

RECIPROCITY

Editor, F. H. Meyer
146 Ross Hall
University of Wisconsin
Superior, WI 54880

Published by NEW SCIENCE ADVOCATES, INC., an organization devoted to promoting the Reciprocal System of physical theory.

Treasurer: Rainer Huck
1195 South Windsor St.
Salt Lake City, UT 84105

Secretary: Ronald W. Satz
Transpower Corporation
4518 Cedar Lake Road
St. Louis Park, MN 55416

Vol. VII, No. 2

June, 1977

NOTICE

SECOND ANNUAL NSA, INC. CONFERENCE
August 19-20, 1977, University of Mississippi

*NSA, INC. (NEW SCIENCE ADVOCATES, INC.) IS THE PUBLISHER OF RECIPROCITY.

MORE ABOUT CONFERENCE AND CALL FOR PAPERS INSIDE THIS ISSUE.

NEW NSA, INC. PRESIDENT

Dr. Frank A. Anderson has been elected President, NEW SCIENCE ADVOCATES, INC. by the NSA Board of Trustees to succeed Dr. Paul de Lespinasse, who remains a member of the Board.

Dr. Anderson is Chairman of the Department of Chemical Engineering and Associate Dean of the School of Engineering of the University of Mississippi. He is a long time student and advocate of further testing and investigation of the Reciprocal System of physical theory, originated by D. B. Larson of Portland, Oregon, to discover whether all of it or how much of it is true.

CONTENTS OF THIS RECIPROCITY

1. ATOMIC NUMBERS REVALUED. F. H. Meyer. An advocacy of the Case Against the Nuclear Atom.
2. WHITE LIES ABOUT BLACK HOLES. R. W. Satz.
3. QUESTION BOX. Editor, R. W. Satz. DOES THE LARSON THEORY CORRECTLY CALCULATE THE AMOUNT OF MERCURY'S EXCESS PERIHELION PRECESSIONAL MOTION? Question by L. Sokolow, Castleton, VT 05735. Answer by Editor, RECIPROCITY.
An advocacy of the Case for Three-Dimensional Time.
4. News about forthcoming August, 1977 NSA Conference.

5. Paperback reprint of D. B. Larson's NEW LIGHT ON SPACE AND TIME now available for \$4.00 (including postage) from either Treasurer, NSA or Editor, RECIPROCITY.
6. Pamphlet, THE UNMYSTERIOUS UNIVERSE, by R. W. Satz, a good introduction to the Reciprocal System is still available for \$2.60 (including postage) from either Secretary, NSA or Editor, RECIPROCITY.
7. Join the growing NSA movement for the mighty purpose of advancing the search for truth about the physical and metaphysical universe. Membership Annual dues, \$8, includes receiving and aid to publishing and circulating RECIPROCITY to a wider readership, is payable to Treasurer, Dr. Rainer Huck, whose address is on the masthead of this issue of RECIPROCITY.
8. IMPORTANT COMING EVENT. Revised Edition of the great book, THE STRUCTURE OF THE PHYSICAL UNIVERSE (first edition out of print) by Dewey B. Larson is now in preparation. This is the book in which 18 years ago Mr. Larson first published the Reciprocal System to the world.

CALL FOR INVITED PAPERS
SECOND NSA CONFERENCE
UNIVERSITY, MISSISSIPPI

NSA members and others interested in exchanging information about newly-found implications and problems of the Reciprocal System consider reporting to the coming August 19-20 NSA Conference. If you are preparing a report, please let NSA Secretary Ronald W. Satz know. Address of Secretary is on the masthead of this RECIPROCITY. Besides your name and address, please send Ronald the title of your paper, time length of report (not to exceed 30 minutes, 15-20 minutes usual), whether or not you will need audio-visual aid.

Invited reports will be scheduled Friday morning and afternoon, August 19 and if time permits, Saturday, August 20.

The main purpose of the Second Annual NSA Conference is to facilitate the continuing further exploration of the Reciprocal System of physical theory, originated by Mr. Dewey B. Larson.

Mr. Larson is busy at present, preparing a new edition of his book, THE STRUCTURE OF THE PHYSICAL UNIVERSE, which began it all. We hope that he will again be with us this year to present the principal address on Saturday, August 20.

A schedule of the Conference events and further information details about the August meeting will be mailed to NSA members and other interested persons in July.

Readers of RECIPROCITY and of the works of D. B. Larson, who have not yet joined NSA, INC. are urged to do so. Annual dues are \$8, payable to NSA Treasurer, Dr. Rainer Huck, whose address is on the RECIPROCITY masthead. Dues and other contributions to NSA are tax-deductible, since for the present IRS allows NSA the status of a non-profit educational corporation.

If you wish to see NSA in action and further help to advance the search for truth, put August 19-20 days on your calendar and come to University, Mississippi to attend the Second Annual NSA Conference.

ATOMIC NUMBERS REVALUED

Frank H. Meyer

(This inquiry was aided by a grant from the Learning Resources and Research Committee, University of Wisconsin-Superior)

ATOMIC NUMBER AND THE NUCLEAR ATOM

One of the permanent achievements of modern physics and chemistry is the Periodic Table of the Chemical Elements. The elements are reliably arranged in this Table according to their atomic numbers.

It is generally supposed at present that the concept of atomic number, upon which the Periodic Table is based, is inseparable from the nuclear atom.

Atomic number and the Periodic Table are, in fact, separable from the nuclear atom model. This is fortunate, since evidence has accumulated that this model is fatally flawed.

My aim is to show and discuss the evidence.

DEFINITION OF THE NUCLEAR ATOM MODEL

By the nuclear atom theory I mean the concept of the atom of matter as a MINUTE positively charged electrical NUCLEUS surrounded by ELECTRONS, bearing oppositely directed (negative) electrical charge, equal in magnitude.

ATOMS OF MATTER EXIST

It is not part of my aim to show that the atoms of matter do not exist. I consider that since 1905 it has been established beyond all reasonable doubt that matter does exist and necessarily exists in the form of ATOMS. In that year A. Einstein (1) published his paper on 'Brownian Motion' in which a procedure is disclosed for deciding at long last if atoms do or do not exist. When this procedure was applied by J. Perrin (2), the evidence he obtained by counting Avogadro's number, favored an unequivocal yes answer. The atoms of matter actually exist.

I shall be concerned ONLY to show that the nuclear atom model fails to give a true and adequate picture of the atom that does exist.

WHAT HURTS SCIENCE

In a limited way the nuclear atom model has been and is useful in organizing knowledge about the structure of the atom. Similarly, the celestial sphere of Ptolemaic-Aristotelian geocentric cosmology is useful even to-day in navigation and astronomy. But like the celestial sphere the nuclear atom model is a hindrance to further scientific progress, if mistakenly regarded as literally true.

Everybody knows more than anybody. To have the courage of one's convictions is a popular error. What requires far more courage is to make an attack on one's convictions. In physics as in religion this is much harder to do and has often been met by disdain and even hostility of one's associates, and so it is not usually done. It is primarily for this reason that what hurts us in science is not so much what we don't know as what we know that ISN'T SO.

TWO ASSUMPTIONS OF NUCLEAR ATOM MODEL

When the nuclear atom hypothesis is analyzed, it is clear that the model rests essentially on two assumptions: 1) E. Rutherford's scattering experiments proved that a nucleus exists in the atom of gold and in every other material atom; 2) Radioactivity exists and proves that electrons are another essential part of the atom of gold and all other atoms of matter.

Although widely regarded as facts, neither assumption has been proven true yet and neither can withstand reexamination in the light of presently available physical information.

1a) The conclusion drawn by Rutherford (3) from a mathematical analysis of the results obtained from his scattering experiments was NOT the ONLY possible valid conclusion that could have been drawn. In the light of the subsequent development of atomic theory another conclusion can be drawn from the Rutherford experiment just as valid then and now to his actual conclusion.

The observed facts were entirely consistent with Rutherford's hypothesis that MOST of the mass of an atom is concentrated in a very small region. However, the same facts were and are just as consistent with the hypothesis that ALL of the mass of the atom is concentrated in this region; in other words, that THIS is the ATOM, not the so-called NUCLEUS of the atom.

This alternative conclusion gives us a complete and consistent explanation of the results of Rutherford's scattering experiments in terms of existing knowledge. On this basis there is NO NEED to postulate the existence of an atomic nucleus, and Occam's Principle, one of the sound common-sense rules of science, tells us that we should not make UNNECESSARY hypotheses. In brief, all of the facts disclosed by the Rutherford experiment with alpha particles and gold foil are entirely compatible with the conclusion that they merely establish the TRUE SIZE of the atom, indicating that it is very much smaller than previously believed, the diameter of an atom being $\leq 10^{-12}$ cm.

How then could the unnecessary hypothesis of a nucleus in the structure of the atom have been accepted so readily and uncritically? Rutherford himself must bear part of the responsibility. Because the first conclusion he reached was at the time a possible valid conclusion, he jumped to the erroneous conclusion that his conclusion was the ONLY possible valid conclusion. The successive generations of physicists who without further inquiry uncritically have accepted Rutherford's leap into the dark also bear a share of accountability for the consequent error that ensued. This error has now reached calamitous proportions.

2a) The argument that the existence of radioactivity proves that electrons do and must exist as essential parts of the atom of matter also is NOT valid.

Electrons as such do not exist in atoms either inside or outside the non-existent nucleus, although in the original Rutherford nuclear atom model they were supposed to be in both locations.

The argument from radioactivity that electrons must exist as parts of or in atoms follows:

- x. Under certain conditions atoms disintegrate (Radioactivity).
- y. Electrons are found among the disintegration products.
- z. Therefore, electrons must be parts of atoms.

The conclusion does not necessarily follow from the premises. The weakness of the above argument can be exposed by substituting the term 'photons' for 'electrons' in the above minor premise and the conclusion and stating the new conclusion the nuclear physicist now deduces.

- x. Under certain conditions atoms disintegrate (Radioactivity).
- u. Photons are found among the disintegration products.
- v. Nevertheless, photons are NOT constituents of atoms.

On the basis of the very same argumentative form can the physicist logically and/or reasonably arrive at these diametrically opposed formal conclusions?

It is true, of course, that atoms can acquire electric charge, either positive or negative. This is NOT a process of gaining or losing electrons, but instead a process of acquiring discrete rotational vibrations in time or space.

ATOM NUMBER REEXAMINED

If the atoms of matter lack nucleonic and electronic structure, then a correct interpretation of the physical meaning of ATOMIC NUMBER has not yet been achieved.

The presently accepted physical interpretation of the meaning of atomic number assumes that the nuclear atom model was proved true by the Rutherford scattering experiment and by the existence of radioactivity. This is not necessarily so, as previously shown.

Hence the meaning usually attributed to atomic number is probably false. Atomic number is NOT the ordinal number which is equal to the number of positive electric charges carried by the nucleus of an atom of a particular chemical element. Nor does atomic number mean the number of electrons in the particular atom.

While the concept of atomic number historically has been associated continuously with the nuclear atom model, it is logically independent of the nuclear model. Since the weight of evidence puts the meaningful status of the atomic number concept beyond all reasonable doubt, it is clear that this concept with a different physical interpretation will survive the scrapping of the nuclear atom model. The vitality of the atomic number concept derives from the fact that its life stems more essentially from the truth and validity of the Periodic Table of the Chemical Elements than from the putative truth and validity of the Nuclear Atom Model.

What is not at all in question about ATOMIC NUMBER is a mathematical formula, discovered by H. Moseley (4) from a detailed study of the X-ray spectra of the series of elements from aluminum ($Z = 13$) to gold ($Z = 79$). Moseley found the mathematical relationship between the frequency of a characteristic X-ray emission from a chemical element and its atomic number Z to be

$$\nu = 0.248 \times 10^{16} (Z - 1)^2 \quad (1)$$

What is in question about ATOMIC NUMBER is the physical interpretation given to this formula by Moseley, who took his cue from the nuclear atom model, as developed by E. Rutherford (3) and N. Bohr (5).

Elaborating the nuclear atom model, Bohr created a theoretical equation to explain the Moseley formula, eq. (1). Bohr's equation involves besides the atomic number Z , the mass, m , and the electric charge, e , of an electron and Planck's constant h . According to Bohr's theory, the frequency of a light spectral line is given by

$$\nu = \frac{Z^2 2\pi^2 m e^4}{h^3} \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \quad (2)$$

Inserting the numerical values of m , e and h and letting $n_1 = 1$ and $n_2 = 2$, the result is obtained that

$$\nu = 0.246 \times 10^{16} Z^2 \quad (3)$$

The near identity of equations (1) and (3) indicates that a necessary condition for the Rutherford-Bohr nuclear atom model to be true was satisfied. However, this is not a sufficient condition. Mathematical agreement between theory and experiment is never sufficient to prove the physical truth of a theory.

Although the experimental evidence concerning atomic number definitely implies that atoms of matter are constituted by discrete units of some sort, it does not follow that these units must be or are electrically charged particles, such as protons and electrons, and other particles such as neutrons.

Nor does atomic number mean that an atom is necessarily made up of parts, such as a nucleus and electron orbitals. The author of electron orbitals abandoned them long ago, in spite of the fact that they still are sometimes taught in college and high school textbooks as true.

Nuclear atom theory ultimately rests on the presumption that elementary particles exist and that atoms must be constituted from these "building blocks." It was supposed at first that only two elementary particles exist, the electron and the proton. The atom was initially constructed entirely from these two "elementary particles." Both particles were put into the nucleus with enough additional electrons outside to insure the electrical neutrality of the atom. Then when the neutron was discovered, it was deemed to be a third elementary particle. It replaced the electron in the nucleus. The electron was then forever expelled from the nucleus without ever having been anywhere in the atom in the first place.

Meanwhile, more and more so-called elementary particles have been turning up. No one knows how many there are nor what an elementary particle is. No one really knows which of them, if any, should be put in atoms and which should be left out.

In putting neutrons as an essential constituent into atoms, nuclear atom theory sanctions a small miracle. Neutrons are unstable in our material environment -- their half-life is about 12 minutes. Therefore, the prolonged existence of individual neutrons in atoms, which are remarkably stable in this same environment, is an unexplained "scientific miracle."

In order to make an electron as an essential constituent of stable atoms a bit more plausible, nuclear physicists let an electron allegedly do inside an atom what it does not and can not do outside: accelerate without radiating energy.

It is particularly impossible that protons exist as parts of postulated atomic nuclei. Everybody knows that like electrical charges repel each other with very large force at very small distances of separation. Nobody has found the unknown so-called nuclear force supposed to attract the protons and overcome the known repulsion between them.

ATOMIC NUMBER REVALUED

Nuclear physics can be replaced, so far as its nuclear atom model is concerned with a truer theory of the physical significance of ATOMIC NUMBER.

Beyond some brief comment this will not be done in this essay. That would be like requiring of Hercules after he completed the task of cleaning out the Augean stables to vindicate his deed by telling what he was going to put in the place of what he had removed. Hercules might well reply: Is it not enough that I have done what I have done?

A truer theory of atomic structure will have to include the atomic number concept physically reinterpreted to preserve its function of ordering the array of the chemical elements in the Periodic Table.

The most promising reevaluation of the physical meaning of atomic number derives from the Reciprocal System of D. B. Larson (6).

As a general physical theory, the Reciprocal System covers all physical fields, including atomic physics, and inasmuch as all of the conclusions reached in the theoretical development are derived entirely by deduction from the basic postulates of the system, these conclusions provide an important new source of atomic information that is completely independent of observation.

According to the Reciprocal System, atoms emerge from superposition of discrete combinations of 2-dimensional and 1-dimensional rotations of photons of radiation. Three integers suffice to distinguish one chemical element from another in terms of specific numbers of associated rotations of photons in three dimensions of time. For example, the designations for the first few elements of the Periodic Table are listed in Table I. As shown in Table I, the atomic number of an element follows from the three integers characteristic of it -- Integers enclosed in parentheses denote 1-dimensional motions in space; integers without parentheses denote 2-dimensional and 1-dimensional rotations in time.

One of several achievements of the Reciprocal System new conception of the atom and atomic number NOT attainable with the nuclear atom model is some theoretical calculation of the measured equilibrium interatomic distances characteristic of the crystals of the chemical elements (7). The work has now reached the stage where a computer-based procedure in BASIC is in preparation, which R. W. Satz, my son, F. V. Meyer and I think and hope will serve to predict all possible crystal structures of the 117 possible chemical elements and also the binary compounds which the elements can form.

REFERENCES

1. A. Einstein, "Investigation of the Theory of the Brownian Movement" (1905) in Dover Publication, N.Y., 1956.
2. J. Perrin. "Atoms," Constable, London, 1923.
3. E. Rutherford, Philo. Mag. 21, 669-688, 1911.
4. H. Moseley, Philo. Mag. 26, 1024, 1913.
5. N. Bohr, Philo. Mag. 26, 1, 1913.
6. D. B. Larson, "The Structure of the Physical Universe," North Pacific Publishers, 1959. New revised second edition in preparation.
7. F. H. Meyer, "New Theory of Solid Cohesion." Approved Research Proposal to Learning Resources and Research Committee, UW-Superior. Progress Report to Annual Meeting of Minnesota Academy of Science and Minnesota Area Association of Physics Teachers, May, 1975, Mankato State College, Minnesota.

AIDS TO SELF-PACED STUDY OF THE RECIPROCAL SYSTEM

One of the reasons persons interested in sustained inquiry about the Reciprocal System have incorporated ourselves into a non-profit educational organization is that the Reciprocal System is too large a proposition to be evaluated thoroughly by any single isolated individual.

For the same reason no one can understand and contribute to the Reciprocal System without study, without protracted study on his or her own and at his or her own pace.

Study of the Reciprocal System starts with study of literature about it, even though it must not stop there.

Since most of us are only at the beginning, NSA has been concerning itself to insure availability of literature about the Reciprocal System. This is why RECIPROCITY is published. This is why R. W. Satz wrote THE UNMYSTERIOUS UNIVERSE.

continued on page 13

TABLE I. D. B. LARSON'S INTERPRETATION OF ATOMIC NUMBER (Z)

"The atomic number of any ... element is equal to its net equivalent electric time displacement less two units."

"To obtain the total electric equivalent of the magnetic displacement we must sum up the individual $2n^2$ terms."

n "does not refer to the total from zero to n; it is the equivalent of the nth term alone."

Element	Displacement	Z	Computation of	Z
H	2-1-(1)	1	$2(1)^2+2(1)^2+(-1)-2=$	1
He	2-1-0	2	$2(1)^2+2(1)^2+0-2=$	2
Li	2-1-1	3	$2(1)^2+2(1)^2+1-2=$	3
Be	2-1-2	4	$2(1)^2+2(1)^2+2-2=$	4
B	2-1-3	5	$2(1)^2+2(1)^2+3-2=$	5
C	2-1-4	6	$2(1)^2+2(1)^2+4-2=$	6
	2-2-(4)	6	$2(1)^2+2(1)^2+2(2)^2-4-2=$	6
N	2-2-(3)	7	$2(1)^2+2(1)^2+2(2)^2-3-2=$	7
O	2-2-(2)	8	$2(1)^2+2(1)^2+2(2)^2-2-2=$	8
F	2-2-(1)	9	$2(1)^2+2(1)^2+2(2)^2-1-2=$	9
Ne	2-2-0	10	$2(1)^2+2(1)^2+2(2)^2-2=$	10
Na	2-2-1	11	$2(1)^2+2(1)^2+2(2)^2+1-2=$	11
Mg	2-2-2	12	$2(1)^2+2(1)^2+2(2)^2+2-2=$	12
Al	2-2-3	13	$2(1)^2+2(1)^2+2(2)^2+3-2=$	13
Si	2-2-4	14	$2(1)^2+2(1)^2+2(2)^2+4-2=$	14
	3-2-(4)	14	$2(1)^2+2(1)^2+2(2)^2+2(2)^2-4-2$	14
P	3-2-(3)	15	$2(1)^2+2(1)^2+2(2)^2+2(2)^2-3-2=$	15
S	3-2-(2)	16	$2(1)^2+2(1)^2+2(2)^2+2(2)^2-2-2=$	16
Cl	3-2-(1)	17	$2(1)^2+2(1)^2+2(2)^2+2(2)^2-1-2=$	17
Ar	3-2-0	18	$2(1)^2+2(1)^2+2(2)^2+2(2)^2-2=$	18

THE WHITE ART OF BLACK HOLES

by
Ronald W. Satz

Kip Thorne introduces his article on black holes in Scientific American by stating:

Of all the conceptions of the human mind from unicorns to gargoyles to the hydrogen bomb perhaps the most fantastic is the black hole: a hole in space with a definite edge over which anything can fall and nothing can escape; a hole with a gravitational field so strong that even light is caught and held in its grip; a hole that curves space and warps time. Like the unicorn and the gargoyle, the black hole seems much more at home in science fiction or in ancient myth than in the real universe. Nevertheless, the laws of modern physics virtually demand that black holes exist. In our galaxy alone there may be millions of them.

Thorne is saying that because the "laws" of modern physics require them, black holes must exist. However, it is more rational to conclude that those "laws" which give rise to the gargoyles, unicorns, and black holes of physics are wrong--that, as ordinarily expected, deductions from false premises yield bizarre results. Let us now investigate how such concepts as the black hole arose historically. The theory of the black hole stems from the theories of general relativity, the nuclear atom, and the hydrogen-to-helium conversion process in stars.

In the 1930's, Subrahmanyam Chandrasekhar's investigation of stellar evolution and structure led him to conclude that, in the process of converting hydrogen to helium, most stars lose energy and contract until internal pressures become great enough to cause collapse of atomic structure. Back in 1924, Sir Arthur Eddington had suggested that the high density of the white dwarf companion of the bright star Sirius was due to "electron degeneracy," with all electrons stripped from individual atoms. Chandrasekhar seemed to provide an explanation of how this could occur.

At this point someone might have pointed to a simpler solution: perhaps the nuclear atom concept was incorrect because of the grave difficulty in explaining the high density of the white dwarfs. Perhaps atoms do not have electrons circling around them at relatively large distances. Perhaps the postulated hydrogen-to-helium conversion process in stars was incorrect. . . .

Chandrasekhar believed that a "non-relativistic gas" at the center of a white dwarf could always adjust itself until the gravitational forces compressing the star are countered. However, according to the theory of general relativity, with a certain limiting mass, the gravitational forces are not countered fully and so the star does not come into equilibrium. The limiting mass, termed the Chandrasekhar limit, has been calculated to be 1.2 solar masses.²

Oppenheimer considered what would happen to stars of mass larger than the Chandrasekhar limit. As the central density increases, inverse beta decay would take place, driving electrons into protons. Thus increasingly rich neutron elements would be formed--giving rise to a "neutron star." Recently astronomers have concluded that the pulsars are neutron stars.

However, it must be pointed out that there is no evidence that pulsars are neutron rich, in the same way that there is no evidence that white dwarfs are electron degenerate. In order to obtain such densities with the nuclear atom concept, those deductions might be correct. But there is an atomic theory, developed by Mr. Larson, that explains such high densities without the use of the nuclear atom. . . .

According to current theory, if the remaining mass exceeds two solar masses, it will continue to contract to a "Schwarzschild singularity," a bottomless pit, a black hole. The properties of a black hole are supposed to be:

1. a gravitational field so strong that not even light can escape, and thus no observer can see any phenomena occurring within the Schwarzschild radius;
2. a curvature of the space-time whirlpool becoming infinite at the central singularity;
3. a circumference of 19 kilometers multiplied by the mass of the hole and divided by the mass of the sun;
4. a mass of between 3 and 50 solar masses;
5. a composition of matter compressed to near infinite density, losing in the process every property of separate identity except mass, electric charge, and angular momentum.

To say the least, such properties are astounding. It is a relief to know that the Reciprocal System, developed by Mr. Larson, contains no such theoretical objects! Here is a brief tabulation of the relevant points of the Reciprocal System:

1. Atoms are not composed of electrons, protons, and neutrons, but are whole units comprised of various rotational motions; at equilibrium there is equality of inward and outward forces on groups of atoms; great compression can take place without "electron degeneracy" or "neutron formation."
2. In the sector of the universe in which we live there are two regions. In the time-space region, gravitation is inward, whereas the space-time progression is outward. In the time region, which lies within unit space, the motions are reversed: gravitation is outward, the progression inward. According to the theory, during a type I supernova explosion, part of the material is dispersed outward in space (to form a red giant star) and part dispersed outward in time (to form a white dwarf). The expansion outward in time is equivalent to a contraction in space--hence the extreme density of the white dwarfs. Type I supernovae occur

because a thermal limit is reached in the energy conversion process taking place. Type II supernovae occur because of a stellar age limit. Here, instead of a white dwarf being formed, a pulsar is formed. The type II process is what ultimately produces the quasars. All of these high speed explosion products--white dwarfs, pulsars, and quasars--originate from expansion in time.

3. A different mechanism of energy generation is postulated, which in turn produces a different pattern of stellar evolution. In the Reciprocal System, stars slowly increase in mass and temperature until the destructive thermal limit of the iron group elements is reached. At this point, a type I supernovae occurs, creating a red giant and white dwarf. Gravity acts in both directions to bring the white dwarf and red giant back to the main sequence. There is no stellar death into a black hole. Simply, a succession of type I supernovae occur until the star reaches its upper age limit and terminates in a type II supernovae, producing pulsars which eventually leave this sector for the space-time region.

What about claims of observation of a black hole? Kip Thorne states that he is 90% certain of a black hole in Cygnus X-1. It seems that its mass is eight times that of the sun--meaning that in current theory, a white dwarf and neutron star are ruled out. However, in the Reciprocal System no such mass limit exists. In fact, it is apparent that the "black hole" in Cygnus X-1, because of its copious emissions of radio waves and X-rays, is really a body that will eventually become a pulsar. It is a product of a type II supernova. At present the periodicity of its radiation is not distinguishable from continuous radiation, but as the high speed explosion product moves outward it will be. Thus here is a test between current theory and Reciprocal System--we predict that this so-called black hole will turn out to be a pulsar, but a pulsar that is more massive than any neutron star could be.

Currently, it is postulated that black holes account for the great mass discrepancy in giant elliptical galaxies. Mr. Larson provides the explanation from the Reciprocal System:

A star pressure is building up in the interiors of the older galaxies; that is, an increasing proportion of the constituent stars are being accelerated to ultra high speeds by the energy released in the explosion of stars that reach the destructive age limit. The cores of these galaxies are thus in the same condition as the white dwarf stars and quasars; their density is abnormally high because the introduction of the time displacement of the ultra high speeds reduces the equivalent space occupied by the central portion of the galaxy. In brief, we may say that the reason for the abnormal relation between mass and luminosity in the giant ellipticals is that these galaxies have white dwarf cores--not white dwarf stars in the core, but white dwarf cores.⁴

It seems that many individuals are intrigued with the term "black hole." Perhaps we could retain this term in the Reciprocal System to denote the location at which mass has left this sector for the inverse sector, the space-time sector!

REFERENCES

1. K. S. Thorne, "The Search for Black Holes," Scientific American, December 1974, p. 32.
2. Martin Harwit, Astrophysical Concepts, (New York: John Wiley and Sons, 1973), p. 359.
3. J. R. Oppenheimer and G. M. Volkoff, "On Massive Neutron Cores," Phys. Rev., 56, 455 (1939).
4. Dewey B. Larson, Quasars and Pulsars, (Portland, Oregon: North Pacific Publishers, 1971), pp. 148-149.

AIDS TO SELF-PACED STUDY OF THE RECIPROCAL SYSTEM
continued from page 8

a good introduction to the Reciprocal System. This is why NSA has arranged to have D. B. Larson's NEW LIGHT ON SPACE AND TIME reprinted in paperback after the first edition was sold out and was no longer available. Similarly, the first edition of THE STRUCTURE OF THE PHYSICAL UNIVERSE by D. B. Larson has been sold out. This will be replaced by a new and better revised edition soon to be available.

Don't try to learn about and understand the Reciprocal System in one sitting, no matter how well or poorly versed in physical science and/or engineering you may be. The better approach is to read and reflect about the Reciprocal System periodically and frequently, even daily and at any rate as often as you can. Even without much previous education you can become well-acquainted with the Reciprocal System by this approach.

If you have had more previous training in science and/or engineering and mathematics and you come to study the Reciprocal System, this will be both an asset and a handicap. It is an asset to know about approaches to knowledge different from the Reciprocal System. It is helpful and even necessary to learning the latter to do so by comparing the Reciprocal System with other approaches. It is a handicap because one of the difficulties for learning about a new truth is the necessity of unlearning what you have come to take for granted as unquestionable to the point of being so when it isn't. The more educated you are, the more you may have to unlearn, if your education has misled you. This is what the man meant who said that: What hurts us is not so much what we don't know as what we know that isn't so.

It is often hardest to make a beginning. You, whoever you are, can learn the Reciprocal System by working at your own pace. The Reciprocal System represents an approach to the study of physics and more advanced science different from the traditional approach. It is different in that the traditional approach is empirical, while that of the Reciprocal System is logical. In the traditional approach emphasis is on experimental facts. In the logical approach emphasis is on basic postulates and generalizations DEDUCED from them. Concentrate on discovering all of the implications of the two Fundamental Postulates of the Reciprocal System and you will

continued on page 15

QUESTION BOX
R. W. Satz, Editor

Dear Professor Meyer,

In your paper "Time of Planetary Perihelion Motion" on page 10 in Appendix 1 for the case of Mercury you considered the formula

$$\pi \frac{v^2}{c^2} = 8.04 \times 10^{-8}$$

and stated that this is in the unit of fraction of a cycle. IS IT POSSIBLE THAT THIS IS AN ERROR? It seems to me that this should be in radians per revolution.

The formula $\pi \frac{v^2}{c^2}$ does not give 43" per century for Mercury's excess perihelion motion. It gives only 7" per century, since $6\pi \frac{v^2}{c^2}$ gives 43" per century. This came to me from reading an article by Ronald W. Satz in RECIPROCITY (Vol. IV, No. 2, page 5, July 1974).

Leonid Sokolow, Castleton, VT 05735

Dear Mr. Sokolow,

Thank you for your letter of May 6 concerning a possible error in my paper, "Time of Planetary Perihelion Motion."

You question whether the units should be radians per revolution rather than fraction of a cycle per cycle (or fraction of a revolution per revolution) in the equation

$$\pi \frac{v^2}{c^2} = 8.04 \times 10^{-8}$$

Your question can be answered best by showing how the result was derived for Mercury's perihelion motion that the perihelion precesses 8.04×10^{-8} fraction of one cycle per cycle of Mercury's orbital motion.

The Reciprocal System explanation of excess perihelion motion attributes it to coordinate time rather than a gravitational effect (which is the Relativity Theory explanation). The two theories are mathematically equivalent for the planets of the solar system, although different in physical conception.

The orbital velocity of Mercury, V , in terms of the velocity of light, C , taken as unity, that is, $V/C = 0.00016$.

The coordinate time of the perihelion excess precession = $V^2/C^2 = 2.56 \times 10^{-8}$. (The clock time thus must be increased by this factor.)

This computed time increase is radial, because the scalar space-time direction of the orbital velocity is outward, while the gravitational motion is inward.

To calculate the precessional space equivalent of this radial time increase multiply 2.56×10^{-8} by $\pi = 8.04 \times 10^{-8}$ fraction of a cycle per cycle.

If we desire to convert this unit to arc seconds per cycle, we must compute the number of arc seconds in a cycle = 3600 arc seconds per degree $\times 360^\circ$ in a cycle = 1.296×10^6 arc seconds per cycle.

Multiply 1.296×10^6 arc seconds by 8.04×10^{-8} and the product = 0.1042 arc seconds per cycle.

If we desire to convert to units of arc seconds per century, then first compute the number of Mercury orbital revolutions per earth year and multiply this number by 100 earth years. Since the period of Mercury's revolution = 87.969 days ≈ 0.24 year (earth), Mercury performs ≈ 4.167 revolutions per earth year, so in 100 years, Mercury performs 416.7 revolutions.

Multiply 0.1042 arc seconds per revolution by 416.7 revolutions = 43.4 seconds of arc length per century, the excess perihelion motion by Mercury, computed from the premises of the Reciprocal System.

If you wish to offer further comment and/or ask more questions about this, I shall be glad to discuss the matter further with you.

The Reciprocal System is a unified comprehensive theory and the best way to reexamine and criticize twentieth century physics. If you have not yet done so, I invite you to join NSA, INC. and join with us in this essential task.

Cordially yours,

Frank H. Meyer, Editor, RECIPROCITY

AIDS TO SELF-PACED STUDY OF THE RECIPROCAL SYSTEM
continued from page 13

be on the way not only to understanding the Reciprocal System but also to competence in evaluating the essential whole of modern and ancient science.

If you have had college undergraduate or graduate preparation in physics and/or engineering and mathematics, and you need aid in beginning to question and unlearn that which you acquired from the traditional approach that is wrong, one way to obtain this aid may be to write Dr. Thomas Phipps, 829 Whann Avenue, McLean, Virginia 22101 and request a reprint of his three-part paper, 'Toward a Fundamental Mechanics.' This also would serve to expose you to a non-empirical approach different from that of the Reciprocal System. Dr. Phipps starts from different insights and axioms (or postulates). To learn the meaning of the Fundamental Postulates of the Reciprocal System, you should keep mulling them over, compare them with alternatives, develop the art of distinguishing and relating among the possibilities.