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## Quasars and Pulsars

By D. B. Larson, North Pacific Publishers, Oregon, Pp. 180, $6.50

    In this book, the author puts forward a radically new theory, the Reciprocal Theory as has been called by him, to explain some recently observed phenomena of the universe, which the physicists have been in trouble to explain with the currently existing laws and principles of physics. The author asserts that the root of all trouble lies in the fact that the whole system of modern physical laws have been developed on the _wrong_ _premise_ that _matter_ is the basic entity of the universe. But, the author observes, as the matter is now known to undergo annihilation releasing energy, it cannot be the basic entity of the universe. According to the author, _motion_ and not matter, is the fundamental entity of the universe and, in order that physics may satisfactorily explain and interpret the various astronomically observed phenomena of modern days, it must do away with the matter concept of the universe, and the concept of the _units_ _of_ _motion_ must replace that of the _units_ _of_ _matter_. The simplest equation of motion, the author argues, is $v = s/t$, thus defining space and time as the two reciprocal aspects of motion, and _nothing_ _else_. The Reciprocal Theory presented by the author derives its name from the reciprocal nature of the two aspects defining the fundamental entity of the theory, _viz_., the motion. The author asserts that the relation $v = s/t$ is not merely a mathematical relation, but a general relation. It says that speed is equal to space divided by time. One can also hold that the reciprocal speed is equal to time divided by space. Space and time, therefore, stand on equal footing as the two fundamental entities, differing only in that they stand in a reciprocal relation to each other. In speed, the measure of motion, more space is the equivalent of less time and _vice_ _versa_. Like time, space also progresses and the motion is the result of the progression of space and time. Like space, time is also assumed to be three dimensional, but these dimensions are dimensions of time, not the spacial dimensions.

The author makes two assumptions, viz., (a) motion is three dimensional and (b) motion, and hence space and time, exist only in discrete units, in order to enunciate the two fundamental postulates of his Reciprocal System.

The fundamental postulates are:

1. The physical universe is composed entirely of one component, motion (or space-time), existing in three dimensions, in discrete units, and with two reciprocal aspects, space and time.

2. The physical universe conforms to the relations of ordinary commutative mathematics, its magnitudes are absolute, and its geometry is Euclidean.

The entire structure of the Reciprocal Theory has been developed on these two premises only and no further assumptions have been made, and the astronomical phenomena like quasars, pulsars, the white dwarfs, the red shifts etc., have been attempted to be explained by the theory. The author claims that the properties of space and time that have been postulated in his Reciprocal Theory predict not only the existence, but also the observed structure and properties of the smallest atoms to largest galaxies.

Before attempting to explain the astronomical phenomena like quasars, pulsars, white dwarfs etc. (which appears to be the main purpose of this volume), the author devotes full three chapters (Chapters III-V) to explain the true nature of space-time and motion as envisaged in this new theory. Here his arguments are abstract and he seems to rely more on abstract logic than concrete mathematics. But the logic put forward by him is highly thought-provoking. Thus the author's contention that "the one-to-one space-time ratio of the outward progression is the speed of light" and that "the inward motion due to the inherently scalar nature of the rotation is gravitation" may lead the reader into a new world of abstract thoughts.

From the sixth chapter on, the author explains the astronomical phenomena in the light of his Reciprocal Theory. According to the theory, gravitation is a local phenomenon but the progression of space-time originates everywhere and its magnitude is constant irrespective of location. So gravitational motion inward decreases with the increase in the distance from the gravitating matter, in the inverse square law, and at a point called the gravitational limit, this inward motion is exactly counterbalanced by the outward motion of space-time progression. After this point, the motion is that of recession which increases to very large values at very great distances. This is what is actually observed. The observed distribution of matter in the universe is not the same as would be expected on the basis of Newton law. The observed recession of the galaxies from

each other need not be the result of the "big bang", but is a direct result of the space-time progression outside the gravitational limits. The recession is a general phenomenon according to the Reciprocal Theory. Any two units of matter that are outside the gravitational limits of each other will recede from each other. This explains the vast separation of stars in a globular cluster and those in a galaxy, from each other.

With such a background of the Reciprocal Theory, the author presents explanations of several astronomical phenomena that will appear very strange, if not impossible, to the astronomers and physicists. For example, the author asserts that within the gravitational limits the aggregates of matter are continually growing. "Atoms join together into particles, the particles gather into clouds, the clouds condense into stars, the stars increase in size and form groups and clusters. These aggregations grow into small galaxies, and the small galaxies become large galaxies", as the author puts it. Such an evolution theory will be hardly acceptable to the scientists. The author contends that the gravitational contraction in the early stage of a star initiates energy generation by atomic disintegration, which in turn raises the stellar temperature to values suitable for conversion process. If, however, the central temperature reaches the destructive limit of the nickel-iron group of elements, there will be a sudden release of a very large amount of energy and the star will blow off producing a supernova. The result of the explosion produces two components. According to the author, the component of gas ejected with relatively lower velocities again concentrate to a very diffuse stellar body to form red giants. Another component that by explosion, attains speed larger than that of light, the ultra high speed component as is called, expands outward in time rather than in space, and as a result of the reciprocal space-time relation this component will occupy very small space. This component is the white dwarf. It is the product of matter expanding in time just as the matter expanded in space produces the diffuse red giants.

The author asserts that all high density astronomical objects like quasars, pulsars, galactic nuclei, etc., are explained by the same process. Just as the explosion of a normal star produces two components, the giant and a white dwarf, so does a galactic explosion produce two components. The low speed component becomes a radio galaxy, a normal diffuse object, while the ultra high speed component is the quasar, a peculiar object by any physical standard. The radio glaxaxies and the quasars are thus the galactic equivalents of red giants and white dwarfs. Quasars are the ultra high speed (and so superdense) products of galactic explosions. The unusually large values of redshifts observed in some quasars appear to be better explained by the new theory. According to this theory, the observed redshifts consists of two components--one due to actual recession ($Z$) which cannot exceed 1.00 corresponding to the speed of light; the other part is due to the ultra high speed imparted to the

quasar by galactic explosion. The value of tnis component of red-
shift, as the author shows, will be $3.5\sqrt{z}$. The upper limit of red-
shift that any object can have is therefore 4.5, corresponding to
the recession redshift 1.00. But before this is attained, the quasar
converts to the neutral level at 2.00 explosion speed that corresponds
to a recession shift of 0.326. Thus under normal conditions, the
2.326 value of redshift cannot be exceeded. This agrees well with
the current observations. The author attempts to verify these and
other statements in the light of the present observational data and
finds the agreement quite satisfactory.

In the last chapter the author, after careful analysis of all
available information on the two types of supernovae explosions,
asserts that the pulsars are the ultra high speed product of Type II
supernovae explosions. On the basis of his Reciprocal Theory, he
finds an upper limit of pulsar lifetime to be 13000 years. He estab-
lishes a correlation between the pulsar period and its age and finds
that the age of the oldest pulsar known is 9100 years, far below his
theoretical upper limit.

In conclusion, it may be said that the author has been very bold
in presenting a radically new theory of physics by which he has been
able to explain many observed facts of astronomy which have plagued
the astronomers and physicists since their discovery. But his expla-
nations have rested more on logic than on mathematical formulation.
Whether this Reciprocal Theory would stand the test of time has to
be patiently observed. If it does, the physicists will find in it
their long-cherished desire, viz., one comprehensive theory with
universal applicability, although many of the currently cherished
theories will then receive death blows and will vanish yielding
place to the new.

### FROM THE INDIAN ASSOCIATION FOR THE CULTIVATION
### OF SCIENCE, PUBLISHER OF THE INDIAN JOURNAL OF PHYSICS

Dr. A. K. Barna, Secretary, Board of Editors, INDIAN JOURNAL
OF PHYSICS, has written the Editor, RECIPROCITY:

"The review of the book, 'Quasars and Pulsars' by D. B. Larson,
published in the Indian Journal of Physics Vol. 47, pp. 509-512,
may be reprinted in your science newsletter, Reciprocity."

### DE LESPINASSE TO TEACH RECIPROCAL SYSTEM
(Dr. Ernest L. Lippert, Jr., of Toledo, Ohio, Special Features
Editor, RECIPROCITY, journeyed to Adrian, Michigan the other day,
visited with Dr. de Lespinasse and shares the experience of his
interview with us.)

Dr. Paul de Lespinasse, Chairman of the Department of Political Science at Adrian College, Adrian, Michigan, will teach a new course titled "The Larsonian Worldview". This new course is one in a planned offering of forty-nine different three week courses for the 1975 Interim experience during January, 1975 at Adrian College.

The purpose of the Interim is to stimulate the student's desire to explore for himself. This format will allow de Lespinasse to discuss and examine the impact and implications of Dewey Larson's Reciprocal system in fields such as biology, psychology, eithics, philosophy of science and theology.

Though most of us perhaps consider only those implications which Larsonian postulates and premises have for the physical sciences, de Lespinasse is quick to point out that, if the reciprocal concept truly represents the nature of the physical sectors of the world, then it should have implications for all fields of scholarship, including the non-physical sciences of humankind.

Despite the fact that de Lespinasse is a political scientist, he is well qualified to teach this course. He first became aware of Dewey Larson's theories while he was teaching astronomy. He was asked to step and fill in for the course in astronomy, because of a sudden vacancy. In the light of his avocational interest in astronomy and natural science, he was able to do so. This teacher thus joins socio-political thought and scientific reasoning, an admirable combination of talent for guiding a seminar course in the Larsonian Worldview. As one of the founders of NSA, Paul de Lespinasse has been very active in stimulating and developing the investigation of the Reciprocal System.

During our interview our friend told me that he hopes to guide the students in independent study and to encourage them to pursue the implications of Larson's views in diverse areas of their own choice. Since no technical background is required, he and his students hopefully will be able to develop the needed background from Larson's point of view and from their own native abilities.

The culmination of the course, if all goes well, will be some term papers describing the result of the students' study of the Reciprocal System and applying it to a variety of current problems, not just science and technology.

## THE QUESTION BOX

(A regular feature of forthcoming RECIPROCITY Issues. Competent and willing person to assume charge of it is needed. Editor proposes Ronald Satz, if he is available)

QUESTION: From Charles W. Bonner, Columbus, Mississippi. Please provide a detailed rationale of how the RS theory produces the correct answer to this 'Lorentz transform' problem:

$$L \longleftarrow \quad M \quad \longrightarrow R$$
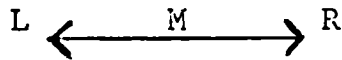
When L and R travel at the speed of light relative to M, Larson says the speed of R relative to L is 2 units of space divided by two units of time; thus, the velocity of R relative to L is 2/2 = 1. Now suppose that L and R both travel at C/2 relative to M. If we seemingly follow the same procedure as above, it appears that the total distance involved is $(\frac{1}{2} + \frac{1}{2})$ and the total time involved is $(1 + 1)$, so that the velocity of R relative to L should be distance/time = 1/2. Obviously something is wrong. What?

ANSWER. Assume that the particles traveling with the speed C/2 are atoms. Then the rate of motion of the atom toward R relative to the motion of the atom toward L is 0.8C. The RS theory thus offers the same answer to your question as does the Lorentz transformation equation. The mode of motion of a photon (vibration) is different from that of an atom (a combination of vibration and rotation). Photons remain in the space-time locations in which they originate; atoms do not. The space-time locations of photons move at the unit rate C. Atoms do not remain in the space-time locations in which they originate. Therefore, the procedure for calculating the rate of motion of two photons going apart from each other is not applicable to calculate the motion rate of two atoms moving apart from each other, each at v = C/2 with respect to M. The relative motion rate of the two atoms in this case is

$$u = \frac{0.5C + 0.5C}{1 + \frac{(0.5C)(0.5C)}{C^2}} = \frac{1.0C}{1.25} = 0.8C \qquad (1)$$

The procedure, equation (1), is called the Lorentz transformation equation. How does the RS theory arrive at the Lorentz equation? How does the RS theory deduce this equation?

This question amounts to asking how does RS theory imply the transformation equation:

$$u_{da} = \frac{v_{db} + w_{ba}}{1 + \frac{v_{db} \, w_{ba}}{C^2}}$$

This Lorentz equation or law about the composition of velocities follows from the RS theory, because the latter assumes that a light photon remains in the space-time location in which it originates and further assumes that the location progresses at unit speed or at the

uniform rate of $C = 3 \times 10^5$ km/sec., independent of the motion of source or detector of the photon. These assumptions are incompatible with the Newtonian-Galilean transformation equation, the Newtonian law of the composition of velocities, $u_{da} = v_{db} + w_{ba}$ ; $u_{da} = -u_{ad}$.

The fact that the velocity of light is independent of the velocity of the source of the light implies that any finite velocity of the source, when added to the velocity of light, yields a resultant for the light whose magnitude equals that of the speed of light.

Now in Newtonian physics, when three particles A, B, D are moving in a straight line, and if U is the velocity of A relative to D, V is the velocity of D relative to B and W is the velocity of B relative to A, then $u_{ad} + v_{db} + w_{ba} = 0$.

However, the just stated fact and RS principle asserts that when $v = C$, then $u = -C$, whatever value w may have. This implies that the equation $u + v + w = 0$ is not true when velocities commensurable with that of light are involved: it works satisfactorily only when all the velocities are small compared with C.

How then to deduce the correct form of the law of composition of velocities for velocities of any magnitude is now the task. Specify then that the exact relation between the three velocities is $F(u,v,w) = 0$. Agree that $w_{ba} = -w_{ab}$, etc.

By permuting the three particles A, B and D note that the function F has to be a symmetric function of u, v and w.

Further, the function F has to be a linear function so that it may yield a one-valued solution when solved with respect to u, v or w. Consequently, the equation assumes the form
  $g + h(u + v + w) + k(vw + wu + uv) + l(uvw) = 0$

Since when $w = 0$, $u = -v$, then $g - ku^2 = 0$ for all values of u and so g and k are zero.

Thus, the equation takes the form $h(u + v + w) + l(uvw) = 0$. Also, $u = -C$ when $v = C$, no matter what the value of w. Hence $hw - l\,C^2\,w = 0$ and $h = l\,C^2$. Therefore, $l\,C^2 (u + v + w) + l(uvw) = 0$ or
$u + v + w + \dfrac{uvw}{C^2} = 0$

This is the exact relation which replaces the Newtonian relation $u + v + w = 0$

This exact relation implies that $-u - \dfrac{uvw}{C^2} = v + w$ and

$-u\left[1 + \dfrac{vw}{C^2}\right] = v + w$       A 4.1-7

$$- u = \frac{v + w}{1 - \dfrac{vw}{c^2}}$$

Thus, the Lorentz Law of the composition of velocities is simply the mathematically equivalent expression of every physical theory which assumes that the speed of radiation in vacuo is independent of the motion of the radiation source.

$$- u_{ad} = u_{da}$$

$$\therefore \quad u_{da} = \frac{v_{db} + w_{ba}}{1 - \dfrac{v_{db} \, w_{ba}}{c^2}}$$

Q.E.D.