BELGRADE LAKES INSTITUTE FOR ADVANCED RESEARCH - SCIENTIFIC JOURNAL*

Volume 13 Number 2A – 1 February 2013 (DRAFT) (updated 2 February 2013 6:52 A.M.)

Glenn A. Baxter, P.E., Editor

Glenn A. Baxter, P.E., Physicist, Licensed Professional Engineer

PHYSICS UNIVERSITY www.k1man.com/physicsuniversity

BELGRADE LAKES INSTITUTE FOR ADVANCED RESEARCH www.k1man.com

EDITORIAL

Dr. Ian J. Cowan joins us in this issue of the Scientific Journal with his landmark paper UPDATE ON ELECTRODYNAMICS OF MOVING BODIES www.k1man.com/Cowan130128B.pdf He presented this fine paper at the 26 January 2013 NPA world wide video conference. See this at www.k1man.com/videoconf130126 Dr. Cowan says therein that he has had doubts about Special Relativity for the last 40 years. Dr. Cowan's presentation was also discussed during our weekly physics conference call (one hour 24 minutes). Listen to this at www.k1man.com/Conf130128.mp3 Participants were Harry H. Ricker, BSEE, Virginia Tech, MSEE, UNH; Glenn A. Baxter, P.E., BSIE URI; Nick Percival, **BS Physics, Harvard; Al McDowell, BSEE, Syracuse, PhD. Cornell, Dr. Satya Pal Asija, P.E., BS, MBA, Grad IERE (Lond.), JD, etc.**

Dr. D. Sasso of Italy writes (in part)**:** **"**I looked at (Dr.) Cowan's paper, and I think it has a good scientific value."

Also joining us this issue is Dr. Herbert Dingle, Dr. Peter Kohut, Harry H. Ricker III, Tom Bethel, and Poicarpo Yoshin Ulianov writing about the Witte effect.

LETTERS

Dr. D. Sasso of Italy writes: "I looked at (Dr.) Cowan's paper and I think it has a good scientific value. I agree that "Electrodynamics of Moving Bodies" (or Special Relativity) must be updated because it is an obsolete and in numerous points wrong theory.

You know from my viewpoint this necessary update is represented by the Theory of Reference Frames. (Ed. Note: See www.k1man.com/k) I observe only there is much confusion on the question of relativity, for example on the Sagnac experiment, on the Michelson-Morley experiment in the numerous versions, on the Doppler effect and on many theoretical concepts. I am in no hurry but I know I am right and sooner or later also other physicists will accept the Theory of Reference Frames.

In the meantime I am working on the Non-Standard Model and soon I will publish a new paper."

Dr. Ian J. Cowan of Ireland writes (to Harry Ricker):

I have started to look at the various references you and others have given me. I see, in particular, that you yourself have been and still are a very prolific contributor to the General Science Journal, providing a wealth of most interesting material. I also listened to the follow-on discussion you and Glenn (Baxter) had had (Ed note: listen to this at www.k1man.com/Ricker130128.mp3).... I had intended, for curiosity, listening to perhaps the first 15 minutes or so, but was so enthralled by the discussion – quite amazing how for some three hours just the two of you kept up such an incisive and wide-ranging discourse without any abatement! – that at the end I was sorry it was terminating: three hours had seemed like so many minutes (now that's *real* relativity!). It is indeed interesting to follow the careers of such people as Zapffe; when I commenced studying what might be called heterodox contributions to physics almost twenty years ago, I did come across many contributors, and Zapffe may have been among them, though unfortunately if so I had not remembered him among others such as Michelson and Lorentz themselves, Rutherford, Soddy, Dingle, Essen, Burniston Browne, Zwicky, Monti, Kelly, …, so I'm glad now to rectify this (apart from the quite inconsequential coincidence that we share the same birthday – his being exactly forty years before mine – that I discovered on looking at his bio.). By the way, another incidental fact, I don't know of what consequence, that I was reminded of in mentioning Rutherford: one of my undergraduate university professors was E. T. S. Walton, who, along with Sir John Cockcroft and working under Rutherford, won the Nobel physics prize for the first transmutation of atomic nuclei by artificially accelerated particles (called 'splitting the atom' in the Press of the time) in 1932 - we had a 50th anniversary series of appropriate lectures here in Dublin last April.

I should be very happy to participate in an audio interview as you suggest, if you think it would be interesting. I could certainly tell you something about Alf Kelly, although I only got to know him personally a few years before his death in 2005. I had, of course, heard about him many years before that, and am glad to report that on publication of my GED paper in 2003 he immediately wrote to me congratulating me on what he claimed to be a 'Magnum Opus on the topic'.

I do agree on the desirability of effecting closer co-operation across the Atlantic, though I think this is one thing on which you may have picked me up incorrectly. I think you said that I had indicated a significant dissident-science organization in Europe, perhaps more so than in the US; whereas my position is on the contrary that (although I may be missing it) I see very little in Europe at present to match even the tithe portion of what you are going. Exceptions like M. C. Duffy's P.I.R.T. conferences in London and Monti's Galileo in Italy (neither of which I have attended) notwithstanding; though the St. Petersburg ones are exceptional (and I remember thinking during my 2004 attendance thereat that I had had to travel to the main country of the fairly recently disestablished Soviet Union to be able to engage in truly untrammelled and objective discussions in this area of science!).

Best regards,

Ian.

On the twin paradox (which I, along with many others, found hard to swallow, and even contradictory in regard to its simultaneous claim for particular non-reciprocity along with that for general reciprocity, when I first encountered it perhaps some 45 years ago), I looked at your project-page site, and provided the initial comment to Nick Percival, who had also drawn it to my attention, that there appeared to be a not insignificant commonality in the results there delineated and my own electrodynamic ones, arrived at from different angles; and that that, of course, bodes well for the likelihood that neither of us is too much off track in this. And the addition of the adjective 'physical' before claims of (absolute) space and time would, indeed, appear to be expedient in avoiding a possible diversion in such considerations to the question of metaphysical reality. Your draft (!) on unipolar induction appears to be very comprehensive and well reasoned, and I am sure the finished product (if this be only the draft!) will be exceedingly comprehensive. I look forward to future discussions and further study and comparisons in regard to all these matters.

Best regards,

Ian.

P.S. – On your own P.S.: As I have indicated, your group engages – in so far as I have been able to establish from admittedly only so far having touched its extensive communications – in very interesting and stimulating exchanges. It is ironic that one has been led to dissidence (other than towards orthodoxy) from a dissident group (although perhaps I shouldn't be too surprised living in Ireland: there is a standing joke that the first item on the agenda of any newly established organization here is the *split*!)

Harry Ricker of the United States writes to Dr. Cowan:

Thanks for your nice mail. I discovered in working on unipolar induction that it is indeed a very complicated problem. I keep discovering more experiments. I may have bit off a bit too much.

I think that what caused a lot of interest in your presentation was that it put together a lot of experimental facts in a compact form that was very convincing. People were very convinced by the presentation that indeed there was a

large body of experimental facts against the prevailing paradigms based upon the Einstein theories of relativity.

There also were people who were strongly interested in your electromagnetic ideas and want to know more about your thinking. I have suggested that you should participate in an audio interview with Glenn Baxter that would be recorded for the data base. In particular I would like to hear about how you became interested in this area of dissident physics from your encounter with the ideas of Alf Kelly. In addition, while we are aware of his work we know nothing about him on a personal level and so we would like to have any stories or information regarding him become part of some audio interviews.

Finally, it has been suggested that perhaps there is a need for closer cooperation between dissident scientists here in the US with those in Europe. Perhaps we can work to accomplish this.

Harry

MORE LETTERS / E-MAILS AT www.k1man.com/Jan2013 and www.k1man.com/Feb2013

INFORMATION OVERLOAD: From 3000 B.C. 20 2003 5 billion gigabites of human information was generated. This feat was repeated every two days between 2003 and 2010. By 2013 every 10 minutes. NATURE 26 April 2012 P. 447.

SOURCES

NPA, the Natural Philosophy Alliance, is a world wide forum for the critical analysis of mainstream science and the open exchange of related ideas. See www.k1man.com/vr Coming NPA video conferences: www.k1man.com/vc NPA members: www.k1man.com/members

World Scientists: www.k1man.com/ws World Science Database: www.k1man.com/wsd

Scientific Papers: www.vixra.org www.arxiv.org www.k1man.com/v www.k1man.com/k

ACADEMIC COURSES: Calculus: www.k1man.com/Calculus Other courses: www.k1man.com/Khan Atom: www.k1man.com/Atom Limit: www.k1man.com/Limit

PAPERS

SPECIAL RELATIVITY MATH DISPROOF ON ONE PAGE – by Glenn A. Baxter, P.E. www.k1man.com/c12

SCIENCE AT THE CROSSROADS by Dr. Herbert Dingle www.k1man.com/Dingle130114A.pdf

SPECIAL RELATIVITY AND ITS ABSURD LOGIC by Dr. Peter Kohut
www.k1man.com/Kohut130120A.pdf

THE IRKSOMENESS OF EINSTEIN'S SPECIAL THEORY OF RELATIVITY by Harry H. Ricker III
www.k1man.com/Ricker130116B.pdf

Rethinking Relativity by Tom Bethell www.k1man.com/Bethell130201A.pdf

No one has paid attention yet, but a well-respected physics journal just published an article whose conclusion, if generally accepted, will undermine the foundations of modern physics--Einstein's theory of relativity in particular. Published in Physics Letters A (December 21, 1998), the article claims that the speed with which the force of gravity propagates must be at least twenty billion times faster than the speed of light. This would contradict the special theory of relativity of 1905, which asserts that nothing can go faster than light. This claim about the special

THE WITTE EFFECT: THE NEUTRINO SPEED AND THE ANISTROPY OF THE LIGHT SPEED AS DEFINED IN THE GENERAL THEORY OF RELATIVITY by Poicarpo Yoshin Ulianov www.k1man.com/Relativity130201S

"…There are reasons to believe that the Witte effect explains why OPERA's neutrinos seem to move at speeds above the speed of light…"

GUEST EDITORIAL

39 QUOTATIONS by John Sheperd

(1) "All humans by nature desire to know"
- Aristotle, *Metaphysics*, Book 1(A) *Note: Most quotations state "men" instead of "humans", but evidently these are mis-translations.*

(2) "Most educated people are aware that we are the outcome of nearly 4 billion years of Darwinian selection, but many tend to think that humans are somehow the culmination. Our sun, however, is less than half-way through its lifespan. It will not be humans who watch the sun's demise, 6 billion years from now. Any creatures that then exist will be as different from us as we are from bacteria or amoebae."
- Martin Rees, Professor of Cosmology and Astrophysics, Cambridge University, at a lecture in the spring of 2006 at the Hay-on-Wye book festival.

(3) "A man's ethical behavior should be based effectually on sympathy, education, and social ties and needs; no religious basis is necessary. Man would indeed be in a

poor way if he had to be restrained by fear of punishment and hope of reward after death."
- Albert Einstein, "Religion and Science", New York Times Magazine, November 9, 1930

(4) "In science, there is only physics. All the rest is stamp collecting."
- attr. to Ernest Rutherford. However, his Nobel prize was in Chemistry.

(5) "I am surrounded by priests who repeat incessantly that their kingdom is not of this world, and yet they lay their hands on everything they can get."
- Napoleon Bonaparte]

(6) It is as though a gardener looked at an old oak tree and remarked, wonderingly: "Isn't it strange that no major new boughs have appeared on this tree for many years. These days, all the new growth appears to be at the twig level !"
- Richard Dawkins, Review of "Full House", remarking on development of individual species:

(7) "...the assertion that culture explains the whole of human variation may be taken seriously when there are reports of war parties of women raiding surrounding settlememnts to capture men as husbands."
- -John Tooby & Leda Cosmides

(8) "The fact that the supernatural has no place in our explanations, in our understanding of so much about the universe and life, doesn't diminish the awe..."
- Richard Dawkins

(9) "...when two opposite points of view are expressed with equal intensity, the truth does not necessarily lie exactly halfway between them. It is possible for one side to be simply wrong."
- Richard Dawkins

(10) The nobility of science as a human endeavor was well encapsulated by the physicist Subrahmanyan Chandrasekhar when he used the Icarus metaphor in praise of Sir Arthur Eddington. He said, "Let us see how high we can fly before the sun melts the wax in our wings."

(11) The following interview is excerpted from a conversation between Mother Jones contributing writer Michael Krasny and Richard Dawkins, the Charles Simonyi Chair for the Public Understanding of Science at Oxford University and author of The Selfish Gene, River Out of Eden, and Climbing Mount Improbable. The interview took place on March 17, 1997, at San Francisco's Herbst Theater at a California

Academy of Sciences benefit.
Q: You're known for your atheism and your comment that "religion is a virus." Are you more tolerant toward religion these days?
A: No. I am often asked to explain as a biologist why religion has such a hold. The theory is this: When a child is young, for good Darwinian reasons, it would be valuable if the child believed everything it's told. A child needs to learn a language, it needs to learn the social customs of its people, it needs to learn all sorts of rules -- like don't put your finger in the fire, and don't pick up snakes, and don't eat red berries. There are lots of things that for good survival reasons a child needs to learn.
So it's understandable that Darwinian natural selection would have built into the child's brain the rule of thumb, "Be fantastically gullible; believe everything you're told by your elders and betters."
That's a good rule, and it works. But any rule that says "Believe everything you're told" is automatically going to be vulnerable to parasitization. Computers, for example, are vulnerable to parasitization because they believe all they're told. If you tell them in the right programming language, they'll do it. Computer viruses work by somebody writing a program that says, "Duplicate me and, while you're at it, erase this entire disk."
My point is that the survival mechanism that makes children's brains believe what they're told -- for good reason -- is automatically vulnerable to parasitic codes such as "You must believe in the great juju in the sky," or "You must kneel down and face east and pray five times a day." These codes are then passed down through generations. And there's no obvious reason why it should stop.
There's an additional factor in the virus theory, which is that those viruses that are good at surviving will be the ones that are more likely to survive. So, if the virus says, "If you don't believe in this you will go to hell when you die," that's a pretty potent threat, especially to a child. Or, if it says, "When you become a little bit older you will meet people who will tell you the opposite of this, and they will have remarkably plausible arguments and they'll have lots of what they'll call evidence on their side and you'll be really tempted to believe it, but the more tempted you are, the more that's just Satan getting at you." This is exactly what many creationists in this country have been primed with.
Q: You've said that when you discovered Darwin, everything fell into place. You felt a peace of mind. How was your atheism confirmed by Darwinism?
A: Before I discovered Darwin, I was fascinated by the apparent design and beauty of living things. I knew enough biology to know that living creatures are prodigiously complicated and elegant. They look exactly as though they'd been designed. That was why I believed in a divine creator. Because I had been so persuaded by this argument for design, when I discovered Darwinism, I had a kind of "road to Damascus" experience.
I think there is a serenity that comes from understanding, from being able to solve a

mystery. And the bigger the mystery, the greater the serenity. When you think about the diversity, complexity, and beauty of life -- the elegance of the apparent design of life -- it adds up to a colossal mystery. And the solution, Darwin's solution, is quite remarkably simple. My serenity comes from the satisfaction of seeing a really, really neat, elegant explanation that can explain so much."

(12) "Seek the company of those who are looking for the truth, but run from those who have found it."
- Attibuted to Vaclav Havel (playwrite, Czech president)

(13) "It's too late to agree with me: I've changed my mind."
- Mahub ul Haq, a heretic among economists, who died July16 1998, aged 64.

(14) "A bird in the hand is dead".
- J. T. O'Hara in "The Gift of Happiness Belongs to those Who UnrapIt", Andrews McMeel, 1998?

(15) "A man is judged by the company he avoids"
- J. T. O'Hara, op. cit. above..

(16) "One good friend is worth 10 lousy relatives"
- J. T. O'Hara, op. cit. above.

(17) "An optimist hasn't had much experience"
- J. T. O'Hara, op. cit. above.

(18) "No one ever loses money by undersetimating public taste"
- "The Economist" - obituary on Lew Grade, Dec. 19, 1998

(19) "I am an amateur-crastinator trying to decide whether to go pro-"
- Tony Ward tag line, January 2000.

(20) "If a husband, all alone in a forest, expresses an opinion, is he still wrong?"
- Tony Ward tag line, 1997

(21) "I'm exhausted from not talking"
- attr. to Sam Goldwyn.

(22) "It's no accident that Chauvin was a Frenchman" - attributed to a frustrated French would-be wine importer - iimports command less than 5% of the French market.

(23) "Cum grano salis"
- Pliny the Elder in *Naturalis Historia*, referring to the discovery of an antidote to poisons.

(24) "If the human brain were simple enough for us to understand, we would be too simple to understand it."
- anonymous

(25) "Entia non sunt multiplicanda praeter necessitatum"
- (Occam's razor - use a minimal set of entities and concepts).

(26) "Be very very careful what you put into that head, because you will never, ever get it out."
- Cardinal Wolsey (1475? - 1530), referring to the education of boys.

(27) "The early bird trains the late worm"
- Tony Ward tag line, Feb. 2000

(28) "The common pro-crastinator works for money. I waste time for the pure pleasure it gives me ..."
- Tony Ward tag line March 2000

(29) "The second mouse gets the cheese"
- Tony Ward tag line, Feb. 2000.

(30) "If your experiment needs statisics, you ought to have done a better experiment."
- attr. to Ernest Rutherford.

(31) "... man was forced to invent work in order to escape the strain of having to think"
- Hercule Poirot in Agatha Christie's "Death on the Nile"

(32) "All things by immortal power,
Near or far,
Hiddenly
To each other are,
That thou canst not stir a flower
Without troubling of a star .... "
- From "Mistress of Vision" by Francis Thompson (1857-1907), referring to "fields" - gravitational, electric, magnetic and who knows what others that exist in Nature.

(33) "A ... field is a mathematical function we use to avoid the idea of action at a

distance."
- Richard Feynman (1918 - 1988) in "The Feynman Lectures on Physics", Volume II, p. 15-7. Do they exist? - We really don't know. (JMS)

(34) "Dean is to faculty as hydrant is to dog."
- Alfred Kahn (1917 - 2010), father of de-regulation in the USA in the 1970's, former dean of Cornell's College of Arts and Sciences.

(35) "Never make forecasts, especially about the future."
- Attributed to Samuel Goldman.

(36) "I believe that a scientist looking at a nonscientific problem is just as dumb as the next guy."
- Richard Feynman (1918 - 1988)

(37) "The first principle is that you must not fool yourself - and you are the easiest person to fool."
- Richard Feynman (918 - 1988)

(38) "The fault, dear Brutus, is not in our stars, / But in ourselves."
- Julius Ceasar, Act 1, Scene 2.

(39) "My clock has stopped completely, but it is still right twice a day"
- old English proverb

SUMMER PHYSICS COLLOQUIUM IN PORTLAND, MAINE

We are calling for papers and inviting speakers for the 17 August 2013 Physics Colloquium, to be held in Portland, Maine. The theme for the 2013 Colloquium will be the so called Higgs Boson.

The 18 August 2012 Physics Colloquium scheduled in Portland, Maine focused on the effect of Special Relativity on Electromagnetic Theory as described by Maxwell's equations. Accepted papers for presentation at the 2013 colloquium will be distributed to all registered attendees before the colloquium so they can be studied and even discussed, which will greatly improve the effectiveness and efficiency of the colloquium itself. Attendees are cordially invited to dinner in Portland on Friday evening, August 16, 2013 at 7:00 p.m. to informally meet and to also discuss physics. Please register for the colloquium (free) and/or the dinner (off the menu) by sending an E-mail to Institute@k1man.com

www.viXra.org

We submit this Scientific Journal each month to www.viXra.org.

PHYSICS - MATHEMATICS SHORT WAVE RADIO PROGRAM

World Wide Short Wave Talk Show, 29 January 2013, and being aired 24/7 for the entire week on 14.275 MHz. USB, 7.2425 MHz., LSB, and 3.890 MHz. LSB, (plus or minus QRM).

Below are some of the mp3 audio and selected video teleconferences included in the program:

One hour twenty four minute conference call discussion regarding Dr. Ian Cowan's NPA video conference presentation (www.k1man.com/videoconf130126) on 26 January 2013 www.k1man.com/conf130128.mp3 plus other interesting topics regarding Special Relativity and cosmology.

PARTICIPANTS WERE:

Harry H. Ricker, BSEE, Virginia Tech, MSEE, UNH; Glenn A. Baxter, P.E., BSIE URI; Nick Percival, **BS Physics, Harvard; Al McDowell, BSEE, Syracuse, PhD. Cornell, Dr. Satya Pal Asija, P.E., BS, MBA, Grad IERE (Lond.), JD, etc.**

Three hour two minute discussion regarding Dr. Ian Cowan, other scientists, and also cosmology and other interesting topics. www.k1man.com/Ricker130129.mp3 plus other topics.

PARTICIPANTS WERE:

Harry H. Ricker, BSEE, Virginia Tech, MSEE, UNH; Glenn A. Baxter, P.E., BSIE URI

Other similar mp3 recordings: www.k1man.com/physicsiniversity

You can purchase a little portable short wave SSB receiver to listen to this short wave program every day (in the entire United States or in the entire world) at Radio Shack for about $100. Your Editor has the little Grundig G, about the size of a paper back book.

Dr. Rodney Bartlett's Interesting Paper:

www.k1man.com/f300 - The non-Higgs, revised electroweak unification, revised gravitation, and explained dark energy/dark mater – By Dr. Rodney Bartlett

International Amateur Radio Network programming is 27/7 daily and is simulcast on the short wave frequencies of 3.890 MHz., Lower Sideband, 7.242.5 MHz, Lower Sideband, and 14.275 MHz. Upper Sideband + - QRM. Live telephone call ins will be taken at 207 242 2143, and/or you can also participate in the live video conferences on Saturdays via computer at the above referenced URL The video conference sponsor, NPA (the Natural Philosophical Alliance), is at www.k1man.com/H

OTHER PAPERS

Papers by Glenn A. Baxter, P.E. www.k1man.com/v

Papers by Harry H. Ricker www.k1man.com/h

Papers by Dr. Daniel Gezari www.k1man.com/k4

Papers by D. Sasso www.k1man.com/k

Papers by Dr. Peter Kohut www.k1man.com/k10
Papers by Dr. M.S. Khan www.k1man.com/k8

Paper by Dr. Karl V. Thompson's paper www.k1man.com/k9

Papers by Dr. Johannes C. Valks www.k1man.com/k1

Papers by Prof. Daniel Y. Cahill www.k1man.com/k2

Papers by Dr. Sanjay Wagh www.k1man.com/k5

Papers by Dr. Johannes C. Valks www.k1man.com/k1

Papers by JOSEPH A. RYBCZYK www.k1man.com/k3

Papers by Cochetklov Victor Nikolayevick www.k1man.com/k6

Papers by Dr. Z Y. Wang www.k1man.com/k7

"To kill an error is as good a service, and sometimes even better than, establishing a new truth or fact."

Charles Darwin

"Great causes are never tried on the merits; but the cause is reduced to particulars to suit the size of the partisans, and the contention

is ever hottest on minor matters." - Ralph Waldo Emerson - From his essay "Nature" 1844

BELGRADE LAKES INSTITUTE FOR ADVANCED RESEARCH -

SCIENTIFIC JOURNAL - PREVIOUS ISSUES: www.k1man.com/p

*** THE INSTITUTE'S MISSION STATEMENT:

The Belgrade Lakes Institute For Advanced Research was founded in 1999 to study original scientific work of great thinkers going back as far as possible (even thousands of years) to reexamine ideas in search of hints or inspiration which might apply to current scientific progress in physics. The late Dr. Richard Feynman**** is an Honorary Member of the Institute, and his lectures and publications serve as a corner stone for our work and model for our thinking and efforts. Other examples of great thinkers and scientists would include people such as Michael Faraday, Maxwell, Euler, Cantor, Lavoisier, Lise Meitner, Otto Hahn, Bohr, De Broglie, Planck, Avogadro, Boltzmann, Compton, Schrodinger,Dr. xSA Albert Einstein, Newton, Leibnitz, Pythagoras, Descartes, and many others. Membership in the Institute is by application and majority of votes timely cast by the general membership. For more information call the USA number 207 242 2143 or E-mail Institute@K1MAN.com Articles for the Scientific Journal are invited. Our mail address is Belgrade Lakes Institute For Advanced Research, 310 Woodland Camp Road, Box 440, Belgrade Lakes, Maine 04918 USA www.k1man.com/physics

PAST ISSUES OF THE SCIENTIFIC JOURNAL: www.k1man.com/p

****Richard Feynman

Richard Feynman (1918–1988), American physicist and Nobel laureate. Feynman shared the 1965 Nobel Prize in physics for his role in the development of the theory of quantum electrodynamics, the study of the interaction of light with atoms and their electrons. He also made important contributions to the theory of quarks (particles that make up elementary particles such as protons and electrons) and superfluidity (a state of matter in which a substance flows with no resistance). He created a method of mapping out interactions between elementary particles that became a standard way of representing particle interactions and is now known as Feynman diagrams. Feynman was a noted teacher, a notorious practical joker, and one of the most colorful characters in physics.

Feynman was born in New York City. As a child he was fascinated by mathematics and electronics and became known in his neighborhood as "the boy who fixes radios by thinking." He graduated with a bachelor's degree in physics from the Massachusetts Institute of Technology (MIT) in 1939 and obtained a Ph.D. degree in physics from Princeton University in 1942. His advisor was John Wheeler, and his thesis, "A Principle of Least Action in Quantum Mechanics," was typical of his use of basic principles to solve fundamental problems.

During World War II (1939-1945) Feynman worked at what would become Los Alamos National Laboratory in central New Mexico, where the first nuclear weapons were being designed and tested. Feynman was in charge of a group responsible for problems involving large-scale computations (carried out by hand or with rudimentary calculators) to predict the behavior of neutrons in atomic explosions.

After the war Feynman moved to Cornell University, where German-born American physicist Hans Bethe was building an impressive school of theoretical physicists. Feynman continued developing his own approach to quantum electrodynamics (QED) at Cornell and then at the California Institute of Technology (Caltech), where he moved in 1950.

Feynman shared the 1965 Nobel Prize in physics with American physicist Julian Schwinger and Japanese physicist Tomonaga Shin'ichirō for his work on QED. Each of the three had independently developed methods for calculating the interaction between electrons, positrons (particles with the same mass as electrons but opposite in charge) and photons (packets of light energy). The three approaches were fundamentally the same, and QED remains the most accurate physical theory known. In Feynman's *space–time* approach, he represented physical processes with collections of diagrams showing how particles moved from one point in space and time to another. Feynman had rules for calculating the probability associated with each diagram, and he added the probabilities of all the diagrams to give the probability of the physical process itself.

Feynman wrote only 37 research papers in his career (a remarkably small number for such a prolific researcher), but many consider the two discoveries he made at Caltech, superfluidity and the prediction of quarks, were also worthy of the Nobel Prize. Feynman developed the theory of superfluidity (the flow of a liquid without resistance) in liquid helium in the early 1950s. Feynman worked on the *weak interaction*, the *strong force*, and the composition of neutrons and protons later in the 1950s. The weak interaction is the force that causes slow nuclear reactions such as beta decay (the emission of electrons or positrons by radioactive substances). Feynman studied the weak interaction with American physicist Murray Gell-Mann. The strong force is the short-range force that holds the nucleus of an atom together. Feynman's studies of the weak interaction and the strong force led him to believe that the proton and neutron were composed of even smaller particles. Both particles are now known to be composed of quarks.

The written version of a series of undergraduate lectures given by Feynman at Caltech, *The Feynman Lectures on Physics* (three volumes with Robert Leighton and Matthew Sands, 1963), quickly became a standard reference in physics. At the front of the lectures Feynman is shown indulging in one of his favorite pastimes, playing the bongo drum. Painting was another hobby. In 1986 Feynman was appointed to the Rogers Commission, which investigated the Challenger disaster—the explosion aboard the space shuttle Challenger that killed seven astronauts in 1986. In front of television cameras, he demonstrated how the failure of a rubber O-ring seal, caused by the cold, was responsible for the disaster. Feynman wrote several popular collections of anecdotes about his life, including *"Surely You're Joking Mr. Feynman"* (with Ralph Leighton and Edward Hutchings, 1984) and *What do YOU Care What Other People Think?* (with Ralph Leighton, 1988).

** Mr. Baxter has a degree in Industrial Engineering from the University of Rhode Island and is a Licensed Professional Engineer in Illinois and Maine. He is a graduate of Vermont Academy, which honored him in 1993 as a Distinguished Alumnus with the Dr. Florence R. Sabin Award. It was at Vermont Academy as a student where Mr. Baxter attended a talk and met the very popular relativity author James A. Coleman(7). Mr. Baxter has been doing research in relativity and physics ever since and is currently Executive Director of the Belgrade Lakes Institute for Advanced Research. His current interests include physics, philosophy, and theology.

FORUMS www.k1man.com/z

Glenn A. Baxter, P.E., Executive Director,
Belgrade Lakes Institute For Advanced Research
And
Editor, Scientific Journal
310 Woodland Camp Road
Belgrade, Maine 04917
Institute@K1MAN.com tel. 207 242 2143 www.k1man.com/physics

Autobiography www.k1man.com/g

Glenn A. Baxter, P.E., at his home in Belgrade Lakes, Maine U.S.A.

Glenn A. Baxter, P.E., age 4, with his dad, Frank H. Baxter (Bachelor of Science Degree, Mechanical Engineering, 1914, Rhode Island State College), and President of Frank H. Baxter Associates, 370 Lexington Avenue, New York City. See www.k1man.com/fhb and also www.k1man.com/w10 and www.k1man.com/Loons