RECIPROCITY

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CONTENTS OF THIS RECIPROCITY

BUILDING THE RECIPROCAL CORRESPONDENCE CLUB (RCC)
Editorial

RCC, launched in the last issue of RECIPROCITY, is under way and building.

To be understood, the Reciprocal System of physical theory requires continued, persistent study and versatile learning. The richest resource you have for this purpose beyond your own native ability consists of NSA members and your RCC correspondents. Everybody knows more than anybody. And when learning unprecedented knowledge, as the Reciprocal System is, you can accelerate your learning by sharing your gains and problems with students who also are coping with the search for truth. We don't wish it to be said about the Reciprocal System, as has been said of the relativity theory, that no more than half a dozen persons are able to understand it. To learn what is new requires change of attitude. Seldom can any book by itself provoke a change of attitude so well as another human consultant, whether friend or foe. In fact, your best friend may be your bravest enemy, for it is he or she who can keep you on your toes.

In part the material of this issue of RECIPROCITY has been prepared to suggest some facets of the Reciprocal System you may elect to discuss further with an RCC correspondent.

A MODEL OF MOTION EQUILIBRIUM

Dr. Paul F. deLespinasse
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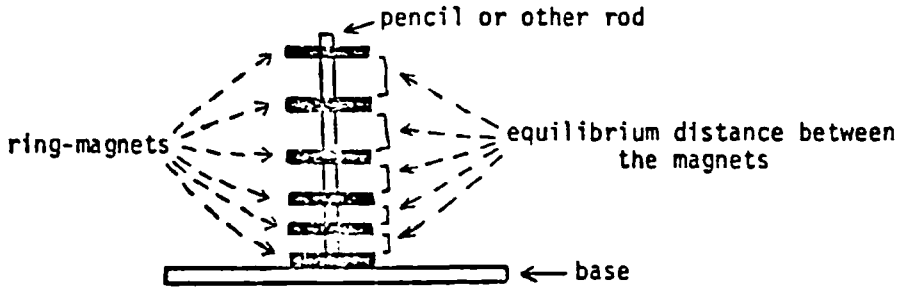
The American College Dictionary defines an equilibrium as a "state of rest due to the action of forces that counteract each other." In Larsonian terms, we may wish to substitute "motions" for "forces."

The concept of an equilibrium comes up in two different forms in my classes. As a political scientist, I spend considerable time teaching basic economic concepts necessary for political analysis, and one of these concepts is that of an "equilibrium price," As a philosopher, I teach a course on The Larsonian Worldview in which we discuss equilibria among atoms in material aggregates, among stars in a galaxy, etc. For both of these purposes a simple physical model of equilibrium appears to be very useful in helping students to visualize what we are talking about.

The model consists of five or six ceramic ring magnets placed around a pencil or other non-magnetic rod in the orientation in which they appear to repel each other. The rod being attached to a base which holds it vertically, the magnets assume stable equilibrium distances from each other at the points where the repulsive magnetic motions are equal to the gravitational motions of the magnets towards the earth which tend (under the circumstances) to bring them together.



This device, incidentally, can also be used to illustrate the difference between a report and an inference. At the first session of my Larsonian Worldview class, I place the model on the seminar table before students arrive, and no one is allowed to touch it before class commences. I then ask each student to observe (but no touch) the model and to write a description of what he sees. Then I depress the top magnet until the magnets are all in contact, and release the pressure allowing them to return to their original positions. Once again the students write down what they have seen. By now they have all caught on that the rings are magnets. Those incautious enough to say that the magnets repelled each other provide an opportunity to point out the difference between what they observed---namely the outward motion of the magnets---and what they inferred or had been trained to read in to this observation. Profound awareness of this distinction is, of course, essential before a person can give Larson's ideas serious consideration.

DEWEY LARSON COMES TO UTAH

As a result of the efforts of NSA member Dr. Roy Curtin, Dewey Larson was invited to lecture at the Eyring Research Institute in Provo, Utah. Mr. Larson spent the morning of January 25 explaining some of the basic concepts of the Reciprocal System Theory to many of the staff members of the Institute. Later that afternoon Dr. Henry Eyring, a distinguished chemist and perhaps Utah's premier scientist, attended the meeting and generated some lively discussion with Mr. Larson. Although Dr. Eyring was understandably guarded in his comments concerning the applicability of the Reciprocal System Theory in his own field, he nevertheless voiced approval for some of Mr. Larson's concepts, notably the originality of using Unity rather than zero as the natural datum.

The bulk of the next day was spent discussing proprietary matters with those members of the institute whose special problems motivated the need for Mr. Larson's visit. Needless to say, NSA members Ron Blackburn and Rainer Huck made the most of Mr. Larson's visit by attending many of the meetings at the Institute. The "great blizzard of '78" although confined mainly to the midwest region succeeded in disrupting air travel to the extent that Mr. Larson suffered several delays on his return flight.

THIRD ANNUAL CONFERENCE OF THE NEW SCIENCE ADVOCATES INC.

The third annual conference of NSA, Inc. will be held in Salt Lake City, Utah, August 25-26, 1978, on the campus of the University of Utah. Air conditioned rooms will be available at the dormitories for $7 per night for singles and $10 per night for doubles. Meals will also be available at the dorms for $8.50 per day. Please notify NSA Treasurer Rainer Huck at your earliest possible convenience regarding your intentions to attend.

Transportation between the airport and campus will be provided to all conferees supplying arrival and departure dates to Dr. Huck. Please communicate these dates as soon as they become finalized.

All individuals wishing to present papers, report on related developments in contemporary theory, or otherwise address the conference should give advance notification, the sooner the better. NSA encourages the participation of all members and officers in the interchange of ideas.

Mid-August temperatures in the Salt Lake Valley tend to be quite hot, although the subjective effect is moderated somewhat by the low average humidity. Light clothing with a jacket for nighttimes should be adequate.

THE EFFECT OF GRAVITATION ON RADIATION

D. B. Larson
Portland, Oregon

As I pointed out in the article on "Reference Systems" published in the Winter 1977-78 issue of Reciprocity, the representation of the physical universe in a three-dimensional spatial coordinate system is not fully in agreement with reality. This system cannot represent some of the properties that do exist, such as motion in time, whereas it portrays some properties of the universe that actually do not exist, such as the directions of scalar motions.

Gravitation, which is purely a scalar motion, simply reduces the scalar magnitude of the distance between the gravitating object A and any space-time location B. There is nothing in this phenomenon itself that gives it a direction in the context of a fixed reference system; that is, nature does not distinguish between a scalar motion of A relative to B, and a similar motion of B relative to A. It follows that when this motion is viewed in the context of the fixed reference system, where the motion must have a direction, this direction is imputed by chance. The motion as seen in the reference system will therefore be divided equally between motion of A toward B and motion of B toward A, even where, as in the case of gravitational action on radiation, all motion originates at the gravitating object A. This issue does not arise where A and B are both masses, as in that case there is a symmetrical distribution of the motion, but it has a bearing on any case where the motion is asymmetrical.

The same effect can be seen in the induction of electric charges. The motion due to the charge, like the gravitational motion, is scalar, and even though it originates with object X, the motion as seen in the fixed reference system is divided equally between motion of X toward (or away from) Y and a similar motion of Y relative to X. The vibrational motion of X then becomes vibration of both X and Y.

WHAT IS TO BE DONE?

Editorial

In preparing for the Third Annual NSA Conference during August 25-26 in Salt Lake City, we should remind ourselves about the decision at the Second Annual Conference in Oxford, Mississippi last year to aim at building local NSA branches.

NSA Locals will be needed in the future to organize a strong, fluorishing RECIPROCAL CORRESPONDENCE CLUB nationally and internationally to educate humankind about the Reciprocal System of physical theory.

Scientific theory can best be judged by its fruit. A ripe fruit of the Reciprocal System is its theory of solid cohesion, which incidentally also brings into sharp question the Rutherford-Bohr nuclear atom model of the atom of matter.

Another notable success of the Reciprocal System is that it has capped the education of Ronald W. Satz, the engineer-inventor-author and National Secretary, NSA. Of course, the Reciprocal System did not invent the Satz engine; Satz did that himself.

Nevertheless, adoption by the United States and the world of the Satz engine will aid and not hinder the opportunity for a wider hearing about the Reciprocal System among humankind. In the best interests of our country and our movement let us all wish Ronald Satz quick success in getting his engine into production.

BOOK REVIEW. Theory and Design of the New Rational Combustion Engine.
Ronald W. Satz, Author. F. H. Meyer, Reviewer.

The present Secretary, New Science Advocates, Inc., and one of its founders, Mr. Ronald W. Satz has invented a new type of engine, the Satz engine (U. S. Patent No. 4,009,573).

R. W. Satz wrote his first book, The Unmysterious Universe, to introduce the Reciprocal System of physical theory to beginning students of the new physics, created by Mr. Dewey B. Larson of Portland, Oregon.

Ronald Satz has now written his second book with the above title about his magnificant invention, the Satz engine.

The engine is a rotary positive displacement hot gas regenerative engine type. It is an original design, of course, for which a patent has been allowed. An early version of the engine was the basis of his Master of Engineering thesis in Transportation Engineering at the Rensselear Polytechnic Institute, 1974. A member of the Society of Automotive Engineers and the American Society of Mechanical Engineers, Mr. Satz has devoted some 10,000 hours to the project.

The book is nearly 500 pages in length and includes 800 equations, 17 figures, 28 engineering drawings, 30 tables, an engine history chronology, a pictorial view, a picture of the model of the engine, a copy of the patent (U. S. Patent No. 4,009,573), and a discussion of the 10 computer programs used in simulating the engine. The copyrighted book is available for $85 from Transpower Corporation.

Satz's major claim is that he has solved the gas turbine temperature problem. As a consequence, he is prepared to guarantee that his engine is more efficient than any existing engine and more efficient than any engine contemplated by other inventors. Satz maintains that his engine will provide twice the fuel economy, half the maintenance, and 3/4 the first cost of the conventional Otto cycle engine. In full production the engine would save Americans an astounding $35 billions a year.

Unlike all previous Brayton cycle engines, the Satz engine has compression and expansion of the working fluid taking place within the same housing rather than two separate housings. This allows much higher temperatures to be used, inasmuch as the mechanism goes from cold to hot and back to cold. Of course, higher temperatures mean higher efficiencies. In the book Satz presents very careful calculations showing that his engine will achieve an overall efficiency of 57%, which compares with 25% for the present Otto-cycle engine.

By adopting the Satz engine the United States cannot make all of the energy problem we face now and in the near future go away. Nevertheless, if the people wish to keep the automobile and light flying vehicles moving ahead within the limit of finite fuel resources, the novel Satz proposal and design, its promise examined and proved, will be worth going with. It will be interesting to see when this promise is taken by some alert leaders of free enterprise amidst business as usual.

BIRTH OF THE NEW PHYSICS

Frank H. Meyer

Member, American Physical Society, American Crystallographic Association
American Association of Physics Teachers, Philosophy of
Science Association, etc.

Mainstream

Contemporary physics is NOT in the mainstream of progressive human thought. This is a FACT, according to recent outstanding leaders of physics and of other natural science, such as Dr. P.A.M. Dirac, Dr. R. Feynman, Dr. George Thomson, Dr. Norbert Weiner, etc.

Dirac (1) said of contemporary physics in 1963:

> "The present stage of physical theory is merely a stepping-stone toward the better stages we shall have in the future. One can be quite sure that there will be better stages simply because of the difficulties that occur in the physics of today .... . There will have to be some new development that is quite unexpected, that we cannot even make a guess about."

Dr. Dirac, a competent mathematical physicist, could not even make a guess about a new development he thought necessitated in 1963. It does not necessarily mean that this new development was in 1963 still in the future.

It is suggested by NEW SCIENCE ADVOCATES, INC. with due humility that the new quite unexpected development which Dr. Dirac anticipated in 1963 was, in fact, publicly announced four years earlier in 1959, when Mr. D. B. Larson published his basic work, THE STRUCTURE OF THE PHYSICAL UNIVERSE. This work does not merely present new physical and logical descriptions of the photon, atom, positron, electron, neutron, neutrino, the cosmic atom ("anti-matter"), etc., but a new unified, comprehensive conception of the physical world. Larson calls the resulting unified physics the Reciprocal System of physics.

The Reciprocal System has been since 1959 and is at the present time the new mainstream of physics.

Success and Failure

No amount of success can save a scientific theory, if it is not entirely true. For then, sooner or later, the theory will fail and its failure settles whether or not the theory still is in the mainstream of physics.

The successes of Newton's mechanics lasted for more than two centuries, although based on the false assumptions that space and time are unrelated to each other and to motion. His mechanics enabled Leverrier to discover the planet Neptune. Yet when

classical mechanics was unable to account for an excess of a mere 43" of arc length per century in the precession rate of Mercury's perihelion, it was thereafter no longer in the mainstream of physics.

The success of Einstein's relativity mechanics in explaining Mercury's perihelion excess rate, will not keep it in the mainstream of physics. Although he corrected Newton's mistaken assumption that space and time are separable from one another, Einstein failed to repudiate Newton's baseless belief that time and space are inseparable from motion. In his book, SIDELIGHTS ON RELATIVITY, Einstein (2) affirmed that "the idea of motion is inapplicable" to space-time.

In fact, motion is the essence of space and time, as disclosed by the Reciprocal System, whose fundamental postulate is that motion is nothing more nor less than a reciprocal relation between space and time. More space and less time mean faster motion. Less space and more time mean slower motion. We challenge those who disbelieve that the Reciprocal System is true to prove correct Einstein's and Newton's contradictions of these elementary propositions of the Reciprocal System.

We, on our part, challenge the vulgar conventional notions that motion is a mere attribute of matter, that hence ONLY things can and do move, that motion without any thing moving is inconceivable and therefore impossible and that space presupposes "the concept of the solid body (3)". Indeed, the existence of the solid body presupposes the physical existence of space and time or motion. The idea of motion is applicable to space and time, since the latter are the very essence of the former.

This is why the most general feature of all motion, velocity ($^{s}/_{t}$) and/or inverse velocity ($^{t}/_{s}$), requires only the specification of space and time. For specific motions, such as light or matter, more than one velocity must be specified. In the case of light, besides the universal scalar constant unit speed of the space-time progression ($c = {}^{1s}/_{1t} = 3 \times 10^{5}$ km/sec), frequency ($\nu = \frac{\text{cycles}}{\text{sec}}$, another speed) must be specified. In the case of the motion or momentum of matter both a velocity (v and an inverse, 3-dimensional velocity, mass ($^{t^3}/_{s^3}$), must be specified, momentum ($^{t^2}/_{s^2}$) itself being a 2-dimensional inverse velocity. Energy ($^{t}/_{s}$) is the 1-dimensional reciprocal to velocity ($^{s}/_{t}$), as can be deduced from Einstein's mass-energy equivalence equation:

$$E\ (^{t}/_{s}) \quad = \quad m(^{t^3}/_{s^3}) \quad c^2\ (^{s^2}/_{t^2})$$

Incidentally, Newton never employed the term 'momentum", employing instead for the product of mass by velocity the phrase 'quantity of motion' of matter.

One cause of the ultimate failure of both the Einsteinian and the Newtonian interpretation of gravitational motion is their unexamined assumption that gravitation is necessarily some kind of an interaction between material particles, whether action by way of a field of gravitational waves or gravitons or action at a distance. It turns out that this assumption is quite unnecessary, since it is untrue.

In fact, gravitational motion involves no interaction (4, Meyer) among material particles, because such motion is rather the result of an intrinsic scalar displacement of each such particle toward all space-time locations, or toward unity in Larson's nomenclature. From the latter concept, derived from his Fundamental Postulates Larson (5) has deduced Newton's Law of Gravitation and the repulsive character of gravitational force in solid cohesion. Although physics textbooks presently still say that gravitational force is always only attractive, no reason has been shown why this is so, because it isn't. Gravitation under certain conditions is attractive and under other conditions is repulsive, just like electricity and also magnetism.

The Reciprocal System explains that the Mercury perihelion excess precession rate is 43 seconds of arc length per century just as well as does Einstein's general relativity mechanics, but it does so on a totally different and more rational basis. According to the Reciprocal System, all of 532 seconds of arc length per century of the Mercury perihelion precession rate is attributable to gravitational motion of the perihelion, the 43 excess seconds being due not to relativity of the planetary mass but rather to the existence of 3-dimensional time. Thus, while 532 seconds of the total rate of 575 seconds is a gravitational effect, deducible equally well from Newton's as from the Reciprocal System's gravitational theory, the 43 seconds is not a gravitational consequence. The Reciprocal System's calculated values of the excess perihelion rates for the other planets of the solar system are in good agreement with the measured values to the extent that the latter are available and also with these values computed from the general relativity equation (6, Meyer).

Why Contemporary Physics Is Not Mainstream

If physics derived from unchecked speculation does not remain long in the mainstream of physics, this is simply because some, but not all, of the assumptions of physical theory eventually have turned out not to be quite true. Physics is concerned with truth about nature. The odds are against deducing truth accidentally from errors lurking in the numerous unconnected theories that hitherto have populated the fields of physics.

The need is to exercise much care in formulating the fundamental postulates of physics in order to tie all of it together. This has not been done outside of the Reciprocal System.

As Richard Feynman (7) observed in 1967:

> "Today our theories of physics, the laws of physics, are a multitude of different parts and pieces that do not fit together very well .... We have all these nice principles and known facts, but we are in some kind of trouble."

Though Dr. Feynman probably would not agree, the Rutherford-Bohr nuclear atom model of the atom of matter is a case in point. This model appears to be taken for granted by most contemporary physicists.

Meanwhile, conclusive evidence has accumulated that the Reciprocal System has deduced an adequate solution of the solid cohesion problem. The space-time

progression force, an unfamiliar but real force, has been identified as the attractive force. This force is distinguished from the repulsive force, which turns out to be gravitational force or motion. All the action occurs within a natural discrete unit of space and results in a stable equilibrium.

An important result of this development of the adequate resolution of the solid cohesion issue is that error is disclosed in the prevailing model of the atom. The error is of so far-reaching a nature as to require rejecting and discarding the model as beyond patching and repair.

The Reciprocal System solid cohesion theory is true, accurate and adequate. The proof is its ability to compute the most characteristic feature of a solid or crystal - nearest neighbor interatomic distance. A few illustrations are presented on the following page. More extensive data are presented in the work of Larson (5) and the forthcoming new edition.

The weight of evidence now requires that questions be asked and doubt be expressed whether the Rutherford-Bohr nuclear atom model is so and in the mainstream of physics. Such doubt is beginning to be voiced:

> "K. Shraeder-Frechette (8) affirms "that a new paradigm seems needed in high energy physics, and that there is no more reason to say that matter is made of elementary particles than to say that it is not."

In actuality abundant reason exists to say that matter is <u>not</u> made of so-called elementary particles such as electrons, neutrons, protons, etc., that an atom has <u>no</u> parts, <u>no</u> nucleus, that the atom does not contradict the law of physics about accelerating charged particles radiating nor the law of electricity that like charged particles repel in inverse proportion to the square of the distances between them.

The nuclear atom model is <u>not</u> the only theory of physics, which while taken for granted, is quite questionable.

Six other uncritically accepted theories not in the mainstream of progressing physics are:

1. The sun generates its radiant energy primarily by fusion of its lightest elements, not at all by fission of its heavy elements.

2. The solar constant has been essentially absolute for more than 2 billion years.

3. Electron and negative electric charge are inseparable. The conductors of electricity in metals are charged electrons.

4. Motion or progression does not apply to space-time.

5. Space-time is a continuum and in no sense made of discrete units or quanta, as matter and energy are.

LARSON EQUATION

TO CALCULATE EQUILIBRIUM INTERATOMIC DISTANCE IN CRYSTALS OF NOBLE GAS ELEMENTS

a		principal magnetic rotation
b		subordinate magnetic rotation
Y		$\ln t = (\log^2 \log b)^{1/3}$
S_o	=	2.914 Y Angstrom units ($\mathring{A}$)

Example: Argon a = 4 b = 3

$S_o = 2.914 (\log^2 a \log b)^{1/3} = \underline{3.76\ \mathring{A}}$

LARSON EQUATION

TO CALCULATE EQUILIBRIUM INTERATOMIC DISTANCE IN CRYSTALS OF MOST CHEMICAL ELEMENTS

a		principal magnetic rotation
b		subordinate magnetic rotation
c		electric rotation
X		$\log^{1/2} c$
Y		$(\log^2 a \log b)^{1/3}$
S_o		equilibrium interatomic distance
S_o	=	$2.914\ Y/X$ Angstroms ($\mathring{A}$)

Example: Rubidium a = 4, b = 4, c = 2

$S_o = 2.914 (\log^2 a \log b)^{1/3} / \log^{1/2} c = \underline{4.85\ \mathring{A}}$

6. Compact ultra-dense astronomical objects such as white dwarf stars, pulsars, quasars, etc. are due to gravitational collapse, not the results of explosive expansion in time.

Why the Reciprocal System is Mainstream

Dr. A. Einstein (9), perhaps the most visionary physicist of his generation, outlined a program for building mainstream physics in the following:

> "From the very beginning there has always been present the attempt to find a unifying theoretical basis for all these single sciences, consisting of a minimum of concepts and fundamental relationships, from which all the concepts and relationships of the single disciplines might be derived by logical process. This is what we mean by the search for a foundation of the whole of physics .... Some physicists, among them myself, cannot believe that we must abandon, actually and forever, the idea of direct representation of physical reality in space and time."

The Reciprocal System is the appropriate answer to the above challenge of Einstein. The Reciprocal System is proof that humankind can achieve "the idea of direct representation of physical reality in space and time".

The objective of mainstream physics is the attainment of a unified general physics.

Difficult questions must be asked, thought about, examined:

What is the fundamental component of the physical universe? Is it matter and fields? Is it motion? Is it space and time?

The prevailing view has been that the physical universe is made of some stuff. The unity of the world exists in its materiality. This leads to the conjecture that the physical world should be analyzable into elementary particles. Quantum mechanics and relativity mechanics are committed to the paradigm that the physical world at least must be a world of things, reducible to elementary particles.

This view is increasingly questioned, doubted and disbelieved. Dr. Norbert Weiner (10) voiced the evaluation of it:

> "There is a general feeling that the multiplicity of fundamental particles in physics is untolerable and is bound to be replaced in the near future by a much more unified physics in which both quantum theory and relativity are to be recast."

Dr. George Thomson (11), son of Dr. J. J. Thomson, both Nobel laureates in physics, expressed a similar dissent:

> "There is some new idea wanted to make these new pieces fall into place in the puzzle .... When the idea comes, it may very probably involve a recasting of fundamental ideas and the abandonment of something we now take completely for granted."

Dr. David Bohm (12), a thoughtful physicist expressed this critical dissent:

> "....our physical theories are at present in a state of flux, that may lead to radical changes in them such that current fundamental ideas, based on measure and metric, may also have to be replaced by new ideas, based on order .....
>
> "There is no thing in the universe."

The Reciprocal System postulates that matter is one form of motion and that motion without matter also exists. It answers that the fundamental component of the physical universe is motion or space-time.

The new physics of the Reciprocal System is expressed in two Fundamental Postulates, from which all else follows, specifically a theoretical physical universe which at this time is in no known disagreement with the existing physical universe.

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.

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

More work remains to be done to develop and apply the mathematics, the native language, of the Reciprocal System. While recognizing the desirability of evolving this kind of mathematics to describe the actual physical world, Dr. A. Einstein (13) did not believe anyone could do it.

> "From the quantum phenomenon it appears to follow with certainty that a finite system of finite energy can be completely described by a finite set of numbers (quantum numbers). This does not seem to be in accordance with a continuum theory, and must lead to an attempt to find a purely algebraic theory for the description of reality. But nobody knows how to obtain the basis of such a theory."

Four years after Einstein published this comment Mr. D. B. Larson (5) published his work, in which among many other results he showed how to obtain the basis of an algebraic theory for the description of physical reality.

Development of the mathematical side of the Reciprocal System can and will accelerate the creation of mainstream physics, which all natural philosophers have been seeking on earth.

References

1. Dirac, P.A.M. Scientific American, May, 1963.

2. Einstein, A. Sidelights on Relativity. Methuen and Co., Ltd., 1922.

3. Einstein, A. Ideas and Opinions. Laurel Edition, 1954.

4. Meyer, F. H. Gravitational Motion: An Interaction? J. of Minnesota Academy of Science. 41, 40, 1975.

5. Larson, D. B. The Structure of the Universe. North American Publishers, 1959.

6. Meyer, F. H. Time of Planetary Perihelion Motion.

7. Feynman, R. The Character of Physical Law, MIT Press, Cambridge, MA, 1967, pages 80 & 166.

8. Shraeder-Frechette, K. Atomism in Crisis: An Analysis of the Current High Energy Paradigm. Philosophy of Science. 44, 3, September, 1977, p. 409-440.

9. Einstein, A. Out of My Later Years. Philosophical Library, Inc. New York, 1950, pp. 99, 110.

10. Weiner, N. The New Scientist, January 23, 1964.

11. Thomson, G. The Atom (Fifth Edition), Oxford University Press. London, 1956, p. 184.

12. Bohm, D. In Waddington, (Ed.) Toward a Theoretic Biology, Edinburgh University Press. 1969.

13. Einstein, A. The Meaning of Relativity. Princeton University Press, 1955. pp. 165-166.

Table II

From D. B. Larson, THE STRUCTURE OF THE PHYSICAL UNIVERSE
p. 35, 1959

Group	Z	Element	2D Rotations	1D Rotations	Interatomic Distance		
					Calculated Å	Calculations Checked Å	Observed Å
2B	11	Sodium	3-2 1/2 3-3	2	3.72	3.72	3.72
	12	Magnesium	3-2 1/2	2 1/2	3.16	3.16	3.20
	13	Aluminum	3-2 1/2	3	2.85	2.89	2.86
3A	19	Potassium	4-3	2	4.49	4.52	4.50
	20	Calcium	4-3	2 1/2	3.95	3.93	3.98
	21	Scandium	4-3	4	3.18	3.19	3.21
	22	Titanium	4-3	5	2.95	2.96	2.92
3B	37	Rubidium	4-4	2	4.85	4.85	4.86
	38	Strontium	4-4	2 1/2	4.27	4.22	4.28
	39	Yttrium	4-4	3 1/2	3.62	3.61	3.66
	40	Zirconium	4-4	5	3.18	3.18	3.23
4A	55	Cesium	5-4, 4 1/2-4	2	5.23	5.25	5.24
	56	Barium	5-4	3	4.26	4.27	4.34
	57	Lanthanum	5-4, 4 1/2-4	4	3.70	3.71	3.74
	58	Cerium	5-4	5	3.52	3.53	3.55
4B	90	Thorium	4 1/2-5	5	3.52	3.54	3.56

Table III

From D. B. Larson, THE STRUCTURE OF THE PHYSICAL UNIVERSE
p. 38, 1959

Group	Z	Element	2D Rotations	1D Rotations	Interatomic Distance		
					Calculated	Calculations Checked	Observed
3A	23	Vanadium	4-3	6-10	2.62	2.64	2.63
	24	Chromium	4-3	7	2.68	2.70	2.72
	24	Chromium	4-3	10	2.46	2.48	2.49
	25	Manganese	4-3	8	2.59	2.60	2.56
	26	Iron	4-3	8 1/2	2.56	2.57	2.57
	26	Iron	4-3	10	2.46	2.58	2.48
	27	Cobalt	4-3	9	2.52	2.54	2.515
	27	Cobalt	4-3	10	2.46	2.48	2.50
3B	41	Niobium	4-4	6-10	2.83	2.84	2.85
	42	Molybdenum	4-4, 4-5	10	2.73	2.73	2.72
	43	Technetium	4-4, 4-5	10	2.73	2.73	2.735
	44	Ruthenium	4-4, 4-5	10	2.73	2.73	2.765
	45	Rhodium	4-4	10	2.66	2.66	2.63
4A	59	Praseodymium	5-4, 5-5	5	3.61	3.61	3.64
	60	Neodymium	5-4, 5-5	5	3.61	3.61	3.62
	62	Samarium	5-4, 5-5	5	3.61	3.61	3.59
	63	Europium	5-4, 5-5	1-5	4.06	4.06	4.08
	64	Gadolinium	5-4, 5-5	5	3.61	3.61	3.59
	65	Terbium	5-4	5	3.52	3.53	3.54
	66	Dysprosium	5-4	5	3.52	3.53	3.54
	67	Holmium	5-4	5	3.52	3.53	3.52
	68	Erbium	5-4	5	3.52	3.53	3.50
	69	Thulium	5-4	5	3.52	3.53	3.48
	70	Ytterbium	5-4, 4 1/2-4	1-5	3.87	3.87	3.87
4B	92	Uranium	4 1/2-5	10	2.95	2.96	2.97
	92	Uranium	41/2-41/2	10	2.88	2.89	2.85