

# The Space-Time Universe

*Prof. K.V.K. Nehru, Ph.D.*

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## Part 1

The last years of Einstein were spent in pursuing his cherished dream of evolving a general theory of the universe. He never succeeded. Nor anyone else did, so far. The body of knowledge which we call physical science is at present only a loose collection of numerous different theories, each constructed to explain a particular domain of facts and not applicable to another set of facts. There has not been a general theory covering all physical phenomena, from the microscopic to the macroscopic.

Indeed the experts in the field—those who studied not only in depth but also in breadth—are beginning to realize that modern science reached the end of a blind alley (the nature of this blind alley will be explained later). The proliferation of concepts like the neutron stars, the black holes, the gravitational waves, the vacuum interactions and quarks—Dr. Philips' *ESP of Quarks* is not the final word on *Occult Chemistry* and we must always have an open mind—are the results of frantic attempts to save the sinking boat of modern science. Unfortunately, it is not recognized that all of these are pure speculations and are never observed.

The object of this article is to introduce to the general theory of the universe, now available by the researches of Dewey B. Larson and called the *Reciprocal System of theory*, to outline its remarkable accomplishments and also to show how closely it resembles the occult view delineated in *The Secret Doctrine*. But first it is necessary to take a look at the pandemonium in modern science and to realize that all is not well with it.

### Failures of Current Science

We will briefly trace some of the important short-comings of the prevalent world-view of the modern science-which, of course, does not mean to deny the fact of its impressive achievements.

1. *The nuclear atom and the electronic structure of matter.* From the fact that in certain atomic reactions, like radioactivity, beta rays (electrons) were found among the products, it is concluded that electrons are constituents of atoms. But the equally probable alternative of the electrons coming into existence *during* the process is overlooked. For example, in atomic disintegration photons are also found in the products. However, the previous logic is not applied here: the photons are not taken to be parts of the atoms in the manner in which the electrons are supposed to be.

The postulated electron in the atom is then imputed with strange characteristics as compared to a free electron, such as the lack of definite location, jumping from one orbit to another without traversing the intervening space, etc.

As the atom itself is found to be electrically neutral, the negative charge of the electron is assumed to be neutralized by an equal amount of positive charge in the nucleus. But in actuality a negative and a positive charge brought into mutual contact do not merely neutralize each other: they *destroy* each

other, as is amply demonstrated (by the same science) in the annihilation reactions between matter and anti-matter!

Further, the assumed positive charges of the protons in the nucleus are confined to extremely small dimensions, of the order of  $10^{-13}$  cm. Therefore, the force of repulsion among these positive charges is tremendously large (due to the inverse square variation with distance) and the nucleus must come to pieces. To counteract this, therefore, it is assumed *ad hoc* that there is an attracting “nuclear force” to hold the nucleus together. Since there is absolutely no observation to support for the existence of the hypothetical nuclear force, it is further assumed that this force exists only in the nucleus.

Another fly in the sore is the case of the neutron, which is also supposed to be a constituent part of the nucleus. It is a known fact that the free neutron is not a stable particle and spontaneously disintegrates with a half-life of about 13 minutes. However, since the atom itself is stable, the scientists are obliged to attribute strange characteristics to the neutron as part of an atom.

It is assumed that the recalcitrant nature of the inert gases results from the occurrence of 8 electrons in the outer orbit, which is thought to be a stable configuration. In fact, the covalent bond, such as in CuCl, is thought to be the result of the respective atoms assuming this supposedly stable configuration of 8 electrons in their outermost orbits. If this is true, it is not clear why, for example, an atom like that of chlorine, having 7 electrons in its outer orbit, does not convert to a stable structure and turn into “inert chlorine,” by absorbing an electron when placed in an environment of negative charges.

The view that electric current consists of a flow of negative charges cannot be true since the *observed* behavior of the flow of static negative charges is not the same as that of an electric current. For example, the current-carrying conductor is electrostatically neutral, which is not true in the case of accumulated static electric charges.

The property that distinguishes matter from antimatter is taken to be the charge conjugation. For example, the particle conjugated to the electron with its negative electric charge is positron, which is an electron with positive electric charge. On this basis, it is hard to see what are the conjugate antiparticles of electrically neutral particles, like neutrons. Indeed, it is contended that this particle itself is its conjugate.

Then there is the proliferation of the elementary particles. Their number grew from the original three of electron, proton and neutron to more than a hundred now. It is evident that they can no more be treated as elementary. In addition, there is no explanation of the electric charge itself. It is simply taken to be one more of the given items of Nature, as irreducible and as incomprehensible as gravity. We must realize that having lived with these irreducibles, the given items of physical knowledge, for generations has lulled us into the false belief that they do not require explanation or that no explanation is ever possible.

The final blow, however, to the concept of the fundamental role of matter comes from the interconvertibility of matter and radiation. There should, therefore, be an entity more fundamental to both—the common denominator, as it were.

2. *Relativity, gravitation and the macrocosmos.* The mathematics of the Relativity theory, like the Lorenz transformations, the Riemannian geometry, etc., far antedate the Relativity theory. While its mathematics proved to be correct, the Relativity theory is not internally consistent in its conceptual foundations. One of these logical inconsistencies is the clock paradox. According to Relativity a moving clock runs slow. But since (again according to Relativity), motion is relative, if you consider the case of two clocks in relative motion, each clock runs slower than the other. This paradox has never

been resolved, except by resorting to arguments which automatically confute Einstein's views.

Einstein's dictum that  $c$ , the velocity of light is the highest speed that is possible in the universe has no real observational support. It may be recalled that the experimental situation which led him to reach this conclusion is the observed decrease in the acceleration of electrically accelerated charged particles at high speeds. Since from Newton's law,  $\text{Force} = \text{mass} \times \text{acceleration}$ , Einstein concluded that for this to happen, the mass must increase with velocity. His formula predicts, in fact, that the mass increases and approaches infinity as its speed approaches  $c$ . But the theory is silent as to any increase in the gravitation pertinent to this increasing mass.

Obviously, Einstein overlooked other alternatives, equally valid mathematically, which explain the decrease in acceleration with increase in speed. One alternative, for example, is that the effect of the apparently constant electric charge that is forcing the acceleration may decrease with speed. The equation,  $\text{Force} = \text{mass} \times \text{acceleration}$ , still holds good. If this is true, as Larson points out, there will never be infinite mass and consequently there will not be any upper limit to the speed attainable to the mass. The speed, then, is limited only by the capabilities of the process. Indeed there is visible evidence-like the quasar red shifts-that point to these ultralimit speeds; but unfortunately, the evidence is being misinterpreted because of the unquestioned servitude to Einstein's authority.

Einstein's concepts in the General Relativity too are equally questionable. Larson points out: "gravitational energy is purely an energy of position. *But energy of position in space cannot be propagated in space.*"<sup>1</sup> Thus gravitation can never be propagated. In fact, astronomers disregard Einstein here and make their calculations as though gravitational action is instantaneous in order to arrive at correct results.

In short, one finds that there has been no understanding of many important cosmological phenomena like gravity or its relation to nuclear and electromagnetic forces, quasars, pulsars, origin of cosmic waves, the 2.7 K background radiation, the "constants" of nature, etc. except with the use of ad hoc hypotheses. That there has not been a general theory hitherto explaining all the realms of the physical universe is no surprise since the individual theories of modern science each applicable to only a limited range of physical phenomena, themselves are either unsound or not self-consistent or are replete with hypotheses bolstered up for the occasion.

## Part 2

We have seen in the previous article that the present state of the theory in physical sciences requires a re-examination of the validity of the most fundamental of the scientific concepts. This is the task to which Dewey Larson, an Engineer-scientist from Oregon, U.S.A., has addressed himself to. To be sure, this is an enterprise of immense arduousness since it requires an open mind, which means the ability of the mind to step out of the inveterate patterns of thinking—to do this without transgressing rationality. His researches reveal to us a most unexpectedly simple theory that encompasses all physical phenomena of the universe from atomic to galactic magnitudes. He shows in his work how his predictions completely agree with the present observational knowledge in all different domains, answers the long-standing scientific puzzles, and take us into regions as yet unexplored by current science. His theory explains the origin of gravity and the nature of radiation, the galactic recession, the atomic structure, cohesion, electricity, stellar evolution, radioactivity and cosmic rays among other things. What is more striking is an extraordinary propinquity of the theory to the viewpoints of

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1 Larson, Dewey B., *Beyond Newton, An Explanation of Gravitation*, p. 23

occultism.

A brief survey of the development of his “Reciprocal System of theory,” as Larson calls it, is presented below with a view to appraise its comprehensive nature and to show how it throws fresh light on *Occult Chemistry*.

## Space and Time

The author points out that space and time are the most fundamental concepts, the correct understanding of whose nature and characteristics should precede any theoretical development. Basing solely on what is revealed in direct observation—and not on any interpretation—the following can be said of them as being true in the local environment:

*Space* is three-dimensional, homogeneous, and isotropic.

*Time* progresses uniformly and (perhaps only locally) unidirectionally.

The *scalar relation* between space and time is reciprocal (that is, speed = space / time), and this relation constitutes *motion*.<sup>2</sup>

He takes pains to clarify the meaning of “dimension” and that time has no dimension in space. “...time enters into the mathematics of the physical processes... as a scalar quantity. From this the physicists have jumped to the conclusion that time is one-dimensional. The point that the physicists have overlooked is that ‘direction’ in the context of physical processes which are represented by vectorial equations in present day physics always means ‘direction in space’.”<sup>3</sup> Then he reminds us that, “...no matter how many dimensions it may have, time has no direction in space... There is nothing in the role which time plays in the equations of motion to indicate specifically that time has more than one dimension. But a careful consideration... does not show that the present day assumption that we know time to be one-dimensional is completely unfounded...”<sup>4</sup>

Then he makes the important assumption that the relation which we find in the region accessible to observation also holds good in the inaccessible region of the universe. The first, and the most important, conclusion that can be drawn now from the extrapolated relation is that, “...inasmuch as this specifies the existence of a general reciprocal relation between space and time, there must be complete scalar symmetry between these two entities.”<sup>5</sup> Hence he calls his theory the *Reciprocal System*. Basing on further observational trends, on the existence of discrete quanta, two postulates are arrived at, from which and which alone the entire theory is developed:

*First Fundamental Postulate:* The physical universe is composed entirely of one component, motion, existing in three dimensions, in discrete units, and with two reciprocal aspects, space and time. (Cf *The Secret Doctrine*, ii, p. 260; *The Mahatma Letters*, p. 341.)

*Second Fundamental Postulate:* The physical universe conforms to the relations of ordinary commutative mathematics, its primary magnitudes are absolute and its geometry is Euclidean.<sup>6</sup>

The validity of these postulates is established by comparing the logical inferences drawn from them

<sup>2</sup> Larson, Dewey B., *New Light on Space and Time*, page 35.

<sup>3</sup> *ibid.*, page 33.

<sup>4</sup> *ibid.*, page 35.

<sup>5</sup> *ibid.*, page 61.

<sup>6</sup> Larson, Dewey B., *Nothing But Motion*, page 30.

with actual facts observed in nature. The domain of the predictions ranges from the heart of the atom to the farthest reaches of the universe and not one single case of discrepancy with facts seems to be present while there is much light thrown on phenomena that have so far not yielded to the present day science.

In view of the symmetry between space and time, it turns out that any property of one of these is also the property of the other. More specifically, this leads us to the conclusions that time is also three-dimensional and that space too progresses like time.

It must again be pointed out that the dimensions of time are properties of time and do not have anything space-like. Though the three-dimensionality of time may look strange, nothing in our experience contravenes this possibility, even though it may not point out to this possibility. In fact, C.W. Leadbeater speaks of three-dimensional time in his book *The Monad*. More bizarre may look the concept of progression of space similar to the observed progression of time. But the fact is that we have actual observational evidence of the progression of space in the recession of the distant galaxies. Further, "...when we analyze the motion of the distant galaxies, this... turns out to be scalar... the motion actually has no specific direction. It is simply a scalar motion, outward from all other galaxies."<sup>7</sup>

It is important to clearly understand the nature of the scalar motion. It is either outward from *all* other locations, or inward toward *all* other locations. A scalar motion has no inherent direction, unlike the motions of our everyday experience. As an example, consider an expanding balloon. The different points on the surface of such a balloon move outward from each other. The movement of any particular point, as far as the balloon itself is concerned, has no inherent direction—its motion is scalar; simply away from *all* other points. The direction is acquired only if the balloon is related to a stationary reference frame like the room in which it is situated.

In the light of the above we must revise our view of 'running of time' as a unidirectional flow. It is, rather, a scalar progression, that is, "...each location *in time* is continually moving outward away from all other locations *in time*."<sup>8</sup>

Now, if space also is progressing scalarly, that is, expanding outward incessantly, why we are not aware of it just as we are cognizant of the progression of time? The reason is that in our environment this outward progression of space is counterbalanced by a scalar inward motion engendered by matter and we seem to see a stationary space.

This concept thus leads us to the view that both space and time progress, expand continually toward infinity and there is no progression of time divorced from an equal progression of space. However, since an increase in space is equivalent to a decrease in time and vice versa, the expansion of space is counterbalanced by the expansion of time. Thus space-time prior to any physical manifestation is eternal motion. This appears as expanding toward infinity when regarded from the standpoint of our human mind—which looks at the space progression in artificial isolation from the concomitant progression in time. It is this anthropocentric alienation of space and time that is responsible for a lopsided appraisal of the universe, that has led science astray, to its present predicament. Larson demonstrates how the emancipation from this one-sided view of the universe beautifully simplifies the physical theory—most of which is unnecessarily complicated at the present moment—and makes possible extraordinary insights. It is not known history to us that all the serious stumbling-blocks that beset the progress either in philosophy or in science have been the results of treating—consciously or

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7 *New Light on Space and Time*, *op. cit.*, page 62.

8 *ibid.*, page 82.

unconsciously—our earth, our viewpoint or our mind as the most fundamental!

It may also be noted at this juncture that in a way it is not correct to envision space and time as the primordial *Duality*; for there is no space progression without accompanying time progression and vice versa, and no space and time *per se* without being related as *motion*. There is only a primordial *Trinity*. This is what Pythagoras had always upheld.

In order to allay the doubts of the conventional thinker regarding the possibility of validity of the above postulates it may be necessary once again to point out that by them Larson not only provides explanations of qualitative nature but also arrives at the actual values of the physical properties of matter and the numerical magnitudes of natural constants like the gravitational constant, molar gas constant, or Planck's constant, etc. from theory alone.

## Radiation

An important consequence of the progression of space-time is that unit speed, one unit of space per unit of time, is the condition of rest in the physical universe. Thus, unit speed and not zero is the datum level from which all physical manifestation starts. In other words, unity is Nature's zero-point. This, I think, is a most remarkable discovery.

Here we should be careful not to fall prey to, what A.N. Whitehead used to call, "the fallacy of simple location," which is to imagine, as the prevalent world view of science does, that material particles are situated in (or superadded to) a setting of space and time; as though matter is embedded in a receptacle of four-dimensional space-time. Larson points out that space and time "...cannot constitute a setting or background for motion, because motion is not a background for itself. Everywhere in a universe of motion, space and time are the two reciprocal aspects of that motion, and they have no other significance anywhere."<sup>9</sup> This is where previous thinkers like Descartes, Eddington and Hobbes, who endeavored to develop a general theory on the basis of the motion concept have failed by not recognizing that in a universe of motion, space and time cannot have independent definitions.

Aside from this ceaseless progression, the ever-present motion, a universe in the neutral condition would be one vast domain of featureless uniformity in which nothing ever happens and nothing could happen.<sup>10</sup> This gives us a fresh insight as to how we should regard the condition of Pralaya. In order that there may be *events or phenomena* in the universe, there must be deviations from unity; a *displacement* of motion from the unit level. Such a displacement is possible by the periodic directional reversal of the prevenient unidirectional unit motion in one of the three dimensions. When this happens, this periodic motion becomes detached from the ever-present background progression in that particular dimension; it now becomes a *physical entity*, the first manifestation. Moreover since this oscillation has no other independent motion, it gets carried away by the background motion at unit speed in either of the remaining two dimensions.

Larson identifies these oscillating units as the *photons* of electromagnetic radiation (the basic particles of light), with the space-time ratio of the oscillation (the number of space unit reversals per one time unit) as the *frequency* of the radiation and the unit velocity of the progression as the *velocity of light*.

Thus, according to the theory, light (radiation) is the first "thing" that emerges out of the primordial perfect uniformity, which is nonentity from our standpoint. Are not these vibrating units identical with the SOUND mentioned as the starting point of creation? *The Secret Doctrine* unequivocally portrays

<sup>9</sup> Larson, Dewey B., *Quasars and Pulsars*, page 11.

<sup>10</sup> Cf. *The Mahatma Letters*, page 135, 246 & 341.

light as the First Born.<sup>11</sup>

One of the outstanding achievements of the Reciprocal System is the complete and logical explanation of the dual particle/wave nature of radiation that is so intriguing. “The photon acts as a particle in emission and absorption because it is a single independent unit; it travels as a wave because the combination of a linear oscillation and a translatory movement in a perpendicular direction produces a wave-like motion.”<sup>12</sup>

Outstanding achievement number two of the theory is the explanation of the transmission of radiant energy without any medium which remained without explanation hitherto. “The answer here is that radiation is not transmitted at all. The photon remains *permanently* in the space-time location in which it originates, but space-time itself progresses, carrying the photon with it, and the photon is therefore able to act on any object which is *not* carried along by the progression and which are therefore encountered in route.”<sup>13</sup>

## Part 3

In the previous articles of this series, we have seen how the anthropocentric treatment of space and time has been a severe obstacle in the progress of (modern) science. We have then traced the new light on space and time brought out by Larson and have come as far as the genesis of light (radiation), as the first-born. We will continue with the development of the Reciprocal System and see how the rest of the physical manifestation unfolds.

### Matter and Gravitation

We have seen that radiation arises out of the displacement of the basic motion from the one-to-one space/time ratio (*i.e.*, unit speed) which is the neutral condition prior to physical manifestation. This displacement is a linear type. Now an examination of the properties of three-dimensional space reveals that this is not the only type of displacement of space-time that is possible, even though this is the only one that can originate first from the neutral condition of space-time. Another possibility is rotation. Thus we find that the second “thing” manifested in the physical universe—the first “thing” manifested being the photon, as we noted earlier—is a rotating unit: in fact, a rotating photon.

Scalar rotation differs from the familiar vector rotation of our ordinary experience in an important aspect. Scalar rotation, it is found, involves additionally a *scalar*, unidirectional translatory motion. (One can picture this as the forward movement of a rolling wheel.) In fact, the Theory shows how these rotating units reverse the motion pattern of free space (namely, its scalar outward progression) and start moving in the *inward* scalar direction: which means toward all other locations in space-time.

Larson identifies these rotating photons as *atoms*, atoms collectively as *matter*, and their inherent scalar inward motion as *gravity*.

*The Secret Doctrine* talks of “elemental vortices inaugurated by the Universal Mind.”<sup>14</sup> The material atoms are photons rotating in space—the photons themselves being linear vibratory time units. Thus it is literally true that matter is congealed light. It is this aspect of the Reciprocal System we will have occasion to refer to when we later consider the structures of atoms and Anu as given out in the *Occult*

11 Blavatsky, Helena P., *The Secret Doctrine*, ii, pages 303-304.

12 *New Light on Space and Time*, *op. cit.*, page 86.

13 *ibid.*, page 87.

14 *The Secret Doctrine*, ii, *op. cit.*, page 348.

*Chemistry* by C.W. Leadbeater and Annie Besant as a result of their clairvoyant researches.

The explanation of gravity is outstanding achievement number three of the Theory. “The gravitational motion of each mass carries the mass inward in space-time. Since all other masses are similarly moving inward in space-time, each mass moves towards all other masses. Such a motion needs no medium, nor does it require a finite time for propagation; the inward motion is an inherent property of the atoms and there is no propagation.”<sup>15</sup>

Further, we can understand why our experience of time is so different from our experience of space. Our consciousness is associated with material bodies and the Reciprocal System shows that atoms of matter are time-structures (net displacement in time). Even though “...space actually progresses outward at the same rate as time, ...the outward motion which the space progression imparts to objects existing in this local environment is more than counterbalanced by the inward movement due to gravitation, and... we seem to see a stationary space.”<sup>16</sup> On the other hand, the progression of time is not abated since matter itself is a time-structure. Thus we experience in one second the equivalent of 300 million meters of space!

The concept of physical entities as compound motions is one of the greatest contributions which the Reciprocal System makes toward the clarification of the physical picture. This must be obvious to anyone who is familiar with the tenets of occult science. We can turn to the *Mahatma Letters* or *The Secret Doctrine* for bountiful quotations.<sup>17,18</sup>

The current scientific view that the atom is a composite structure, built up of smaller units, stems from the impression that if we can get particles out of an atom—as in radioactivity, for example—then there must be particles in atoms. Once parts of an atom in the above sense are posited, it naturally becomes necessary to conjure up forces to hold them together, and Larson rightly reminds us that “...no clue has ever been discovered as to the nature and origin of the force that holds the ‘parts’ of the atom together.”<sup>19</sup>

The outstanding achievement number four of the Reciprocal System is to explain how the parts of the atom hold together. “There is nothing to explain, because the atom has no separate parts. It is one integral unit, and the special and distinctive characteristics of each kind of atom are not due to the way in which separate ‘parts’ are put together, but are due to the nature and magnitude of the several distinct *motions* of which each atom is composed.”<sup>20</sup> The original meaning of “atom” as  $\mu$  is justified, after all.

The two opposite motions, the ever-present outward scalar progression of space-time and the inward scalar progression that is gravity, govern the course of the physical phenomena throughout the universe. Since the effect of gravitation diminishes with distance while the background outward space-time progression is constant at unit speed, as it originates everywhere, we find that up to a certain distance—which Larson calls the gravitational limit—from a gravitating material aggregate, like a galaxy, the net motion is inward. Beyond the gravitational limit, the space-time progression becomes greater than gravity and the net motion is outward. This manifests to us as the recession of the distant galaxies from each other, and gives the linear relationship between the speed of recession and the distance, known as the Hubble’s Law. There is absolutely no need to resort to an *ad hoc* hypothesis like the one popular with astronomers that the universe started from a Big Bang. The logical explanation of the galactic

15 *New Light on Space and Time*, *op. cit.*, page 91.

16 *ibid.*, page 91.

17 *The Mahatma Letters*, *op. cit.*, pages 136, 156, 163.

18 *The Secret Doctrine*, ii, *op. cit.*, pages 236-7, 241, 328.

19 *New Light on Space and Time*, *op. cit.*, page 96.

20 *ibid.*, page 99.



recession can be claimed as the outstanding achievement number five of the Reciprocal System.

The new look at gravity at once clarifies a puzzle about its nature which has, so far, not been explained by science—that it cannot be screened off, unlike other forces like electricity or magnetism. The explanation is that gravitational motion is not an interaction between one mass and another; it is the inherent motion of the individual atom (towards all other space-time units) and there is nothing that is propagated that could be screened off.

At this juncture, it may be of interest to see how the mass energy equation of Einstein arises. In the Reciprocal System, mass (inertia) is three-dimensional inverse speed while momentum and energy are respectively two and one-dimensional inverse speeds. It is already pointed out that  $c$ , the speed of light, has been identified as the natural unit of speed in the Reciprocal System. As such, one natural unit of inverse speed becomes  $1/c$  in the one-dimensional case, and  $1/c^3$  in the three-dimensional case. Thus,  $m$  units of mass and  $E$  units of energy, when expressed in the natural units, are respectively  $m / (1/c^2)$  and  $E / (1/c)$ . We find that quantities expressed in the natural units can be equated directly and that the “constants of nature”—like, for example, the Gravitational Constant or Planck’s Constant—are actually conversion coefficients whose numerical magnitudes are the result of choosing conventional units in an arbitrary manner. Thus we find that  $E / (1/c) = m / (1/c^3)$  or  $E = mc^2$ .

Another remarkable insight the Reciprocal System gives into the nature of gravity, which no scientist hitherto has ever suspected, is that gravitation does not always manifest as attraction; it also manifests as repulsion under certain circumstances! No doubt, students of occult literature, however, do find this intriguing concept enunciated at more than one place in *The Secret Doctrine*.<sup>21,22</sup>

According to the discrete unit postulate, less than one (natural) unit of space does not exist. However, in view of the general reciprocal relation between space and time, an increase of time, say  $t$  natural units is equivalent to a decrease of space, of  $1/t$  natural units. Consequently, we note within unit space, even though the space is constant at unit value, there is a progression of *equivalent space*. But the magnitude of this equivalent progression is a continuous decrease (*i.e.*,  $1/t$  decreases as  $t$  increases), which means that the progression is inward, in contradistinction to its outward progression in the region outside unit space. Since gravitation is a scalar motion always in opposition to the space-time progression, we find its scalar direction inside the unit space is outward. This manifests to us as a repulsion. In fact, the cohesion between atoms in the solid state is the result of the equilibrium between the inward progression of space-time and this outward motion of gravitation in the region inside unit space. This fact can account for all the types of atomic bonding. There is no necessity to arbitrarily resort to an assortment of explanations like the covalent bond, the ionic bond, the metallic bond, and the like. Larson demonstrates the truth of the underlying theory by calculating solely from it the values of a cohort of properties as inter-atomic distances, density, the compressibility coefficient, specific heat, the melting point, etc. of thousands of elements and compounds and showing their close agreement with the experimental values.

According to the Reciprocal System, the liquid state of matter is reached when atomic cohesion is overcome in one of the dimensions by thermal motion, and the gaseous state is the result of overcoming cohesion in all three dimensions. Thus, the *state* of matter (solid, liquid, or gaseous) is shown to be the result of the state of the individual atom (or unit). Experiments on the melting point of solutions amply support this. This is an insight of great significance from the occultist’s point of view. The liquid state, for example, is regarded by modern science as a characteristic of the aggregate and not of the

21 *The Secret Doctrine*, ii, *op. cit.*, pages 220-1, 238, 328.

22 *The Mahatma Letters*, *op. cit.*, page 160.

individual unit. In such a view, therefore, to speak of a “liquid molecule,” for example, is absolutely meaningless, since liquid state is regarded as the lack of long-range order in the arrangement of the individual molecules, and obviously order, or lack of it, refers to the relative arrangement of the individuals and is a group property and does not apply to a single unit by itself. However, from a study of the work of Leadbeater and Annie Besant on Occult Chemistry, we do get the impression that the change of state of matter is marked by the change in the condition of the *individual unit*.<sup>23</sup> The elucidation of the physical states of matter can be classed as outstanding achievement number six of the Reciprocal System.

Examination of the possibilities of the rotational motion that constitutes the atom, reveals the genesis of the Periodic Table of Elements on the basis of rotation in three dimensions. The Reciprocal System further shows that there is not only a lower limit (the positive zero) to this rotational displacement (namely, one unit) but there is an upper limit (the negative zero) too, because of the reciprocal symmetry between space and time. Thus, if the atomic rotation reaches this upper limit, the motion as rotational displacement is terminated and reverts to an equivalent amount of linear displacement (*i.e.*, radiation). This is known to us as the phenomenon of *radioactivity*. As radioactivity is the result of reaching the negative zero level (as against the familiar positive zero level) the space-time relations are inverted. The order of the radioactive disintegration of the individual atoms is based on the proximity in time (unlike in the ordinary explosion where the action spreads on the basis of proximity in space). This shows up as random disintegration in space. Further, while in the familiar explosion in space the action spreads at a high speed, in radioactive disintegration, the action spreads at a high inverse speed, that is, slowly! This results in the long decay life (running into millions of years in some cases) of the radioactive elements.

## Electricity and Magnetism

Since the Reciprocal System asserts that *motion is the common denominator of the physical universe* (cf. ML, pages 135-7, 155, 163), a question like “what is electricity?” does not arise. Everything in the physical universe is a form of motion; it only is necessary to see what type of motion is electricity. So far, we have considered linear translation, linear vibration and rotation. The next logical possibility is rotational vibration. Indeed, the theoretical development of the Reciprocal System shows that electricity and magnetism (or more technically, the electric and the magnetic charges) are one-dimensional and two-dimensional rotational vibrations, respectively (SD, page 241, 286; ML, pages 155-6). All the characteristics of electrical and magnetic phenomena can be deduced from this basis, including the derivation of the actual values of the material properties like electrical resistivity, susceptibility, permeability, and a host of others.

Incidentally, it will be found that electric charges are distinct from electric current. The latter comprises of the movement of *uncharged* electrons. An interesting feature of electrons are that they move through matter, not through the interstices. This is in view of the fact that the (uncharged) electron is effectively a rotating unit of space. Since the relation of space to space is not motion, an electron, when not carrying the electric charge, cannot move through empty space. On the other hand, matter is a time structure and since the relation of space to time is motion, electrons can move through matter. We will later again have occasion to refer to this phenomenon, in connection with the occult observations of *Koilon*.

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<sup>23</sup> Leadbeater, C. W. and Besant, Annie, *Occult Chemistry*, Theosophical Publishing House, India; the section on Catalysis and Crystallization.

The explanation of the origin and nature of electricity and magnetism is the outstanding achievement number seven of the Theory.

In a subsequent article we will endeavor to sketch the extraordinary truths brought to light by the Reciprocal System concerning the universe at large—truths which have not been suspected to exist.

## Part 4

In the previous three articles of this series, we have firstly shown how the concept of the universe as consisting of units of matter contained in a framework provided by three-dimensional space and one-dimensional time lead theoretical physics into its present predicament. We have then traced the development of the first general physical theory, called the *Reciprocal System*, and shown that every aspect of the physical universe can be derived, without any ad hoc assumptions from occasion to occasion, from its fundamental concept, namely that the physical universe consists of units of motion. We have examined space and time, the phenomena of radiation, matter and gravitation, electricity and magnetism, from the point of view of this new basic concept.

The new understanding of magnetism leads also to a novel explanation of the origin of isotopes and the conclusion that the material atoms evolve in time. It points out that the nature of matter varies, in this respect, from location to location in the universe. One cannot fail to recall kindred statements in *The Secret Doctrine*<sup>24</sup> and *The Mahatma Letters*.<sup>25</sup>

It is not normally realized that the concept of space as extension permeates to a large extent almost all of our scientific and non-scientific thinking. For example, theosophists are inclined to imagine that the mental body “extends” in space despite repeated admonitions from investigators like Arthur Ellison. We envision the universe of atoms, stars and galaxies as stretched out in a background of extension space. The new understanding of motion brought out by the Reciprocal System reveals some properties of space (and time) that are altogether not suspect hitherto. “When we are dealing with translatory motion, space manifests itself as extension. This is the familiar entity that we normally visualize whenever the term ‘space’ is used... When we characterize space as an aspect of motion, however, we introduce other kinds of space, since motion can be vibrational or rotational as well as translatory, and one of the two reciprocal aspects of this vibrational or rotational motion is space... even though such space does not constitute extension in the usual sense of the term.”<sup>26</sup> (This leads Larson to explain, among others, the reduction in the velocity of light traversing a material medium, the electrical resistance, etc.)

The knowledge of the true nature of space, as a component of motion, and as not having existence independent of its reciprocal, time, shows that space, as we are prone to imagine it, is no such static background at all. We have already seen that the reason why we seem to see a stationary three-dimensional space is that the inward progression of gravity counterbalances the outward progression of space. In fact, space or time is not even physical: only motion, as asserted by Pythagoras. By overcoming this fallacious view, which misled science and common sense for over 4,000 years, we become ready to take the next step onto the stage set by Larson to unravel further secrets of space-time.

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24 *The Secret Doctrine*, ii, *op. cit.*, pages 325-6.

25 *The Mahatma Letters*, *op. cit.*, page 160.

26 Larson, Dewey B., *New Light on Space and Time*, *op. cit.*, page 154.

## The Conjugate Universe

We have seen that the material atoms and subatomic particles are vibratory time units rotating in space. Now, the symmetry and reciprocity between the properties of space and time postulated in the Reciprocal System thereby also require the existence of matter whose atoms are vibratory space units rotating in time, somewhere in the universe. Larson calls these structures which are exactly like the material atoms except that the roles of space and time are interchanged, the “cosmic atoms” (c-atoms), and cosmic atoms collectively as “Cosmic matter” (c-matter). This answers to what is conventionally referred to as anti-matter by scientists (of course, with a difference: anti-matter, in this view, is not an additive inverse but the multiplicative inverse of matter).

The reason why we do not see aggregates of anti-matter in our space is at once understandable and is no subject of idle speculation as in the conventional theory. This is because the gravitation of c-matter acts inward in *time* in view of the scalar rotation that constitutes a c-atom is rotation in time, and not inward in space (as in the case of a material atom with its scalar rotation in space). The cosmic gravitation, therefore, draws the c-atoms together in time forming aggregates in 3-dimensional time! Thus we are led to the necessity of the existence of another half of the universe, the cosmic sector, so far not suspected of in the least, with the roles of space and time interchanged—a universe of c-matter, c-stars and c-galaxies distributed three-dimensionally in time but progressing outward in space (like our half is progressing outward in time).

Another reason for not being able to observe the c-sector of the universe is apparent now. Since the c-stars comprise of c-atoms aggregated in three-dimensional time but widely dispersed in three-dimensional space we do not see them as spatial aggregates at all. Further, since a c-atom is moving *inward* in time (due to the gravitation in time) while the material atom is moving scalarly *outward* in time, even the chance encounter between them does not last longer than for one natural unit of time ( $1.52 \times 10^{-16}$  sec.). The sudden disintegration of the exceptionally stable particles like the protons that is currently the subject of intense theoretical and experimental activity in physics can be easily explained on the basis of their chance encounters with the atoms of the cosmic sector, moving inward in time. Thus we see that there is another half of the physical universe right here and right now but not observable by us. However, this does not mean that we have absolutely no communication or contact with the conjugate sector, as we will presently see.

In view of the reciprocal relationship between the respective constituents of the two sectors of the universe, the radiation from the c-stars at high inverse temperature shows up in our sector as radiation of low temperature. Moreover, such radiation, originating from c-stars which are not aggregates in space and not localized in space, does not seem to be coming from any one direction. It would be isotropic and uniform in space. We have exactly such phenomenon, namely, the absolutely isotropic and uniform background microwave radiation at  $2.7^\circ\text{K}$ , which is of course, currently being (mis)interpreted as the radiation left over by the hypothetical Big Bang with which our universe is assumed to have originated. Once again, like in the case of the recession of the galaxies, we find that there is absolutely no need to resort to *ad hoc* assumptions such as the Big Bang. I may note here that, due to lack of space, I am refraining from mentioning a host of the astronomical phenomena, which either stand unexplained or could be explained only with the help of *ad hoc* desultory assumptions by the conventional science, come out as logical conclusions from the fundamental postulates of the Reciprocal System.

## Galactic Death and the Quasars

We have noted that atoms keep on evolving and eventually reach the upper limit (see part III of this article, *Reciprocity* XXV (3), p. 19) after a long period and disintegrate. Therefore, the central regions of very large galaxies, which are *ipso facto* very old, suddenly explode on reaching this upper limit of matter, thereby releasing stupendous quantities of energy. The Reciprocal System shows that the magnitude of these explosions is so gigantic that a fragment of the galaxy is ejected at speeds greater than that of light.

This greater than unit speed (unit speed in the Reciprocal System being the speed of light) does not manifest to us as a change of position in space, that is, as motion in space; instead, it involves motion in time, that is, change of position in coordinate time. We see such an object, with speed greater than that of light, as being stationary in our space. However, it manifests other peculiarities like, for example, a red shift greater than 1.0. One concept that needs elaboration here is that of “empty time.” While an explosion in space creates empty space between the atoms and results in a decrease of density, an explosion in time creates empty time and gives rise to very high densities (since an increase in time is tantamount to a decrease in space in view of the reciprocal relationship between them). Such ultra high densities are actually observed in the White Dwarf stars, the pulsars and the quasars. It is, therefore, not necessary to take recourse to such *ad hoc* hypotheses like those of “degenerate” matter, black holes and the like.

Larson’s identification of the ultra high speed components of the titanic explosion of the core of a galaxy with the quasars solves all the mysteries that surround these enigmatical astronomical objects, without stretching the physical theory beyond the limits of rationality. Their large redshifts, stupendous energy outpouring, distribution in space, extreme compactness, nature of the emission and absorption spectra—all of them quantitatively agree with the predictions of the Reciprocal System.

Remembering that the boundary between the cosmic sector (region of motion in 3-dimensional time) and our sector (region of motion in 3-dimensional space) is unit speed in all the dimensions, we see that the superluminary speeds imparted to the quasar material eventually transfer it to the cosmic sector, after the gravitation in space is finally overcome. When this happens, the quasar disappears from our view. Exactly the same state of affairs holds good in the cosmic sector of the universe; the c-matter congeals into c-stars, the c-stars group themselves into c-galaxies and the c-galaxies eventually disintegrate explosively and part of the most evolved c-matter gets ejected into our material sector from the c-sector. Because they come from a region not localized in space, these c-atoms appear to be traveling in all directions isotropically and uniformly. Once again we have the observational confirmation of this in the cosmic rays, whose origin and characteristics are a great puzzle to the conventional theory. All the observed characteristics of the cosmic rays come out logically and naturally in the Reciprocal System.

Prediction of the other half of the universe and phenomena therefore can be classed as the outstanding achievement number eight of the Reciprocal System.

It is unfortunate that the hypothetical nature of concepts like that of quarks, gravitational waves or curvature of space-time is not well-recognized. Especially, the proliferation of the “elementary particles” with the advent of powerful atom-smashing machines is pressing the theoretical physicists to the verge of rational thinking and the conceiving of quarks in the shape of fundamental building blocks of matter seems to be a step away from reality than one toward it simply because of the ever-widening number of problems it creates more than it solves. Under these chaotic circumstances, Larson’s explanation of these various exotic particles as the evanescent manifestations of the different c-atoms

ushers order and utmost relief into the field of physics.

### The Grand Cycle of the Universe

Among other things, with the help of this concept of the conjugate sector of the universe, Larson explains how the universe always remains the same though always changing and evolving; a truth, once again, of the occult sciences.

Diffuse intergalactic nebulae and matter coalesce under the influence of gravity, form stars; stars aggregate into star clusters and clusters into small galaxies. These galaxies recede from each other due to the outward progression of space-time. The galaxies cannibalize smaller galaxies and become larger ones, which eventually undergo disintegration on reaching the upper stability limit of matter, ejecting part of the matter into the cosmic sector. In the cosmic sector, a similar sequence of events happen (with the roles of space and time interchanged, of course) and eventually the c-matter ejected from the c-galaxies recedes outward in time and enters our material sector at random locations and starts the material half of the evolutionary cycle as diffuse intergalactic nebulae and dust.

Thus, on the whole, the universe remains the same, though each half (the material and the cosmic) continually evolves. The material sector, expanding in space, evolves in time. The cosmic sector, on the other hand, expanding in time, evolves in space. Further, the end of evolution in one sector marks the beginning of evolution in the other sector, cyclically, reminding us of the Evolutionary Spiral. It is a “steady-state” universe but without the necessity to break the conservation laws unlike the Hoyle-Narlikar’s steady-state model. From another point of view, it is an oscillating universe: but the oscillation is not the banal expansion-contraction in space as envisaged by the cosmologists or the exoteric students of occultism. It is an oscillation between space and time—an oscillation that is non-reversing. The expansion toward infinite space in one sector completely counterbalances the expansion toward infinite time in the other sector (in view of the reciprocal relation between them) and on the grand scale of the dual-sector universe we have the entire physical manifestation on the one hand, and NOTHING on the other, on equal footing!

## Part 5

In the previous parts of this Article we have endeavored to sketch the development of the *Reciprocal System* of physical theory created by Dewey B. Larson. As it was impossible to deal with the whole of the theory, attempt has been made to present the salient features that have a broad enough scope to enable the interested reader to appreciate its potentialities.

### New Light on Quantum Phenomena

Since in the time region (the region inside the quantum of space) only motion in time can truly exist, the appropriate reference frame that ought to be adopted for the description of the physical phenomena is the three-dimensional temporal reference frame, and not the conventional, spatial reference frame. The origin of the conventional reference frame is at zero speed, whereas the origin of the temporal reference frame is at zero *inverse speed*, which is tantamount to infinite speed in the context of the conventional spatial frame. Consequently, a location pertaining to the temporal reference frame is found not localized in the conventional reference frame and *vice versa*. This is the origin of the non-locality characteristic so perplexing in the quantum phenomena. The reciprocal (inverse) relation between these two types of reference frames also explains why a localizable particle in the context of a

spatial reference frame needs to be regarded as an endless repetition, namely, as a wave, in the context of the temporal reference frame. This insight resolves the vexed problem of the wave-particle duality.

There are yet unforeseen insights brought to light by the Reciprocal System. In the outside region, that is, in the context of the three-dimensional spatial reference frame, speed (= space/time) is directional (vectorial). However, in the inside region, that is, the time region, inverse speed (=time/space) is the quantity that is “directional” while speed appears scalar. This “direction,” of course, pertains to the realm of the three-dimensional time and has nothing to do with direction in space. In the universe of motion all physical quantities can be reduced to space-time terms. Larson, in a major overhaul of the dimensions of the various physical entities, arrives at the conclusion that the dimensions of energy are those of inverse speed, namely, time/space. Consequently, energy needs to be represented by complex numbers in the time region, and negative energy states are as natural in the time region as negative speeds (velocities) are in the spatial reference frame.

## Conclusion

We have attempted to present some of the important contributions of the Reciprocal System to the understanding of the physical universe starting from a new paradigm—the concept of a universe of motion, in place of the current one of a universe of matter embedded in a framework of space and time. The examples cited here are expected to convey a broad-enough scope of the theoretical system and establish that a *prima facie* case exists for a general theory. It is only fair to record that some of the more esoteric aspects of the Theory, like multi-dimensional motion, the scalar regions of the universe, etc., have entirely to be omitted for pedagogic reasons. Mention must also be made of the fact that Larson finds the basic constituent of the universe according to the new paradigm, namely, to be scalar motion. Even though the existence of this kind of motion has been recognized, it has played a minor and insignificant role in physical theory hitherto. So Larson carries out a full-scale investigation of the properties and possibilities of scalar motion and discovers that this type of motion plays the central role in the drama of physical phenomena. He finds, for example, that some of the unexplained physical facts are really the unfamiliar features of certain types of *scalar motion*. For instance, all the *observed* characteristics of the gravitational field—like the instantaneous action, the lack of shielding effect, equality of the inertial and the gravitational mass, etc.—come out logically from the properties of scalar motion of a particular type. There is no need to resort to *ad hoc assumptions* like the curving of space-time and the finite speed of propagation of the gravitational influence, which have absolutely no observational support. Consequently, the Reciprocal System is free from all singularities—like black holes, cosmic strings, and the like—that plague conventional astronomy theory. Indeed, the occurrence of these singularities indicates a defective theory. Before the advent of the Reciprocal System, there has been no theory that truly depicted the facts about gravitation. Therefore, theories not fitting the facts have been allowed to pass off, and stupendous amount of research has been side-tracked.

The real reason for omitting the description of some of the significant features of the Reciprocal system alluded to in the above paragraph from this introductory Article is—as has been hinted at the outset—no matter how simple and logical the new conclusions are from the viewpoint of the new paradigm, since one is habituated to the old paradigm, some of them might look nothing short of preposterous. Having invested one’s entire professional career in the existing paradigm, one’s mind does not take kindly to the prospect of a basic paradigm change. The first few contacts are the most difficult ones, as Kuhn points out. One would not be inclined even to pay attention to the new conclusions, much less evaluate them on their own merit. It has been found wise to discuss first those features that could be assimilated easily on a first encounter.