Fundamental universal field equation Relating energy, Space and time

Manjunath. R.
#16,8th Main road,
Shivanagar, Rajajinagar,
Bangalore-560010
Karnataka, India
manjunathr1988@yahoo.in

Abstract: Most fundamental assumptions of physics are concerned with the concepts of space and time, Fundamental concepts like energy, space, time related through a universal planck's constant is mathematically represented by the equation **E=X^2t/h** (Where E=energy, x=space, t=time, h=planck's constant). The above expression was developed based on wave theory, classical mechanics, atomic physics and mathematical concepts.
Equation **m=X^2t/h(1+D)** (where m=total mass content of universe, x=space, t=time, D=spacial distance, h=planck's constant) describes how space, time, mass, spacial distance are related to each other. The paper also describes how Fundamental concepts like space, time behave in presence and absence of mass in universe to some extent i.e influence of mass (gravity) on the behavior of space and time. [Academia Arena, 2010;2(2):66-69] (ISSN 1553-992X).

Keywords: energy, mass, space, time.

1. Introduction :

According to Einstein's mass energy relationship E=mc^2 where c is not just the velocity of a certain phenomenon-namely the propagation of electromagnetic radiation (light)-but rather a fundamental feature of the way space and time are unified as spacetime. In the mass dominated universe, gravity plays an important role in the unification of space and time to form spacetime. Gravity has control on rate of expansion or rate of contraction of universe with respect to time 't', Suppose all the mass content of universe is converted to energy, then energy dominated universe come into existence. Energy of universe is distributed along it's space with respect to time 't', then this energy is given by relation "**E=X^2t/h".** Total energy of universe is constant then **x^2 α 1/t** i.e space varies inversely with time in the absence of mass. Rate of expansion of universe occurs in short time or contraction of universe occurs in long time. Here space, time behaves as separate factors in absence of mass**(gravity)**

Derivation of equation : "E=X^2t/h"

Part :1

Consider a photon of relativistic mass **'m'** moving with speed **'c'** is associated with the wavelength **'λ'** is given by the relation ***λ=h/mc, Where h=planck's constant (6.625*10^-34 JS).***
According to **wave theory,** speed of the photon wave is given by **c = λ /T**, where **T**= time period.
By substitution of value of **'c'** in the equation **λ = h/mc,** we get the expression **m λ^2 = hT.**
According to **wave theory,** as frequency of photon wave is given by **f=1/T.**
Then the equation **m λ^ 2 = hT** becomes **f=h/mλ^2**
De Broglie wavelength associated with the photon is given by **λ= h/p,**
thus the equation **f=h/mλ^2** becomes **f=p/mλ.**
Angular frequency associated with the photon is given by **ω= 2 πf.**
By putting the value of **f=p/mλ.** in the above equation we get **ω= 2 πp/mλ.**
The above equation **ω= 2 πp/mλ.** can be applied to both photons and material particles like electron in motion.
Debroglie wavelength associated with the electron is given by **λ=h/mv**
Where v=velocity of electron in motion
Then the equation **ω= 2 πp/mλ** becomes **ω= 2 πpmv/mh** i.e **ω= 2 πpv/h.**

Part : 2

Consider a electron of mass **"m_e"** at rest, total energy associated with the electron is given by **"m_e c^2".** Suppose radiation of energy **hf** is incident on this electron at rest. Part of energy **hf"** is absorbed by electron and part of

energy **hf'** is scattered by electron. Absorbed energy **hf"** is converted to motion of electron, hence electron travels a distance **'x'** in time **'t'.** let **θ** is the scattering angle.

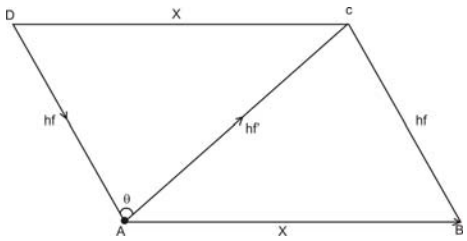

Figure :1 –schematic diagram of scattering of energy of photon by electron
x= Linear displacement of electron
hf = Energy of incident radiation
hf' = Energy of scattered radiation
θ = scattering angle
Consider a parallelogram ABCD constructed as shown in the figure 1.
Let AB=CD=x, AD=BC=hf, AC=hf'(opposite sides in parallelogram are equal)
Law of cosine is given by **a^2=b^2+c^2-2bc cos θ.** Let a = x, b=hf, c=hf', cos A = cosθ.
By applying the law of cosine to the triangle ADC, we get
X^2=(hf)^2+(hf')2-2(hf)(hf') cos θ = 1
By law of conservation of momentum pf photon.
We get $\vec{p}_y = \vec{p}_{y''} + \vec{p}_{y'}$ where $\vec{p}_y, \vec{p}_{y''}, \vec{p}_{y'}$ be the momentum of incident, absorbed and scattered photon respectively.
Let us assume absorbed momentum of photon = momentem of electron
i.e. $\vec{p}_{y''} = \vec{p}$

Thus $\vec{p}_y = \vec{p} + \vec{p}_{y'}$ where $\vec{p}$ = momentum of electron

$\vec{p} = \vec{p}_y - \vec{p}_{y'}$ Squaring on the both sides we get

P^2= $\left(\vec{p}_y - \vec{p}_{y'}\right)$^2, as (a-b)^2=a^2+b^2-2ab

Thus the above equation becomes **p ^2=p_y ^2+$p_{y'}$ ^2-2** $|\vec{p}_y \cdot \vec{p}_{y'}|$

According to dot product rule $|\vec{a} \bullet \vec{b}| = |a||b|\cos\theta$
Then we get **p^2= p_y ^2+ $p_{y'}$ ^ 2-2| p_y | | $p_{y'}$ | cos θ**
Let us multiply the above equation by **c ^ 2**we get
Where **c** = speed of light in vaccum **(3* 10 ^ 8 m/s)**
P ^2 c ^2 = p_y ^ 2c ^2 +$p_{y'}$ c^2-2| p_y | | $p_{y'}$ | cos θ
As we know frequency of photon is directly proportional to it's momentum
i.e **hf = pc** thus the below equation is obtained
p ^2 c ^ 2= =(hf)^2+(hf')2-2(hf)(hf')cos θ = 2
By comparison of 1 and 2 we get **x ^ 2 = p ^2 c^ 2**
i.e **x = pc** (position of electron is defined as the function of it's momentum)
After absorption of energy **hf"** from the photon,
total energy of electron increases from **m_e c^2 to mc^2**.
Then total energy associated with the electron in motion is given by **E= mc^2**.

Amount of motion associated with the electron is given by **p =mv**, thus we can write **m=p/v.**
By substitution of value of **'m'** in the equation **E=mc^2,**
We get **E= pc^2/v as** position of electron is defined as the function of it's momentum.
i.e. **x=pc** then the above equation **E= pc^2/v** becomes **E=xc/v**
By rearranging the above equation we get **v/c=x/E=3**
Angular frequency associated with the electron during it's motion can be given by
ω= 2 πpv/h, i.e ω= 2 πxv /hc because **x = pc** (position of electron is defined as the function of it's momentum)
Rearranging this equation we get
h ω/ 2 πx=v/c = 4
By comparison of 3 and 4 we get the equation **E= 2 πx ^ 2/hω**
where E=Total Energy of electron
X = Position of electron
ω = Angular frequency of electron
h *=planck's constant (6.625*10^-34 JS).*

Part : 3
Consider a material particle (electron) moving in a **circular orbit** with constant angular velocity "**ω".**
Then total energy associated with the particle can be given by the equation **E= 2 πx ^ 2/hω,**
where E=Total Energy of electron in circular orbit
X = Position of electron in circular orbit
ω = Angular velocity of electron in circular orbit
h *=planck's constant (6.625*10^-34 JS).*
Note : angular frequency of electron can be defined as angular velocity when it moves in a circular orbit.
As orbit is circular **ω = θ/t** (**θ =** angular displacement with respect to time t)
The above equation **E= 2 πx ^ 2/hω** becomes **E= 2 πx ^ 2t/hθ**
Let **θ = 2 π** for one complete revolution then the equation **E= 2 πx ^ 2t/hθ**
Becomes **E= 2 πx ^ 2t/h2π** i.e **E= x ^t/h** is obtained
Let **"E"** be total energy of particle at position **"x"** with respect to time **"t"**
We can also tell that total energy of particle **"E**" is distributed at position **"x"** with respect to time **"t".** As we know total energy of universe **"E"** is distributed along its space **"x"** with respect to time **"t".**
This energy is given equation **E=x ^ 2t/ h = 5**
Fundamental equation of unified field theory is given by the equation
E=total m(1+D) =6, by comparison of 5 and 6 we get the expression
m=X^2t/h(1+D) where **m =** mass content of universe
x = space of universe
t = time
D = spacial distance
h *=planck's constant (6.625*10^-34 JS).*

Result :

1) **Total energy of universe "E" is distributed along its space "x" with respect to time "t". This energy is given by the equation "E=x ^ 2t/ h".**
2) **Space, time, mass content and spacial distance are related to each other by the expression "m=X^2t/h(1+D)"**

Discussions :
Consider all the mass content of universe is converted to energy i.e energy dominated universe come into existence. In case of mass dominated universe gravity plays an dominant role in unification of space, time to form spacetime. In case of energy dominated universe, there is absence of gravity (all the mass is converted to energy) hence space, time behave as separate factors. Total energy of universe is constant i.e **E** = constant.
Then **x^2 α 1/t** i.e space varies inversely with time in the absence of mass. Rate of expansion of universe occurs in short time or contraction of universe occurs in long time.
To prevent this, mass is created in universe to fill the empty space **m α X^2t/(1+D).** As mass is created in the universe (more the gravity prevails in the universe), more the value of D and x decreases with respect to time "t". Hence rate of expansion is governed by the **law of nature.**

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Correspondance to:
Manjunath. R.(Reader in physics)
#16,8th Main road,
Shivanagar, Rajajinagar,
Bangalore-560010
Karnataka, India
Contact : res -080-65960971
mob : 91-9008487836
manjunathr1988@yahoo.in

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Conclusion:
Only in the case of presence of mass (gravity) in the universe, there is existence of space time i.e. unification of Space and time. In case of absence of mass (gravity)) in the universe, space and time behave as separate factors. So, I conclude that gravity is responsible for the unification of space and time.

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Additional Information:
As told earlier position of electron is defined as a function of it's momentum i.e **x = pc**
Small change in momentum of electron causes small change in it's position **i.e. dx = dpc** hence,
dp = dx/c
Newton second law of motion is mathematically represented by equation **F=dp/dt**
Where **F =** force exerted by photon
dp = Small change in momentum of electron with respect to time
As dp = dx/c then the above equation becomes **F= dx/dtc.**
as velocity of electron is defined as **v = dx/dt.**
Then **F =v/c** is obtained
Force exerted by photon is defined as function of velocity of electron
As impulse exerted by photon is mathematically given by **I = F dt.**
then the equation **F= dx/dtc** becomes **Fdt = dx/c**
i.e I =dx/c
impulse exerted by photon is defined as function of change in position of electron.

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