A JOURNEY TOWARD PHYSICAL TRUTH

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"The sciences now have masks on them; if the masks were taken off, they would appear supremely beautiful."

Descartes, 1619

Abstract

The original notes, transparencies and slides underlying this paper were prepared for a talk to be delivered at the Mathematics and Physics Lecture Series of the University of Northern Iowa at Cedar Falls on April 10, 1984, following a kind invitation by Professor H. C. Myung and his colleagues. Regrettably, the unexpected death of my mother in Italy precisely during the period of my scheduled talk, prevented my delivering it. Subsequently, I was forced to terminate all research on the topic outlined in this paper because of a number of circumstances, such as the termination of research support from the U. S. Department of Energy, and the systematic rejection by the National Science Foundation, the Department of Energy and other U. S. Governmental Agencies, of a truly considerable number of experimental, theoretical and mathematical applications submitted by our Institute on behalf of senior scholars on fundamental open problems underlying the topic of this paper. More recently, Professor P. Bandyopadhyay and S. Roy of the Indian Statistical Institute invited me to deliver a talk at their International Conference of 1985. Unfortunately, I was unable to deliver the lecture despite the availability of travel funds from India. My involuntary termination of research had turned, in the meantime, into a voluntary form of protest against the extremes of manipulatory practices on fundamental physical issues and sheer scientific corruption currently afflicting high levels of the academic community, as well as against an incredible lack of governmental interest in monitoring scientific ethics in basic research. These deplorable aspects of the current scientific scene have been amply reviewed and documented elsewhere, and they will not be considered in this note [although their knowledge appears to be a prerequisite for a truly deep appraisal of the scientific contents of this note]. I would like to thank friends and member of The Institute for Basic Research for preparing this brief and nontechnical summary of available notes and transparencies, for appearance in the Proceedings of the 1985 Calcutta Conference. Needless to say, I am solely responsible for the contents of this paper. I would like also to thank the Jet Propulsion Laboratory for providing a beautiful collage of slides from NASA missions in the Solar system along which the original talk was patterned. I would also like to thank NASA for authorization to reprint their slides.

1. THE BEGINNING OF THE JOURNEY.

Fellow Colleagues, welcome on board the spaceship "Discovery" which is ready to take—off for a journey throughout the Solar System. The objective of our mission is the pursuit of physical truth via a free, unobstructed and direct observation of Nature. In particular, we shall investigate the limitations and possible generalizations of currently available relativities [Galilei's, Einstein's special and general relativities], as well as the now vexing problem of reconciling available unitary/reversible doctrines in particle physics, with the manifestly noncanonical/irreversible character of our macroscopic physical reality.

For these purposes, most of the physical and mathematical knowledge accumulated by mankind until now has been stored in the memory banks of our spaceship computers, and it is available to you via your individual terminals.

Fellow colleagues, please fasten your space—seats. The countdown has started. We are about to take off.
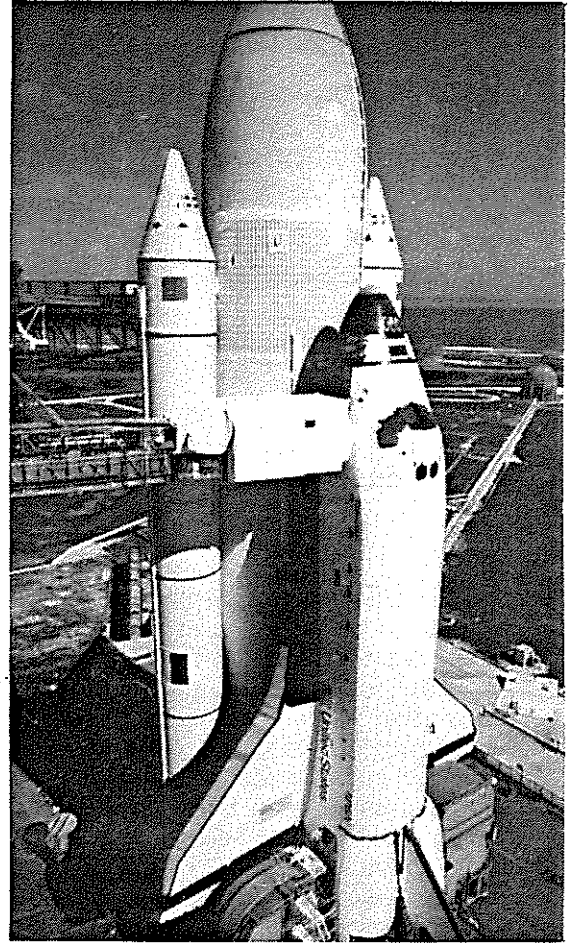
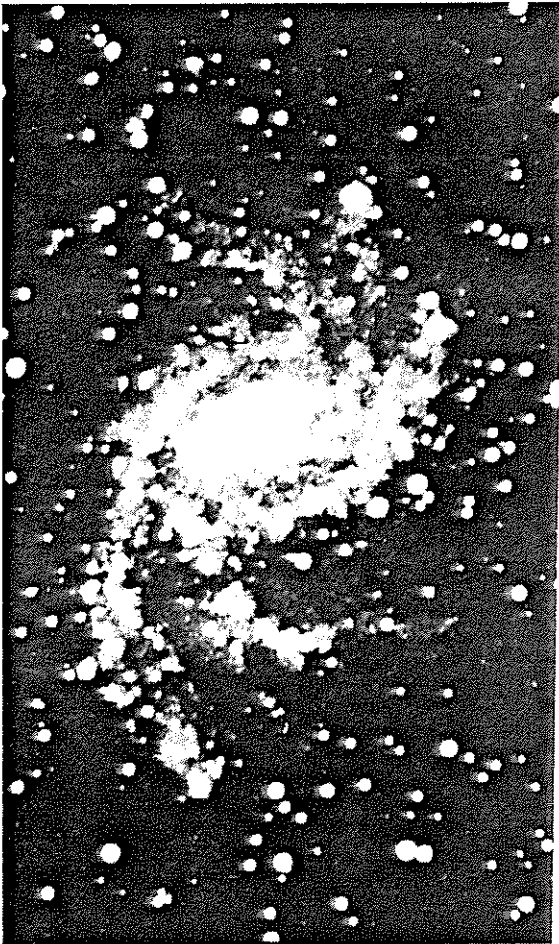
. . . . 7, 6, 5, 4, 3, 2, 1.
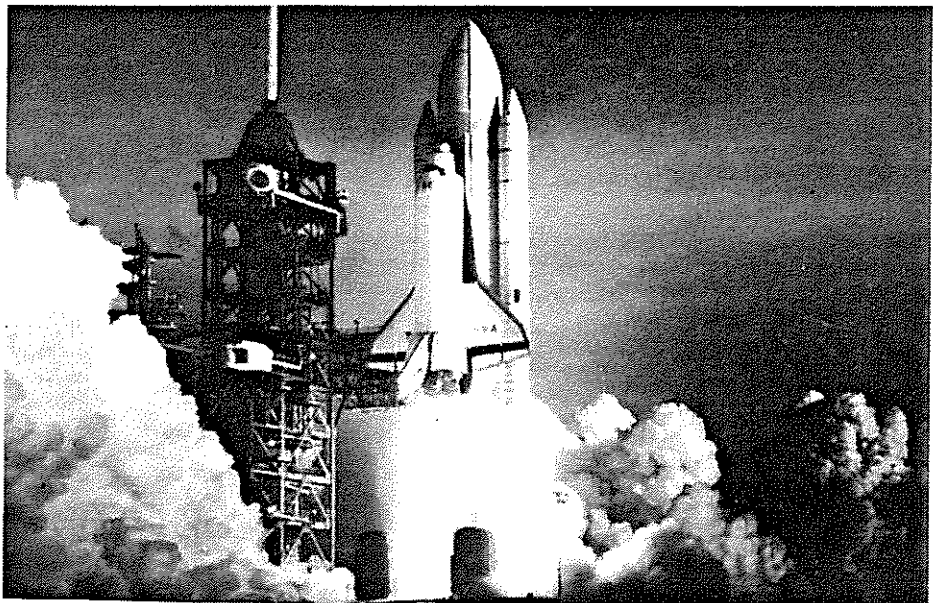
8. THE LAST GUIDANCE SHEET.

Fellow colleagues, please open your last Guidance Envelope. As you can see, its contents tells you that:

OUR TRIP HAS NO RETURN.

We are heading for other far—away stars and galaxies.

It could not be otherwise, for every advancement in human knowledge is a trip without return.

Interstellar space is of a vastity beyond our imagination, but, ..., do not dispair, for

WE SHALL BE SCIENTIFIC COMPANIONS FOREVER.

Ruggero Maria Santilli
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February, 1984

Look at the proliferation of data in your monitors supporting this deplorable occurence, such as the following theorems [which can be readily proved by a graduate student in physics or applied mathematics] :

THEOREM 1. Under sufficient continuity conditions, there can be no map [quantization] of a noncanonical/nonhamiltonian system into a collection of unitary/Hamiltonian systems; and, viceversa, no [finite] collection of unitary/Hamiltonian particles can result, under the correspondence [classical] limit, into a noncanonical/nonhamiltonian system.

Restated in simpler terms, macroscopic objects under decaying dynamical conditions, such as our probe, simply cannot be reduced to a collection of particles constituents each of which has a stable trajectory.

THEOREM 2. Under sufficient continuity conditions, a Galilean/Lorentzian form—NON—invariant system cannot be reduced to a collection of Galilean/Lorentzian form—invariant systems; and, viceversa, no [finite] collection of Galilean/Lorentzian form—invariant systems can yield a Galilean/Lorentzian form—NON—invariant one.

In simple terms, a collection of particles, each of which verifies the conventional rotational symmetry, simply cannot result into a system whose angular momentum is continuously varying.

THEOREM 3. Under sufficient continuity conditions, an irreversible classical system cannot be reduced to a collection of reversible trajectories for its particle constituents; and, viceversa, a [finite] collection of reversible particle trajectories cannot result in a macroscopic irreversible event.

In other words, the idea that the irreversibility of our probe is only "illusory" and disappears under reduction of the system to its elementary constituents, is nothing but a manifestation of a studious adulteration of physical evidence ultimately motivated by uncontrolable academic—financial—ethnic greed. Point—like wavepackets exist only in the mind of corrupt academicians, but not in the physical reality. The EXTENDED character of a macroscopic object and its CONTACT/NON-HAMILTONIAN interactions essentially persist in the reduction of the object to its particle constituents, such as protons and neutrons. In fact, those particles too have a clearly extended character which must be taken into consideration when moving within a medium composed of other particles, as occurring in the interior of the sun. The further reduction of protons and neutrons to their constituents leaves the chain essentially unchanged because dimensionless objects can exist in certain geometrical abstractions, but not in the physical reality.

Once these simple physical truths are seen, a vast horizon of possible physical advances exist at the boundary of our imagination and beyond.

All these possible advances are now left to you, fellow colleagues. You have acquired the knowledge and seen the light.

Good luck in your endeavor. May God help, guide and illuminate you toward higher and higher achievements of human knowledge.
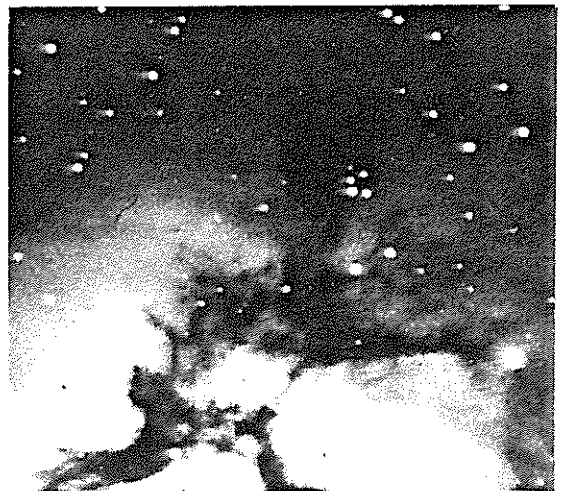
We have lift—off. Our journey has started. We are now in phase of rapid acceleration. Soon we will be out of Earth's atmosphere.

Please give a last look at Cambridge, U. S. A., Geneva, Switzerland, and other places renowned for their academic institutions and research laboratories. We are about to leave their academic politics behind us, and to conduct an unobstructed pursuit of novel physical knowledge.

We have now left Earth's atmosphere and are rapidly approaching the Moon. Look! We have just passed the Moon. We are now in interplanetary space.

Fellow colleagues, please give a last look at our small and faraway Earth. Finally, we are free scientists.
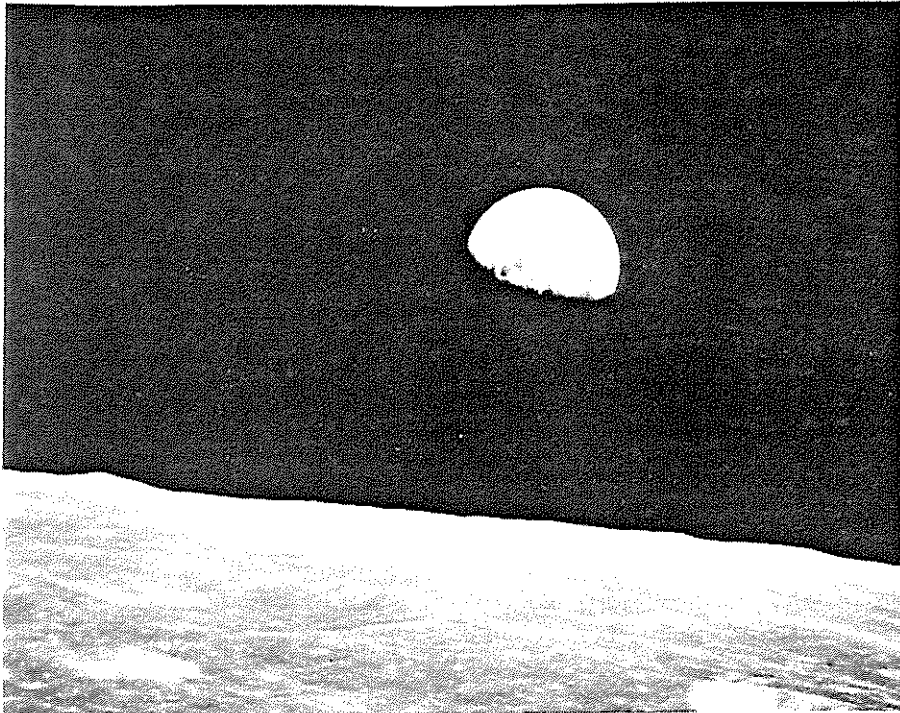
2. A PERIOD OF STUDY AND MEDITATION.

The first objective of our scientific mission is a direct observation of the Jovian system. The journey to our observational post will demand a long period of time.

Please open—up your Guidance Envelope Number One. You will see the suggestion to use this time for the review of Galilean, special and general relativities, not as presented by contemporary academicians in the field [for their scientific ethics is often dubious because of evident vested interests in the theories], but as presented by their originators [for they gained a towering post in human history, not only because of their scientific vision, but also because of their ethical standards that transpares from their writings to this day]. You are suggested to give priority to the ultimate conceptual foundations of the theories. We can readily express them via the most advanced possible mathematics by means of our in—board computers.

Your Guidance Sheet Number One recommends to begin your studies with the original contributions of the Founding Fathers of contemporary mechanics. Among the extensive

reference list available in your monitor, you will note insistent recommendations to read Galilei [1538], Newton [1687], Euler [1736], Lagrange [1788], Hamilton [1834], Jacobi [1837], and others. ·

You are urged to identify, within these writings, the ultimate conceptual foundations of the contemporary, classical, Galilean relativity, that is,

A form—invariant description of objects [such as Jupiter] approximated as MASSIVE POINTS, while moving in EMPTY SPACE, under ACTION—AT—A—DISTANCE INTERACTIONS [e.g., of gravitational type] WITHOUT COLLISIONS.

You are urged to compare these physical conditions with the much broader conditions of what is today called "Newtonian Mechanics", this is, a mechanics characterized by an endless variety of local and non—local forces which are not necessarily of action—at—a—distance character [such as the contact—resistive forces due to the motion of extended objects within resistive physical media].

In this way you can identify the limitations of Galilei's relativity, which, in turn, are a prerequisite for the construction of possible generalizations.

Your Guidance Sheet insists on your entering into a technical analysis of the limitations of Galilei's relativity vis—a—vis the vastity of Newtonian mechanics at large. You will see specific references to the irreconcilable differences between the canonical/Hamiltonian character of Galilei's relativity as compared to the generally noncanonical/nonhamiltonian nature of the trajectories of the physical reality, such as motion of extended objects within resistive media.

On your monitor, you can also see a specific reference to the distinction between the "truncated" Lagrange's and Hamilton's equations and Liouville's theorem, as presented in the physical and mathematical literature of this century, and the original Lagrange's and Hamilton's equations [which were specifically conceived with external terms to represent nonlagrangian/nonhamiltonian forces], as well as the original Liouville theorem [which was conceived to be compatible with Lagrange's/ Hamilton's equations WITH external terms, thus resulting into a general noncanonical structure].

Your Guidance Sheet Number One also recommends you to identify the mathematical structure of Galilei's relativity, and prove its incompatibility with that of Newtonian mechanics at large. You can see in this way the familiar canonical realization of Lie algebras, as far as Galilei's relativity is concerned, vz the generally non—Lie character of the brackets of the

time evolution law of Hamilton's equations with external, nonpotential, terms. You will also see the covering Lie—admissible character of these brackets following a generalization of Lie algebras originally conceived by Albert [1948], and subsequently identified as applicable to Newtonian mechanics at large [Santilli, 1968].

Your computer terminal can then readily establish the inapplicability of Galilei's relativity to Newtonian mechanics at large under the sole condition that the mathematical algorithms admit a realization in the frame of the observer. In this way, you can see, e. g., the violation of the integrability conditions of the Lie—Koenigs theorem for the reduction of given nonhamiltonian equations to a Hamiltonian form whenever the class of admissible transformations is restricted to contain the frame of the observer.

Once you have absorbed in the necessary technical details all these [and several other] aspects, you will be ready for a direct observation of the Jovian system from a Galilean—Newtonian viewpoint, and then for your own pursuit of novel advances.

But, ... be ware! Do not forget all those flashing lights on your monitor! They alert you for open problems, such as the local—differential character of Galilean theories resulting from the point—like approximation of objects, as compared to the generally nonlocal/integral character of Newtonian mechanics resulting from motion of extended object in resistive media; the currently unknown topology for nonlocal/integral formulations of dynamics; and several other fundamental open problems in mechanics. Only when you have reached these ultimate frontiers of scientific knowledge, you will be truly ready for a direct observation of the Jovian system.

Your Guidance Sheet then recommends you to pass to the study of the original contributions by the Founding Fathers of the Special Relativity, such as Lorentz [1904], Poincaré [1905], Einstein [1905] and others. You are suggested to verify the preservation, within the context of the special relativity, of the conceptual foundations of Galilei's relativity regarding.the point—like character of the particles admitted, their motion in empty space, and the restriction of the admitted forces to those of action—at—a—distance character.

For the purpose of identifying the [classical] limitations of the theory, you are suggested to study the literature on the manifest incompatibility of the special relativity with the theory of elasticity at large and, in particular, with the dynamical behaviour of extended, deformable bodies moving within resistive physical media [a limitation so studiously ignored by contemporary physicists on Earth].

You are then suggested to continue this first phase of study by reading Einstein's original contributions on gravitation, with particular emphasis on Einstein's doubts concerning the right—hand—side of his equations [which he compared to a house made of "base wood"], vs. the maturity of the left—hand—side for the EXTERIOR problem [which he compared to a house made of "fine marble"].

You should study the limitations of the general theory of relativity for the INTERIOR problem, as limpidly stated by the originators, because expressing a crude approximation of an astrophysical object as a perfect gas of point—like particles.

Fellow colleagues, our interplanetary journey to the Jovian system is about to end. We are approaching our first, direct, observational post.

3. . THE MAJESTIC BEAUTY OF GALILEI'S VISION.

Look! We have the privilege of experiencing a direct, near—by observation of the Jovian system as it first appeared to Galilei centuries ago.

We cannot but feel a sense of awe at the
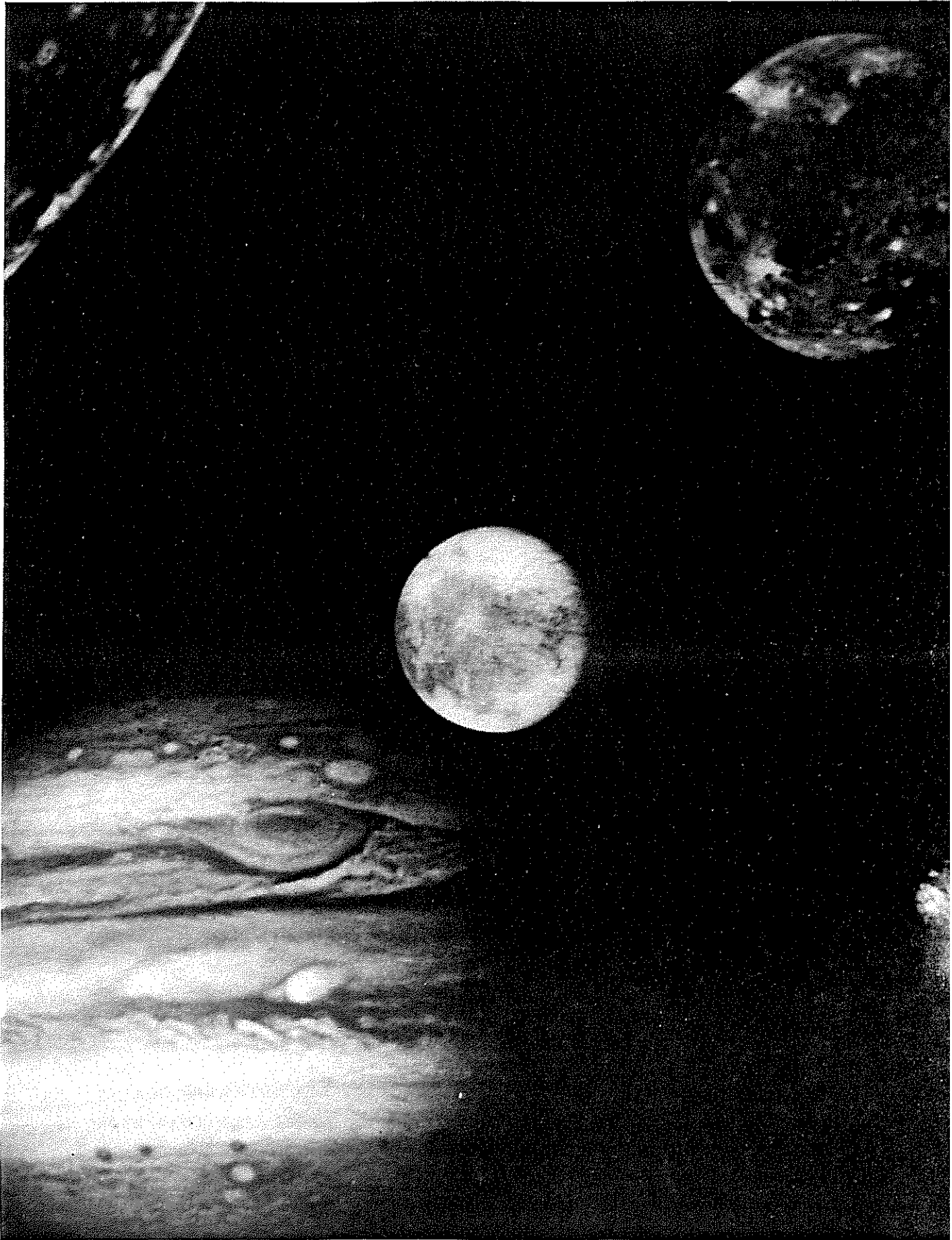
majestic beauty of Nature. We cannot but feel a sense of respect and admiration toward Galilei's scientific vision.

Yes, our direct experimental observation confirms the validity of Galilei's relativity for the dynamical evolution of the Jovian system. In fact, by ignoring the rest of the Solar System in first approximation, we can directly verify the validity of the ten Galilean conservation laws, as well as of the potential/Galilean—form—invariant character of the mutual gravitational forces, and we shall write

$$\begin{cases} \dot{I}_k = 0, \quad k = 1,2,....,10 \\ m_i \, \ddot{r}_i = f_i^{SA}_{GFI}, \\ \quad i = 1,2,.......,N \end{cases} \tag{1}$$

where: SA stands for Helmoltz's [1887] characterization of the potential forces via the notion of [variational] Self Adjointness; and GFI represents Galilean Form—Invariance as the ultimate syntesis of the relativity.

Note the standing green light on your monitor next to Eqs. (1). It means that no inconsistency and/or unresolved problematic aspect exists for the applicability of Galilei's relativity to the physical conditions under consideration here.

The relativistic generalization of the Galilean theory is today straightforward, and you can study it via a variety of techniques available at your terminal, such as that of group expansion.

Again, we cannot feel but a sense of respect and admiration for the Founding Fathers of the special relativity. Thanks to their efforts, our computers can now extrapolate the dynamical conditions of one of Jupiter's moons, say, Europa, to [a classical approximation of] the relativistic conditions of ONE electron of an atomic structure, or, much along the same lines, of ONE charged particle, such as a meson, while moving in a particle accelerator. There is no doubt that, for the conditions
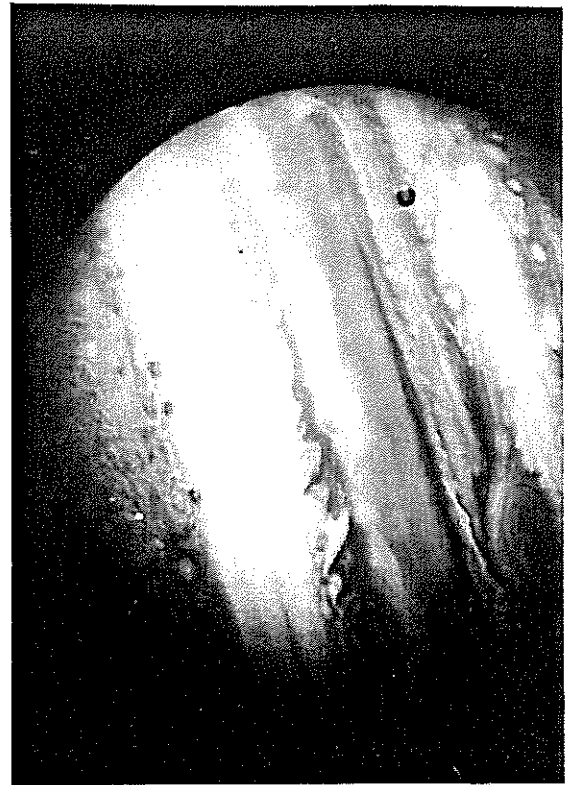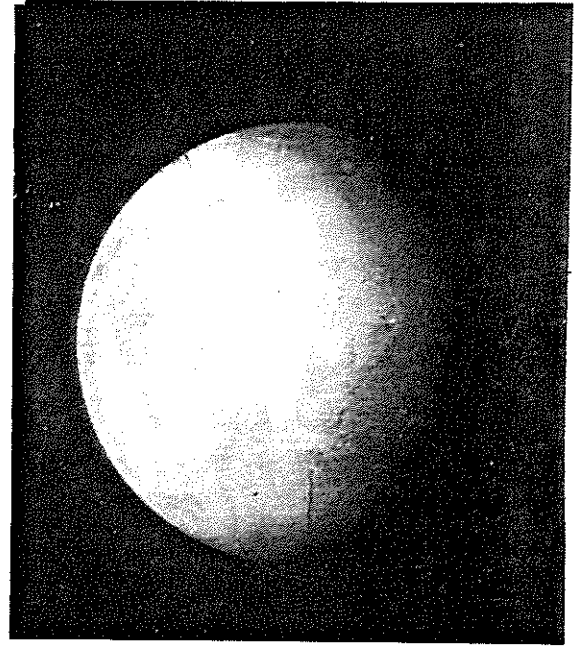
under consideration here [ONE charged parti-cle moving in vacuum under an external electromagnetic field], the special relativity is indeed valid.

Yet, our deeply respectful sentiments for Lorentz, Poincaré, Einstein and other Founders of the special relativity, cannot suppress the need for further advances. To be scientists, we must keep in due consideration all fundament-al, unresolved, problematic aspects of the spec-ial relativity.

Look at your monitor . You will see a blinking yellow light whenever considering classical·relativistic systems of particles. It sig-nals the existence of important open problems without their ultimate resolution as of now. Look at the list of references below the blink-ing yellow light. They are all dissident papers.

By scanning them, you can identify, most visibly, the apparent inability of the special relativity to represent interactions, whenever a SYSTEM of particles is considers, i.e., the so—called no—interaction theorem. A number of additional papers identify the inability of the special relativity to represent the deformation of extended particles under sufficiently in-tense, external fields. Other papers point out the breakdown of the mathematical founda-tions of the special relativity [beginning with its topology] for the nonlocal/integral dyna-mics of extended particles moving within re-sistive media. The long list of dissident views then continues with other aspects, such as the still unresolved dichotomy between the Max-wellian and the Ampere—Neumann electro-dynamics [Graneau, 1982; Phipps, 1980, et al.]

The list of dissident contributions in the technical literature is too long to be outlined here even briefly. One aspect is·however im-portant for this presentation. You see, you are not looking at an adulterated article from a famous institution at Earth, where qualified, at times major, problematic aspects are carefully ignored via a smoke—screen of psuedo—techni-cal language. Our spaceship has been conceived for true scientific democracy. You simply can-not erase from your monitors the list of dissi-

dent papers on the special relativity. You sim-ply cannot shut—off the blinking yellow light.

You are now requested to consider the gravitational level of treatment of the Jovian system so majestically displayed in front of your eyes. For this, we begin with the exterior treatment of the Jovian system offered by Einstein's field equations

$$G_{\mu\nu} = 0, \qquad (2)$$

where in the right—hand—side we·have ignored the matter tensor $M_{\mu\nu}$. [because it is appli-cable only for the interior problem], and we have assumed in first approximation that the total electromagnetic tensor $T_{\mu\nu}$ is null [because the total charges and magnetic mo-ments of Jupiter as well as of its moons pro-vide only higher order corrections].

Eqs. (2) represent an ultimate hope by Einstein: to reduce the gravitational field in the exterior problem to pure geometry without source.

But, look at what happens to your moni-tors whenever Eqs. (2) appear! Look at the red blinking light! It signals the existence of unresolved technical problems. Look at the long list of dissident contributions!

As an example, you can study the life—long research by Yilmaz [1957] to show that Einstein's field equations should be implement-ed with the addition in the right—hand—side of the stress—energy tensor of matter $k_{\mu\nu}$ to read

$$G_{\mu\nu} = c\, k_{\mu\nu}, \qquad (3)$$

This modification appears to be necessary to achieve compatibility of gravitation with the Hamiltonian character of Galilean treatments as well as for numerous additional reasons.

You should also be aware of the contribu-tion by Santilli [1974] who proved that, under the assumption of a null TOTAL electromagne-

tic phenomenology [null total charge, null total electric and magnetic moments, etc.], the value of the electromagnetic tensor $t_{\mu\nu}$ originating from all charged constituents of matter is so large to be of FIRST–ORDER nature. The studies here considered also show that, owing to the extremely large number of charged constituents of matter at all levels of structure [molecular, atomic, nuclear and sub-nuclear], as well as their high dynamical conditions, the electromagnetic tensor $t_{\mu\nu}$ can account for the entire gravitational mass of macroscopic objects.

According to these studies, Einstein's equations (2) are incompatible with nature, and should be replaced with the form

$$G_{\mu\nu} = c\, t_{\mu\nu}, \qquad (4)$$

Look at the dichotomy on your computer monitors regarding

- Einstein's hope of reducing gravity to pure geometry without source in the exterior problem; on one side, and

- the charged structure of matter with consequential, long–range, first–order field propagating outside macroscopic objects, on the other side.

You will note the irreconcilable incompatibility of these two aspects, in the sense that

★ either you accept Einstein's hypothesis of pure geometry in the exterior gravitation without source, in which case you must prove Maxwell [as well as Ampere–Neumann] electrodynamics as fundamentally wrong; or

★ you accept Maxwell [or Ampere–Neumann] electrodynamics, in which case Eqs. (2) are unacceptable already at first–order because of the physical reality underlying Eqs. (4).

There simply is no compromise known at this time.

In summary, our direct observation of the Jovian system has given us the opportunity of verifying the following aspects of our current knowledge on the exterior treatment of closed systems of particles moving in a vacuum under mutual action–at–a–distance interactions without collisions:

1) The validity of total conservation laws and of Galilei's relativity;

2) The validity of the special relativity for the characterization of each individual constituent;

3) The local validity of the rotational and of the Lorentz symmetry for any stable trajectory;

4) The existence of problematic aspects not yet fully resolved at this moment regarding the validity of the special relativity for the classical treatment of a system of particle;

5) The validity of the Riemannian geometry [left–hand–side of Eqs. (2)], compared to the irreconcilable incompatibility of Einstein's gravitation with the charged structure of matter and several other inconsistencies.

4. THE MANIFEST INSUFFICIENCIES OF AVAILABLE DOCTRINES FOR THE INTERIOR CLASSICAL PROBLEM.

So far, we have done nothing but look at a planet as conceived by Galilei, Newton and Einstein, that is, as a MASSIVE POINT. But, despite our genuine sentiments of respect for our scientific Fathers, science cannot die with them. We must go ahead and look for possible fundamental advances.

It is evident that planets are not massive points. They evidently have an internal structure. We MUST inspect the dynamics of such an internal structure and find out whether or not it is compatible with available relativities.

Fellow colleagues, we are now entering into the second phase of our mission. Please open–up your Guidance Envelope Number 2. The first recommendation you will find is to

fasten your space—seats again. Our pilots have initiated a rather difficult trajectory within the upper layers of Jupiter's atmosphere. It is a risky leg of our journey, but we must do it, for no advancement in human knowledge can be achieved without risks.

Look, we are rapidly approaching Jupiter. Details of its inner structure are becoming clearer and clearer.


We have now reached our conditions of direct observation of the interior problem. WHAT DO YOU SEE? It is evident! We see something profoundly more complex than the comparatively simpler exterior dynamics. In particular, we see vortices in the Jovian atmosphere with CONTINUOUSLY VARING ANGULAR MOMENTA. Good—by simplicity of stable trajectories and conservation laws!

But, our observation is still insufficiently deep. We must penetrate into the Jovian system deeper and PERSONALLY experience the dynamics of the contact forces. This is the risky leg of our journey.

Look, we have left the safety of the action—at—a—distance interactions and are now entering within the upper layers of the Jovian atmosphere. Be prepared of our spaceship becoming a ball of fire. At that time, we will temporarily lose any contact with the outside world. Nevertheless, on board sensors will characterize our dynamics in all details right into your individual monitors.

Yes, fellow colleagues, our spaceship is about to become a part of the interior dynamics of Jupiter.

Look! We have CONTACT with Jupiter's atmosphere. Penetration within the interior dynamics has started with a massive electric discharge, followed by fierry fire. We are now PERSONALLY EXPERIENCING THE CONTACT INTERACTIONS of our spaceship within the interior of the Jovian structure. This phase of deceleration will be followed by another phase of rapid acceleration and exit from the Jovian atmosphere thanks to the spaceship engines working at maximum power.
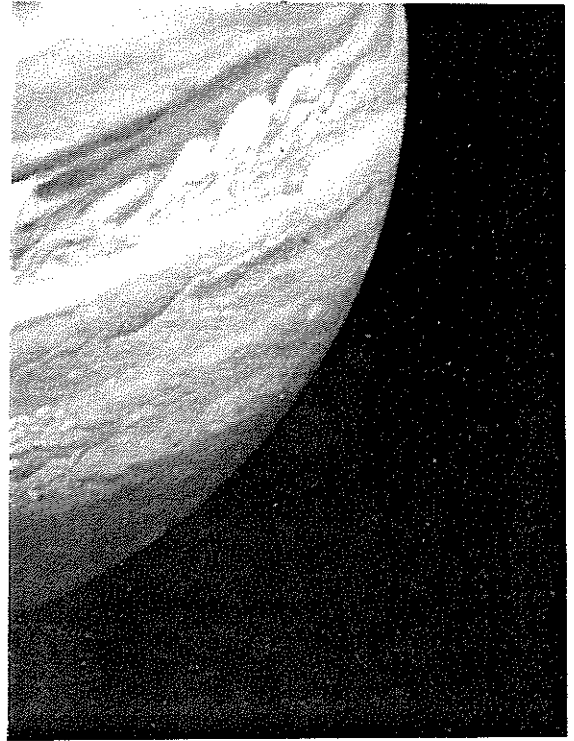
All those diagrams on your monitors are characterizing our decaying trajectory. Now, ask your computers to ascertain whether our trajectory is compatible with Galilei's relativity. What's the answer? A large, red, flashing light! It means that our current trajectory is irreconcilably incompatible with Galilei's relativity.

Ask your computers now to see whether Einstein's special relativity in general, and Lorentz's transformations in particular, are compatible with our trajectory. What's the answer? Look! The entire monitor's screen is flashing red! After all, this is no surprise. A central component of Lorentz's symmetry is the rotational symmetry. The idea that these tools are valid for the treatment of decaying trajectories with continuously decreasing angular momenta cannot but be relegated to what it is: sheer adulteration of scientific truths.

Now check the final step. Ask your computer to scan all available theories of gravitation that are of Einsteinian character, and see whether any of them is compatible with our trajectory. What's the answer? Your terminals are projecting holographic, three—dimensional letters out of the screen and right in front of your face flashing: N—O! N—O! N—O!

The answer is evident. All gravitational theories of Einsteinian type are centrally dependent on the assumption of their locally Lorentz's character, that is, on the local stability of each trajectory. On the contrary, a necessary condition for any gravitational theory to represent the interior gravitational problem is that of NOT being locally Lorentz's in character.

The stability of Jupiter's trajectory in the Solar system is majestically set in front of our eyes, with its consequential rotational, Galilean and Lorentz character. But the idea that a proton orbits in the core of Jupiter with a conserved angular momentum, is nothing but a vile adulteration of physical truths by vulgarly corrupt academicians on Earth. It cannot be qualified in any different way. There must be a limit to the approximation of our theories beyond which research positions become a manifestation of sheer corruption.

The second objective of our mission has now been accomplished. Our powerful engines will take us outside the Jovian atmosphere. You can feel the limit of their capabilities. Yes, they are overcoming the Jovian gravitational field. We are making it. We have regained direct visual observability with the outside world. We are out of danger and back into the safety of motion in empty space.
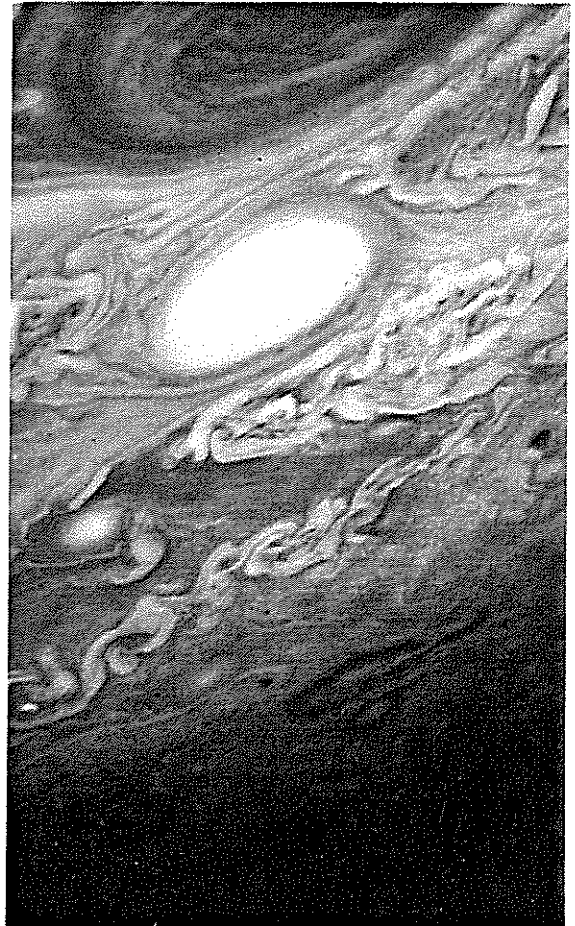
We can now analyze the data during our journey in the interior of the Jovian system. The answer leaves no doubt.

In the exterior dynamical problem, we have an object moving in empty space. Therefore, the actual shape and structure of the object does not affect the trajectory of its center–of–mass. Under these physical conditions, the object can indeed be effectively approximated as being a massive point, as correctly viewed by Galilei, Newton and Einstein.

The interior problem, instead, implies motion of EXTENDED objects under the CONTACT interactions due to a resistive medium. The actual shape, size and structure of the object then affect directly the dynamical evolution of its center–of–mass, as we have personally experienced.

In the exterior problem, we have canonical time evolutions [those characterized by the truncated Hamilton's equations without external terms], while in the interior problem we have generally noncanonical time evolution [that is, equations of motion which violate Helmholtz integrability conditions for the DIRECT Hamiltonian representation IN THE FRAME OF THE OBSERVER]. In this sense, the exterior problem is Hamiltonian, while the interior problem is simply beyond the technical capability of the truncated Hamilton's equations, and demands the equations originally conceived by Hamilton.

In the exterior problem, we have stable orbits, as established by the majestic physical reality in front of our eyes. This implies first, the [local and global] validity of the rotational symmetry, and then that of the full Galilean/Lortentz symmetry, as well as the locally Lorentz character of any effective gravitational theory.

In the interior problem, we have, instead, generally unstable orbits with continuously varying angular momenta. This implies, first, the breakdown of the rotational symmetry, and then that of the Galilean/Lorentz symmetry, as well as the necessary locally NON–Lorentz character of any acceptable theory of gravitation.

In the exterior problem, the underlying medium [empty space] can be safely accepted as being homogeneous and isotropic. These features, when joint with the point–like approximation of particles and other conditions, imply the validity of the Galilean/Lorentz symmetries.

In the interior problem, the underlying medium, being a physical medium, is manifestly inhomogeneous and anisotropic. These features alone are sufficient to imply the breakdown of all conventional relativities and related symmetries as generally presented in available textbooks on Earth.

In the interior problem, the point–like approximation of objects implies the validity of a local–differential geometry [and topology], thus resulting in the validity of the symplectic or Riemannian geometry. In the interior problem instead, the necessarily extended character of the constituents implies a non-local/integral geometry [as well as topology]. This additional aspect alone is sufficient to imply the invalidation in the interior problem of all orthodox relativities.

Your computer terminals can provide you with a long list of additonal data and irreconcilable differences between the exterior and the interior dynamics. The ineffectiveness for the interior dynamics of available relativities and the need for suitable covering relativities, is then simply out of the question.

In this way, we have accomplished the second objective of our journey.

5. THE NEED FOR FURTHER DIRECT OBSERVATIONS.

Leading academicians at Harvard, CERN and other institutions in the far–away Earth have acquired a reputation for ignoring our findings, such as the noncanonical/nonhamiltonian character of the interior trajectories, or the anisotropic/inhomogeneous nature of the

medium underlying the interior dynamics; or the non–Lie structure of the underlying algebras.

Famed academicians on Earth claim that all these aspects of our classical reality are "fictitious", because they can be made to disappear in the transition to the "more appropriate" quantum mechanical treatment of.the constituents of matter.

For this journey to truly be in the name of scientific democracy, we cannot ignore these orthodox views. We must probe them and establish whether they have any technical ground of plausibility, or they are mere manifestation of manipulatory actions.

To do this, we must continue our journey and undertake a third, much more risky leg: a direct observation of the interior of our Sun! In fact, only there extended, macroscopic, objects, are reduced to their particle constituents. Only there we can see the ultimate synthesis of the classical, macroscopic reality with particle and gravitational theories.

The journey from the Jovian system to the Sun is quite long. In your Guidance Envelope Number Three, you will find instructions on how to use the time. As you can see, you are suggested to study all available physical and mathematical knowledge for the GENERALIZATION of current relativities. Once you have acquired such a knowledge, then you will be able to make your own contribution toward the conception, construction and verification of an appropriate generalization.

6. THE STUDY OF MORE RECENT ADVANCES.

Your Guidance Sheet Number Three suggests you to: look again at Jupiter; observe its essential physical characteristics; and deduce its primary physical laws. What do we have there?

Well, we clearly have a system whose center—of—mass dynamics is unquestionably Galilean—Lorentzian, while its interior dynamics is unequivocally nongalilean/nonlorentzian.

Ask yourself the simple question: do total conservation laws necessarily imply conservative, action—at—a—distance forces? The answer is evidently N—O! In fact, Galilean/Lorentzian total conservation laws can occur as subsidiary constraints to an intrinsically nongalilean/nonlorentzian interior dynamics.

You can reconstruct in this way the notion of closed—nonself adjoint system [Santilli, 1978], as a first characterization of a mechanical system which verifies Galilean/Lorentzian laws for the center—of—mass motion, while admitting a basically more general interior dynamics. In fact, system (1) can be readily extended to the system proposed by the locally quoted author

$$\begin{cases} \dot{I}_k = 0, \ k = 1,2,\ldots\ldots,10 \\ m_i \ddot{\mathbf{r}}_i = \mathbf{f}_{iGFI}^{SA} + \mathbf{F}_{iGNI}^{NSA}, \end{cases} \quad (5)$$

$$k = i = 1,2,\ldots, N$$

where: laws $\dot{I}_k = 0$, $k = 1, 2, \ldots, 10$, are the same as those of systems (1); and, the new forces F_{iGNI}^{NSA} are Non—Self—Adjoint [that is, they violate the mathematical and physical conditions for being of action—at—a—distance/potential type], and GALILEI—NON—INVARIANT [that is, they violate, in general, each component of Galilei's symmetry, beginning with the symmetry under rotations].

A scan at the literature tells you that systems (5) admit multiple infinities of consistent solutions. In fact, the ten subsidiary conditions $\dot{I}_k = 0$, can be reduced to seven conditions on the 3N forces F_{iNGI}^{NSA}. The existence of an infinite number of solutions for $n > 2$ is then evident. The two—body case is also consistent, although we must refer you to the technical literature for its treatment.

Systems (5) essentially approximate the physical reality we have directly observed during our trip: the global stability of astrophysical bodies [such as Jupiter] does not necessarily imply the local stability of each constituent, but can be the result of a collection of internal trajectories each of which is unstable. Equivalently, systems (5) schematize the physical evidence according to which the conservation of the total angular momentum can occur under continuously varying angular momenta of the constituents. The same situation occurs for other conservation laws. We merely have local, internal exchanges of physical quantities within the system, while the total quantities are conserved.

Also, your Guidance Sheet suggests you to meditate on the manifestly reversible character of the trajectory of the center—of—mass of Jupiter within the Solar system, and com-

pare it with the manifest irreversibility of its interior dynamics. Look how beautifully compatible the two opposite laws are. We merely have a statistical/thermodynamical counterpart of the compatibility of total conservation laws with time—rates of variations of internal quantities.

Finally, your Guidance Sheet suggests you to study in detail the LIMITATIONS of system (5), as clearly presented in the original contributions, for there is no ethical presentation of novel advances without the joint identification of their limitations. Systems (5) were suggested as a mere LOCAL/DIFFERENTIAL APPROXIMATION of systems that are intrinsically NONLOCAL/INTEGRAL. The nontriviality of the systems is the avoidance of mum-

bo—jumbo approximations of perpetual—motion—type for the interior dynamics that are currently dominating physical investigations on Earth. This was achieved via the NECESSARY BREAKING, FIRST, OF THE ROTATIONAL SYMMETRY [TO ENSURE UNSTABLE INTERIOR ORBITS] AND THEN OF THE FULL GALILEAN/LORENTZ SYMMETRY. The breaking was ensured, not by additing trivial symmetry—breaking terms in the Hamiltonian, but instead, via the acknowledgment of the STRICTLY NONHAMILTONIAN character of the systems. The local—differential approximation was recovered via a power—series expansion of the nonlocal/integral forces in the velocities. This approximation permitted the use of available local—differential geometries and topologies, but it remained a mere approximation. The next covering step is the full nonlocal/integral treatment. The point is that effective nonlocal/integral geometries and topologies were not available at the time of proposal (5) [1978], nor do they appear to be available now [early 1984].

Next, you are suggested to study the relativistic extension of systems (5), [Santilli, 1982]. In this preliminary and classical approximation you can see how a meson in a particle accelerator can verify the special relativity, while its interior laws can be intrinsically noneinsteinian.

In the same contribution here considered, you will see how the speed of light c in vacuum is indeed a necessary maximal limit for the attainable speed of any material object, but only UNDER THE CONDITIONS ORIGINALLY CONCEIVED BY EINSTEIN: POINT—LIKE PARTICLES MOVING IN EMPTY SPACE UNDER ACTION—AT—A—DISTANCE INTERACTIONS WITHOUT COLLISIONS. If one considers instead EXTENDED PARTICLES MOVING WITHIN A MATERIAL MEDIUM UNDER ACTION—AT—A—DISTANCE AS WELL AS CONTACT INTERACTIONS, the situation is profoundly different and no

final resolution regarding the maximal limit of the speed of material bodies can be drawn at this time. In fact, the contribution under consideration identifies the fact that the maximum limit of the speed of material bodies can well be a function of the physical characteristics of the interior medium. As such, this maximal speed can be LOWER OR HIGHER THAN THE SPEED OF LIGHT IN VACUUM. In support of these expectations, De Sabbata and Gasperini [1983] show via the use of gauge theories that the value of 75c for the maximal speed of hadronic constituents is admissible on grounds of available knowledge.

To put it bluntly, the idea that the validity of the Lorentz symmetry and Einsteinian laws for the center—of—mass dynamics of a meson in a particle accelerator NECESSARILY implies the validity of the same symmetry and of the same physical laws for the interior dynamics, is nothing but a manifestation of Earthly academic manipulation of fundamental physical knowledge. The idea is based on the [tacit] assumption that the mesonic constituents are constituted by POINT—LIKE WAVEPACKETS, which is experimentally known to be FALSE. Available experimental data establishes that the constituents of strongly interacting particles [whatever they are] must be in conditions of mutual overlapping of their wavepackets, one within that of all the others. This confirms the historical hypothesis of the existence of NONLOCAL interactions in the INTERIOR of strongly interacting particles, with consequential DEVIATIONS from Einsteinian laws in the interior structural problem [only]. In this way, the problem of the structure of a strongly interacting particle results to be essentially similar to that of Jupiter. This is the reason for the insistence of the Guidance Sheets to begin your study at the primitive, classical, Galilean level. Operational reformulations for particle mechanics are a mere technical task.

side bonus, one could obtain a strict confinement of quarks, e.g., via the use of the Lie—isotopic generalization of unitary symmetries [Mignani, 1982] and the Lie—isotopic "quantization" of Nambu's mechanics for triplets [Kalnay, 1982]. In fact, under the approaches here considered, the Hilbert spaces for the exterior and for the interior dynamics would be strictly incoherent, thus resulting in an identically null probability of tunnel effects for free quarks as needed to comply with experimental evidence.

If one abandons the notion of point—like wavepackets for the hadronic constituents, and accepts the experimental reality for what it is, extended wavepackets moving within a medium of other wavepackets, a new scientific horizon emerges, not only for hadronic mechanics, but also for several independent approaches, such as the identification of the quarks themselves with physical particles by Barut [1979].

Along similar lines, the studies in progress at the Indian Statistical Institute [Bandyodadhyay and Roy, 1984] on the anisotropic generalization of conventional formulations acquires a rather solid ground of plausibility. In fact, we have essentially the anisotropic version of the anisotropic and inhomogeneous characterization of the interior of hadrons propugnated by hadronic mechanics.

Above all, you are suggested to keep in mind the "direct universality" of hadronic mechanics as an important element toward the possible future recovery of unity of physical and mathematical thought. In fact, a number of formulations of nonunitary/nonconservative time evolutions existing in the literature, are nothing but particularizations of the covering, Lie—admissible/bimodular form.

You are also suggested to study the capability of hadronic mechanics to recover the conventional reversible character of the center-of-mass trajectories, while admitting an intrinsically irreversible interior dynamics, in a way fully parallel to the classical case of Jupiter.

Finally, you are urged to study in detail the experimental contributions directly or indirectly relevant for a generalization of conventional relativities for the interior of hadrons, such as:

▲ The pioneering neutron interferometric experiments by Rauch and his team [1975], whose latest runs appear to confirm the expected deformation of neutrons under sufficiently intense external fields, with consequential alteration of their magnetic moments, and evident breaking of the conventional [but not isotopic] rotational symmetry. These experiments, if permitted to be confirmed in all necessary details, would establish the ultimate idea of hadronic mechanics [mutation of particles under sufficient physical conditions], thus opening the way to the identification of the hadronic constituents with physical particles.

▲ The recent elaborations by several independent groups in Europe and elsewhere regarding the expected deviations from Einsteinian laws in the behaviour of the mean life of unstable hadrons at different energies. These data, if permitted to be confirmed in the laboratory via direct measures, would establish the ultimate conceptual equivalence of a hadron with Jupiter.

▲ The pioneering experiments by Slobodrian, Conzett et al [1981] on the apparent origin of the irreversibility of the physical world at the open, nuclear, and, thus, particle level. These experiments too, if permitted to be confirmed and rushed—on counterclaims dismissed in the laboratory, would set the final touch needed for

the regaining of unity of physical and mathematical thought.

Once you have acquired sufficient knowledge on these and numerous other topics, you will have achieved sufficient maturity to initiate your own research toward those generalizations of conventional relativities that appear to be necessary for the resolution of fundamental open problems, such as identification of hadronic constituents with physical particles.

7. AN ULTIMATE MOMENT OF PHYSICAL TRUTH.

Fellow colleagues, our studies are interrupted abruptly by the ringing of all in—board alarm systems. We have initiated the last and most dangerous leg of our journey. We have lost direct observability of the outside world. We are close to the Sun.

This will also be the most rapid part of our journey, as we have attained maximal possible speed to minimize the time near the sun, and avoid unnecessary stress to the special heat—shields of our spaceship.

Only seconds are at our disposal. Look! We are now well within direct experimental observability of the sun by in—broad sensors. Your monitors will keep you informed of all needed details.

A probe is detaching from our spaceship and heading at relativistic speeds for penetration into the Sun. The objective is now clear. We want to observe the decomposition of a macroscopic system into its particle constituents and verify whether or not in this process the mechanics, algebras and geometries can perform a transition from a noncanonical/irreversible/nonhamiltonian form to a unitary/reversible/hamiltonian particularization.

Here! We are at our nearest point to the Sun. The probe has entered within the Sun and disintegrated into particle constituents.
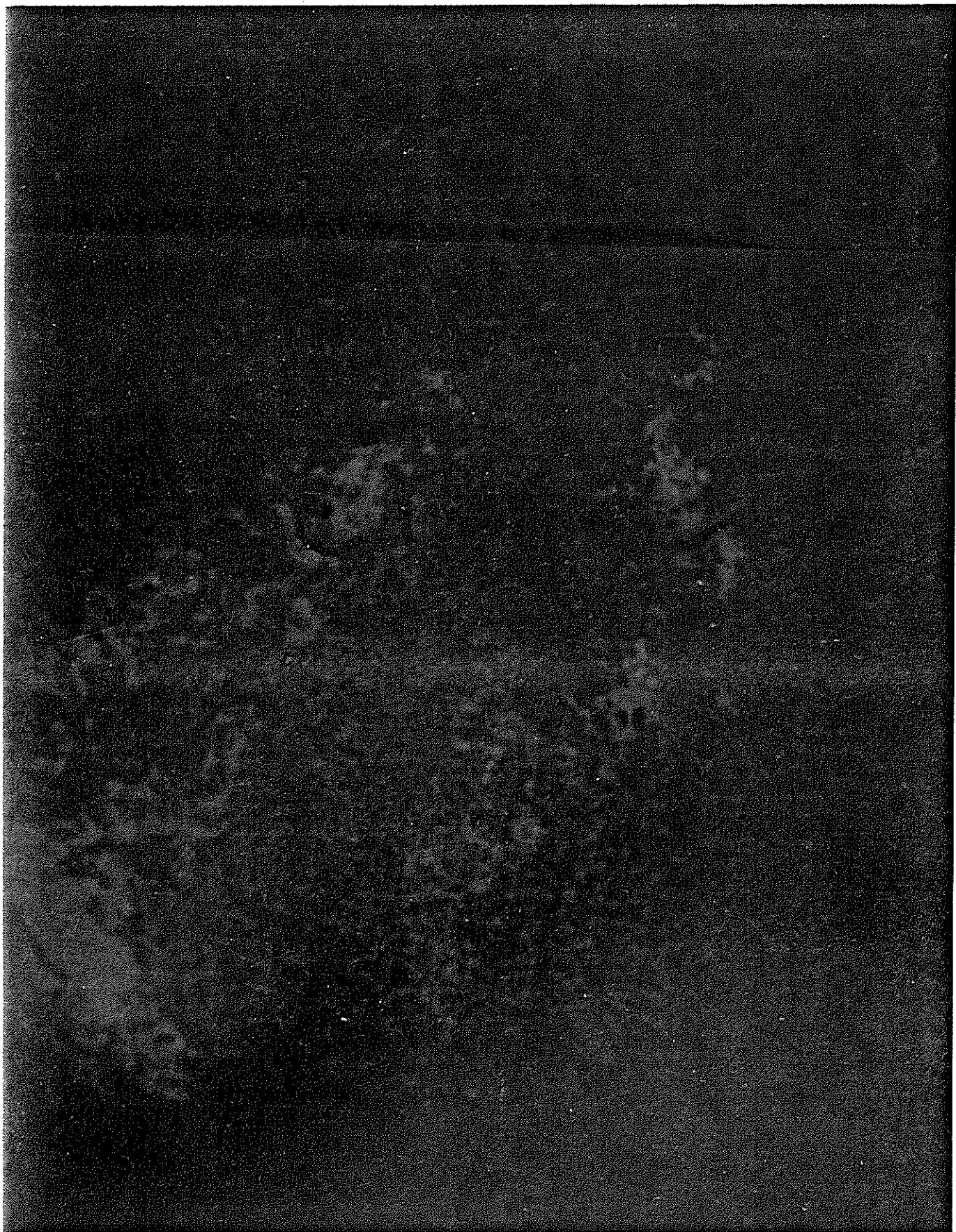
All observational data have been stored into our computers. Our primary task is now that of existing from the Sun's environment at the maximal attainable speed.

Finally, we are at a safe distance from the sun. We can now analyze the data on the probe. What do you see? Look! All in—board computers are projecting immense holographic images in various directions outside our spaceship. They consist of huge, red, pulsating letters clearly visible throughout our solar system with naked eyes:

<div align="center">

N—O! N—O! N—O!

</div>

The dream by vested academic interests on Earth that the noncanonical/irreversible/nonhamiltonian character of the physical reality in our macroscopic environment can be reduced to unitary/reversible/hamiltonian treatments of particle constituents is nothing but what it is: attempts to manipulate fundamental physical issues for personal gains.