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An Arm-Chair Philosophy from a Physicist∗

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Abstract:- The introduction in the paper gives a good insight on the summary of the paper. Topics mainly from Physics and few from general are taken at random and their relevance to Physics and philosophy are discussed. A physicist should necessarily read between the lines of the paper and even a non-physicist can have a general reading as matter is given in a popular style at many places. The last topic in the paper is 'Rudiments of Veda and Vedic Science'
Keywords:-This Research Paper not being focused on a particular subject or topic, the key wordsare many and hence not included

I. INTRODUCTION

The subject 'Physics' irrespective of its various branches Mechanics, Optics, Thermal or Quantum to mention few, has applications in every walk of life. Leave aside a non-physicist, even a well- qualifiedphysicist is sometimes ignorant and unaware of the applications and sometimes even the relevance of the subject to various phenomena and systems occurring in daily life. There is no wonder when a mathematician forgets simple arithmetic. I have cited merely very few instances just casually as if sitting on an arm-chair and giving out things philosophically. I request the readers of this paper to be also in an easy arm-chair (if you have one) and make a rapid reading which might take about an hour or read between the lines which might take nearly two hours. As being lazy is human, reading is sometimes unpleasant, but I want the readers to really go through this paper.Sometimes the reader might find the matter very elementary. For any subject, there is a fundamental and frontier.Look at the fundamentals before going to the frontier. I am a simpleresearchermerely doing with the arithmetic of the subject.There is, as such, no review of literature but matter presented in a serial order numbering over 30 and references, if any, given right at the point and context itself. The paper ends with a conclusion.

II. THE ARM-CHAIR PHILOSOPHY

What do you mean by "Philosophy"?

The pocket Oxford Dictionary 7th edition 1984 page 552 gives the meaning of 'Philosophy' as "Use of reason and argument in search for truth and knowledge of reality specially of the causes and nature of things and of the principles governing existence, perception, human behavior, and the material universe, particular system or set of beliefs reached by this system of conduct in life".The word, 'Philosophy' is made up of two Greek words: σοφιγ – love and φiλεω – wisdom and so means, "Love of Wisdom". Philosophy embodies man's striving to engage in a constant search in order to cognize the infinite, the "roots and causes" of all things existing and to call into thequestioneverything he has achieved. Plato, the great philosopher of antiquity, said that "*philosophy has its source in surprise and amazement"*. The great thinker Aristotle, the tutor of Alexander the Great, held that*"all sciences pursue a special aim, except philosophy which alone of all sciences is free, for only this science exists for its own sake".*
separable from religion that, it helped towards a better understanding of religious dogma, while others were of the opinion that it was based on doubt and reason, and so was incompatible with religion, which proceeds from belief. Some of the thinkers maintain that philosophy is a doctrine about science and others like it to art while still others, for example, Albert Camus a French writer and philosopher assert that the only serious philosophical problemis that of suicide. Ancient Philosophyphilosophers have to rake their brains

Fig.1 Plato (Left) discussing Philosophy with Aristotle (Right)

Over a great many problems which are now being studied by a whole army of scientists. To give an example, it was the Greek Thales of Miletus who divided the year into 365 days and the month into 30, but Plato, in order to make a harmony of numbers, made it exactly $364\frac{1}{2}$ making the year $729 = 3^6$ days and nights.

Avicenna, who was called "Prince of Philosophy" by his contemporaries thought that motion is potentially contained in matter and amounts to its liability to be transformed. Thus, a convincing answer to the question, "What is Philosophy" can be that it is a '*world outlook'*. It is a view of the world – of nature and society and a man's place in it – and an analysis of the possibilities of understanding and transforming it. But, it is also a conviction, a belief in the necessity for action on the basis of acquired knowledge. It is a blend of knowledge and assessment, knowledge and conviction, the emotional and rational. So philosophy is a special form of theoretical knowledge, involving not just an objective generalization of the entire human experience, but also the identification of moments in that experience which are of particular significance for man. According to the German philosopher Immanuel Kant, in philosophy we seek answers to three questions: "*What can I know?", "What must I do?"* and "*What can I hope for?".* According to Ludwig Wittgenstein, 'philosophy' is not a theory but an activity. Charles Caleb Colton had quoted philosophy as one of the three modes of bearing the ills of life the other two being indifference and religion. According to Thomas Earnest Hulme, one of the main reasons for existence of philosophy is not that does provide you refuge for definitions. Ambrose Bierce said that philosophy is a "*route of many roads leading from nowhere to nothing".* Frederick the Great, however, had a different view. He said that

"*If I wish to punish a province, I would have it governed by philosophers"*. Alfred North Whitehead says that "*Philosophy begins in wonder, and at the end, when philosophic thought has done its best, the wonder remains".* Swami Chinmayananda *one of the many Indian*religious preachers said that "*Philosophy is a view of life whereas religion is a way of life".*

Putting things in a nut shell, "*Philosophy is a general doctrine about Science, Art and mysteries of nature* - Author

What is "*Science*?"

'Science' is a systematized knowledge about anything in the universe. It is an organizedknowledge giving an understanding of the material world. People must understand that

" 'science' is inherently neither a potential for good nor for evil. It is a potential to be harnessed by man to do his bidding" -Glenn T Seaborg

"*The grand aim of all sciences is to cover the greatest number of empirical facts by logical deduction from the smallest number of hypotheses or axioms".*

'Science' is the attempt to make the chaotic diversity of our sense experience correspond to a logically uniform system of thoughts" … Albert Einstein

" *'Science without religion is lame, religion without science is blind"*

"What is 'Science' today is the 'Technology' of tomorrow" – Dr. S. Chandrasekhar

" '*Science' by itself, cannot supply us with an ethic. It can show us how to achieve a given end, and it may show us that some ends cannot be achieved."* – Bertrand Russell

"*Men love to wonder, and that is the seed of our Science".*

"The religion that is afraid of science dishonors God and commits suicide" ….. Emerson

" *Science' is a first-rate piece of furniture for a man's upper chamber, if he has common sense on the ground floor"* – Oliver Wendell Holmes

What is *'Physics'?*

A concise and simple definition and meaning of 'Physics' is as under:

"*Physics is that branch of science which deals with the effects of various forms of energy regarding the position, motion and state of matter".* Physics is the study of matter and energy and energy possessed by matter in its various forms. Thus the study of Physics involves space, matter, motion, energy and time.

What do you mean by *'Space'?*

'Space' is an expanse in which things exist and move. For example, Aristotelian space, Newtonian space, Kantian space, Euclidean space, Eddingtonian space, Einsteinian space, etc. What is of interest is the Newtonian and Einsteinian space. Newton's theory treated space and time separately, but unified motion and gravity. According to Immanuel Kant, 'Space' is not a concept but a form of intuition.Einstein's theory unified

the three dimensions in space with the dimension of time and called it space-time. According to Einstein, matter curves space-time, while space-time determines how matter moves. Well, then from this point of view, *how does Einstein differ from Newton?*I put the answer in one sentence: *"According to Newton, with the disappearance of matter, energy and time, space still remains, but according to Einstein, space also disappears with matter energy and time"*

Matter
Matter is anything that occupies space. Space occupied by matter is known as
'volume' and the quantity of matter as 'mass'. Matter exists is various states such as solid, liquid, gas, plasma and Bose-Einstein condensate.

Motion
Anything that undergoes displacement from a position of rest is said to be in motion. The concept of 'rest' and 'motion' are relative and governed by Einstein's theory of Relativity.

Energy
Energy of a body is its capacity to do work. The concept of 'energy' and 'work'
are synonymously used in Physics. Any system or agency capable of doing work is said to be in possession of energy. There are various forms of energy such as 'Heat', 'Light', 'Electricity', 'Sound', 'Nuclear', etc. One form of energy can be converted into another and that is the "Principle of transformation of energy" and according to the "Principle of conservation of energy", *the total energy content of the universe is constant.*

Time
'Time' is the rate of change of duration between the past and the present. There is a universal flow of time with the past never repeating and the future uniformly approaching. Time is also related with matter and motion which exist together. Matter is the cause and motion the effect. According to Leibnitz, 'space' is an order of co-existences and 'time' is an order of successions. The great philosopher Aristotle said that 'time' is the measure of change with respect to 'before' and 'after'.
See what Francis Bacon said, "*Time is the greatest innovator"*
"*There is only one thing in the universe that flows uniformly and continuously, that is 'Time'* -Author

Space and Time
Space and time are themselves empty abstractions that acquire reality only in
Matter.There is no time outside a process or space outside matter. But, space and time are the forms of existence of matter. We cannot perceive matter in other than space-time forms. In our perceptions, we perceive space and time separately, but that does not mean we can really (and not mentally!) separate space and time from matter: Space and time only acquire objective reality in matter. Time requires reality only in a process in the real motion of matter. Certainlya good jugglery of words and are from Albert Einstein's Philosophical views and the Theory of Relativity by D.P. Gribanov, Progress Publishers, 1987, p.26-27

Metaphysics
The word, 'Metaphysics' is notoriously hard to define. Metaphysics literally
means "After Physics" or "Beyond Physics". There is a historical reason behind this
Andronicus, a librarian from Alexandria while arranging Aristotle's manuscripts, put them after the manuscripts of Physics.and hence the name 'Metaphysics'. Metaphysics is the foundation of philosophy and Aristotle called it 'First Philosophy'. It is a broad and intricate discipline dealing mostly with things that exist and the way how they exist. A person doing research in metaphysics is called 'Metaphysician' according to whom nothing new can appear in the universe and many such people started interfering with the development of science. They simply say Ya, Ya; Nay, Nay.
[Metaphysics is a traditional branch of philosophy that tries to answer two basic questions: 1.Ultimately, what is there? and 2. What is it like?
A central branch of metaphysics is "Ontology", an investigation into 'being' and 'being as such'and how they are related to each other – on-line Wikipedia]

Dialectics
The dictionary meaning of dialectics is, "*Logical discussion by question and answer; critical discussion to find truth in philosophy"* Dialectics are ideas opposed to metaphysics and extensively deals with metaphysical contradictions. It is the science of the development of nature, society and thought which examines phenomena from all aspects. Dialectics helps to find truth by critical discussion and arguments. According to Plato, a

dialectician is a man who knew how to ask questions and give answers and at the same time he is not knowing what he is already knowing. Socrates is one of the ancient dialecticians and Frederick Angels one of the modern dialecticians and author of Dialectics of Nature.

I would like to quote below some of the arguments based on dialectics: When you try to enter flowing water in a river, Heraclitus says that your feet are under different water at different times and you cannot enter the same water twice. Cratylus the chief disciple of Heraclitus argues that you cannot enter the water even once meaning thereby that the water in which you want to enter has already flown. When Plato told his disciples that man is a two-legged featherless animal, one of the disciples brought a plucked cockerel and keeping on the table said: "This is Man". The arguments and discussions go on. Dialecticians and metaphysicians have two opposing views of development.

Dialectical Materialism:-It is the scientific world outlook. It follows the universal method of cognition of the laws governing the development of nature, society and thought.

…… Random collection from "What is Philosophy?" by Galina Kirilenko and Lydia Korshunova, Progress Publishers, Moscow, 1985

Theory

As the object of science is not only to discover facts but to find general truths and articulate fundamental laws. Scientists call such intellectual constructs 'Theory'. In science, 'theory' does not mean 'Speculation' or 'idea' as it does in everyday conversation. A scientific theory is a presentation of fact. It has been arrived at by what is known as scientific method, an accepted procedure of logic by which scientists test a hypothesis through careful observation, experimentation and measurement. A hypothesis or a set of hypotheses that has withstood every attempt to prove it false may be called a theory. Thus, the theories of gravity or evolution are not conjectures. They describe fundamental facts about life on Earth just as do Newton's law of motion, Boyle's law of gases, Mendel' law of heredity and the law of conservation of energy. In general, what we mean by a theory is that "*It is an ordered scientific conceptual scheme"*

Experiment

'Experiment' is both a verb and noun. Experiments are performed to verify theories or any theory put forward by scientists, is confirmed later by performing experiments in laboratories. Experiment or experimentation is a process involving 'space', 'time' and 'energy'. Do not experiment on things which have no scientific basis

Occurrence and happenings

'Occurrence' is natural. For example, eruption of a volcano or formation of a rain bow are natural occurrences. A happening can be both natural or man-made. For example, launching of a rocket or collision between two vehicles are happenings which are man-made.

Existence, Discovery and invention

Desire for existence is unique with any living organism. Existence and invention are two aspects of the same reality. Several laws exist, but they are still to be discovered. For example, Gas Laws existed in the realm of Physics not known to the experimenters till they were discovered and shown by Charles or Robert Boyle.

It was the monkey that existed first and by evolution, we have the man obtained or rather invented by nature by modification in habits and culture. Thus,

"*The heavenly father invented man because he was disappointed in the monkey"*

….. Mark Twain

Past and Present

The 'present' is either a continuation of the 'past' or something new. The future depends upon the past and the present. You only interpret the future in terms of the past and that is why one has to study history. Remember, the 'present' is because of the 'past' .See what Thomas Fuller said: "*Today is yesterday's pupil"*

Phenomena and Events

'Phenomenon' and 'Event' are closely related. Sometimes the latter is the 'cause' and former the 'effect'. The term, event is more general and the term phenomenon is more scientific and inherent in the system. Some of the phenomena are events. Revolution of an electron around the nucleus of an atom, flow of current through a cable, charging of a lead accumulator, etc. are events whereas ionization of an atom, generation of thermo-electric current when you heat the junction of a thermo-couple, self-discharge or back emf in an electrolyte, etc. are phenomena. When two phenomena taking place in any physical processes the result arising there-from will be different. For example, when current flows through two conductors

connected in series, the effective resistance will be increased because the 'phenomenon' in this case is *'conduction'*, whereas when you charge a pair of capacitors in series, the effective capacitance gets reduced because in this case the phenomenon is *'induction'*. Other examples are 'Conduction' and 'Convection'; Fission and Fusion.

Knowledge and Experience

'Knowledge' is something gained by an individual over a period of time. As a child
Is born, it knows nothing, but as it grows, goes to school, gets educated, it starts knowing about the world. A systematized knowledge gained by him is 'Science'. When he applies his knowledge in his daily life at home, at his place of work or anywhere, he gets more experience by utilizing his knowledge and he becomes more efficient. A knowledgeable man is said to be proficient. Thus 'Proficiency' and 'Efficiency' are related with 'knowledge' and 'Experience' respectively.
The word 'Knowledge' comes from the word'Know' The question now is, knowledge of what? Knowledge of anything around us or in the universe. Knowledge is a relative term. One may have more knowledge than the other and vice versa. The next question is, how to gain knowledge? I am giving below four simple steps to gain knowledge:

i) Try to know what you do not know
ii) Try to know more than what you know
iii) Try to know what others know
iv) Try to know more than what others know.

The last two of the above steps will require lot of interaction with others and the final situation should be
"I know what you know and you know what I know"

"Knowledge is the true organ of sight, not theeyes ……. Panch Tantra
"Without knowledge life is no more than the shadow of death" ….. Moliere
"A desire of knowledge is the natural feeling of mankind: and every human being whose mind is not balanced, will be willing to give all that he has to get knowledge"
….. Samuel Johnson
"*It is knowledge that adds to experience. One should keep both at equal levels. Ideas are derived from knowledge and adds to your experience. A single idea, if it is right, saves us the labor of infinity of experience"*
……. Jacques Maritain
"*Measurement of life should be proportional rather to the intensity of the Experience than to its actual length"*
……. Thomas Hardy

Techniques* and*Technicalities

These are related to the questions, 'How'? and 'Why'? The answer to the question, 'How' is more scientific whereas answer to the question, 'Why?' is more technical. The answers lie in the development of technology which in a general sense is 'Engineering Science'. The law makers at the helm of affairs in the field of education in the country once separated engineering from science and called it technical and the parent body, 'Science' from which it was formed, non-technical. A state of shame indeed on their part and essentially they were not aware of the answers to the questions How? and Why? wherein exactly lies the unification of 'Science' with 'Engineering'
The fabrication of a computer may be technical, but its principle of working involves techniques requiring considerable knowledge of Physics. It is interesting to read what is given on page-1, Chapter-1 of Electronics by Philip Parker, Edward Arnold Publishers, 1960 reprint here as under:
"*Electron is a part of every atom, and the use of electrons is a part of atomic physics, here (*in Electronics) *as everywhere, to separate 'Engineering' from 'Physics' is to cut it off from the source."*[If one reads between the lines, the implied meaning of the author is Engineering is something formed from Physics]
I have been teaching Applied Physics in Polytechnics for over four decades and the above quotation was given by me to a committee of experts who once came to examine the equivalence of technical and non-*technical* stature of polytechnic teachers and conclusively added my own philosophical statement, "*Scienceinvolves more techniques than itself remaining non-technical in a polytechnic curriculum".*This statement silenced most of them and cut-short further discussions. Such a disparity in Polytechnics in India created a turmoil and converted Polytechnics into politics clinics. This disparity, however, does not exist as on today thanks to the serious understanding by the law makers

Macroscopic* and *Microscopic Measurements

I would like to giveheresome essential difference between 'Physics' and 'Engineering'

Macroscopic measurements are large-scale measurements such as radius of Earth (6370 km), height of an average man (1.7m), dimensions of a dust particle (~ 1 mm),Age of Earth ($1.3x10^{17}$s), time taken by a train (30 minutes), human heart beat (~0.8 s) mass of a bag of wheat (50kg), mass of a grain of iron dust (~1 mg), etc. Microscopic measurements are those related to the atomic system such as atoms, molecules, ions, etc., for example, radius of an atom ($\sim 10^{-11}$m), mass of an electron ($9.11x10^{-31}$kg, time taken by an electron to go once round the nucleus of an atom ($1.52x10^{-16}$second), etc. In Physics, we carry out both macroscopic and microscopic measurements whereas in engineering one has to deal mostly with macroscopic measurements. As an illustration, if somebody wants to find the wavelength of light you are using for reading, it is the job of a physicist and not an engineer even though some engineer may be capable of doing it. I am putting things in a generalized way. A further distinction between the two types of measurements will be made clear by taking Ohm's law as an example:

In the verification of Ohm's law experiment, we measure the potential difference V across a resistor of resistance R by a voltmeter and the current I flowing through it by an ammeter, so that the Ohm's law equation in the macroscopic form is $R = \frac{V}{I}$. The corresponding microscopic quantities are Electric intensity E, Resistivity ρ and Current density J. These microscopic quantities are not macroscopically measurable and hence the Ohm' law equation in the microscopic form is $\rho = \frac{E}{J}$.

Is there any phenomenon the measurement of which is both macroscopic and microscopic?

Well,There is!. The Brownian motion on which the famous scientist Albert Einstein and Smoluchowski worked on. In the year 1827, the botanist Robert Brown (1773-1858) watched the behavior of pollen grains suspended in water through a powerful magnifying glass. He found that the grains were in a state of continuous chaotic motion. It was shown independently in 1905 by Einstein (1879-1955) and Smoluchowski (1872-1917) that the Brownian particles behave like gigantic molecules whose average kinetic energy is equal to that of the liquid or gas surrounding the particles. In their theoretical treatment they have shown that a Brownian particle with a mass of $m \approx 10^{-14}$ kg and radius $r \approx 10^{-6}$ m is an object that is both macroscopic and microscopic at the same time. From the energy point of view it is microscopic because it participates in thermal motion and its average kinetic energy equals the average energy of thermal motion of the molecules, i.e. $\frac{3}{2}$ kT where k is Boltzmann's constant and T the absolute temperature. But, from the point of view of its momentum, the particle is macroscopic. Its linear momentum, $p = \sqrt{2mK} = \sqrt{2m\frac{3}{2}}$ kT, where K is the kinetic energy. This is substantially larger than that of a molecule which is equal to $p_0 = \sqrt{2m_0\frac{3}{2}}$ kT. The ratio of the two linear momenta is,

$$\frac{p}{p_0} = \sqrt{\left(\frac{m}{m_0}\right)} \approx \sqrt{\left(\frac{10^{-14}}{10^{-26}}\right)} = \sqrt{(10^{12})} = 10^6$$

Naturally, the collision of a molecule with a Brownian particle resembles the collision of a completely elastic particle with a wall, the molecule bounces off the particle with practically the same velocity in the opposite direction and the momentum of the Brownian particle is changed by only a very small amount $\Delta p = 2p_0$. A very large number of such collisions will be required and the number can be found to be

$$N_0 \approx \frac{p}{p_0} = 10^6$$

Without going into further mathematical details, the time interval during which the particle travelling one 'step' is shown to be 10^{-4} second and the number of steps during an observation time of, say 15 minutes, is seen to be 10^7. The treatment speaks for itself that Brownian motion is both macroscopic and microscopic.

The above treatment given by me is further augmented by excerpts from a very famous book given below:["*Brownian motion is a physical phenomenon of utmost importance, because it bridges a gap between microscopic and macroscopic worlds, very much as Boltzmann's equation does. It is good to see transition from microscopic to macroscopic dynamics at work".* ….Chapter-5,Brownian Motion, p.109, Bohmian Mechanics : The Physics and Mathematics of Quantum Theory by Detlef Durr- Stefan Teufel, Springer Edition 2009]

In the present days of Nano-technology, measurements which were earlier thought to be microscopic have been made macroscopic.By suitable arguments, the concept of 'Entropy' applied to a thermodynamic system can also be shown to be both macroscopic and microscopic.

Reversible* and *Irreversible statements

In the following are given some of the statements which require lot of thinking and discussion.In order to maintain brevity and avoid running this paper into pages, description of only few will be considered. Let us take for example,

i) Screw is an inclined plane.

On the face of it, it looks strange as to how the screw is related with the Inclined plane. This simple illustration will indicate the relationship of Mathematics with Physics which will be seen now. There is both a vertical motion of the screw and the direction of climb on the inclined plane (Fig. 2) The rotational motion of the screw makes it advance along the vertical. Now, imagine an insect moving from the base head of the screw through its grooves upwards, it will find its path to be an inclined plane. Let us deal with some simple geometry here. If the screw thread diameter is 1 cm, then its circular path is πx1 = 3.14 cm.That is, the insect can cover a distance of 3.14 cm in the

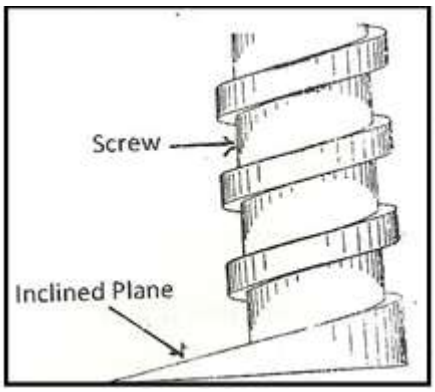

Fig. 2.Illustration of screw as an Inclined Plane

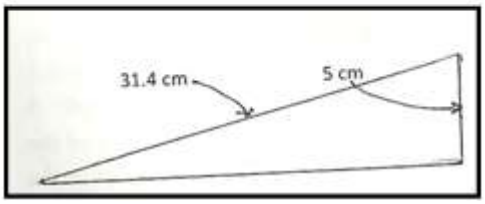

Fig.3 The inclined plane

Grooveof the screw. If the height (length) of the screw is 5 cm, and if there are, say, 10 threads and hence 10 grooves for the screw, then the insect covers an inclined path of length 10x3.14 = 31.4 cm in order to climb a height of 5 cm as shown in Fig.3 .

Thus, our statement that "Screw is an inclined plane" brought to us this simple geometry. This is the very principle underlying the construction of pathways to climb a mountain some of which are wonders of civil engineering. The 'Screw', the Pulley and the Lever are very much due to Archimedes.(Fig.4)

ii) Friction, viscosity and surface tension are forces but, any force need not necessarily be any of these.
iii) Force is a vector and any vector need not necessarily be only force
iv) Work is Energy and Energy is
Work
v) Pulley is a Lever and Lever need not necessarily be only
Pulley

Fig.4 Archimedes (287 BC -212BC

vi) A Thermo-couple is a Heat Engine

This requiressome discussion. Thermo-couple is a device which transforms thermal energy into electric current. The hot junction plays the part similar to a boiler or a heater in a steam engine while the cold junction serves as a cooler. If a quantity of heat Q_1 at an absolute temperature T_1 is supplied to the hot junction, a part Q_2 of this store of heat will be rejected to the cold junction at an absolute temperature T_2 and the difference $(Q_1 - Q_2)$ will be convertedinto energy which is the current. The efficiency of a thermo-couple, i.e. the part of the received heat that transformed into electric form of energy is

$$\eta = \frac{(Q_1 - Q_2)}{Q_1}$$

As we know that the efficiency of a heat engine in the case (without any loss of heat) could be

$$\eta = \frac{(T_1 - T_2)}{T_1}$$

which is also true for a thermo-couple.
vii) Space is Matter and Matter is Space
viii) Physics is built on Mathematics
ix) Mathematics is the language of Physics
x) Kilo Watt (kW) is Power whereas kilo Watt Hour (kWH) is Energy

Synonymous Terms.
In our daily life, we come across some synonymous terms such as i) Drug and medicine, ii) Home and House, iii) Fitter and Mechanic, etc. Now, coming to Physics, some of the synonymous terms are:
i) Work and Energy
ii) Electromotive force and Potential difference
iii) Absorption and excitation by atoms
iv) Observation and Reading
v) Potential and Potential Difference
vi) Distance and displacement
vii) Capacity and Capacitance

viii) Resistor and Resistance
ix) Experiment and Experimentation
x) Practical and Experiment
xi) Indeterminacy and Uncertainty

Action* and *Reaction (Newton's Law as applied to public life).
'Action' and 'Reaction' are something like two sides of the same coin. For example,
i) Forces always exist in pairs (A single force cannot exist independently)
ii) 'Problem' and 'a Solution' ('Problem' is the 'Action' and 'Solution' is the useful 'Reaction').
All problems have solutions – Only we are not aware of the solutions
iii) 'Success' and 'Failure' – ('Failure' is the 'Action' and 'Success' is the 'Reaction')'

With reference to an Industry (I mean its staff), 'Action' on one side creates working imbalance with rights increasing on the other side. Rights become more than interests and ultimately there will be a confrontation between the two. Due to such existence of a working imbalance, more 'disobedience' is created than 'obedience' This leads to lock-out of the industry. In connection with this, see what Napoleon said:

"*A man will fight harder for his interests than his rights"*

Wisdom, Ignorance* and *Innocence
This is something general and not much related with the subject Physics. The deas are made clear from the quotations of few eminent men.
i) *"Ignorance is not innocence, but sin" ……*Robert Brown
ii) *"Nine-tenths of wisdom is wise in time" .....* Theodore Roosevelt
iii) *"A wise man will make more opportunities than he finds" ...* Francis Bacon
iv) *"A man of learning lives even after his death, the ignorant man is dead while still alive" ….* Ali
v) *"The perfection of human knowledge is ignorance of divine knowledge. You must know enough to know that you do not know" .....* Hujwiri
vi) *"The wise lives on efforts and the fool on dreams" ....* Prophet Mohammed
vii) *"Wisdom is prevented by ignorance and delusion is the result"* .BhagwadGita
viii) *"It is better to be a wise fool than a foolish wise man" ….* Author

In the above philosophy, what I meant by a wiseman is a person knowing elements of Physics. Go through the following illustrations:
a) A man cuts a bar magnet into two by using a hacksaw blade (work of a fool)
b) Ocean tides are beautiful. They are created by gravity
c) A person feels better in a lying down position as the center of gravity is brought lower and a reduction of pressure due to more surface area.
d) Electricians are found usually thin and tall because of the equation, $R = \rho(\frac{l}{a})$ where R is the resistance, ρ the resistivity, l the length and a the area of cross section of the conductor. One can say that electricians in general are good resistors.
e) We discard the cell of our clock because the cell is dead and what we mean by saying that in the language of Physics is that "Internal resistance of the cell has become infinite".
f) One cannot see an electron with the naked eye because the wavelength of light must be less than the dimensions of the object.
g) I was once going through a picnic spot near Mumbai, India and started observing (All physicists should be good observers because taking observation is their profession). I just looked at a nearby pine tree wagging with the wind and terrorizing the picnickers and for a moment I thought of an equation* given in a very famous classical book which I used as a text book for my graduate studies. I .approached an attendant of the picnic spot and told him that the tree might fall on any one and asked for the approximate height of the tree which he said was about 90 feet. I requested him to cut the tree. I still remember the optimum height as 27 meter.

∗[Equation (31), $l = 1.99\sqrt[3]{(\frac{qk^2}{g\rho})}$, Chapter IV Elasticity, p.59, Properties of Matter, Blackie & Son Ltd., 1946 reprint. The value obtained for a pine of 15 cm cross is about 27 meter]

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It is unknowingly 'Physics' at work

There are many illustrations where Physics plays an important role which one has to think and find out for the cause. For brevity, only few are given.

i) Pulling a hand-cart is more easier than pushing it The answer lies in the resolution of forces (Fig. 5). It will be seen that while pushing the vertical component R Sin θ gets added to the weight W of the cart whereas while pulling the vertical component R Sin θ acts in the opposite direction and tries to decrease the weight of the cart.

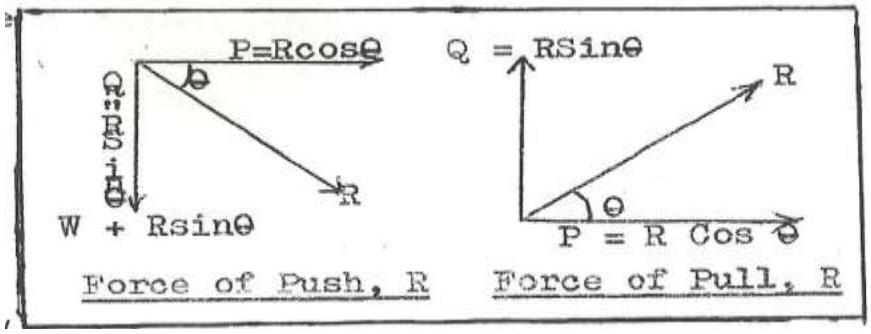

Fig. 5 Illustration of "Pulling" easier than "Pushing"

ii) The Hydrostatic ParadoxWe have to see some elementary aspects of liquids contained in a series of Pascal's vases having a common connection. In Fig.6 is shown only two for convenience. The peculiarity of the vessels is that the area A of the bottom of each vessel is the same. Two points are illustrated here. One that liquids find their own level and the other that the thrust T due to the liquid at the bottom of each vase is the same irrespective of the quantity of liquid contained in each.For example, in Fig.(a), the liquid is much more than that in Fig.(b) and this is a paradox often referred to as the hydrostatic paradox. Authors of books have not taken proper care to explain this paradox. An analytical explanation can be given by the resolution of vectors as shown in the figures. In Fig.(a), the normal thrust at some point such as O is being reacted by the vector R , which on resolution gives the vectors P and Q. P acts vertically upwards whereas Q acts horizontally. As the liquid is at rest, Q will not have any effect and vectors such as P will exert forces on the slanting walls of the vessel and the thrust exerted at the bottom will be only due to the liquid column of height h shown by the dotted lines.

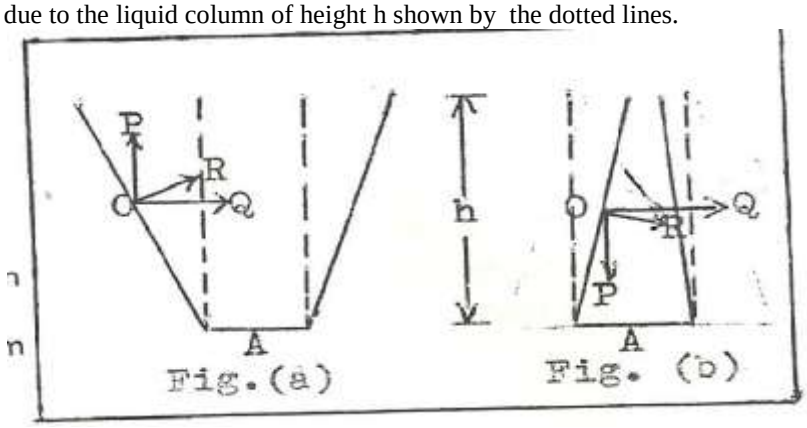

Fig.6 Explanation for Hydrostatic Paradox

In the Fig.(b), the reactionary thrust R on resolution brings out vectors P and Q . Q as before being horizontal has no effect and P in this case is vertically downwards. Many such P's will contribute an extra thrust at the bottom of the vessel thereby compensating for the absence of liquid on the outer sides of the slanting wall of the vessel. Thus the thrust at the bottom in each case is T = A h ρ g, where h is the height of liquid column, ρ the density of liquid and g the acceleration due togravity.

iii) The Simple Voltaic Cell.

In elementary books on Physics and in the chapter on Electricity, the flow ofcurrent from a simple voltaic cell is demonstrated by connecting a low voltage electric bulb across the terminalsof the cell. Such circuits exist even

today. I would like to ask the readers a question: How did Volta (1745-1827) use an electric bulb in the eighteenth century when the electric bulb was invented by Thomas Alva Edison (1847-1931) in the nineteenthcentury? Well !! Volta demonstrated theflow of current by charging and discharging a condenserStatic electricity had a firm basis at the time of Volta and the idea of condenser and the gold leaf electroscope was an idealdetector and the circuit used by Volta is shown in Fig.7.

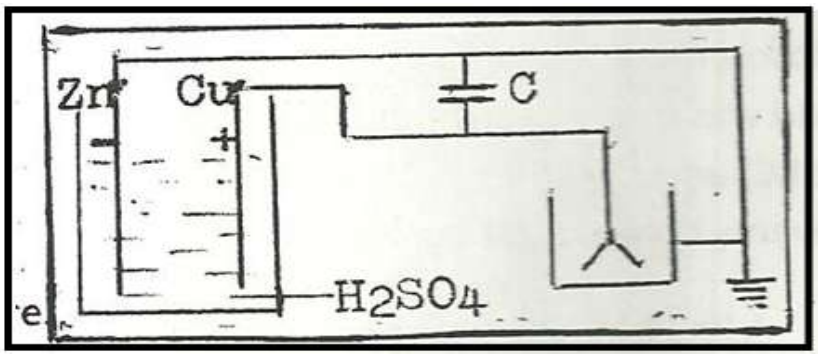

Fig.7Volta's Circuit

The flow of current was demonstrated by Volta by varying the capacity of a condenser as shown in the fig. In the normal position when the plates are close together (large capacity), the gold leaves did not show any appreciable effect. But, when the cell is disconnected and the plates are separated (small capacity), for whatever charge Q taken by the plates, the potential is appreciably increased and the gold leaves diverge.

This circuit is really complicated for a school student studying elementary Physics and hence not given, But, any teacher (Well, I am one) teaching the subject should know this. History and Philosophy of Physics is more important and interesting than the subject matterwhich originated from it. In most of the universities in USA, there is a department for History and Philosophy of Physics

iv) The origin of the Inverse Square Law

In any two-body problem, whether magnetic poles or electric charges, the
force is directly proportional to the product of the masses and inversely proportional to the square of the distance between the two bodies. This is true even for celestial bodies. We study Coulomb's law and it is of interest to note that the originator of this law isnot Charles A Coulomb (1736-1806), but, much before him, Sir Isaac Newton (1642-1727) started the investigation with the falling of the Apple (Whether the apple really fell is still a dispute). Instead of the apple, consider a heavenly body such as the Moon falling towards the Earth. Newton calculated the acceleration of the falling Moon as $27\text{x}10^{-4}\,\frac{m}{s^2}$ which is some 3640 times smaller than the acceleration $9.8\,\frac{m}{s^2}$ on the surface of the Earth. The falling apple is at a distance of 6371 km (radius of Earth) from the center of Earth and the Moon is at a distance of 384400 km, i.e. 60.1 times farther. Comparing the two ratios, 3640 and 60.1, Newton noticed that the first is almost exactly equal to the square of the second. This meant that the law of gravity or any such forceis very simple: "*The force of attraction decreases as the inverse square of the distance between the bodies"*. This is the same inverse square law which we come across in electrostatics or magnetism.

Tidal Friction

As gravity rules the universe, ocean tides are the result of gravity. The Earth is
not absolutely and perfectly rigid and it is surprising and interesting to know that mathematical calculations have lead to the conclusion that the surface of the Earth is raised by 1 foot for every 4 to 5 feet rise of the ocean waters. Thus what we observe in the tides is the relative difference between the vertical motion of land and water.

Two British scientists, Jeffreys and Taylor found that due to tidal forces, there is friction at the bottom of the sea specially in shallow basins. The total energy per second or power generation continuously due to tides amounts to 2 billion HP. As a result of this dissipation of energy, the Earth slows down its rotation about its axis, just as an automobile's wheels do when the brakes are applied. Calculations have shown that the Earth slows down by $2\text{x}10^{-8}$ second per rotation. This appears to be negligible but the effect is considerable when we take the case for a century. A century contains 36525 days so that the time factor is $36525\text{x}2\text{x}10^{-8} = 7\text{x}10^{-4}$ second. Thus, a century ago days were shorter by 0,0007 second. On an average between then and now, the length of the day was $3.5\text{x}10^{-4}$ second shorter than at present. But, since 36525 days have passed by, the total accumulated error must be

$36525 \times 3.5 \times 10^{-4}$ = 14 second. This slowing down of Earth's rotation due to tidal friction puzzled astronomers and it helped them to explain discrepancies regarding various astronomical observations. From this point of view, even the motion of Earth cannot be taken as a perfect clock.

[….Excerpts from "Gravity" by George Gamow, Ch.2 The Apple and the Moon, p.42-43. Vakils Feffer and Simons Pvt. Ltd., 3rd Indian reprint]

.I do not know what you know and you do not know what I know

This, indeed, is an interesting phraseology ruling and covering the entire field of knowledge. One should not think that he is the only knowledgeable. The other man might know much more than you. I would like to give below my own experience of an interview faced by me some time in the year 1962 when I was only a graduate in Physics. The post for which applied for was a Scientific Assistant in a well- known organization.Sometimes, simple and very fundamental things are asked at the time of some interviews. I would like to quote below how I was taken by surprise by a simple question and how the interviewers **(consisting of three people) had a setback.**

One interviewer: State Ohm' law.
Self:- Which Ohm's law you want me to state?
Another interviewer:- State all Ohm's laws
Self:- Sir, there are not many Ohm's laws, but only two.

This, appears to be surprising even for the reader of this paper. When I was a graduate student, the text book recommended and followed by me for the topic, 'Sound' was 'SOUND' by Richardson in which is given one more Ohm's law by the same scientist Georg Simon Ohm (1789-1854) who has given the law in electricity. The scientist is more famous for Ohm's law in electricity, but less famous or seldom noticed by readers. In fact, one has to be specific and it has to be "Ohm's Acoustic Law". The scientist had stressed the importance and made clear the harmonic analysis of a complex vibration. According to him, there are great many possible methods of analysis of a complex vibration. The analysis by Fourier series is only one of the possible methods. It derives its importance from the fact that it corresponds to the analysis of the complex note actually made bythe human ear. Ohm asserted that the vibrations which are strictly simple harmonic are unanalyzable and are perceived by the ear as simple tones, but that all other forms of periodic vibrations can be analyzed by the ear and each harmonic constituent separately perceived, if of sufficient intensity. The results of this analysisare not as a rule consciously registered, that is in listening to a musical note we do not ordinarily notice its complex nature, but a proper direction of our attention enables us to do so. Thus the human ear is a practical Fourier analyzer and harmonic analysis in the case of musical notes derives its importance from this fact. I made the answer very elaborate for the readers.

Conclusively, to sum up, with the usual meaning of the terms, V = I R for the Ohm's law in electricity, the Ohm's (acoustic) law in Sound takes the form, p = Z v, where p is the acoustic pressure, v the velocity and Z the acoustic impedance expressed in $\frac{\mathrm{Ns}}{\mathrm{m}^3}$.In this connection it is of great interest to go through the following incidence which really happened.:

"If a boat loaded with rocks floats in the middle of a swimming pool, and a man in the boat throwsthe rocks overboard, what will happen to the water level of the pool?"(At a scientific meeting, this question was put to Dr. Gamow, the physicist J. Robert Oppenheimer and Nobel prize winner Felix Bloch. All three of them, not thinking too carefully, gave the wrong answer.)[Ref: Question 17, p.32, Physics-Foundations and Frontiers, Prentice Hall of India Pvt. Ltd. Ed. 1963]

Distinction between Biology, Physics and Chemistry

It is all Science. The three Biology, Physics and Chemistry existed as one unit.'Biology' is a term: 'Bio' means 'Life' which includes the lives of both the plants and animals. 'logo' means 'science'. Thus, 'Biology' means science of living things both plants and animals. There is a further sub-division: The science of plants is called 'Botany' and the science of animals is called 'Zoology'. In the earlier days both Physics and Chemistry remained as one unit, the physical science or chemical science. The name, 'Chemistry' as such for chemical sciences was given by the Greeks in the 4th century.

Now, coming to 'Physics', it has a separate existence. There is lot of politics between people dealing with these subjects, Physics and Chemistry. I was involved in the teaching of Physics for nearly 46 years in Polytechnics. The situation is not much different in institutions at the international level as an evidence for which the credit of discovering 'Cold Fusion' the subject of which having been claimed by both physicists and chemists.

Who has separated 'Physics' and 'Chemistry' from Science and gave a separate existence for them? Well! It was done at the end of the 18th century and beginning of the 19th century by the famous British physicist and chemist, John Dalton (1776-1844). All scientists in general and all physicists (including me) in particular should thank this great scientist for that. The subject, Physics is applied to Biology and Chemistry separately to become 'Bio-Physics' and 'Physical Chemistry' respectively.

"*Life is inherent with matter in motion. There is life in a galvanometer the pointer of which moves when a current is passed through it. You will be surprised when I say that in a glowing fluorescent tube, millions of people (atoms) are at work inside. Thus, 'Physics' is more lively than any living Biological Science" ...*Author

"*The principal deficiency of a student lies in an almost complete lack of awareness of Physics as a living science, as a field of human culture which will never be complete"*

....From Preface, p .iii, Basic Theories of Physics (Mechanics and Electrodynamics) by P.G. Bergman, Prentice-Hall Inc. 1949

Pascal has said that "*Nature consists in motion and complete rest in death".* You find complete discipline in the celestial (macroscopic) system or atomic (microscopic) system. There is a dearth of activity in the case of a biological system, whereas a physical system such as the revolution of electrons round the nucleus of an atom is something eternal. There is no much difference between Physics and Chemistry except that in the properties. Physical and chemical properties are closely related. If a chemist talks of a 'molecule', the physicist talks of an 'atom' and if the chemist talks of an atom, the physicist talks of 'electrons' and later on the 'quarks' and so on. Sir James Jeans has said that "*Life exists in the universe only because the carbon atom possesses some exceptional properties".* The difference between Physics and Chemistry is somethinglike the difference between Atomic Physics and Nuclear Physics, where in the former the unit of length is the Angstrom (10^{-10}m) whereas in the latter, the unit of length is the Fermi (10^{-15}m). This is just an indication of precision involved in measurements in both the subjects. Leave aside talking about the complicated measurements such as the Planck length ($1.62\text{x}10^{-35}$m) which is some 10^{-20} times the diameter of a proton and the Planck time ($5.39x10^{-44}$ second). We do not want to enter Quantum Gravity any way.

The Planck' constant, h and the Unknown Uncertainty

The famous physicist Werner Heisenberg has given a powerful principle known as the 'Principle of Uncertainty' according to which it is impossible to determine precisely and simultaneously the values of both the member of a pair of physical variables which describe the motion in an atomic system. Such pairs of variables are called as canonically conjugate variables. As an example, the position and momentum of an atomic particle such as an electron cannot be determined simultaneously to any desired degree of accuracy. Taking Δx as an uncertainty in determining the position and Δp as the uncertainty in determining the momentum at the same instant, then these quantities are related as

$$\Delta x \Delta \text{p} = \frac{\text{h}}{2\pi}$$

where h is the Planck's constant of action the value of which is $6.626\text{x}10^{-34}$ Js. If Δx is small, Δp will be large and vice versa. It means that if one quantity is measured accurately, the other quantity becomes less accurate. Thus any instrument cannot measure the quantities accurately than predicted by Heisenberg's uncertainty principle or indeterminacy. The same relation holds for the energy ΔE and time Δt related to any given event. That is,

$$\Delta \text{E}\, \Delta \text{t} = \frac{\text{h}}{2\pi}$$

This principle implies that in physical measurements, 'probability' takes the place of 'exactness' and as such phenomena which are impossible according to classical ideas may find a small but finite probability of occurrence.

We can apply this principle to human life as well. The human body as a whole is a huge macroscopic system built up with innumerable microscopic components made to work in unison in such a way that even any best fabricator on Earth cannot imagine to operate The uncertainty takes place almost daily and remains unknown. The minimum energy required to activate our human mind is just 10^{-11} Joule and the time required for this activation can be taken as the time required for a fast moving particle to pass through the nucleus of an atom which is 10^{-23} second. These are the uncertainties in the thoughts of the human mind. Thus the action of the mind is $(10^{-11})(10^{-23}) = 10^{-34}$ Js which is almost equal to the reduced Planck's constant $\frac{\text{h}}{2\pi} = 1.055\text{x}10^{-34}$ Js.

As Heisenberg says that when you do not know your position, you do not know your motion and when you know your motion, you do not know your position. This uncertainty can be applied for the time at which a man sleeps. If somebody says that he slept at 10 PM by looking at a watch just before sleeping. Well!When he has looked at the watch he was not asleep. Now, when he fell asleep, at what exact time he fell asleep is not known.

Here comes theUncertainty of Heisenberg. When he is asleep, he is not knowing the time and when he knew the time, he was not asleep. I think Heisenberg also did not think about this. In the modern advancement in medicine, some neurologist, by some test of his brain condition can find out the exact time of his sleep. The same is the case with a passenger in an air-conditioned coach with all windows closed. He is notknowing the speed of the train nor does he know the railway station for which when comes out, several places have been already covered. It is difficult to apply the principle in such macroscopic systems, but such uncertainties exist in all walks of life. If somebody says that a meeting will be held at 11 AM and invites people to attend. Now, apart from people coming earlier or late, there are uncertainties in the time shown by the clocks of people attending the meeting and also in the clock of the person who called for the meeting

Even the Earth is not a perfect clock. It slows down during its rotation. The discrepancies in astronomy and astrology are due to such uncertainties.

The Schrodinger Equation

Any system (macroscopic or microscopic) in the universe whether it is biological,

Physical or chemical or the like has certain mass 'm', potential energy,' V' and because of the dual nature of matter a certain wave function ψ is associated with it. In terms of the total energy 'E' the two equations in terms of space and time is given by Schrodinger. They are:

i) $\nabla^2\psi + \frac{8\pi^2}{h^2}m\,(E - V)\psi = 0$

ii) $\nabla^2\psi\frac{h^2}{8\pi^2 m} + \frac{\partial\psi}{\partial t}\frac{h}{2\pi i} - \nabla\psi = 0$

These equations are the basis of all knowledge of a quantum mechanical system and can be taken as universal. Only requirement is, give a proper meaning to the wave functionψ and solve the equation to further understand the mysteries of nature.

Character and Characteristic

Character can be shaped, but characteristic is either in-born (inherent) or

permanent. The characteristic of an atom is to remain neutral in the ground state. When you try to ionize the atom, you are trying to change its character, but by hook or crook, the atom will try to be normal and in the ground state. This is what is happening in 'Laser' and also in the gas discharge in a fluorescent tube.

*"You cannot make a 'Duck' look like a 'Swan' …*Author

See what Abraham Lincoln has said:*"Character is like a tree and reputation is its shadow. The shadow is what we think of the tree is the real thing"*

Universe has no beginning or end (An argument by author inviting comments from readers)

We start by a question:-

What is the origin of heat and light radiation?

The answer to this question is as old as gravitation in the universe. Everything that has mass and mass is inherent in all matter must experience gravitational action. Similarly the presence of mass in the universe is the origin and cause for gravity, heat and light quanta. According to electromagnetic theory, an accelerated charge must radiate energy and radiant energy from a charge is quantized. In the same manner, as per the mass-energy equivalence of Einstein, an accelerated mass must also radiate energy. The energy quanta (photons) and the gravity quanta (gravitons)co-exist in equilibrium in the universe. As moving mass is associated with these and when bodies are assumed to be at absolute rest, the forces of gravitation will be predominant and the heavenly bodies will fall and coalesce into a single body and lose tremendous energy by giving out radiation. This will happen when the gravitational interaction becomes 10^{40}times that of the electromagnetic radiation, whence the gravitational forces will behave as short- range forces. But, there is no chance for such a phenomenon to happen in the near future because bodies can never be at absolute rest according to Einstein. Thus when the electromagnetic radiation becomes the weakest, then there will be darkness everywhere and the loss of radiation will continue till the coalesced mass attains the temperature of absolute zero. Such 'Absoluteness' goes against the theory of relativity.

The Absoluteness, if we take as the end of the Universe, is a remote possibility. If there cannot be an end, there would not have been any beginning. From this point of view, 'age' of the universe, as such, is meaningless. Hence, one need not search for the origin of the universe. If we discard the age of the universe, there cannot have flow of time and the past and future have no meaning. There will always be the 'present'

Things unknown and do not want or care to be known

In the realm of Physics there are several instances where we come acrossequations or formulae the origin of which is worth knowing. For example, let us take the famous Einstein's Mass-Energy equation, $E = mc^2$. E is the symbol for a general form of energy in microphysics wherein the mass, m is taken to be a variable. An equation for energy E in the macrophysics takes the form $E = \frac{1}{2}mv^2$ where E is specifically the kinetic energy derived on the basis of Newton's laws keeping mass, m as constant. Now, start thinking philosophically. The concept of 'Energy' has been coined for the first time by Thomas Young in 1807 and the term 'Kinetic Energy' was introduced by William Thomson (Lord Kelvin) in 1856. It is interesting to know that the symbol 'c' for velocity of light was derived from the Latin word, *'celeritas'* meaning 'swiftness' or 'speed' and the symbol is exclusively reserved for it.

We came across the name of the famous scientist Lord Kelvin now. Well!, Kelvin is the name of a river on whose banks the University of Glasgow stands. Lord Kelvin, earlier known as William Thomson studied at Glasgow University and was appointed to the Chair of Natural Philosophy (Physics) at the University when he was only twenty two The name and fame of the scientist was so great that, in addition to several honors, names such as Lord Compass or Lord Cable were suggested. But the scientist chose the name Lord Kelvin showing affection to both the University of Glasgow and the river Kelvin flowing near it.It is really time consuming in dealing with the history and philosophy of Physics.

I once met my friend, Dr. Ganpatrao, a doctor of Medicine and practicing in the city of Mumbai, India and casually asked him as to why doctors measure the blood pressure of patients by tying the apparatus in their upper arm. He replied that it is convenient and it has been a practice for long and every doctor follows it. This is, however not a scientific answer. As a physicist, I kept on thinking and wanted to know the scientific reasonbehind it. Idea of simple Physics is applied here. 'Pressure' means 'Level' or 'Height'. If there is a difference in level or height, the pressure will be different and accordingly the upper arm is exactly in level with the heart of the patient and the reading has to be correct.

Rudiments of Veda and Vedic Science

The inauguration of the year of Vedic Science on 12 th January 1981, His Holiness Maharishi Mahesh Yogi with 1000 governors of the Age of Enlightenment attending the winter session of the World Government of the Age of Enlightenment at the Indian Express Building in New Delhi, India inaugurated 1981 as the year of Vedic Science.These celebrations marked the first day of the seventh year of the Age of Enlightenment, which Maharishi had earlier inaugurated on 12 th January 1975. In order to honor Maharishi's achievement, in developing Vedic Science which is the most profound synthesis of eternal Veda and modern science, an article

Fig.8His Holiness MaharishiMahesh Yogi

was presented by Dr. Geoffrey Clements, the Vice-Chancellor and professor of Physics at Maharishi European Research University, Switzerland highlighting the application of modern Physics to Vedic Science. Accordingly, it is the Schrodinger equation which is the basis of all knowledge of a quantum mechanical system, represented by

$H\psi = E\psi$

where H is the Hamiltonian, the operator corresponding to the total energy E of the system and ψ represents the states in which the system can exist. These states are eternal and non-changing and are called as the 'Eigen functions' of the Hamiltonian E represents the energy levels of the system when it is in the states represented by the various Eigen functions. These energy levels

are called 'Eigen values'. Such an equation is called an Eigen value equation for the operator. The complete set of these Eigen functions provides a very natural basis in terms of which any physical state of the system can be represented. The Hamiltonian contains within its structure the entire value of all different states of a system. The Hamiltonian for the particular system is rather like the '*rishi'* while the *'devata'* and *'chandas'* are represented by the energy eigenvalue and the Eigen function of a particular state, the degree of energy and the rhythmical patterns of its flow

The seat of Vedic Science lies in the relationship between the two constituents of the Veda-Mantra and Brahmana. Vedic Science is the science which constitutes the source of all life, pure knowledge, the mantras of the Veda and what emerges from it, organizing power, the Brahmanas.

The abstract universal Hamiltonian not restricted to a particular system, then assumes the value of *'Brahman'* the totality of pure consciousness, from which all specific values can be derived. In Vedic Science, the key to all problems is contained in one simple, practical philosophy of life, if the awareness is completely in tune with the totality of natural law then all thinking and action are spontaneously in accordance with the law of nature. Problems, which are caused by the inability to act in accordance with the natural law, are automatically dissolved and life is lived on the plane of fulfillment.

An understanding of the mechanics of this process can be gained by looking at the equivalent situation in Quantum Mechanics. Whereas the Hamiltonian provides a description of the totality of a quantum system, the values of specific aspects of the system, such as its momentum, or the position of its various components, are provided by other operators – one for each variable that can be measured. Thus, there is a momentumoperator, a position operator and so on. A comparison between the principles of Vedic Science and those of Quantum Field Theory reveals a striking similarity, reflecting a fundamental unity in their structure, some of the features of which as described above.

Reconstruction Theorem: There is a 'Reconstruction Theorem' according to which all configurations of matter and energy can be established from the expectation values of the possible products of the field operators of a vacuum state. For a clear understanding, various operators should commute with the Hamiltonian.The Maharishi Effect: The qualities of pure consciousness can become lively in society when even a small fraction of society regularly experience pure consciousness. The group practice of Transcendental Meditation Siddhi program by a group of individuals equal in size to just the square root of one per cent of a population has been seen to produce coherence and harmony in the entire population. This resembles the super-radiance effect of lasers and hence called Super Radiance Effect. The third eye of Lord Shiva is a source of powerful laser of several kilowatt power creating super-radiance in the three worlds.

III. Conclusion

I hope you are still in your easy arm-chair and enjoyed the reading of my paper. I have philosophically touched almost all general aspects of the subject. In spite of maintaining brevity, the paper has run into more than 20 pages. I should thank you for your patient reading.

Conclusively, being aged 77, I would like to give you a piece of advice to the young readers and talk about two very important words which have application in all walks of life. One of the words is "Action" and as a physicist, you expect the next word to be "Reaction". But, No!It is "Inaction". Inaction means '*Not being active'*. Very much long before Newton, Lord Krishna in the Bhagavad Gita mentioned Inaction to Arjuna. It is like positive and negative. As in algebra, mixing of positive with negative nullifies the effect and brings out negative, mixing of positive and positive, adds to the effect and brings out more positive and finally mixing of negative with negative, completely destroys the inaction and brings out positive effects. Thus Lord Krishna speaks: Oh! Arjuna, the need of the hour is Action and not Inaction. Put Action on Inaction and do not put Inaction on Action or rather put Action on Action and make it vigorous. Thus, the readers should follow Lord Krishna who was both a mathematician and a physicist.

REFERENCES

Most of the references are given at the context and at appropriate places and hence not given separately

Author's Profile

***Dr.(Prof.) V.C.A. Nair** (b. 15th Aug. 1939) is an Educational Physicist, Counselor, Research Guide and Consultant. He did his Masters from Mumbai University, India and Ph.D. from JJT University, Rajasthan also in India. He has to his credit over 4 decades of teaching Applied Physics in eminent Polytechnics in Mumbai and having taught nearly 16,000 students since 1965. He has published a number of research papers in Physics and is a Life Member of Indian Society for Technical Education which is an all India body. He had been to USA a number of times and visited eminent Universities such as Stanford, Harvard, MIT, University of California both at Berkeley and Los Angeles and University of San Francisco. At present Dr. Nair is a Research Guide at JJT University, Rajasthan, India. *nairvca39@gmail.com