment in which the logic is to measure the time of the light passing with respect to constant distance between inside less gravitational potential and passing near a massive object which results light to move inside higher gravitational potential. There are lots of controversies about the logic behind the delay and the calculations of them.





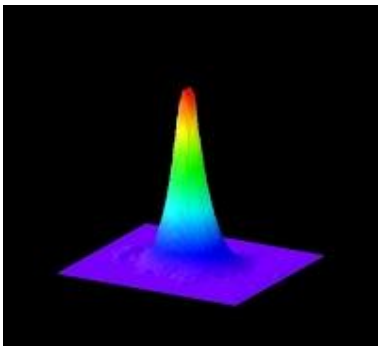
When we think the gravitational potential field, we cannot make a comment about the effect of time dilation before we totally understand motion of aether. We have aether theory and it should result a delay for light passing through the massive object but, it must be dependent to the ***speed of the mass*** and the ***effectiveness of the mass inside the vacuum***. Because we are thinking that there must be an aether drag because of moving bigger masses which must result to light to move inside in a different frame and more distance than the shortest path. And again our expectation is independent from the bending of the light and even can be independent from the size of the mass. When we say ''*effectiveness*'' we refer to gravitational power of the mass around the vacuum, if there is no bigger mass, even a smaller moving mass can result a drag. (*As I heard Shapiro delay does not work on bigger masses like Jupiter. Even if it moves slower delay must be seen on the Jupiter more than the Mercury because its gravitational potential is greater than the others.*)

To understand everything we should write the function of interaction speed and to be able to write it we must propose tests and we can do it just by observing the universe. Because, if universe expands at least few times faster than the speed of light, the gravitational force between distant moving particles will have no effect or very less effect on the other particles. And if we are sure that all the energy is conserved functionally by gravitation we should look at the elliptical and spiral galaxies. Because, we divide the total conserved energy into three parts which are; ***kinetic energy***, ***potential energy*** and ***energy of wave coming***. In elliptical motion the distance of particles turning around changes and it affects the waves strength and time to reach the other. With the expansion in bigger scales and motions of bigger clusters can help us to understand like in the perihelion precession of Mercury. Therefore, we can make a forecast about function. Later on we can start to write the absolute matrix as two parts which are the operation part which is made from pure mathematical constants, forces and operations and the interaction speed part which adjusts and determines the void waves speed, ratio of force and delay in time.

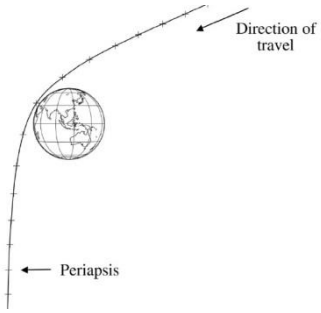


$$\frac{-\hbar^2}{2m}\frac{\partial^2\Psi(x,t)}{\partial x^2}+U(x)\Psi(x,t)=i\hbar\frac{\partial\Psi(x,t)}{\partial t}$$

If we want to understand everything inside the quantum mechanics, we can try to find all the constants, dependencies, methods and functions; after we totally understand and solved the absolute matrix. Because, it seems like we are trying to understand chemistry and even if we totally accomplish the matrix we will still be working about science due to its complexity. But, problem is the terms we use. If we want to understand the mechanics of nature which is physics we should not use some words like; ***relativity, probability, chance, uncertainty***. All of them can be eliminated just with a one word ''***inertia***''. It results every particle to act with the other at the same time and we do not need to think them. Therefore, while we have a one type of particle, forces and inertia; we can see nature and physics is a ***deterministic system*** which is named as ''written'' or ''***fate***''.



If we see everything in the eyes of determinism like this we can understand debates about quantum mechanics better. To make it deterministic people thought there must be an unknown element which is known as ***hidden variable***. Moreover, they thought there must be another force to expand the universe we know as ***fifth force***. Moreover, other chapters still on debate are ***Casimir effect*** and ***van der Waals forces*** which are all about the vacuums states. Even if we know what happens when we go very low temperatures with ***Bose-Einstein condensation***, we still do not know the real reason behind these. Another important chapter we have never talked about is ''***flyby anomaly***'' which is again about the lack of mass around the celestial body. It starts we start to move away from the point like mass source, strength of gravitational force and speed of free fall increases with respect to calculated value. More probably mass of the heat makes this anomaly again. It is just like a mass inside a halo or cloud which wraps around body. More probably we are making mistake at putting the heats mass into planetary object. Lastly, we should have to say that we can explain them all the chapters we have spoken and even lots of unsolved problems in physics with the reasoning we thought.



MY QUESTIONS

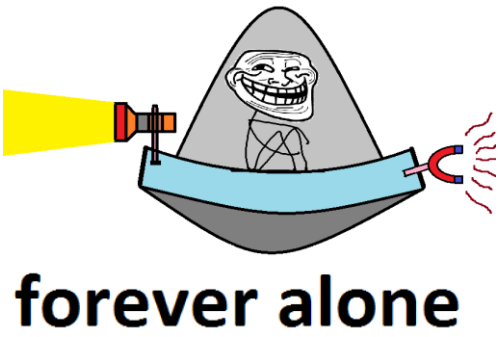
* Can someone solve the exact solution of integral we derived? (*In page 14*)
* Can somebody write the constants of photon expansion potential with pure mathematics?
* Can we turn these constants as a force function to show one by one interaction?
* Is my expansion redshift function true?
* How can we calculate the metric heat density around a point mass?
* How can we calculate the metric heat density distribution inside universe?
* Is there a possible function to conserve the energy for interaction speed?

ABOUT MY WORK

My first work was lack of mathematics and when I started to work about it, I realized that my previous predictions are all wrong. I wrote it to find help from others. But, it result a funny situation that no one turned with a positive idea. I improved my works mathematical part and I'm expecting to find someone can help me about mathematical part of it. It will be good thing for me to hear that I'm wrong with something. So, I'm expecting to upload my work and I even couldn't find an endorser to upload it. And no matter what people say, I will continue to trolling the physics.

I'm still very thankful to ''***wikipedia***''. It is still better than useless people in my department and I'm so sorry for my bad England.

See you working ***zoton mechanics***.



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