International Journal of Scientific & Engineering Research, Volume 10, Issue 7, july-2019
ISSN 2229-5518

Theory of interaction between energies

Abhishek anand

Abstract— The entire universe is made of energy, so to understand the universe first understand energy. This whole paper will go with the degree of energy that how energy operates a mystical system. First, we will try to establish a mathematical model of interaction then graphical view then algebraic model and then, at last, some exiting proofs. As the universe is expanding so, we will try to know whether dark energy is increasing or decreasing in our universe, how photons and mass interact in the given laws of physics and at last the most interesting part how or why mass exists in this universe. Overall, we are trying to be more dipper in the physics of energy without using any complex equations of physics.

Index Terms— Accelerating or expanding universe, Dark energy, Dark matter, Dynamical quantity, Fundamental quantity, Interaction, Mass, Relativity or frame of refrance.

1 Introduction

THE most complex behavior about energy is to explain, what is energy? To do answer to this question we just say, energy is a fundamental quantity. Everything in this universe is made of energy. Such a broader subject has such a less explanation. With this problem in mind, we will try to understand what energy can do? In the frame of energy, how velocity plays an important role and such a frame could be dark matter and dark energy. By explaining such things, we can see the same things with different eyes or vision. The theory of interaction of energy can explain such a broader aspect of physics such as Time traveling is possible or just math magic. But the difficulty is to establish a mathematical model that works perfectly with the nature of energy. To solve this complex problem to easy steps we will introduce a new type of mathematics of interaction. Interaction theory can be used to establish a relation between the interaction of two systems, no other mathematical model can simplify such a problem of interaction. By using the right result of physics, we can get the most beautiful and elegant research of all time. As the entire universe is interacting with some stuff so, we can define the entire universe with the help of interaction theory. I think as, energy hadn't defined yet completely so the main goal is to fully define the energy and by fully defining energy we will define the universe and by defining the universe, we can get our theory of everything. It can give a slight glimpse to solve real-time problems, like how to achieve the speed of light without breaking any physics laws, which had been established until now. One of the most controversial topics of this theory is that classical mechanics establishes that gravitation and mass are two different quantities, but at the level of energy they could be the different sides of the same coin.

• *Author Abhishek anand is currently pursuing 12th class in SR. SEC. DELHI PUBLIC SCHOOL, India, PH: - 9631696112, E-Mail: - abhishekphysics1379@gmail.com*

2 Mathematical model of interaction theory

2.1 Mathematical symbol

LET'S FIRST DISCUSS MATHEMATICAL SYMBOL WHICH WILL OPERATE THE MATHEMATICAL OPERATION IN THE EQUATIONS.

∏ = INTERACTION BETWEEN TWO SYSTEMS {CAN INTERACT}

‡ = NO INTERACTION BETWEEN TWO SYSTEMS {CAN'T INTERACT}

[AND HERE SYSTEM CAN BE ANY TYPE.]

IT'S QUITE SIMPLE BUT EFFICIENT AS EQUALITY HOLDS EQUAL VALUES ON THE LEFT-HAND SIDE [LHS] AND RIGHT-HAND SIDE [RHS] BUT AT THE SAME TIME INTERACTION MAY OR MAY NOT HOLD EQUAL VALUES ON BOTH SIDES [WILL BE PROVEN IN THIS THEORY]. GENERALLY, OR COMMON EXAMPLES OF INTERACTION THEORY CAN BE LIKE THAT, WATER AND WATER CAN INTERACT, MAN-WOMAN CAN INTERACT, MAN-MAN CAN INTERACT, WOMEN-WOMEN CAN INTERACT, ENERGY-ENERGY CAN INTERACT [TO BE PROVEN],ATOM-ATOM CAN INTERACT, MASS-ENERGY CAN INTERACT [TO BE PROVEN] AND SO ON. NOW TO UNDERSTAND IT, WE HAVE TO ESTABLISH A MATHEMATICAL MODEL IN A GRAPHICAL VIEW AND ALGEBRAIC VIEW. AND THE MOST EXCELLENT EXAMPLE OF NO INTERACTION [‡] IS THAT ELECTRIC FIELD LINES CAN'T INTERACT.

International Journal of Scientific & Engineering Research, Volume 10, Issue 7, July-2019
ISSN 2229-5518

2.2 Graphical view of interaction theory

{1} Let's first draw <x-y> plane in 2-d and try to understand no- an interaction between straight lines.

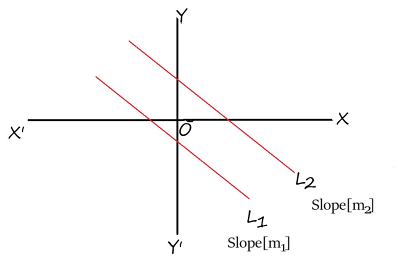

Fig.[1]

We have drawn a line[L_1] and line[L_2] having slope [M_1] and slope[M_2] respectively. Let's assume that line [L_1] and [L_2] are parallel to each other in the x-y plane.

So,

$L_1 // L_2$ then it must be true,

$$M_1 = M_2$$

$$M_1 - M_2 = 0$$

So, line [L_1] and line [L_2] will never interact.

$$K\{L_1\} \ddagger K\{L_2\}$$

$K\{L_1\} \prod K\{L_2\}$ and this statement can even be true that line {L_1} and {L_2} will interact at infinity.

{2}

Again draw [x-y] plane in 2-d and try to understand the interaction between straight lines.

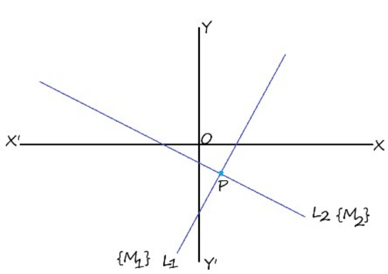

Fig.[2]

We have drawn the line[L_1] and line[L_2] having slope[M_1] and slope[M_2] respectively. Let assume that line [L_1] and line[L_2] are not parallel to each other in the x-y plane.

Then it must be true,

$$M_1 - M_2 = K$$

So, line [L_1] and line [L_2] will interact.

$L_1 \prod L_2$ {''at point p''.}

This is just a simple look at how the interaction will look on a graph of straight lines. Interaction of curves can even be an option but for now, it is sufficient to move these results in physics.

2.3 Algebraic model of interaction theory

Rules

{1}

$K\{x\} \prod K\{x\}$ is explained as x is equal to x and if you use {K} function then it can be shown as they are interacting.

Examples-

$K\{1\} \prod K\{1\}$, $K\{2\} \prod K\{2\}$,……..…$K\{\infty\} \prod K\{\infty\}$.

In all these rules, it can hold only true if both quantities are the same. And incoming page we will find that different quantity can even interact.

{2}

$K\{n\} [K\{x\} \prod K\{x\}]$

$K\{n.x\} \prod K\{n.x\}$ is explained as, we multiples with the same number[n] on the left-hand side and right-hand side, the equality holds equal values and by using [K] function we can convert it into interaction equation.

Examples- $K\{1\}[K\{2\} \prod K\{2\}]=K\{1.2\} \prod K\{1.2\}$

$K\{2\}[K\{3\} \prod K\{3\}] = K\{2.3\} \prod K\{2.3\} = K\{6\} \prod K\{6\}$

.
.
.
.

$K\{\infty\} [K\{\infty\} \prod K\{\infty\}] = K[\infty.\infty] \prod K\{\infty.\infty\}= K\{\infty\} K\{\infty\} \prod K\{\infty\}$

{3}

$K\{x+y\} \prod K\{z\}$

$K\{x\} + K\{y\} \prod K\{z\}$

$K\{x\} \prod K\{z\} - K\{y\}$

$K\{x\} \prod K\{z+y\}$ is explained as, x+y=z

x=z-y

by using [K] function it can be changed in interaction.

{4}

International Journal of Scientific & Engineering Research, Volume 10, Issue 7, July-2019
ISSN 2229-5518

K{x-y} ∏ K{z}
K{x} – K{y} ∏ K{z}
K{x} ∏ K{z} + K{y}
K{x} ∏ K{z+y} is explained as, we add[y] both sides of interaction [LHS and RHS], the equality holds equal values and by using [K] function we can convert it into interaction equation.
{5}
K{x} ∏ K{x}
K{$\frac{x}{y}$} ∏ K{$\frac{x}{y}$} is explained as we divide both sides by [y] equality holds equal values and by using [K] function we can convert it into interaction equation.
{6}
K{x} ∏ K{x}
K{x^2} ∏ K{x^2} is explained as if both LHS and RHS have equal values and by squaring both sides will hold equal value. And by using [K] function we can convert it into the interaction equation.
{7}
K{x} ∏ K{x}
K{$\sqrt{x}$ } ∏ K{$\sqrt{x}$ } is explained as, if both LHS and RHS have equal values and by taking square root it still will hold equality and by using [K] function we can convert it into interaction equation.
The most unique property of this theory is that it uses its properties to solve the equation or any mathematical relation.

3 Can two different quantities interact

To do answer to this question, it is must prove it mathematical first that two different quantities can interact in some manner.
{1}
Let's take a series {1} with [K] function.
K[x] ∏ K[1-1+1-1+1…………………∞] …………<1>
On the right-hand side, series is tending toward infinity in a regular pattern of its kind.
K[1] – K[x] ∏ K[1] – K[1-1+1-1+1……………….∞]
K[1-x] ∏ K[1- < 1-1+1-1+1-1……………………………∞>]
K[1-x] ∏ K[1-1+1-1+1-1………..∞] …………<2>
As series right hand side equation [1] and equation [2] is same so,
K[x] ∏ K[1-x]
K[x] ∏ K[1] – K[x]
K[x] + K[x] ∏ K[1]
K[2x] ∏ K[1]
K[x] ∏ K[$\frac{1}{2}$]
So,
K[$\frac{1}{2}$] ∏ K[1-1+1-1+1…………∞] …………<3>
Multiplying by two<2> in LHS and RHS in K function.
K[1] ∏ K[2-+2-2+2-2………………..∞]
K[1] ∏ K [1+1-1-1+1+1-1-1……………∞]
By rearranging the order in RHS, we get
K[1] ∏ K[1-1+1-1+1-1…………∞] …………….<4>
As in right side of equation<3> and <4> have the same series, so we get
K[$\frac{1}{2}$] ∏ K[1]
Multiplying both sides by 2, we get
K[1] ∏ K[2]
This above result proves that two different quantities can interact with one quantity.

OR

Larger quantities can interact with small quantities in some manner.
There could be thousands of examples around us. And a perfect example from the atomic world can be, one electron is shared between two carbon atoms. And there could even be more examples in the real world.
{2}
Let's take another series [2] with K function.
K[x_1] ∏ K[1-2+3-4+5-6……………∞] ………<5>
K[x_1] + K[x_1] ∏ K[1-2+3-4+5-6………∞] + K[1-2+3-4+5-6……∞]
K[2x_1] ∏ K [1-2+3-4+5-6…………………∞
1-2+3-4+5-6…………………∞]
K[2x_1] ∏ K[1+1-1-1+1+1-1-1………∞] …………….<6>
As in right hand side in equation <6> and <3> are same, we get
K[2x_1] ∏ [1/2]
By dividing 2 in LHS and RHS in [K] function, we get
K[x_1] ∏ K[1/4]
K[$1/4$] ∏ K[1-2+3-4+5-6…………………∞] ……………..<7>
Multiplying by '4' in both side
K[1] ∏ K[4-8+12-16+20………………..∞]
K[1] ∏ K[4+{-8+12}+{-16+20}………………..∞]
K[1] ∏ K[4+4+4+4+……………………..∞]
K[$1/4$] ∏ K[1+1+1+1+1+1+………∞] …………………..<8>
Again, from equation <7>
K[$1/4$] ∏ K[1-2+3-4+5-6…………………∞]
K[1] ∏ K[{4-8}+{12-16}+{20………………..∞]
K[1] ∏ K[-4-4-4-4-4-4-4………………..∞]
K[1/4] ∏ K[-1-1-1-1-1-1-1-1-1……….∞] …………<9>
As left-hand side in equation <8> and <9> are same, we get
K[1+1+1+1+1+1+…………………∞] ∏ K[-1-1-1-1-1-1-1-1-1…..∞]
K[2+2+2+2+2+2+2…………..∞] ∏ K[0] …………….<10>
From equation <8>
K[$1/4$] ∏ K[1+1+1+1+1+1+…………………∞]
K[1/2] ∏ K[2+2+2+2+2+2+2……..∞] …………….<11>
As right-hand side of equation<11> and left-hand side of equation <10> are same so, we get
K[1/2] ∏ K[0]
K[1] ∏ K[0]
K[1+1] ∏ K[1]
K[2] ∏ K[1]
We again proved the same result from different series. I think that any series tending toward infinity can be proven [K{1} ∏ K{2}].
In general,
K[x_1] ∏ K[x_2]
So, if two quantities are equal it will interact and can be written in K function. But if two quantities are interacting in K function there is a possibility that they may or may not be equal quantities.
All the rules hold for equal quantities in the K function will also hold for different quantities in the same manner.
When there is a large number of quantities then only, K[x_1] ∏ K[x_2] is true. As we have proved this result in the case of infin-

International Journal of Scientific & Engineering Research, Volume 10, Issue 7, July-2019
ISSN 2229-5518

ity, and infinity is a large quantity.

4 Interaction – Equality theorem

As this theorem states that if two quantities can interact then just replacing interaction symbol by proportionality symbol, we can move it to equality.

$$K[x_1] \prod K[x_2]$$

$$X_1 \propto X_2$$

$$X_1 = S_0 . X_2 \qquad \ldots\ldots\ldots <1>$$

$$S_0 = x_1/x_2 \qquad \ldots\ldots\ldots\ldots <2>$$

By putting equation <2> in <1>, we get

$$X_1 = x_1/x_2 \times X_2$$

$$1 = 1$$

So, this theorem is true.

5 Interaction theory in energy

And these as we have proved that, two different quantities can interact with each other. So, this relation is very much clear that $K[x_1] \prod K[x_2]$ {for some given condition}
If we denote E_1 and E_2 two different level of energy then,
There is a possibility of $K[E_1] \prod K[E_2]$.
energies are kept in one system then; interaction net result of energy will be always zero. $E_{net} = 0$
Total energy $(E_u) = E_1 + E_2 + E_3 + \ldots\ldots\ldots\ldots\ldots\ldots + E_n$
$K[E_u] \prod K[E_2] + K[E_2] + K[E_3] + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots + K[E_n]$
And, in that system, it might be possible that all energy might be interacting with each other so,
$K[E_1] \prod K[E_2] \prod K[E_3] \prod \ldots\ldots\ldots\ldots\ldots\ldots \prod K[E_n]$
In this way,
$\mathbf{K[E_1] \prod K[E_n]}$ {Given condition}
This above result could be said as the chain interaction process of the system because all the energy is interacting in a loop of a chain in a system.

6 Proof: The energy of the photon is equal to the energy of the mass.

In this part, we want to prove a special result in a special situation which will be extremely useful in the coming equation. We want a relationship between the energy of the photon and the energy of a given mass.
So, from the De-Broglie equation.

$$\lambda_0 = h / mv_0 \qquad \ldots\ldots\ldots [1]$$

HERE, λ_0 = WAVE LENGTH; V_0= VELOCITY; H= PLANK CONSTANT; M= MASS.

And if we increase the velocity near about speed of light then equation [1] will be,

$$\lambda_0 = h / m \cdot c \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots[2]$$

C= speed of light
And the above equation is an approximation
From the Einstein energy equivalence principle [5],

$E_{U_7} = m \cdot c^2$ where E_{U_7} = Energy; m= mass; C= speed of light.

$$m = E_{U_7} / C^2 \qquad \ldots\ldots.. [3]$$

Here, E_{U_7} is only used to create a difference between other energies.
Putting equation [3] in [2], we get

$$E_{U_7} = hC / \lambda_0$$

.As we know velocity increases, mass also increases. So,
Here, E_{U_7} is continuously increasing.
And as we know that the energy of the photon is given by the equation,

$$E = hc / \lambda$$

If, $\lambda_0 = \lambda$ [In given condition]
Then,
$\mathbf{E_{U_7} = E}$
In this special case, when velocity is near about speed of light. Then the energy of the photon is equal to the energy of mass when the wavelength of the photon is equal to the wavelength of the given mass.
As this is a purely a hypnotical situation only because of,{ $\lambda_0 = \lambda$ } wavelengths it is very hard to create such a situation.
But who knows the future? There is always a strong possibility, that someday someone will be able to create these situations in their laboratory.

7 Interaction between mass and dark enenrgy

In this section, we are going to prove how the energy of mass and dark energy interact with each other at large scale. In some special condition, when velocity is near about speed of light.
As far we see in space the galaxy is moving away from us with higher velocity. And it is even possible that galaxy would have velocity near about speed of light. So, the electron in that galaxy would velocity near about the speed of light. So, we are examining that electron which is very far from us and satisfying all conditions.
Mass of electron may be interacting with dark energy so,
$K[M] \prod K[E_u]$ …………[1] where, M= mass, E_u= dark energy
From the Einstein energy equivalence principle,

$$E_{U_7} = m \cdot c^2$$

$$m = E_{U_7} / c^2$$

International Journal of Scientific & Engineering Research, Volume 10, Issue 7, July-2019
ISSN 2229-5518

..........[2]

BY, PUTTING EQUATION [2] IN [1], WE GET

K[E_{U_7}]∏ K[E_u . C^2] ....[3]

As the best example of equation [1] is a galaxy is interacting with dark energy as the electron.
from the De-Broglie equation.

$\lambda_0 = h / mv_0$ ....[4]

Here, λ_0 = wavelength; V_0= velocity; h= plank constant; m= mass.
And by putting equation [2] in [4], we get

$E_{U_7} = hC^2 / \lambda \cdot v$ .... [5]

By putting equation [5] in [3], we get
K[$hC^2 / \lambda \cdot v$] ∏ K[E_u . C^2]
K[E_u] ∏ K[$h / \lambda \cdot C$]
We already have stated that the whole system has velocity near about speed of light so,
K[E_u] ∏ K[$h / \lambda \cdot C$].......... [6]
As this point clear that things have mass than it will have a wavelength too.
So,
$E = hc / \lambda$
As we already have proved that E = E_{U_7} at a velocity near about speed of light in some given condition.

$E_{U_7} / c = h / \lambda$ ....[7]

By putting equation [7] in [6], we get
K[E_u . C^2] ∏ K[E_{U_7}]
As there E_{U_7} is increasing because the system is near about speed of light so, mass must be increasing as mass increases energy also increases. So, E_u must be increasing

SO, $dE_u/dt = positive$

SO, WHEN THE ELECTRON VELOCITY IS NEAR ABOUT SPEED OF LIGHT THEN THE ELECTRON IS INTERACTING WITH A HIGHER NUMBER OF DARK ENERGIES.

From interaction – equality theorem, we get
E_u . $C^2 \propto E_{U_7}$
E_u . $C^2 = S_0 E_{U_7}$

$E_U = S_0 \cdot E_{U_7} / c^2$

THE ABOVE EQUATION IS FOR FINDING OUT DARK ENERGY. AND FROM THIS SIMPLE EQUATION, WE CAN STATE THAT DARK ENERGY IS DIRECTLY DEPENDENT ON THE ENERGY OF THE MASS.

The geometry of space is dynamical quantity [1]. So, energy is continuously dynamically distributing in space. But as we know space expanding at some velocity so the net effect of dynamical effect is zero. Means if we explain space in the co-ordinate system then if there is some degree of curve in positive y-axis then the same degree of the curve must be negative y-axis to make the whole system neutral or zero. To maintain the law of conservation of energy. In general, universe energy is constant. In some way, the universe can't be born or even die. Matters can be made or destroyed but we can't say anything about energy because we don't have any experimental results. But by studying properties of energy we can answer the question that the universe will die or not?

8 THEORY OF THE EXISTANCE OF MASS IN THE UNIVERSE

From the general theory of relativity, we know that vacuum is not an empty place, it contains spacetime fabric and this must be made of energy. So,
let dark energy be [E_u] and energy of space-time fabric be **[ω]. If Newton's theory of gravity was completely correct, the plane would be perfectly flat and the Euclidean formula for a distance d measured outward from the sun $d = \sqrt{x^2 + y^2}$ would be valid. In curved space, however, the distance d may be greater than $d = \sqrt{x^2 + y^2}$. [2]**
We can state that spacetime fabric could be interacting with dark energy so,
K[E_u] ∏ K[ω] ....[1]
And we have already assumed that dark energy can interact with mass so,
K[E_u] ∏ K[M] ....[2]
And from chain interaction process, from equation [2] and [1], we get
K[ω] ∏ K[M] ....[3]
If we increase the curvature [ω] then the mass will also increase. {from equation [3]}
And we know that when we increase the velocity, mass increases. we say the same thing differently as when we increase the velocity spacetime curvature increases.
From equation [3], we can now state that, for the existence of mass on this universe. It must have some velocity and in general, the universe has some velocity. So, if the whole universe stops moving or expanding all mass from this universe will vanish just like magic.
For the existence of mass, the system must have some velocity. Higher will be velocity greater will be the distance $d = \sqrt{x^2 + y^2}$ means greater will be the curvature of space.
We can even calculate the velocity of our universe in terms of mass. Here mass could be the key factor to solve the most interesting problem and if redshift theory is correct then value predicated by that theory for the expanse of the universe must be the same, only if all the assumption is true taken in this theory.

9 IS IT POSSIBLE WHEN THE UNIVERSE IS EXPANDING THEN DARK ENERGY IS INCREASING

From the interaction between mass and dark energy.
K[E_{U_7}] ∏ K[E_u . C^2] ....[1]
From the theory of the existence of mass, we get
K[ω] ∏ K[M]
From the Einstein energy equivalence principle, we get
K[ω . C^2] ∏ K[E_{U_7}] ....[2]
From equation [2] and [1], we get

International Journal of Scientific & Engineering Research, Volume 10, Issue 7, July-2019
ISSN 2229-5518

$K[E_u . C^2] \prod K[\omega .C^2]$
$K[E_u] \prod K[\omega]$
The above equation proves that as space is expanding then dark energy is increasing in this universe. It is found that dark energy is a property of space-time itself [5], and here we stated it mathematically.
The general theory of relativity describes gravity as, any piece of matter or concentration of energy distort the geometry of space-time, causing other particles and light rays to be deflected toward it is defined as gravity [1]. Loop quantum gravity predicts that space comes in discrete lumps [1]. That means for the very small time there is no gravity when discrete pieces of space-time are shifting. Then dark energy [4] plays an important role, as dark energy creates negative pressure [4]. So, for short interval expanse of our universe happen and this process is so fast that with the technology of present days are unable to detect it. Astronomical observations by the supernova cosmology project, the High-z supernova search team provides strong evidence that our universe is not only expanding but also expanding at an accelerating rate [4]. But the question comes why accelerating expanding universe [3]? The possible answer could be when space-fabric takes loop quantum gravity shift [1] then dark energy increases [already stated mathematical] and thus how accelerating expansion is possible. One of the possible candidates for dark energy is vacuum energy [4]. We know space is expanding [4] so, every time-space is expanding dark energy is increasing.

10 INTERACTION BETWEEN PHOTONS AND MASS

Before writing a relation of interaction between mass and photons. We have to assume that photons can interact with mass. So,
$K[E_P] \prod K[M_r]$ ……….[1]
Where E_P = energy of the photon
M_r = relative mass
If we consider that a system having mass have some velocity {V} and as this is proven that velocity increases mass increases [5].

$M_R = M_a / \sqrt{1 - v^2/c^2}$ ……… [2]
Putting equation [2] in [1], we get
$K[E_P] \prod K[M_a / \sqrt{1 - v^2/c^2}]$ …………….[3]
Where M_a = mass of that object in the reference frame.
C = speed of light
From the Einstein energy equivalence principle, we get
$E_{U_7} = M_a . c^2$
$M_a = E_{U_7} / C^2$ …………[4]
Putting equation [4] in [3], we get

$K[E_P] \prod K[E_{U_7} / c^2\sqrt{c^2 - v^2} / c]$

$K[E_P] \prod K[E_{U_7} / \sqrt{C^4 - C^2 v^2}]$ ……………[5]
As in the above equation, physics law is still true and we can now check whether equation [1] is true or not from equation [5]. When the velocity of the system is near about speed of light then we can see from equation [5] there will be no interaction [‡] between mass and photons. And so, we are not able to see objects which are near about speed of light.
$K[E_P]$ ‡ $K[M]$ {when velocity is equal to or near about speed of light.}

11 Conclusion

This paper presents a foundation of the theory of interaction between energy and trying to solve a problem like why the universe is expanding at an accelerating rate? How or why mass existence is possible in our universe. What happens when things are at the speed of light, how they interact in physical reality. And had found that when the universe expands then dark energy increase too. Formulated a new kind of mathematics that can help to establish interaction between two systems or more in easy steps. This mathematical model uses K as a function for operation. The main purpose to write this paper is to show difficult problems about our universe can be solved easily with the best accuracy in physics.

REFERENCES

[1] Lee Smolin, "Atoms of space and time," Special edition 2018[online].Available:https://www.scientificamerican.com/article/atoms-of-space-and-time-2006-01/

[2] Clifford M. Will, "GRAVITATION THEORY," Scientific American Volume 231, Issue 5 10.1038/scientificamerican1174-24;Available:https://www.scientificamerican.com/article/gravitation-theory/

[3] Ranku Kalita, "Inflation, dark energy, and dark matter," Vol.5,No.1{2017}.Available:https://www.sciencepubco.com/index.php/IJAA/article/view/7180

[4] Murad Shibli, "The Foundation of the Theory of Dark Energy: Einstein's Cosmological Constant, Universe Mass-Energy Densities, Expansion of the Universe, a New Formulation of Newtonian Kepler's Laws and the Ultimate Fate of the Universe,"IEEE,2007,DOI:https://doi.org/10.1109/RAST.2007.4284100,Available: https://ieeexplore.ieee.org/document/4284100

[5] Jearl Walker, David Halliday and Robert Resnick, "principles of physics," Wiley press, 10th Edition[2014], Available: https://www.wileyindia.com/principles-of-physics-10ed-isv.html