

RECIPROCALITY

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ANNOUNCEMENT

FIRST ANNUAL CONFERENCE OF NSA,* INC.
AUGUST 20-21, 1976-OWRE AUDITORIUM III,
UNIVERSITY OF MINNESOTA, MINNEAPOLIS
*NSA, INC. (NEW SCIENCE ADVOCATES, INC.) IS
THE PUBLISHER OF RECIPROCALITY.
MORE ABOUT CONFERENCE INSIDE THIS ISSUE.

FINITE GRAVITATIONAL LIMITS

Is the Law of Gravitation Universal?

Newton's expression of the Law of Gravitation in the light of the Reciprocal System of physics is TRUE for low velocities. In this System deductions from the postulates lead to the Lorentz transformations and mass is a scalar constant. For low velocities the result is Newton's expression of the Law of Gravitation.

When this expression has been properly modified by deduction from the postulates of the Reciprocal System for high velocities, Newton's Law of Gravitation continues to hold TRUE. R. W. Satz has derived this modified form for high velocities in RECIPROCALITY Vol. IV, No. 2, page 2, July, 1974. (A reprint of this paper may be had for the asking from the Editor, RECIPROCALITY or from R. W. Satz). From his result he showed how D. B. Larson and F. H. Meyer computed the excess precession of Mercury's perihelion to be 43 seconds of arc length per century in agreement with its observed value.

Satz continues the investigation of gravitational motion in this issue of RECIPROCALITY with a derivation of the formula for the GRAVITATIONAL ATTRACTION OF A GALAXY.

Gravitational motion and matter are inseparable. In the theoretical universe of the Reciprocal System the Law of Gravitation is only as universal as matter. While the existence of matter is affirmed, its unlimited existence is not. The Reciprocal System is not compatible with the presumption that matter is coextensive with all existence. Even the physical universe is not at all a universe of matter. The physical universe is rather, according to the Reciprocal System, a UNIVERSE OF MOTION, of which matter is but one among several forms and is, like electricity, derived from radiation.

How Gravitational Motion is Finite

Since the physical universe is a UNIVERSE OF MOTION, space-time is a MOVING PICTURE, not a still. In other words, space-time is a uniform three-dimensional scalar progression, more universal than gravitational motion. The rate of the progression is one discrete unit of space per one discrete unit of time or 3×10^5 km./sec. It is the space-time progression which limits the efficacy of gravitational motions and causes the monotonic spatial expansion of the universe with increasing time.

The gravitational force of any mass, even as large as the total mass of a galaxy, is consequently not infinite in its spatial extent. Since the gravitational force of every mass is more or less finite, the physical universe lacks any immovable center such as was postulated by the Ptolemaic, Copernican, Newtonian and Einsteinian cosmologies.

THE GRAVITATIONAL ATTRACTION OF THE GALAXY

Ronald W. Satz
Secretary, NSA, INC.

In a previous paper¹ I worked out the general form of Newton's Law of Gravitation and applied it to the special case of a planet orbiting the sun. In this case Newton's Law was modified by the factor

$$1/(1 - \frac{v^2}{c^2})^{1/2}$$

For the case of an object moving directly toward another object, rather than orbiting, the general equation reduces to Newton's Law multiplied by the factor

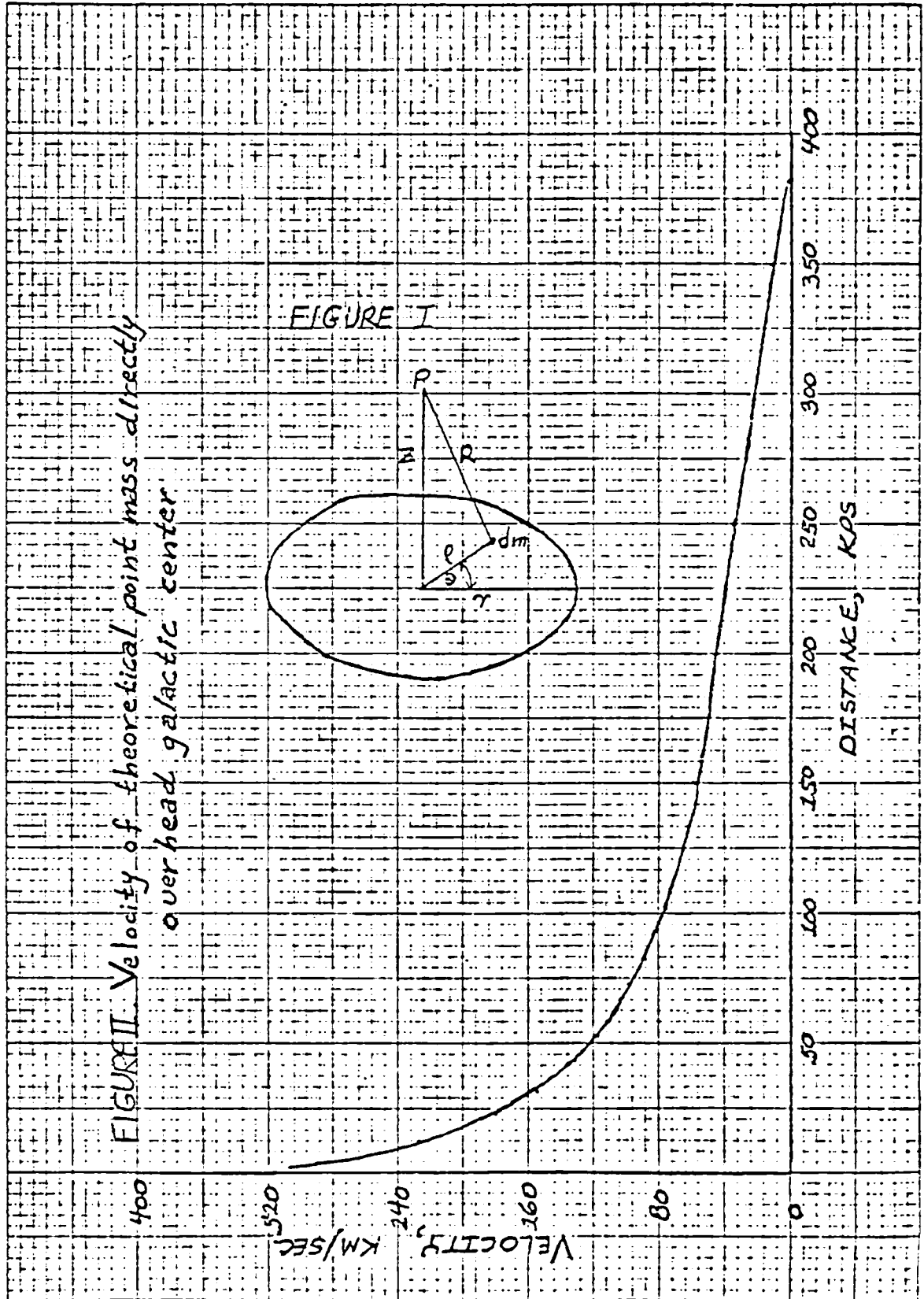
$$(1 - \frac{v^2}{c^2})$$

This is exactly of the same form as Lorentz's modification of Coulomb's Law.

Before applying the new factor, it is important to realize that the galaxy cannot be represented as a point mass; rather it should be represented as a flat disk. The Newtonian attraction of a flat disk for a point mass has been worked out before², but will be repeated here.

In Figure I let the radius of the disk be r and let its surface density be σ . I aim to find the attraction of the disk for a point mass located at P on the perpendicular line passing through the center of the disk. Let O be the origin of a system of polar coordinates ρ and θ , and let z be the distance along the line to the attracted location P .

R. W. Satz, GRAVITATIONAL ATTRACTION OF THE GALAXY.



Since $\rho d\rho d\theta$ is the area of an element in polar coordinates, the mass of such an element is

$$dm = \sigma \rho d\rho d\theta \quad (1)$$

The distance of the element dm from P is

$$R = (\rho^2 + z^2)^{1/2} \quad (2)$$

Then the attraction of the mass dm for the mass at P is

$$- G \frac{dm}{R^2} = - \frac{G \sigma \rho d\rho d\theta}{\rho^2 + z^2} \quad (3)$$

and the component of this attraction along the axis is

$$- \frac{G \sigma \rho d\rho d\theta}{\rho^2 + z^2} \cdot \frac{z}{R} = - \frac{G \sigma z \rho d\rho d\theta}{(\rho^2 + z^2)^{3/2}} \quad (4)$$

The total intensity of attraction of the disk for the point P mass is

$$I = - G \sigma z \int_c^R \int_0^{2\pi} \frac{\rho d\rho d\theta}{(\rho^2 + z^2)^{3/2}}$$

$$I = - 2\pi G \sigma z \int_0^R \frac{\rho d\rho}{(\rho^2 + z^2)^{3/2}}$$

$$I = 2\pi G \sigma \left[\frac{z}{(z^2 + r^2)^{1/2}} - \frac{z}{(z^2)^{1/2}} \right] \quad (5)$$

Assuming z positive,

$$I = 2\pi G \sigma \left[\frac{z}{(z^2 + r^2)^{1/2}} - 1 \right] \quad (5^1)$$

Now with the modifying factor included, the acceleration of the point mass toward the disk is

$$\frac{dv}{dt} = 2\pi G\sigma \left[\frac{z}{(z^2 + r^2)^{1/2}} - 1 \right] \left[1 - \frac{v^2}{c^2} \right]$$

$$\frac{dv}{dt} = \frac{2\pi G\sigma}{c^2} \left[\frac{z}{(z^2 + r^2)^{1/2}} - 1 \right] \left[c^2 - v^2 \right] \quad (6)$$

$$\frac{dv}{dt} = \frac{dv}{dz} \frac{dz}{dt} = v \frac{dv}{dz} \quad (7)$$

The crucial deduction in Larson's gravitational theory is that the gravitational force of any mass extends outward only a finite amount - the gravitational force does not extend out to "infinity", as commonly assumed. At the GRAVITATIONAL LIMIT of THE GALAXY, which will be denoted by d_0 , the attracted velocity of a mass is zero. This velocity becomes larger to the degree that the mass is located closer to the galaxy. Let the velocity be v at distance z . Then, separating the variables in equation 6 and integrating between the limits, the result is

$$\int_0^v \frac{v dv}{c^2 - v^2} = \int_{d_0}^z \frac{2\pi G\sigma}{c^2} \cdot \frac{z dz}{(z^2 + r^2)^{1/2}} - \int_{d_0}^z \frac{2\pi G\sigma dz}{c^2} \quad (8)$$

The outcome of this result is that

$$\frac{v}{c} = \left[1 - e^{-\frac{4\pi G\sigma}{c^2} \left[(z^2 + r^2)^{1/2} - (d_0^2 + r^2)^{1/2} + d_0 - z \right]} \right]^{1/2} \quad (9)$$

For our galaxy the constants in the equation are as follows:

$$G = 6.67 \times 10^{-11} \frac{\text{N} \cdot \text{m}^2}{\text{kg}^2}$$

$$c^2 = (3 \times 10^8)^2 \frac{\text{m}^2}{\text{s}^2}$$

$$\sigma = .2975 \text{ kg/m}^2$$

$$r = 4.626 \times 10^{20} \text{ m}$$

$$d_0 = 2.177 \times 10^{22} \text{ m}$$

With these values equation 9 becomes

$$\frac{v}{c} = \left[1 - e^{-2.771 \times 10^{-27} \left[(z^2 + 2.140 \times 10^4)^{1/2} - 9.087 \times 10^{13} - z \right]} \right]^{1/2} \quad (10)$$

Speed in km/sec vs. distance in kiloparsecs is plotted in the graph (Fig. 2). Great caution must be used in applying equation 10 to real masses:

1. A globular cluster or a small galaxy associated with the Milky Way galaxy is not really a point mass; in fact, observation shows that the near side stars of such objects are attracted at the expense of the farside stars.
2. Globular clusters are not falling directly toward the galactic center; rather they are orbiting.
3. Small local galaxies are at a distance close to the GRAVITATIONAL LIMIT of The Galaxy - - their velocities are difficult to measure and compare with theory.

Even so, the calculated velocities, nevertheless, agree in a very general way with those observed for the local group of objects.

- References:
1. Satz, R.W. RECIPROCITY Vol. IV, No. 2, p. 25, July 1974.
 2. MacMillan, W., The Theory of the Potential (New York: McGraw Hill Book Company, 1930), pp. 15-15.

FIRST ANNUAL NSA CONFERENCE, August 20-21, 1976
OWRE HALL AUDITORIUM III, UNIVERSITY OF MINNESOTA, MINNEAPOLIS

The principal aim of NEW SCIENCE ADVOCATES (NSA), INC. is to promote the Reciprocal System of physical theory, originated by D. B. Larson of Portland, Oregon. Attainment of this aim entails not only a discerning investigation of the Reciprocal System but also a perspicacious reexamination and reevaluation of the theories of nuclear physics and chemistry, quantum and wave mechanics, relativity physics, classical physics, astrophysics, biological evolution and the psychology of memory, passion and thought, including the parapsychology of the human spirit.

Now the time is near for supporters to meet again in the cause of revaluing all science in the light of the Reciprocal System and currently evaluating the latter itself. A two-day Conference has been called by the NSA Board of Trustees, August 20-21, in Minneapolis, Minnesota. The Conference is open to NSA members and non-members interested in aiding our cause. It is the first of what we plan to be an annual event. We are meeting to become better personally acquainted and to consider how best to achieve our objective--the endless SEARCH FOR TRUTH in science, etc.

We shall adopt an appropriate set of NSA By-Laws and decide how to BUILD NSA and IMPROVE RECIPROCITY CONTENT and CIRCULATION.

F. H. Meyer, Editor, RECIPROCITY, and R. W. Satz, Secretary, NSA, have taken initiative to organize the August Conference. We stand ready to aid in whatever ways we can those who will be coming from all over the country to find Owre Hall on the University of Minnesota-Minneapolis campus and also to find over-night accommodations and meals while in Minnesota. Both of the latter probably can be obtained on campus for those who may be interested. Please let us know your preferences.

Part of the activity of an organization like NSA and in future years a major part, should be a program of invited and contributed papers on subjects such on current events and issues of the development of the Reciprocal System. An abbreviated program of this kind is proposed for our 1976 Conference. To this end we have invited Mr. D. B. Larson to present a Progress Report About the Current Status of the Reciprocal System Friday evening, August 20th in Owre Hall. Mr. R. W. Satz has volunteered to discuss briefly why he entitled his introduction to the Reciprocal System, "The Unmysterious Universe". Prof. F. H. Meyer has volunteered to contribute a paper on "Some Fashions and Current Myths of Science". If other NSA supporters wish to present a contributed paper, no more than 20 minutes, it probably can be included in Conference program, so please let either Satz or Meyer know ASAP.

An oak tree grows out of an acorn. NSA is an acorn. The officers of NSA invite as many NSA well-wishers as can do so to participate in the First Annual NSA Conference. The First Annual Conference will be small, but we are growing and should become as strong and long-lived as an oak or even a star.

Owre Hall is located on Washington Avenue and Church Street in the vicinity of the Coffman Memorial Union and the University Hospital. Owre Hall is in the complex of medical school science buildings.

Please note that the tentative date of August 12-14 for the First Annual Conference in last issue of RECIPROCITY has been changed to August 20-21 to accomodate more participants.

The topic around which Mr. Larson will present his progress report to the First Annual Conference is tentatively, THE EXPANDING UNIVERSE IN SPACE AND TIME. This invited paper is scheduled for Friday evening, August 20, in Owre Auditorium 111.

Please communicate with NSA Secretary, R. W. Satz for further information about finalized program and other details of the August Conference.

ABOUT THE NON-EXISTENCE OF A VELOCITY LIMIT EQUAL TO THE SPEED OF LIGHT

Dr. Thomas Phipps, McLean, Virginia, has written some interesting comments in a Letter to the Editor about Dr. Rainer Huck's proposed experiment (RECIPROCITY, Vol. VI, 1, p. 1-4, March, 1976):

"I should like to reply to your invitation in RECIPROCITY for March to comment on Dr. Huck's experimental proposal for observing possible instantaneous action at a distance.

"To begin with, there is empirical reason to ask the question Dr. Huck has raised. Contrary to his statement that 'Neither accident nor design has thus far drawn much attention to any instance where this (light speed as limiting velocity) may, be seen to be conspicuously untrue,' SCIENCE NEWS for April 24, 1976 (Vol. 109, page 267) carries an article that begins, 'Detailed radioastronomical studies of a number of quasars indicate that each of those objects is composed of several components that appear to be moving swiftly apart from each other. In some cases, the apparent velocities are greater than that of light.' This does not bear directly on the question of the rate of force action within a radiation-free 'near zone', raised by Dr. Huck, but it does offer an option to reopen questions about relativity theory."

The May 15 issue of ASTROPHYSICAL JOURNAL LETTERS carries a report that two observed components of the quasar 3c 345 are separating at a rate which indicates a speed of 8c on a cosmological red shift basis, and the following issue (June 1) contains a report from another team of investigators who have measured the same speed at an average of 2.5c over a longer period of time. These results raise the number of observed quasar component separations at speeds apparently greater than that of light to 4, the others being in the 3c quasars 120, 273 and 275.

Since neither conventional theory nor the Reciprocal System allows separations IN SPACE at a rate greater than the speed of light, there is a discrepancy that clearly requires explanation. So far, the astronomers have been unable to come up with anything that is at all plausible. They concede that the observations would be explained if the quasars are not at the cosmological distances, but they do not want to accept this explanation as it leaves them without any theory of the red shifts of the quasars.

In the context of the Reciprocal System, on the other hand, all of the data from observation are consistent. According to the deductions from the postulates of this system of theory, only .027 of the .595 observed red shift of the quasar 3c 345 is due to recession in space. The distances used by the astronomers in their calculations must therefore be reduced by the ratio .027/.595. When the 8c speed is thus corrected, it becomes .363c, only a little over a third of the speed of light, which is a reasonable value. The logical conclusion is that the Reciprocal Theory is correct in its assertions with respect to the quasar red shifts.

Furthermore, the values of the three new very high quasar red shifts also reported in the June 1 AJL issue are in full agreement with the theoretical pattern that D. B. Larson described on pages 8 and 9 of his paper entitled QUASARS-THREE YEARS LATER. Consequently, these values give considerable additional support to the Reciprocal System from which that pattern was derived. The relevance of this further confirmation of this red shift theory to the question concerning the quasar component speeds lies in the fact that Mr. Larson's values for the normal recession (and consequently, the distance) of the quasars were derived from the same System.

It should be noted that the Reciprocal System of physical theory implies that speeds in excess of the speed of light must exist, because the theory recognizes that for a full description of the physical UNIVERSE OF MOTION, motion IN TIME must be taken into account as well as motion in SPACE.

According to the Reciprocal System, an object moving at unit speed (1/1 or n/n) is not moving at all with respect to the natural datum. An object moving with speed 1/n (one unit of space per n units of time) changes position in SPACE (that is, it deviates from the natural datum) because it only moves one spatial unit while the natural (moving) datum is moving n spatial (as well as n temporal) units. Similarly, an object moving with a speed n/1 (n units of space per unit of time) changes position in TIME. Such a speed (n/1) is therefore MOTION IN TIME, which exceeds the SPEED OF LIGHT, c, or unit speed (1/1).

What this suggests is that neither the Reciprocal System nor conventional physics permits SPATIAL speeds greater than c, and consequently the higher speeds will not show up SPATIALLY. They will produce rather TEMPORAL effects of one kind or another.

It appears, then, that for Dr. Huck's experiment to settle whether ultra high speeds may be observationally detected, TEMPORAL more than SPATIAL effects of such speeds should be sought.

Dr. Phipps goes on to say about Dr. Huck's proposed experiment:

"... the question raised by Dr. Huck does not, strictly speaking, depend for its interest on the theories of either relativity or Dewey B. Larson. The question is pre-relativistic, in that it enters already into problems concerning electromagnetic mass -- and mass, of course, is operative at zero speed and finite acceleration, so cannot be beholden to relativity theory in any respect; for that theory yields non-Newtonian results only at the level $(v/c)^2$, for $v > 0$ one understands the scalar nature of mass without introducing

covariant formalisms or other relativistic irrelevances. How can one understand this anticipatory or acausal behavior of the coulombic or inductive field? One need not refer to the ideas of Larson. The explanation is already at hand in the existing physical theory which ascribes such effects to the actions of virtual photons. These obey time-reversible wave equations and thus are quite indifferent to the flow conditions of observable time, which derive their observability from the "completion" of photon processes. But completed photon processes are radiative processes by definition, and thus are not coulombic or inductive. In effect, the virtual photon is privileged to run forward in time, determine what the source is going to do, and run backward in time to deliver the radiation reaction necessary to let the source do it. It can do this without answerability to observation, because observability comes first and only with process completion, i.e. with radiation to the far zone.

"None of this makes any reference to the ideas of either Einstein or Larson. It shows that Dr. Huck has raised a very interesting question about nature, indeed. Unfortunately, it also suggests that his experiment is likely to fail. I do not know in detail just how, would suggest focussing suspicion on the following nasty trick nature might play on us. He sets up two charged condenser plates (piezo electric crystals) at some distance D apart and vibrates them while comparing phases of the electric signals resulting. Now I suggest that to get good phase-measuring sensitivity he is either going to have to increase D or to increase frequency at which the crystals vibrate. But either of these actions and particularly both together threaten to move him out of the radiation-free 'near zone' he must stay within (in order to prevent ordinary radiative acausal delays from dominating his observed results). He says, 'It should be emphasized that I am not at all interested in electromagnetic radiation but only in the mechanical force of interaction'. Indeed it should be emphasized, but more strongly: If radiation occurs dominantly, the effect he is looking for will be wiped out. I have not done the numbers on this, but the calculation should be made as to whether one can get enough phase sensitivity to detect an effect, while staying in the near zone. Experience leads me to doubt it There is a deep-lying conspiracy by nature to prevent premonitory effects that are here (or could be) from being observed. In fact one way to express the uncertainty principle is by the dictum that premonitory effects are unobservable. I wish Dr. Huck luck and hope he will not be discouraged by these observations"

Further examination of Dr. Huck's proposed experiment will be made together with a critique of Dr. Phipps' paper, Toward a Fundamental Mechanics, by Dr. Huck in a future issue of RECIPROCITY.

THE MYTH OF THE QUARK

Due to the continual stream of publicity given to the quark hypothesis in the scientific journals many people apparently have been led to believe that the existence of quarks is now a demonstrated fact. Accepting this "fact" as established, they inquire what does the Reciprocal System say about the "color" or "charm" of quarks, evidently believing that the questions that are now pertinent are those relating to the PROPERTIES of quarks.

It is in order to take advantage of an excellent opportunity to alert the readers of RECIPROCITY as to just how FICTIONAL the quark actually is.

This opportunity is presented NOT by an advocate of the Reciprocity System, which has NO place at all for quarks.

Instead it is presented by a foremost advocate of orthodox nuclear physics and quantum mechanics, Dr. Werner Heisenberg, in the March, 1976 issue of PHYSICS TODAY. In this article, entitled The Nature of Elementary Particles, Heisenberg tells us that

"Wrong questions and wrong pictures creep automatically into particle physics and lead to developments that do not fit the real situation in nature." (IBID, p. 38)

He then goes on to fault the whole quark speculation:

"I am afraid that the quark hypothesis is not really taken seriously to-day by its proponents. Questions dealing with the statistics of quarks, the forces that keep them together, the reason why the quarks are never seen as free particles, are all left more or less undefined. If the quark hypothesis is really to be taken seriously it is necessary to formulate precise mathematical assumptions for the quarks and for the forces that keep them together and to show at least qualitatively, that all these assumptions reproduce the known features of particle physics." (IBID, p. 38-9)

The development of this Heisenberg critique of the quark discloses the kind of mass that modern physics has gotten itself into by insisting that the ultimate units of which the universe is composed must be units of MATTER. For many years we were told that those ultimate units were "ELEMENTARY PARTICLES", and that the only remaining task was to identify the particles and to establish their relations with each other and with the atoms. This, the investigators have been unable to do, so they have now cut loose from all factual foundations, and have embarked on a sea of speculations about possible constituents of the particles, in the hope that this might lead them out of their difficulties. As Heisenberg now points out, these speculations are completely divorced from reality.

The sorry state to which the physicists have been reduced in their fruitless search for an ultimate particle of matter strongly emphasizes the desirability of a NEW approach such as that provided by the Reciprocal System, which identifies the ultimate units as units of MOTION rather than units of matter.

Long-continued failure on the basis of currently accepted ideas is one of the strongest arguments for a CHANGE in thinking. All PROGRESS is initiated by challenging current conceptions and executed by supplanting existing institutions. As expressed by Fred Hoyle:

"It is almost a matter of principle that in any difficult unsolved problem the right method of attack has not been found; failure to solve important problems is rarely due to inadequacy in the handling of technical details."

Although Heisenberg does not reach the point of recognizing that both atoms and particles are COMBINATIONS OF MOTIONS, he does take a significant step in this direction by conceding that they are structures of the same GENERAL NATURE:

"There is no difference in principle between elementary particles and compound systems. This is probably the most important experiential result of the last fifty years." (IBID, p. 33)

Here Heisenberg is saying essentially the same thing, aside from recognizing MOTION as the common denominator, that D. B. Larson said in his NEW LIGHT ON SPACE AND TIME, page 101:

"As indicated in the foregoing discussion, the observed sub-atomic particles ... are not parts from which atoms are constructed; they are complex motions of the same general character as the atoms, but with a lower degree of complexity."

The Reciprocal System clearly seems to provide a better philosophy of science than is offered by the philosophy which has led physics into a fruitless search for quarks, elementary particles, nuclear atoms, space-time continua, gravitational waves, gravitons, gravitational collapses, etc.