The Institute of Field Physics, Inc.

Private Patronage and the Renaissance of General Relativity

Or: "Madmen and Quacks" vs "Sober Going"

Dean Rickles

Gravitation and space-time are too central to the whole scheme of physics to be allowed any longer to lie at the fringes of attention. It is even conceivable that they will furnish the central clue to the elementary particle mystery.

J.A.W.
29 August 1955

SYMPOSIUM

ON THE ROLE OF GRAVITATION IN PHYSICS

Steering Committee: F. J. Belinfante, P. G. Bergmann, B. S. DeWitt, Cecile Morette DeWitt, F. J. Dyson, J. A. Wheeler

Sponsoring Agencies: International Union of Pure and Applied Physics, National Science Foundation, Wright Air Development Center of the U.S. Air Force, Office of Ordnance Research of the U.S. Army, Ministere des Affaires Etrangeres of France, Institute of Natural Science, Institute of Field Physics.

Reasons for holding the symposium:

Although gravitational theory has been a relatively neglected area of physical research in the past two or three decades for several good reasons (e.g., the experience of repeated early failures to extend general relativity theory in a permanently interesting fashion, and lack of experimental guideposts), a renewed interest in the subject has recently begun to develop. Mention should be made of the work of Bergmann, Belinfante, Wheeler, and Klein, and their students, as well as recent conjectures by Pauli and Landau. It is generally felt that the accumulation of new theoretical techniques in recent years now justifies the taking of a fresh look at the theory of gravitation.

Two conferences on relativity theory have recently taken place within a year of each other: Bern, summer 1955; Warsaw, spring 1956. In spite of these a need is still felt for the proposed conference at Chapel Hill in January. The Bern conference, held in memory of Einstein, covered a much broader area than is planned for Chapel Hill, and devoted a considerable fraction of its time to historical surveys. The Warsaw conference, limited to a very small number, was not attended by any U.S. physicists.

The Chapel Hill conference is planned to be a small working conference attended by those few physicists who have been responsible for a number of recent developments as well as by those who have expressed a recent and renewed interest in gravitational theory. The choice of Chapel Hill as a location for the conference is motivated by several considerations, among which may be mentioned:

1. The recent establishment of a project within the Physics Department of the University of North Carolina to make a special study of the role of gravitation in physical theory in the light of modern theoretical techniques. Those taking part in this project will handle the arrangements and details of the conference.

2. The existence of a young and energetic physics faculty at Chapel Hill, all of whom will take an active interest in the conference, seeing it as a real boost to their current efforts at expansion.

3. The truly excellent conference facilities at the University of North Carolina.

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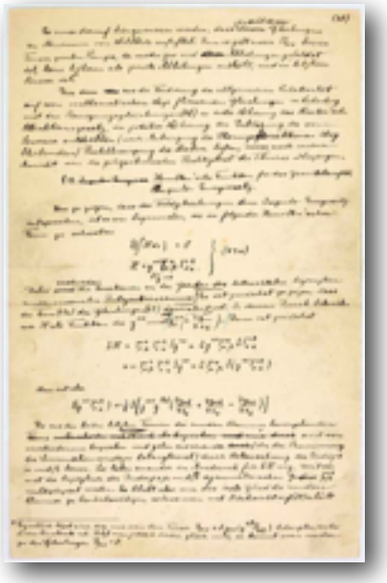
REMARKS ON A PRESENTLY NEGLECTED AREA OF PHYSICAL RESEARCH

The modern theory of gravitation, as formulated by Einstein in 1915, represents the high point of a profound revolution in human ideas as to the nature of the physical universe. The fruits of that revolution and of the simultaneous upheaval occasioned by the advent of the quantum theory are today everywhere to be found-----except, strangely enough, at the summit itself. The general theory of relativity (i.e., Einstein's gravitational theory) remains almost totally barren, its only applications so far being in cosmological theory and in the interpretation of certain minute astronomical effects.

This situation did not come about through any lack of interest in gravitation on the part of physicists immediately following Einstein's formulation. Indeed the foremost physicists of the older generation entered the arena of general relativity

[G]eneral relativity had ... become so much of a game consisting of playing with problems of a mathematical nature, that an acceptable connection with "real" physical problems had been lost and practically most of the scientists working in that field were not or were no longer attached to physical laboratories, but to mathematical institutions.

Andre Mercier, 1993, p. 110



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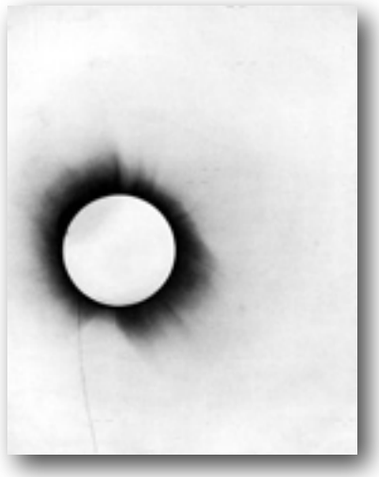

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Now What?

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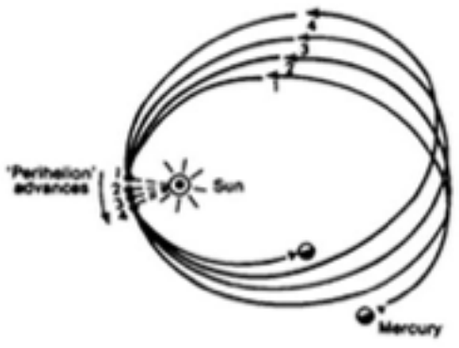

WRIGHT AIR DEVELOPMENT CENTER

Most of my colleagues have pointed out in their comments that the field of general relativity has not received the attention which it deserves and that it is particularly **important to attempt to obtain some synthesis of the methods and concepts used in general relativity with the ideas now employed to discuss elementary particles**. One reason for the neglect of general relativity has been the great difficulty of work in this field which challenges even the best theoretical physicists; solution of the major problems involved will probably require a determined program which may extend over many years. **A second and related reason has been the difficulty of obtaining adequate support for this field; the problems are not of the type which are supported by federal agencies which finance so much of the research in physics in the United States by short term contracts, mostly in fields which appear to have more immediate applicability to defence problems.**

Letter to J. S. Toll from John Wheeler, December 28, 1955

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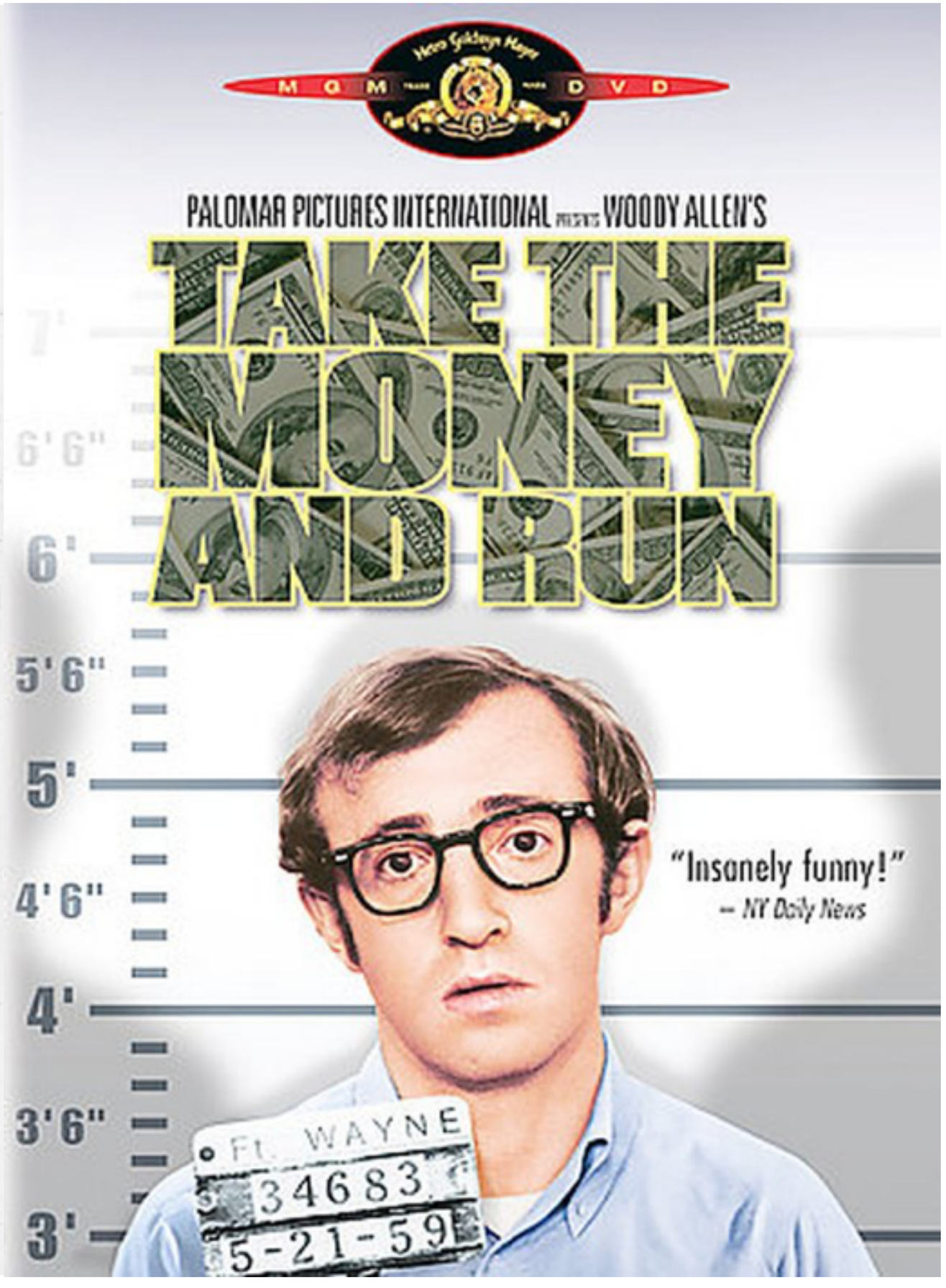

Bahnson [IFP] *contra* Babson [GRF]


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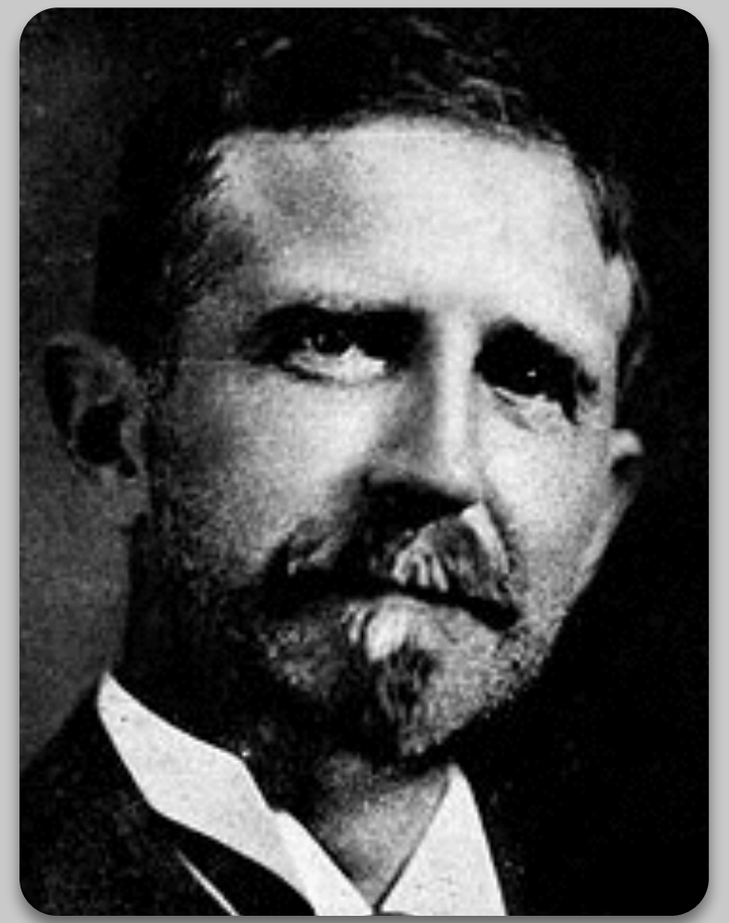
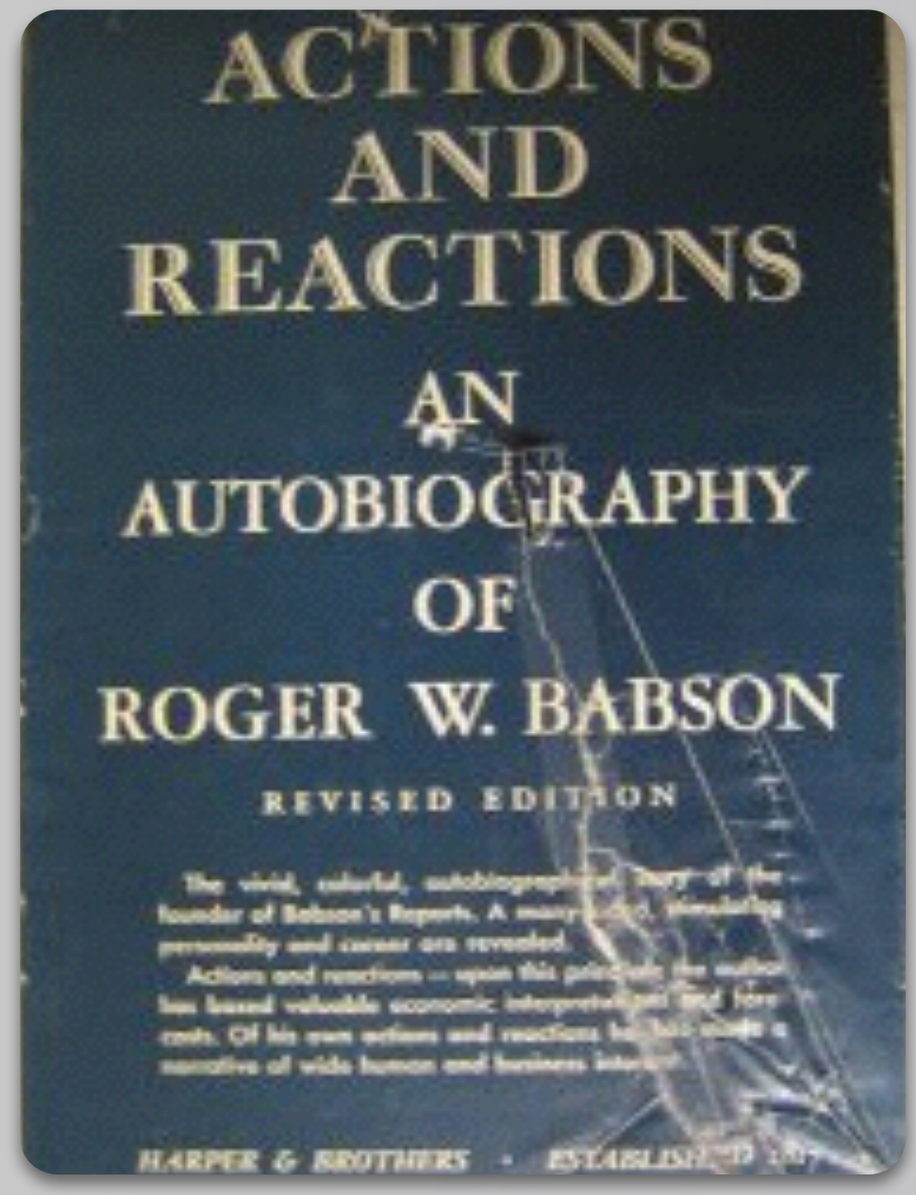
Enter Babson (= Wealthy Crank No.1)



Lots of people, including Einstein, talk about gravity, the restraining force which makes people walk on floors instead of floating in midair. What worries Roger Babson, 74, economic oracle and head of the Babson Institute, is that no one does anything about it. [1950]

TIME


ACTIONS
AND
REACTIONS
AN
AUTOBIOGRAPHY
OF
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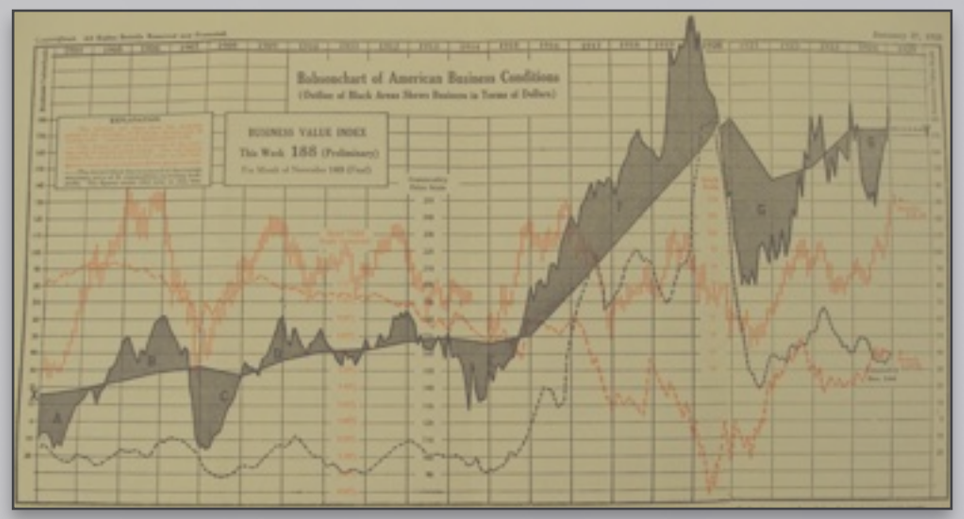
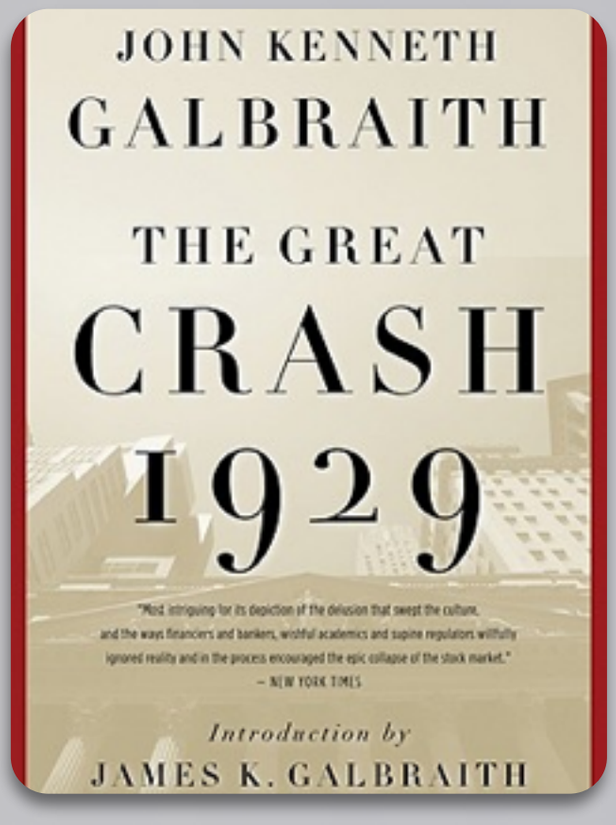
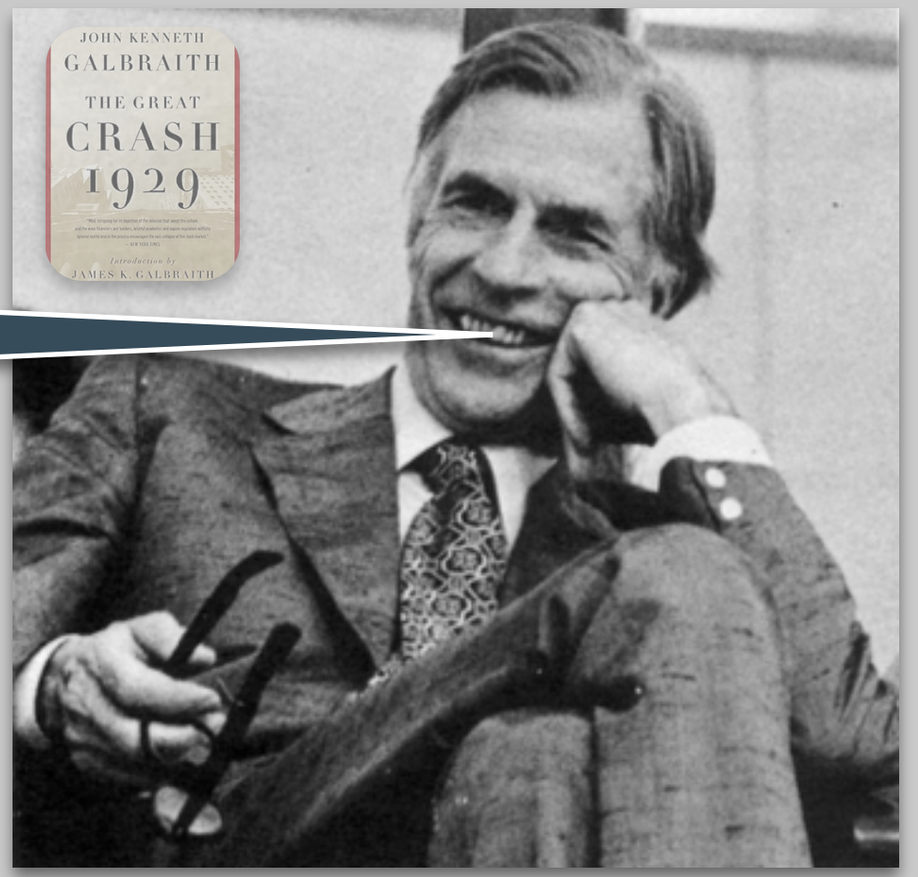

Babsonchart of American Business Conditions
BUSINESS VALUE INDEX


JOHN KENNETH
GALBRAITH
THE GREAT
CRASH
1929
"Most intriguing for its depiction of the delusion that swept the culture,
and the ways financiers and bankers, wishful academics and supine regulators wilfully
ignored reality and in the process encouraged the epic collapse of the stock market."
— NEW YORK TIMES
Introduction by
JAMES K. GALBRAITH

[He] was not a man who inspired confidence as a prophet in the manner of Irving Fisher or the Harvard Economic Society. As an educator, philosopher, theologian, statistician, forecaster and friend of the law of gravity he had sometimes been thought to have spread himself too thin. The methods by which he reached his conclusions were a problem. They involved a hocus-pocus of lines and areas on a chart. Intuition, and possibly even mysticism, played a part. Those who employed rational, objective, and scientific methods were naturally uneasy about Babson, although their methods failed to foretell the crash. In these matters, as so often in our culture, it is far, far better to be



WEIGHT .....
AGE .....
HEIGHT .....
MARRIED or SINGLE.....
MALE or FEMALE .....

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NEW BOSTON, NEW HAMPSHIRE

Roger W. Babson
FOUNDER
George M. Rideout
PRESIDENT

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the Sir Isaac Newton Library
of the Babson Institute

TEMPERAMENT QUESTIONNAIRE

We are collecting statistics to ascertain the relationship between the pull of gravity (weight) on individuals and their temperament. We therefore would greatly appreciate having you put your approximate weight, age, height and marital status at the top of this sheet and, after analyzing yourself, check which of the three following groups under which you would best classify, returning this sheet to us. We enclose a self-addressed envelope requiring no postage. Signature to this blank is not necessary.

George M. Rideout, President

GROUP I *(Endomorphy)*	GROUP II *(Mesomorphy)*	GROUP III *(Ectomorphy)*
I am relaxed in posture.	I am aggressive in posture.	I am small in posture.
I love physical comfort.	I like physical adventure.	I am sensitive to pain.
I like to eat - Am tolerant.	I eat as a matter of course.	I am easily embarrassed.
My physical, mental and emotional reactions are slow.	I am full of energy and direct in manners.	I like privacy and not keen for social gatherings.
I like having people around.	I like to dominate and risk.	I hide my feelings.
I like ceremony and ritual.	I like competition.	I lack poise - confidence.
I hate to be alone - Cling to family relationship.	I am not quick to react to needs and desires of others.	I am an unimpressive talker.
I am gossipy and curious.	I get things done.	Ladies like me.
I have an even disposition.	I talk convincingly.	I lack stimulus - incentive.
I am not excitable - Good sleeper.	I am insensitive to pain - Average sleeper.	I am a teetotaler - Poor sleeper.
I seek friends when troubled.	I seek action when troubled.	I seek privacy when troubled.

Because you check one of the three above Groups, it will not be assumed that all of the characteristics within the Group apply to you. Please be content to check the one Group which most nearly applies to you.

OUR GOAL IS TO ASCERTAIN WHY A DIFFERENCE IN THE GRAVITY PULL SHOULD AFFECT YOUR GLANDS OR BRAINS WHICH DETERMINE YOUR TEMPERAMENT AND PERSONALITY

by a microscope, as yet. Furthermore, many thoughtful people believe that spiritual forces can modify the pull of gravity as illustrated by the story of certain Old Testament Prophets having risen to the skies, and the Ascension of Jesus. The incident of Jesus walking on the water should not be ignored. People often ask why Angels are always shown as defying gravity by flight?

CHAPTER 8

Sir Isaac Babson

THOMAS EDISON once remarked to Roger Babson, who is best known as a stock-market tipster, "Always remember, Babson, you don't know nothin' about nothin'. You've got to find something that isolates from gravity. I think it's coming about from some alloy."

Babson never forgot this remark, and in 1948, with an excess of capital on hand, he founded what is perhaps the most useless scientific project of the twentieth century. It is called the Gravity Research Foundation. Although the Foundation is interested in any and all types of work on gravity, its principal function is to stimulate a search for some type of "gravity screen"—a substance which will cut off gravity in the same way a sheet of steel cuts off a light beam.

This notion of a material "opaque" to gravity is a common one in early science fiction. In H. G. Wells' fantasy, *The First Men in the Moon,* a spaceship operates by means of such a substance—a complicated alloy of metals (with some helium thrown in) called "cavorite," after the name of its inventor. Since Einstein, however, the concept has become almost obsolete. The reason is that if relativity theory is correct, such a screen would be unimaginable. According to Einstein, gravity is not a "force" which pulls objects to earth, but rather a warping of the space-time continuum. The warping causes an apple to fall, but a "screen" between apple and earth would have no effect for the simple reason that there is no force to be screened off.

If Babson is aware of all this, he remains blithely undismayed. "I'm no scientist," he told the press, "but I do know what I'm trying to find out and how I'm going about it . . . few people realize that

New Directions for Research in the Theory of Gravitation

by Prof. Bryce S. DeWitt

Radiation Laboratory
University of California
Berkley 4, Cal.

1953

Before anyone can have the audacity to formulate even the most rudimentary plan of attack on the problem of harnessing the force of gravitation, he must understand the nature of his adversary. I take it as almost axiomatic that the phenomenon of gravitation is poorly understood even by the best of minds, and that the last word on it is very far indeed from having been spoken.

Nevertheless, the theoretical investigation of gravitation has received relatively little attention during the last three decades. There are several reasons for this. First, the subject is peculiarly difficult; the existing body of theory on it involves rather recondite mathematics, and the fundamental equations are almost hopeless of solution in all but a very few special cases. Although the accepted theory is motivated by two or three beautifully simple yet profound principles, these guiding principles have so far been of little help in predicting the general features of the solutions of the equations to which they give rise. And, as any researcher in the field knows, one can develop a serious case of "writer's cramp" in that manipulation of tensor indices which is usually necessary in order to prove only a single tediously trivial point.

Secondly, modern gravitational theory has few consequences which are even remotely susceptible of experimental verification. The old Newtonian theory, involving action-at-a-distance, has, for practical purposes, been far too adequate. Consequently, stimuli for the theoretical investigation of gravitation are virtually non-existent, and gravitational research is almost totally unrewarding. It is a field which had its brief brilliant hour, but which has since fallen into a state of near disrepute.

In spite of all this, it is very probable that the phenomenon of gravitation will eventually have to be reckoned with again in respectable circles, and it may well happen that this reckoning will present itself in a rather acute form. It is one of the purposes of this note to suggest that we may be already in the first phases of such a new development, and to point out some new directions into which we are likely to be led as a result.

I shall assume, virtually without question, the validity, in its appropriate domain, of the Einstein theory of gravitation - that is

to say, of the original general theory of relativity, as distinct from later embellishments by many workers including Einstein himself. Einstein's theory is, to my mind, far too beautiful and satisfying to be cast aside. And it is so intimately connected with and firmly entrenched in those concepts of invariance and conservation which have come to be regarded as fundamental in physics, that in casting it aside, we should be casting aside much that has been enormously fruitful in the past as well as the present, to the experimenter no less than to the theorist. However, it should be borne in mind that the Einstein theory is a "classical" (that is, *non-quantum*) theory. It forms by itself a logical and self-contained system. Only the fact that the real world around us has taught us that the system may not be quite so self-contained after all, makes the following remarks of some interest.

For the sake of orientation let us reverse the usual order of things and first fix our sights on those grossly practical things, such as "gravity reflectors" or "insulators", or magic "alloys" which can change "gravity" into heat, which one might hope to find as the useful by-products of new discoveries in the theory of gravitation. The use of terms such as "reflector" or "insulator" clearly is based upon analogy with electromagnetism. Now, it is quite true that gravitation is similar to electromagnetism in many ways. Just as the latter can be split into an electric and a magnetic part, so can the former be split into two parts, one being that produced by static matter and the other that produced by moving matter. The *gauge group* of electrodynamics has its counterpart in the coordinate transformation group of gravidynamics. The electromagnetic and gravitational fields both propogate with the speed of light.

In other respects, however, the gravitational and electromagnetic fields differ profoundly. Of prime importance is the extreme weakness of gravitational coupling between material bodies, as compared with electromagnetic coupling (advice of professional weight-lifters notwithstanding!) The weakness of this coupling has the consequence that schemes for achieving gravitational insulation, via methods involving fanciful devices such as oscillation or conduction, would require masses of planetary magnitude. And even if the necessary masses could be manipulated, these schemes would be doomed to failure, for, since quantum forces would not be available for such macroscopic manipulation, non-gravitational force fields would have to be employed. But the existence of such external fields would defeat its own purpose, because every stress, every force-potential, and, indeed, every form of energy produces its own gravitational field. The gravitational field is all-pervading.

These features are built into the Einstein theory as consequences

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These considerations are quite sufficient to enable one to state flatly that any frontal attack on the problem of harnessing the power of gravity along the above lines is a waste of time. Indeed, unless the term "gravity" is broadened to include a much wider range of phenomena than hitherto, one may safely pronounce all gravity-power schemes impossible. Such a broadening of terminology may, however, be logically possible, or even necessary. That is the point I wish to make.

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These features are built into the Einstein theory as consequences

"**External stimuli** will be urgently needed in the near future to encourage young physicists to embark upon gravitational research **in spite of the odds**"

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May 30, 1955

Mr. Bryce S. DeWitt
University of California
Theoretical Division
Radiation Laboratory
Berkeley 4, California

My dear Mr. DeWitt:

For several years I have had correspondence with Mr. George Rideout, President of the Gravity Research Foundation in New Boston, New Hampshire. Recently, I wrote him about the fact that the Burlington Mills Company in Greensboro, North Carolina, with whom we have done a considerable amount of business over a period of thirty years, has given a two hundred thousand dollar grant to the State College of the University of North Carolina, at Raleigh, North Carolina, for the building of a nuclear reactor and other laboratory facilities. That laboratory was dedicated about a week ago. I had hoped to attend the dedication but was unable to do so. I did talk to Mr. Spencer Love, Chairman of the Board of Burlington Mills, who is a good friend of mine, and mentioned to him the thing that has been of interest to me for over twenty years. He seemed quite willing to investigate the possibility further in connection with the work in this nuclear laboratory at State College.

You may have recently heard of the division of Glenn L. Martin Aircraft company and I believe of the Convair Division of General Dynamics, that has set up research in anti-gravity as a new method of supporting heavier than air machines above the surface of the earth. You may have also read the article by Mr. William Lear of the Lear Radio Company in the last October issue of FLYING MAGAZINE predicting that fifty years from now the air plane would be a horse and buggy and that anti-gravitational reaction would support aircraft at any desired height above the earth. This may sound a little like the flying saucer deal but I believe it has a very practical opportunity of being worked out during our normal lifetime. Twenty years ago such ideas were not received with much hope of practical consummation. I recall discussing such things with Dr. David Griggs, who is now at the University of Southern California in the Geological Department. He lives in Brentwood which is on the outskirts of Los Angeles. I doubt if you have ever crossed his path but I am sending him a copy of this letter in the hope that you may have had some contact or may have such contact if you are ever in his vicinity or he is in yours.

I agree with your letter that the field of gravitation is quite unexplored. It seems to be one of the most important pioneer frontiers in science today. The

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Mr. Bryce S. DeWitt
University of California

May 30, 1955

practical application of an anti-gravity aircraft, if it could be developed, would certainly change our whole concept of transportation, even more radically than the development of the automobile or airplane itself, in my opinion. It would probably also have broad repercussions in international relations and the entire concept of both trade and political associations between men all over the earth. One fearful note is seen in the accelerated development of weapons both in the nations of the free world and in the Communist dominated areas in that we are undoubtedly not alone in dreaming of such a mechanism and I believe it is a foregone conclusion that the Communist scientists are working along these lines today.

I note your proper feeling that a great deal of theoretical background must be given to the study of gravity before anything practical can be developed. I once had the pleasure of exchanging letters with Mr. Albert Einstein, specifically calling to his attention my hope of the eventual development of some anti-gravity aircraft and he very courteously wrote back the same point that as far as he was concerned, he did not feel confident to step from the theoretical into the practical. You may be of the same temperament or focus of interest and what I am now exploring may not be of interest to you. At the same time, at the suggestion of Mr. Rideout, I did want to lay a few hopes at your threshold for consideration.

What I would like to do, and I think the mechanics of doing it can be made practical in the near future, is to get a qualified scientist who would join the staff of the Neuclear Physics Laboratory at Raleigh, North Carolina, and devote his attention primarily to this phase of gravitational study. I have discussed this matter with Dr. Clifford Beck who is head of the Physics Department at State College and he seems to feel that it is quite workable. I believe I can raise enough funds to give reasonable support to such a scientist with a guaranteed position for at least five years. Dr. Beck made this suggestion because he said we would certainly not stumble on anything dramatic in this field of endeavor in any short period of time. I am quite sure that he agrees with your letter, that basic research must be done in the problem before we can turn our specific attention to the anti-gravitational aircraft project. They have 45 advance students and a rather complete staff available to co-operate with this work and they have a well-equipped laboratory.

I apologize for approaching you, Mr. DeWitt, with no more introduction or forewarning. I will appreciate your comments on this plan. Do you think that you would be interested personally in pursuing the matter further? If not, do you have anyone in mind that might fill such a position?

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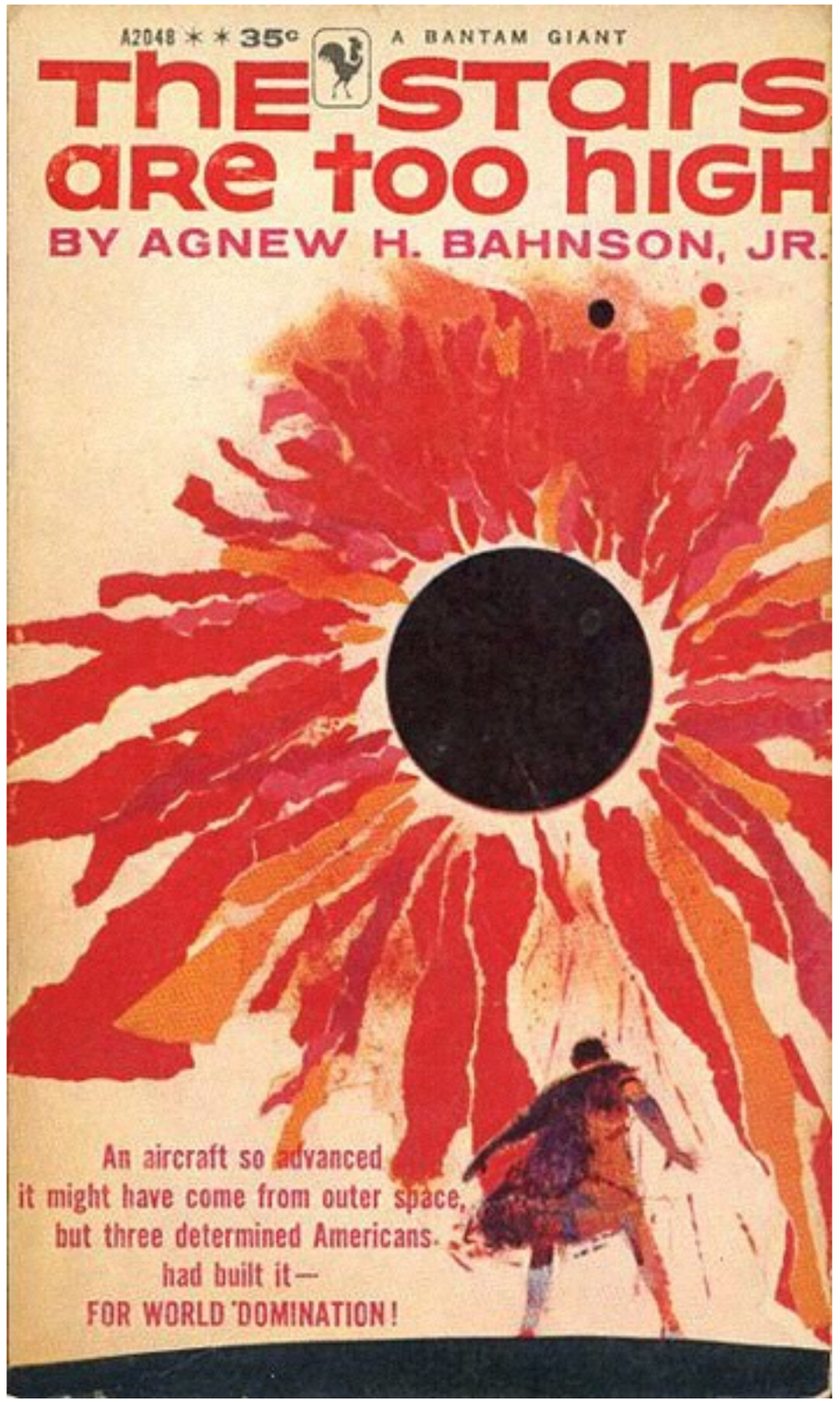

Radiation Laboratory
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I agree with your letter that the field of gravitation is quite unexplored. It seems to be one of the most important pioneer frontiers in science today. The

practical application of an anti-gravity aircraft, if it could be developed, would certainly change our whole concept of transportation, even more radically than the development of the automobile or airplane itself, in my opinion. It would probably also have broad repercussions in international relations and the entire concept of both trade and political associations between men all over the earth. One fearful note is seen in the accelerated development of weapons both in the nations of the free world and in the Communist dominated areas in that we are undoubtedly not alone in dreaming of such a mechanism and I believe it is a foregone conclusion that the Communist scientists are working along these lines today.

I note your proper feeling that a great deal of theoretical background must be given to the study of gravity before anything practical can be developed. I once had the pleasure of exchanging letters with Mr. Albert Einstein, specifically calling to his attention my hope of the eventual development of some anti-gravity aircraft and he very courteously wrote back the same point that as far as he was concerned, he did not feel confident to step from the theoretical into the practical. You may be of the same temperament or focus of interest and what I am now exploring may not be of interest to you. At the same time, at the suggestion of Mr. Rideout, I did want to lay a few hopes at your threshold for consideration.

What I would like to do, and I think the mechanics of doing it can be made practical in the near future, is to get a qualified scientist who would join the staff of the Neuclear Physics Laboratory at Raleigh, North Carolina, and devote

What I would like to do, and I think the mechanics of doing it can be made practical in the near future, is to get a qualified scientist who would join the staff of the Neuclear Physics Laboratory at Raleigh, North Carolina, and devote his attention primarily to this phase of gravitational study. I have discussed this matter with Dr. Clifford Beck who is head of the Physics Department at State College and he seems to feel that it is quite workable. I believe I can raise enough funds to give reasonable support to such a scientist with a guaranteed position for at least five years. Dr. Beck made this suggestion because he said we would certainly not stumble on anything dramatic in this field of endeavor in any short period of time. I am quite sure that he agrees with your letter, that basic research must be done in the problem before we can turn our specific attention to the anti-gravitational aircraft project. They have 45 advance students and a rather complete staff available to co-operate with this work and they have a well-equipped laboratory.

I apologize for approaching you, Mr. DeWitt, with no more introduction or forewarning. I will appreciate your comments on this plan. Do you think that you would be interested personally in pursuing the matter further? If not, do you have anyone in mind that might fill such a position?

Enter Wheeler…

1001 SO. MARSHALL ST.
WINSTON-SALEM, N. C.
TELEPHONE 4-1581
CABLE ADDRESS
"BAHNSON WINSTON SALEM"

June 14, 1955
(Trans. 6-15-55)

Mr. Bryce S. DeWitt
University of California
Theoretical Division
Radiation Laboratory
Berkeley 4, California

Dear Mr. DeWitt:

Saturday I flew down to State College in Raleigh and had a long chat with Dr. Clifford Beck who heads their Department of Physics and who is in charge of their new nuclear reactor. I understand that this is the only nuclear reactor on a college campus in the country.

We worked out a plan that we believe is quite practical in approaching the matter I wrote you about on May 30. He feels that our best approach would be to have a qualified scientist come to State College for a one-year period, starting in as soon as possible, and work with the Nuclear Laboratory facilities on his own initiative as far as his responsibilities and duties are concerned. Possibly he would want to give a siminar to advanced students once a month but even this coul be left optional. There would be no administrative duties and no teaching. He wo be a free lance research scientist that had all of the facilities of the school at his disposal but none of the headaches. Dr. Beck is quite interested in such an arran ment and in the field study. Both of us realize that nothing can be accomplished i any short or possibly foreseeable period of time, but we feel that it is a matter th should receive the concentrated consideration of a capable person in such a setup.

Dr. Beck called his good friend, Dr. John Wheeler, at Princeton Univers this afternoon. Dr. Wheeler recommended you as a person who was interested in his field and as a very qualified physicist. He seemed to feel that you would be interested in such an opportunity and in view of your letter to Mr. Babson, I felt that we were working in the direction that you had in mind.

Our present plan is to try to setup a foundation for advanced research in nuclear physics which would not disclose the primary interest in gravity. This is partially from the standpoint of security and to avoid publicity. I believe such a foundation can be setup and that we might be in position to offer you a job for at le a year at State College on this basis. I am sure that both of us would want to rev the progress of the work at the end of a year but if you are interested in making a more permanent change, we might be able to give a more extended guarantee of t

Bahnson Company
ENGINEERS AND MANUFACTURERS

HUMIDIFYING · HEATING · VENTILATING · COOLING · AIR FILTERING · DEHUMIDIFYIN

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Babson Company

Enter Glenn Martin Company…

June 22 1955

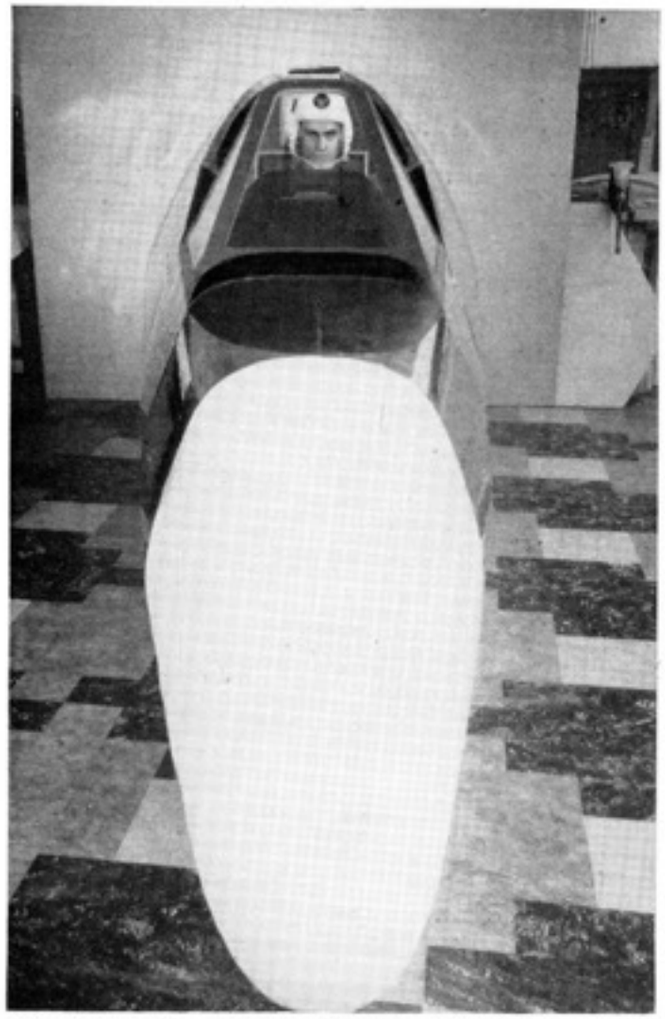
Mr. Agnew H. Bahnson, Jr.
The Bahnson Company
1001 So. Marshall St.
Winston-Salem, N.C.

Dear Mr. Bahnson,

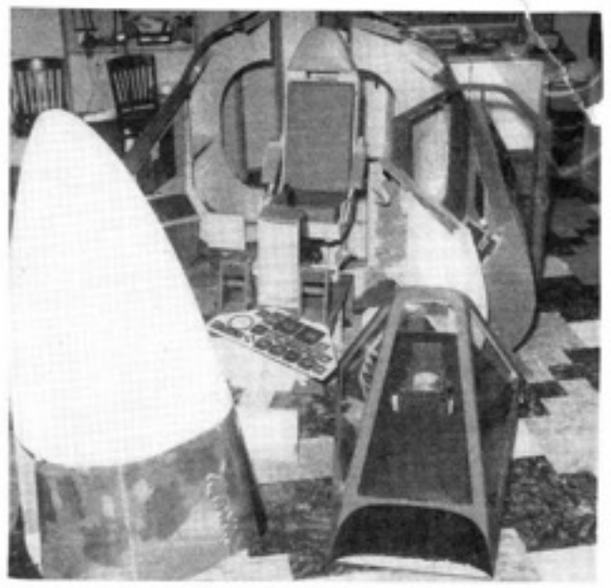
I have received a letter from the Glenn L. Martin Compan
in Baltimore, inviting me to come to Baltimore at their expense to discuss the
matter of a gravity research project which they are establishing.
my
to suggest that we take advantage of the opportunity
It seems to me appropriate to take the

Enter Martin (= Wealthy Crank No.3)

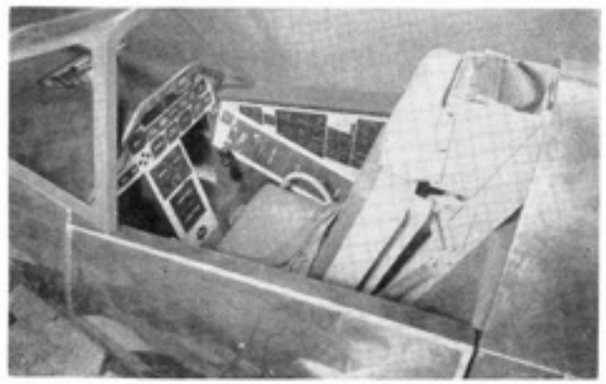
THE GLENN L. MARTIN COMPANY



FIGHTER-BOMBER COCKPIT MOCKUP made in Martin's 3-D layout shop during proposal stage of design development.



PARTS are lightweight, inexpensive, go together easily.



MOCKUP'S INSTRUMENTS and panels are buttoned on, best arrangement achieved by "playing checkers" with individual units.

Advanced Design Covers Big Field—For Instance . . .

Martin Team Pushes Anti-Gravity Study

By Irving Stone

Baltimore—The scientific vision of harnessing new natural forces to overcome gravity may not be an empty dream.

Clues have indicated to scientists at Glenn L. Martin Co., after a relatively short period of theoretical study, that it may be possible to overcome the force of gravity—man's leg iron—by means other than those now used.

► **Man's Leg Iron**—The work at Martin is part of an overall search into the basic laws of nature—probing the unknowns in any field that appears to have application to airborne weapons and factoring the results into the military vista of the immediate and the far future.

In Martin's anti-gravity study, the unified field theory—Einstein's concept of the basic law of the universe—is getting an intensive look. Reason: Wrapped up in this theory is a key to the explanation of the force of gravity and the relationship to other phenomena (such as electromagnetics) which may be vital factors in the anti-gravity solution.

Gravity has always been the aircraft designer's basic problem. In the airplane it is counteracted by engine power-plus-wings. In today's rocket, brute thrust of the motor alone does the job. With the spaceship, new approaches and techniques probably will be required.

One approach—in some respects along the lines of conventional methods still being pursued—will be to devise a small engine-package of very high power, easily generated.

But Martin scientists are also following an alternate approach to uncork a new force to defy gravity. No one will hazard a guess on how long it will take to develop theory, and from there go on to the prodigious physical fact.

► **Advanced Design Projects**—Martin's investigation of the unified field theory is only one project in a long string of items already under study or scheduled for attack in the company's Advanced Design Department.

This is a top-level activity created recently, with George S. Trimble, Jr., heading it in his new capacity as one

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THE GLENN L. MARTIN COMPANY

BALTIMORE 3, MARYLAND

June 10, 1955

Professor Bryce S. DeWitt
University of California
Theoretical Division
Radiation Laboratory
Berkeley 4, California

Dear Professor DeWitt:

During a recent conversation with Mr. George Rideout, President of Roger Babson's Gravity Research Foundation, we were commiserating on the unfortunate state of the affairs that knowledgeable folks do not wish to get "mixed up" in the field of gravity research. During the course of the conversation he reviewed with me your suggestion that perhaps his Gravity Research Foundation might be transformed from its present function into an active center of research concentrating on the field of gravity. He also told me that the foundation was not able to undertake such an expansion. Since Mr. Rideout was familiar with the activities at my company, he thought that perhaps you and I might have some interests in common.

The purpose of this letter is to briefly describe our objectives in the field of gravitation and to suggest that perhaps you might be interested in contributing to such an effort. I take the freedom to do this because Mr. Rideout reviewed your idea for a modest version of the Institute for Advanced Study and it appeared that what you suggested is very close to what we have decided to do and are now implementing.

It occurred to us sometime ago that our industry was vitally concerned with gravity. As time goes on we become more and more concerned because we feel certain that sooner or later man will invade space and we see it as our job to do everything possible to speed this event. At least one category of the things one must study, when he desires to bring space flight to a reality, is the laws of nature surrounding the force of gravity. Although we can probably make some sort of a space vehicle that will operate by brute force, we must contemplate other possible methods of achieving our goal.

We therefore decided that we would invest funds to foster an understanding of the physical phenomenon known as gravitation. As you might suspect, we have found few qualified men interested in pursuing this field, which at the present time is peopled largely by mad men and quacks. As a matter of fact, most of the theoretical work we have had done has been done in Germany on contract with German scientists. Some of the things that you suggested needed doing, we now have underway in this manner.

GLENN L. MARTIN COMPANY

BALTIMORE 3, MARYLAND

To advance the understanding of the laws of nature, my company decided some time ago to start a scientific research laboratory whose efforts would be in no way connected with the present or near future products of the Martin Company. As a matter of fact, we have decided to set the Laboratory up as a separate corporation in a different geographical spot than the present company. In discussing this with our Board of Directors to obtain the required funds, we described the activity as an "industrial version of the Institute for Advanced Study". To put it bluntly, we feel morally obligated to push forward in the basic sciences and we believe as a dynamic industry we can provide the motivation for advances that can be obtained in no other way. One of the major undertakings of the Laboratory will be a study of gravity.

With this background, I believe you can see why I was so interested in Mr. Rideout's information on you. That a man of your reputation is interested in increasing man's understanding of gravitation is very meaningful to me. As a matter of fact, it occurs to me that you might be interested in joining our group, which is just now getting underway, with the avowed purpose of getting on with the problem. I cannot see clearly now exactly how you would fit into the scheme of things - just as I cannot describe to you completely just what environment our newly founded Laboratory will furnish the scientists. Rather we intend that this will develop as time goes on and in accordance with the wishes of the people who will contribute the most.

It may be that you have no interest in being associated even remotely with an industrial organization, but I wager that you would be interested in this project if we could discuss our objectives and have you meet some of our people. To this end, we would be willing to shoulder the expenses of a trip to our plant in Baltimore to visit us for a day or so if you can spare the time and are interested in this challenge.

I might say in closing that probably you have not heard about our laboratory, nor are you likely to in the future. We intend to do something new in the industrial scientific laboratory field. One of the requirements is that it shall not be used as an advertising medium.

Very truly yours,

THE GLENN L. MARTIN COMPANY

C. S. Trimble, Jr.
Vice President - Advanced Design

CST:mc

cc: Mr. George M. Rideout

P.S.: Attached is a copy of the corporate objectives of our Laboratory.

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University of California
Theoretical Division
Radiation Laboratory
Berkeley 4, California

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Very truly yours,

THE GLENN L. MARTIN COMPANY

G. S. Trimble, Jr.
Vice President - Advanced Design

RIAS

RESEARCH INSTITUTE FOR ADVANCED STUDY

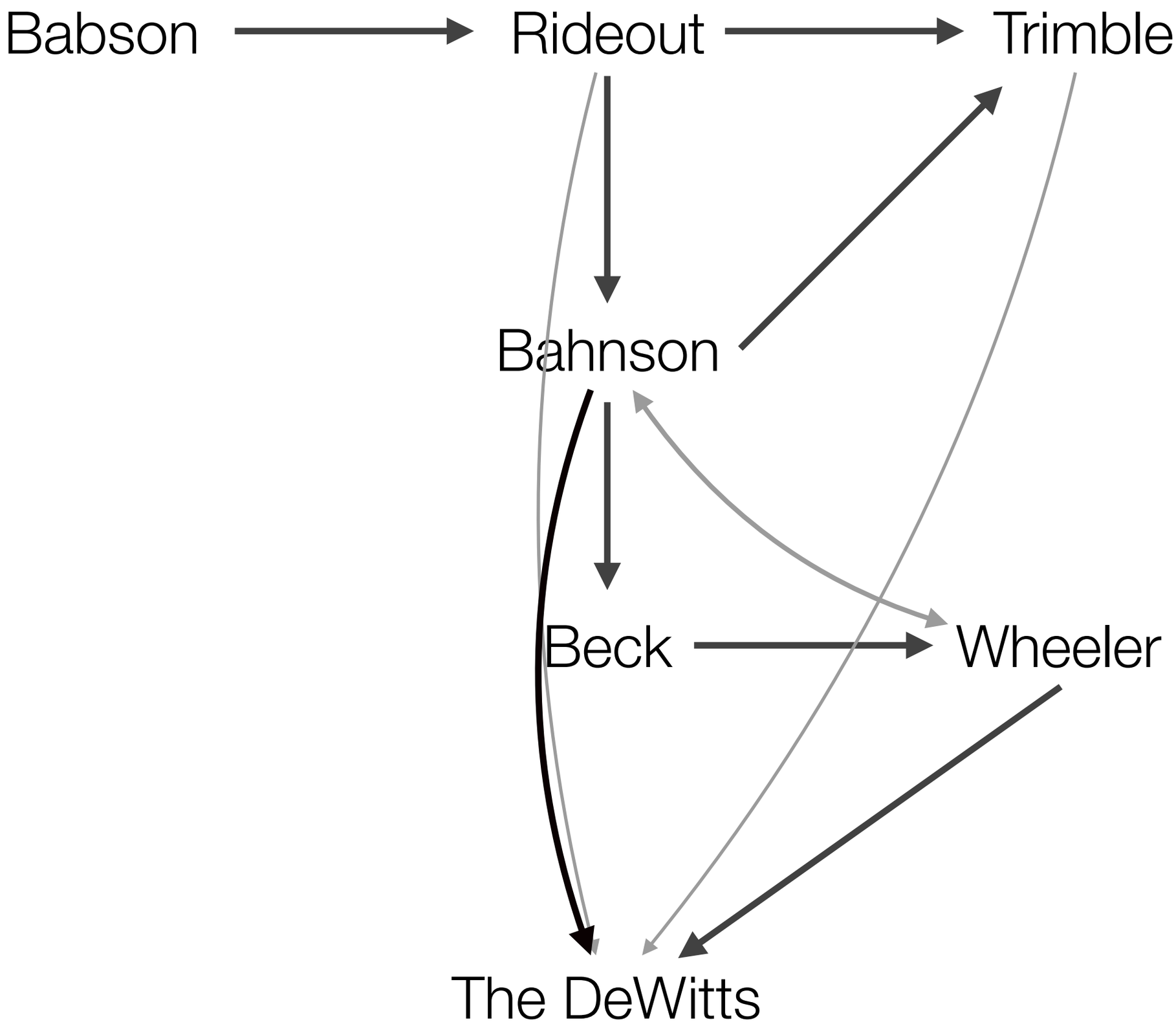
By posing a simple figurative interpretation of the dictionary meaning of *rias*—"long, narrow inlets or creeks"—the basic research program of RIAS may be thought of as a number of rivulets marked for exploration from their deltas on the ocean of technology to their fountain-heads in the rich hinterland of the rock-ribbed continent of pure science.

PURPOSE OF RIAS

Such a purpose, in itself, is by no means an exclusive one. The significant features of RIAS lie in the purely fundamental nature of its research program, in the stimulating industrial environment of its activities, and in its American business management—a management which holds to the premise that basic scientific studies, at long range, can and ought to be profitable and self-perpetuating.

RIAS, Inc. is a wholly owned subsidiary of The Martin Company of Baltimore, designers and builders of manned aircraft for nearly half a century. Postwar projects such as Matador, Titan (ICBM) and the Vanguard earth satellite are earnest of a continuing Martin leadership also in missile and rocket developments. RIAS has therefore been born in an atmosphere of technical and administrative understanding of the problem of fundamental scientific research.

Naturally if I go full time into research in the theory of gravitation, which up to now has been mostly a hobby, I should prefer ~~=~~ association with a college or university ~~to~~ membership in an industrial team. I hope very much to be able to ~~see~~ talk to you and Professor Beck, and I think I can express myself very concretely ~~Briefly~~ when I see you, and give definite answers to your questions shortly thereafter.


Babson
Rideout
Trimble
Bahnson
Beck
Wheeler
The DeWitts

THE BAHNSON COMPANY
Complete Industrial Air Conditioning
1001 SO MARSHALL ST.
WINSTON-SALEM, N. C.
TELEPHONE 4-1581
CABLE ADDRESS
"BAHNSON WINSTON SALEM"

December 29, 1955

Dear Bryce and Cecile:

I enjoyed talking with Cecile earlier this week. I wanted to present a couple of questions to you which you can be thinking over and to which I will need a fairly prompt answer.

The Air Force has shown some interest in our work through a comment by Glenn Martin to the Baltimore office of the Air Force. Martin indicated that we were not interested in government funds at this time. I have talked the matter over with Mr. Morehead Patterson of American Machine and Foundry Company and with John Wheeler at Princeton. Both of them feel that there is no reason to shy away from government funds now that the ONR of the Navy and some division of the Air Force is setup to support theoretical research. John also intimated that it would be fine if we could get the two of you, a post doctoral assistant for about $4500.00 and two or three graduate assistants from $2100 to $2500.00 as well as one visitor from some outside university or even Europe to start in next fall. If we do this, I am pretty sure we will have to get help from the government and we will have to put the wheels in motion rapidly since most of these people will make up their minds by March as to where they will be next fall, at least the good ones. Therefore I think you had better advise me as soon as possible of your feelings in this matter so I can try to go to work. We seem to be running behind schedule a bit now as far as getting the support from industry into this year's tax deduction. It appears that I will have to go to New York to talk with American Machine & Foundry and TWA before they move. If we want the government help, however, I will have to start the ball rolling to see if we can get enough funds to locate and hire this panel of personnel that John has recommended. You had better start thinking about the personnel and advise me about the approach.

I look forward to seeing you both in the near future. It is possible that I will be going North around the 16 of January for a few days and Bryce may want to go up with me to New York and talk with Wheeler as well as to Boston and talk to Weisskopf. Best regards.

Sincerely,

Agnew H. Bahnson, Jr.

AHBjr/s

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Your own statement, "The Glorious Quest", I found very interesting, an
a stimulating expression of your own deep interest. However, I hope you will n
mind if I question the appropriateness of some of the presentation for the purp
you have in mind. Ebullient as you and I are, I suspect sober going may go fur
when it comes to getting money from a foundation. But I will not go into this
matter further for I am sure that you have in the meantime discussed the propos
with Provost Purks and others who have much more practical judgment than I. I
will only mention two points on page 7: (1) The Institute for Advanced Study
and Princeton University are as separate administratively as Chapel Hill and
Duke - and I belong to the University; (2) The typist inadvertently omitted t
final syllable from the name of the Institutes' donor families - the Bombergers
the Fields.

Best regards.

Sincerely,

John A. Wheeler

cc: Provost Purks
Professor Beck
Dr. Bryce de Witt ✓
JAW

A Lesson in how to tame a wealthy crank…

PALMER PHYSICAL LABORATORY
PRINCETON UNIVERSITY
PRINCETON, NEW JERSEY

25 November 1955

Acting President Harris Purks
University of North Carolina
Chapel Hill, North Carolina

Dear President Purks:

As past chairman of the Physics Department Advisory Committee of the University of North Carolina, and as a member twenty years earlier of the Chapel Hill faculty, I have been happy to learn of the steps now under way to forward research in field physics at the University.

I understand that arrangements have been completed to make two new and very good appointments to the faculty of physics at Chapel Hill, of Dr. Bryce De Witt and Dr. Cecile Morette De Witt, both of whom are actively interested in the physics of fields of force. I also understand that it is the hope to appoint younger men to the staff in the same area of interest, and to assist able graduate students who wish to work with them. In addition I am informed that financial assistance is to be made available to the University to hold an annual conference on field physics, and to assist publications of the staff and of a conference report.

With your permission I should like to use the present felicitous occasion to make a few general comments on the transmitted letters of endorsement for the new work by several outstanding physicists and to make a few general comments on the new developments, for whatever value they may have. My comments concern (1) operation within the normal university framework (2) freedom of staff from duties of a non-university character (3) the necessity to dissociate the work at North Carolina absolutely and completely from so-called "anti-gravity research" (4) the nature and importance of the area of research in which the new staff membe are interested and (5) the attitude of responsible American scientists to this enterprise. But first let me pay tribute to the vision and energy of Agnew Hunter Bahnson, who has seen the challenge of a presently neglected area of research and has mobilized -- and continues to enlist -- financial support for this work at the University of North Carolina. His efforts impress me as the highest type of good citizenship. Without the efforts of Mr. Bahnson and public spirited friends and corporations the new opportunities for scientific progress at Chapel Hill would not have happened.

I am happy to learn from recent conversations with you and Mr. Bahnson that the work of the De Witts and others who may join them at Chapel Hill will be carried on within the normal university framework. The Institute of Field Physics, as I understand it from Mr. Bahnson, will serve as a fund-raising agency which will then turn over the money to the University of North Carolina. The University, through its Department of Physics, will then be responsible for the wise spending of this money. This responsibility will be no different in

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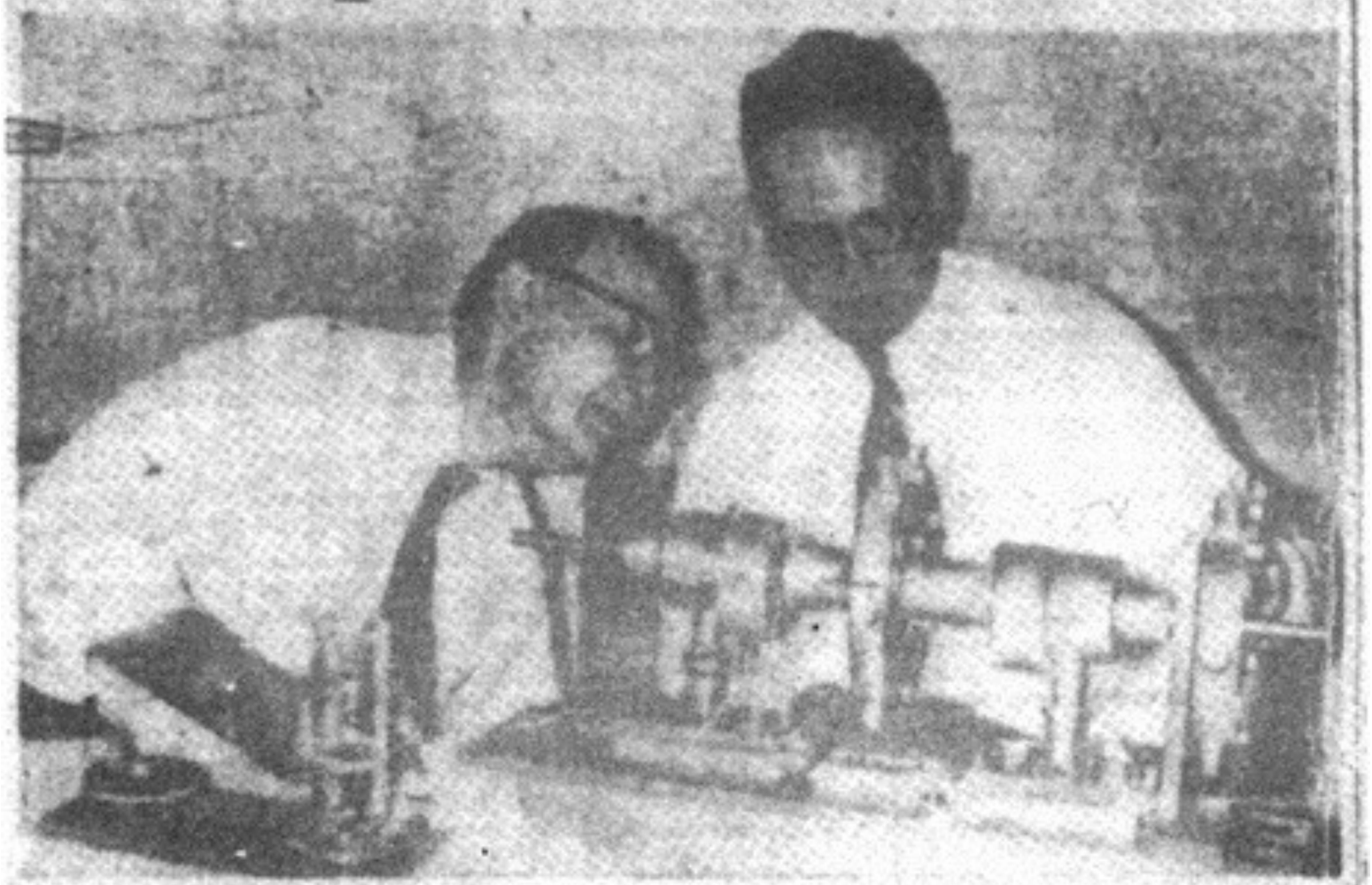
115th Year

Conquest of Gravity Aim Of Top Scientists in U. S.



ANTI-GRAVITY RESEARCH—Dr. Charles T. Dozier, left, senior research engineer and guided missiles expert of the Convair division of General Dynamics Corp., conducting a research experiment toward control of gravity with Martin Kaplan, Convair senior electronics engineer.

Gravity bought and sold!

No, no, no. It was in the wind. When I say it was in the wind, it was in the wind. I was invited to give talks in Seattle and all over the country, and I quickly learned that I should talk about gravity and they would ask me about anti-gravity.

[Interview of Louis Witten: Donald Salisbury and Dean Rickles]

There were people, and I don't know who — this is one of those hearsay things that nobody can verify, so I will say it, but it's totally unverified — that some officer in the Air Force, thinking about the next big thing that the Air Force needed, was an anti-gravity device. And so they needed somebody to work on general relativity.

[Interview of Josh Goldberg: Donald Salisbury and Dean Rickles]

Palmer Physical Laboratory
Princeton University
Princeton, New Jersey

Proposed protection clause for attachment to each and every field physics statement, whether public or promotional, whether issued by the University of North Carolina or by the Institute of Field Physics, or their agents.

The work in field physics and gravitation theory carried on at the University of North Carolina at Chapel Hill, and financed by the Institute of Field Physics, as fund raising agency, has no connection with so-called "anti-gravity research" of whatever kind and for whatever purpose. Its scientists, basing their investigations upon verifiable data, accept the Newton-Einstein analysis of gravity as free of a single established exception, and as the most comprehensive physical description we have today. They seek the implications of gravity and other fields of force at the level of the elementary particles. More generally, the Chapel Hill project is a modest attempt to learn more about the nature of matter and energy.

(Reviewed 27 November 1955 by President Harris Purks, Mr. Agnew Hunter Bahnson, and John A. Wheeler.)

INSTITUTE OF FIELD PHYSICS

Agenda for 1956

Aims for the first year:

(1) To develop as broad a framework as possible within which discussions of classical and quantum gravitational theory may be carried out simultaneously.

(2) To fashion mathematical tools suitable for advancing gravitational theory at least one step beyond its present level.

(3) To carry out at least one actual calculation of some physical quantity which is observable in principle (although not necessarily in practice.)

(4) If any of the aims fails of ready fulfillment, to try to understand why.

Proposed research:

(1) The study of Feymann quantization in curved spaces. (There is evidence that the result of Feyman's path summation rules differs from that of the ordinary quantum mechanical prescription by a quantity proportional to the curvature scalar.)

(2) A search for an appropriate modification of Feyman's rules in the presence of primary constraints.

(3) The actual building and utilization of the Hamiltonian and constraints for the gravitational field, the factor-ordering difficulties being thoroughly resolved.

(4) Completion of the spinor problem and explicit exhibition of the fermion-graviton coupling.

(5) Calculation of the gravitational self-stress (or self-energy) of the neutrino to determine whether the result follows the rather surprising pattern of the corresponding photon problem, in which the self-energy vanishes rigorously to second order.

And, if time permits, one or more of the following:

(6) Investigation of a simple-minded, cylindrical five-dimensional model.

(7) Study of the composite-particle model of pions.

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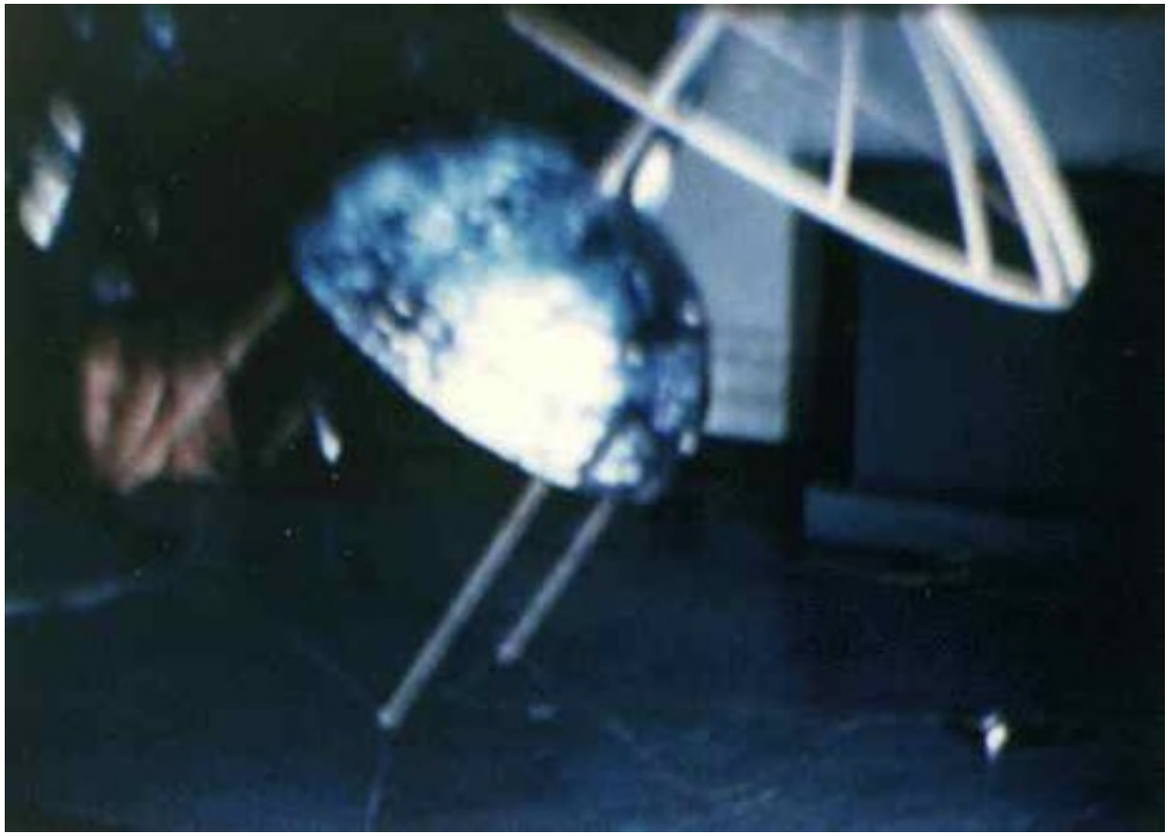


Jan. 4, 1966 A. H. BAHNSON, JR 3,227,901

ELECTRICAL THRUST PRODUCING DEVICE

Filed Sept. 15, 1961

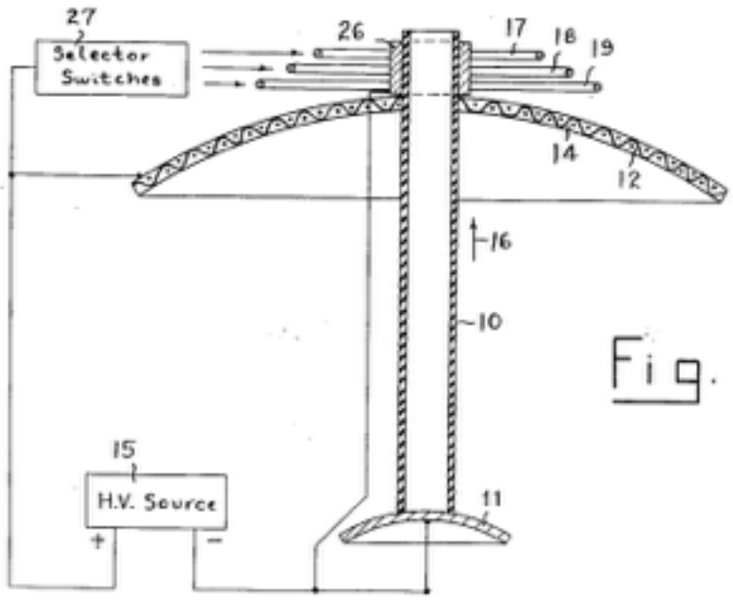


Fig. 1

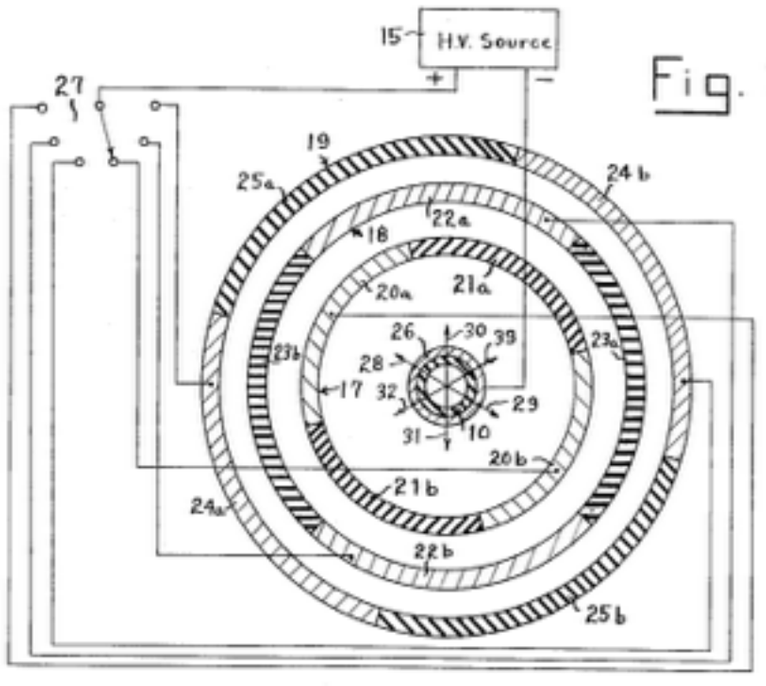


Fig. 2

I went to visit him and visited his laboratory, and the basic idea of his laboratory was he had a strong electrostatic field, which was about 150,000 volts over a distance of about like that, about a meter. And he had an operator operating this thing. But I knew enough about experiments to know that this was not a very happy place, because I knew that for strong electrostatic fields, there shouldn't be any sharp points around. Everything should be curved, and nothing was curved.

And the operator was working on it, his hair was standing up. [Chuckling] And then Bahnson took a long cylindrical pipe, and he smoked a cigarette, and he blew through the pipe into this central place where the electrostatic field was, and low and behold, the smoke rose. "Explain it!" [Laughter] Just at that moment, there's a table with a sharp corner, and I was standing with my back to it, about a foot away, and there was a spark from my backside to the corner of the table. So I said, "Let's go down into the hall." [Laughter] And I said it's nothing worth explaining. It's completely understandable. You can explain it. It's not worth explaining. You had an electric field, you got ionization, you get motion. I said look at the operator, his hair is standing on end! [Laughter]

Mr. Agnew H. Bahnson, Jr., President
Institute of Field Physics, Inc.
1001 South Marshall Street
Winston-Salem, North Carolina

Dear Agnew:

I object strongly to your letter of May 11th to Professor Schiff. I had expressly asked you not to importune Dr. Schiff. If you recall, my reaction to contacting Dr. Schiff to discuss your theories was an unqualifiedly negative one. Evidently, I have nothing to say on your private correspondence, but your letter uses our names and the name of the Institute of Field Physics to attract Dr. Schiff's attention.

I had asked you to separate the two parts of the talk to Western Electric and I thought you had agreed to that.

I came to the office this morning anxious to settle down to work without further interruptions. I found your letter to Dr. Schiff, and I had once more to postpone my research to handle this matter. Research can only be done if a long uninterrupted effort is put into it. The detriment of interruptions is not to be measured by the actual time taken up by the interruption but by the fact that it prevents concentration.

Yours sincerely,

A. H. Bahnson Jr. Killed

Agnew H. Bahnson Jr., 48, a Winston - Salem businessman, scientist and patron of the arts, was killed yesterday afternoon when a plane he was flying crashed at Wooster, Ohio.

Bahnson was president of the Bahnson Co., manufacturers of air-conditioning and de - humidifying equipment, and of Bahnson Service Co., both of Winston-Salem.

The crash occurred about 3:45 p.m. EDT (2:45 p.m. EST) at Wooster Municipal Airport, 60 miles southwest of Cleveland, Ohio.

Bahnson, flying alone in his twin-engine Beechcraft, was en route to Wooster from Cleveland. He was flying to Wooster to talk with Robert Cope, registrar of Wooster College where Bahnson's son, Agnew Hunter Bahnson III, plans to enroll as a freshman next fall. Cope was at the airport waiting for Bahnson, who had flown to Cleveland from here yesterday morning on a business trip.

Airport officials said the plane apparently came in too low in its approach and the wheels hit telephone lines bordering the field. The plane hit the runway, spun around, broke in half and burned.

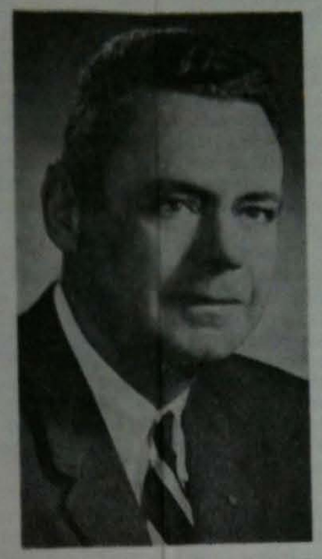
Several fire departments in the area were called to the field but they were unable to put out the fire.

It was believed that Bahnson died instantly. His body was badly burned, witnesses said.

Bahnson was born in Winston-Salem Aug. 30, 1915, to Agnew H. Bahnson Sr. and Elizabeth Hill Bahnson.

He graduated from Reynolds High School here in 1931 and received a Bachelor of Arts degree from the University of North Carolina in 1935. While at Carolina he was a member of Sigma Alpha Epsilon fraternity and was elected to Phi Beta Kappa honorary scholastic fraternity.

He studied air-conditioning engineering and industrial management at Harvard for a year after his graduation from Carolina and went to work in the machine shop of the Bahnson Co. in 1937. He



AGNEW H. BAHNSON JR.
. Twin City businessman . .

was named president of the company 10 years later.

Bahnson was an active man who had a busy hand in many and varied activities.

In the business field, he was a director of Washington Mills Co., Arista Mills and Denning Corp. He was a member of the American Institute of Management and of the American Society of Heating and Air-Conditioning Engineers.

He had traveled extensively and climbed the Matterhorn, a 14,785-foot peak in Switzerland, when he was 18.

A man interested in the arts, he had served as president of the Winston-Salem Symphony Association and had been a board member of the Winston-Salem Civic Music Association. He had set to music the Elizabeth Browning Sonnet Number 14 which was subsequently orchestrated and played by the Winston-Salem Symphony Orchestra. He was a trustee of Old Salem, Inc., for 10 years.

He was an amateur artist and musician. In 1959, he had published a novel which combined science fiction with some political views. The book was "The Stars Are Too High."

Bahnson was also interested in science.

In 1956, he conducted a symposium on gravity research at the annual meeting of the American Astronautical Society in New York City.

He had financed a research project dealing with gravity at the University of North Carolina by establishing the Institute of Field Physics.

In 1961, he was named chairman of the North Carolina Atomic Energy Advisory Commission by Gov. Terry Sanford.

He was an enthusiastic amateur radio operator. He was a pilot and had flown for 25 years.

He was formerly a member of the Interstate YMCA Committee and of the Forsyth Airport Commission.

He was a member of Home Moravian Church and was a former trustee and former member of the board of Christian Education.

He was a member of the Torch Club and the Rotary Club.

Bahnson married Katharine King Bahnson July 5, 1941. She survives. They have made their home for a number of years in Reynolda Estates

Also surviving are two sons, Agnew Hunter III, and Frank King Bahnson, both of the home; a daughter, Karen Bahnson, a rising senior at Smith College, Northampton, Mass.; his parents of 702 W. Fifth Street; and a sister, Mrs. Albert L. Butler Jr. of 330 N. Stratford Road.

The body will be brought to Voglers Chapel late this afternoon. It will remain there until 10:30 a.m. Friday when it will be taken to the Home Moravian Church.

The funeral will be conducted at 11 a.m. Friday at Home Moravian Church by Dr. J. C. Hughes. Burial will be in Salem Cemetery.

The family asks that memorial gifts be made to the Institute of Field Physics, University of North Carolina at Chapel Hill.

THE BAHNSON COMPANY

AND

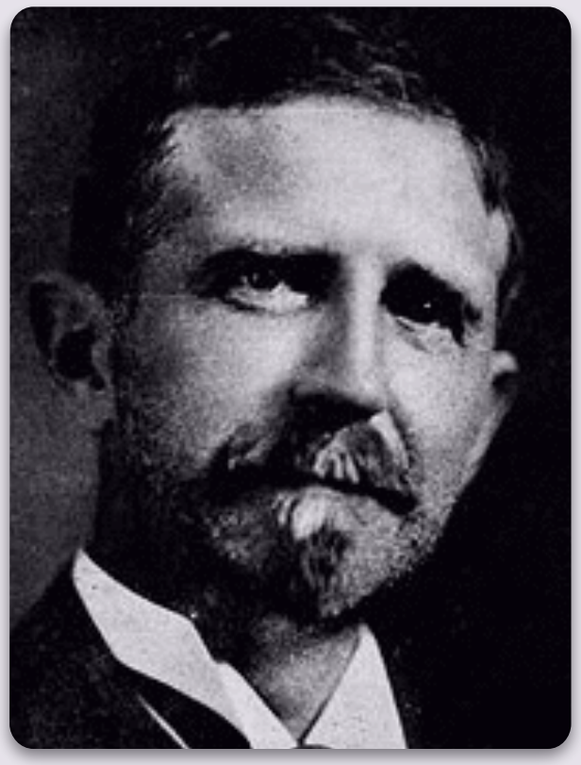
BAHNSON FAMILY

REGRET TO INFORM YOU OF THE DEATH OF

AGNEW HUNTER BAHNSON, JR.

ON WEDNESDAY, JUNE THE THIRD

NINETEEN HUNDRED AND SIXTY-FOUR



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Sources 5

The Role of Gravitation in Physics

Report from the 1957 Chapel Hill Conference

Dean Rickles, Cécile M. DeWitt (eds)

Submitted by: Jürgen Renn, Alexander Blum and Peter Damerow
Copyedited by: Beatrice Gabriel

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