

PHYSICAL TIME

G.H.KESWANI

Time travels in diverse paces with diverse persons.
I'll tell you who time ambles withal,
Who time trots withal, who time gallops withal,
And who stands still withal.

Shakespeare, *As You Like it* (III. ii.328)

Liebnitz¹ said that time is not itself a physical entity, and it has no existence apart from the things it relates.

The best definition of time the author knows is the one given by Einstein in his 1905 – paper as : “the position of the small hand of my watch”.

Time is not something existing everywhere, flowing (into what?) irreversibly, such as our physiological awareness of the passage of time, which is probably a learned experience.

It is simply a physical, that is measurable, expression of the rhythm within every material body or radiation. Immanuel Kant said it is like counting, as in arithmetic.

There are numerous repetitive processes, such as, spontaneous decay of atoms, vibrations (e.g., of cesium or quartz), an oscillating spiral spring with an escapement as in Einstein's watch, pendulum clocks worked by gravity, a tuning fork, frictionless rotating objects like the earth, the earth in orbital motion, pulsating pulsars, the motion of binary stars, light reflected between parallel mirrors, the frequency of a laser beam, and so on.

It is experimentally established but it is a strange fact that these disparate and independent recorders, or, more correctly, time-makers, are all concordant. Some are more accurate or stable, but their physics is, generally speaking well- known. Indeed, it is possible to assign the degree of accuracy of the time-makers, using experimental and statistical methods, down to 10^{-16} sec.

One is thus forced to grant that time has an objective existence, but it is there, where matter and radiation fields are. It is an accompaniment of physically existential “things”. Does time exist in some other manner in all space? It appears to me that it does, implicitly, because, as I showed in my reflections on space, its two physical properties, viz., permittivity (ϵ_0) and permeability (μ_0) related to electrical and magnetic properties, are so to speak, genetically connected to the velocity of light(c), thus:

$1/c^2$ (T^2 / L^2 dimensionally) is connected germinally to $\mu_0\epsilon_0$ (T^2 / L^2). There is an elemental web of distance (L) and (T), in space.

Experimental evidence shows conclusively that when a clock is set into motion relative to the earth it goes slower. I have discussed why it does so. Simply because motion given to anybody means infusion of energy into the body and its inertial mass increases. Clock has history of its rhythm locked up within it cummulatively. Experiments show that the clocks have their original rhythm restored when brought to their earlier state of rest. We are thus led to believe (it is highly probable) that all the matter on earth has the same history from birth. That points to the birth of time itself when first creation took place! When probably times stood still!!

¹ T.W. Arthur, Leibnitz's Theory of Time, in "The Natural Philosophy of Time", D. Reidel. Pub. Co., 1985, p.263.