

LETTERS (continued from page 15)

ity, and a year later, Rutherford reported the discovery of (what were only later called) alpha particles, under the title 'The Magnetic and Electric Deviation of the Easily Absorbed Rays from Radium.'

The facts are somewhat different. In January 1899, Rutherford published a paper in the *Philosophical Magazine* under the title "Uranium Radiation and the Electrical Conduction Produced by It."¹ In that paper, he stated (on page 116): "These experiments [i.e. the absorption of the radiation emitted by a uranium source in aluminium foil of increasing thickness] show that the uranium radiation is complex, and that there are present at least two distinct types of radiation—one that is very readily absorbed, which will be termed for convenience the α radiation, and the other of a more penetrative character, which will be termed the β radiation." This work was carried out in 1898 at the Cavendish Laboratory in Cambridge, England, where Rutherford was an 1851 Exhibition scholar under J. J. Thomson.

There is evidence Rutherford was aware of the existence of a third type of radiation emitted by uranium, but the discovery of the γ radiation is usually attributed to Paul Villard in 1900.²

References

1. E. Rutherford, *Philos. Mag. Ser. 5* **47**, 109 (1899).
2. P. Villard, *C. R. Acad. Sci.* **130**, 1010 (1900).

MONTAGUE COHEN

*McGill University
Montreal, Quebec, Canada*

LUSTIG REPLIES: I am obliged to Montague Cohen for pointing out that I mischaracterized the paper that Ernest Rutherford delivered at the December 1902 meeting of the American Physical Society. Its very title (which I cited in my article) should have stopped me from carelessly writing that it announced the discovery of the alpha particle; and as it was, the absence of the word "alpha" in the paper's abstract led me to mistakenly conclude that the term had been coined later. The significance of Rutherford's paper was that the direction of the deflection proved that the alpha particle was positively charged, and its magnitude led to the determination of the ratio of the particle's charge to its mass.

HARRY LUSTIG

*(lustig@earthlink.net)
Santa Fe, New Mexico*

More on the Sociology of Science—and a Note on Kant's Position

Mara Beller's article "The Sokal Hoax: At Whom Are We Laughing?" (*PHYSICS TODAY*, September 1998, page 29) only reinforces my conclusions arrived at during 40 years of experience since my wife, Malka Lipkin, earned a degree in sociology in 1959 at the University of Illinois and told me about the courses she took explaining how scientists work and the so-called scientific method. Nothing written by historians and philosophers of science about research in physics and how physicists work needs to be taken seriously. They haven't a clue.

Reality today means driving a car in which the driver is guided by an electronic navigation system controlled by signals received from satellites and interpreted by computers using Albert Einstein's general theory of relativity. Every aspect of modern life seems to feel the impact of devices using lasers, computers, magnetic resonance imaging, and solid-state electronics, which would not work without quantum mechanics. Are relativity and quantum mechanics reality or simply texts? Try and live without them in today's society.

Niels Bohr, Max Born, Werner Heisenberg, and Wolfgang Pauli were great physicists. But they never dreamed how their remarkable revolutionary discoveries would completely transform our everyday experiences a half century later and make them an inseparable part of the reality of the life of the common man. Their many papers about reality are completely out of date, and history has bypassed them. But historians have not. Somehow these outdated papers seem to be the only ones that historians and philosophers ever read. They behave like name droppers who are completely devoid of common sense. The great papers that led to the revolutionary discoveries get lost in the confusion.

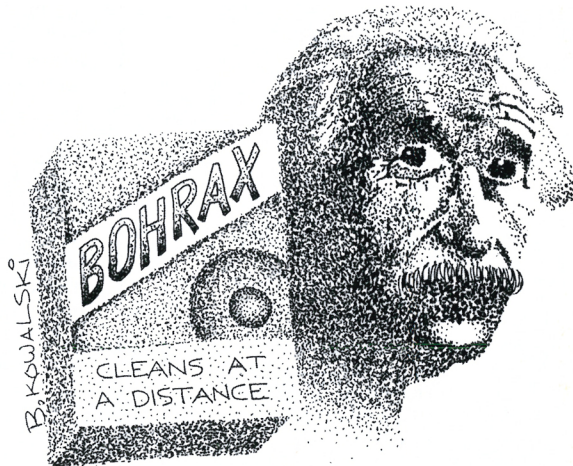
A number of years ago, I was asked to give a talk about the impact of the discovery of the antiproton at a celebration of some anniversary of the discovery. I made the rounds of the post-

docs to hear what they thought about the antiproton. Instead, I heard: "This is also the 100th anniversary of the birth of Niels Bohr. What did Bohr really do?" They knew about the Schrödinger equation, the Dirac equation, the Heisenberg uncertainty principle, the Pauli exclusion principle, the Born-Oppenheimer approximation, and all that. But where were the Bohr equation, the Bohr principle, or the Bohr approximation? Ah yes, there was the Bohr-Sommerfeld quantum theory. "But this is all wrong! Who needs it? What did Bohr do to deserve all this fame?"

I would like our current historians to explain for the next generation what people like Bohr did to make their names worth remembering, not to pontificate about their outdated philosophical utterances. Otherwise, the next generation will not even know who those people were, let alone what they might have said.

I recall a very profound remark made back in 1958 by another great physicist, Eugene Wigner. I had asked him about the collective model of the nucleus recently proposed by Aage Bohr and Ben Mottelson, for which they later were awarded the Nobel Prize. I had heard that Wigner did not like it. "Yes," he said, "I think that this model is wrong. But you know, the old quantum theory of Bohr and Sommerfeld was wrong, too. And it is very difficult to see how we could have ever found the right quantum theory without going through this stage."

I also recall a talk by Paul Dirac about his discovery of the now-famous Dirac equation. When he was asked whether he was bothered by the appearance of the unphysical negative energy states, his answer was, more or less: "No. I had successfully solved the difficulty of finding a description of the electron which was consistent with both relativity and





**You Are
Invited to Attend
the 1999**

INDUSTRIAL PHYSICS FORUM

**for Corporate &
Academic Leaders**

sponsored by

the AIP Corporate Associates,
The Industrial Physicist, & The APS Forum on
Industrial Applications of Physics

**Technological Innovation
for Energy in a
World without Walls**

hosted by

EXXON RESEARCH & ENGINEERING
October 25-26, 1999
Clinton, New Jersey

THEME SESSION:

Markets & technology, resource exploration, innovation
in energy, ultra high strength steels, physics at chemical
engineering interface

ON-SITE TOUR:

Exxon Corporate Research

POLICY SESSION:

Environmental Drivers and Energy Technology
Future resources & environment, CO₂ management
technology, ground transportation plants

FRONTIERS OF PHYSICS:

Protein folding, cascading lasers, accelerating Universe,
self assembly

Registration Fee: \$250 (includes all meals)
Sessions Only: \$170
One day of sessions: \$100
Companion meals: \$90

To register or obtain further meeting information, contact:

Office of the Executive Director
American Institute of Physics
One Physics Ellipse
College Park, MD 20740-3843
Tel. 301-209-3135 or Fax 301-209-3133
<assoc@aip.org>

Or visit the Corporate Associates Homepage
on the AIP Website:
<<http://www.aip.org/aip/corporate/>>

**AMERICAN
INSTITUTE
OF PHYSICS**

quantum mechanics. Of course, when you solve one difficulty, other new difficulties arise. You then try to solve them. You can never solve all difficulties at once."

There is also the story of a prominent mathematician, who is also a religious Jew. During a period of hot debates on evolution versus creationism, he was asked whether he believed in evolution. He answered, "Of course. It is good science." When asked whether he believed the story of the creation in the Bible, he said, "Of course. I believe what is written in the Bible." But wasn't this a contradiction? "Of course it is a contradiction. We don't understand it. But life is full of contradictions that we don't understand. We have to live with them."

I often remember the words I used to hear from my father whenever I thought I was being very clever: "If you would know what you don't know, you would know more than you know."

This will always be true.

HARRY J. LIPKIN

(ftlipkin@wiswiz.weizmann.ac.il)
Weizmann Institute of Science
Rehovot, Israel

A comment to add to the discussion about postmodern social scientists using secondary sources to determine the whys and whats of physics (see, for example, Mara Beller's article in your September 1998 issue). Imagine some aliens who do not experience sex coming to Earth and studying us in this respect. Imagine their attempt at a scientific description of the behavior of humans in love, and in sex, without their having a clue as to what love and sex do for Earthlings. It would be a very strange treatise, without much chance of any of it being right. Why, we don't really need aliens! Wasn't it Immanuel Kant who stated that sex "requires positions unworthy of a philosopher"? He made other pronouncements, too—such as one about the existence of absolute time and space—that failed and that he also arrived at by thinking alone, not by practicing.

Individuals who try to make an academic discipline out of talking about science without knowing it, and without understanding how things fall into place with a correct postulate, remind me of those cartoons about love and sex in which the old geezer says, "I know I like it but I don't remember why." Except that many social scientists don't like "it."

INGA KARLINER

(karliner@uiuc.edu)
University of Illinois
at Urbana-Champaign

US Federal Scientists Shouldn't Get Free Passage to India

With respect to the US Department of Energy having turned down travel requests from eight US scientists to attend the 13th Topical Conference on Hadron Collider Physics at a research institute in India in mid-January, as reported in your March story (page 75), may I cast a vote in support of DOE?

As a semiretired industrial physicist and research manager, I see no reason why such scientists should have their way paid to a country with which the US—their employer, "in loco taxpayers"—is quite rightfully upset. Nor, in fact, do I see the merit of taxpayers subsidizing the mass junkets of government scientists even to friendly countries.

In this particular case, from the US point of view, the cause of scientific exchange was hardly harmed, for our scientists are surely free to request funds to travel to other conferences, both at home and abroad. Rather, the loss was primarily that of the Indian scientists, and—in my opinion—that was the intent.

Have I missed something? Isn't it the predominant view among members of our science organizations that nuclear weapons are bad and we should do everything we can to eliminate them? How does our posturing about scientific exchange lead to discouraging India—or Pakistan, Israel, or any other country—from developing even more deadly weapons of mass destruction?

My hat is off to the unnamed Fermilab researcher mentioned in your story who attended the conference in India at his own expense. At least we know that he was serious about science—or India.

ROBERT A. MYERS

(myers@rlicense.com)
New York, New York

Corrections

March, page 117—George C. Baldwin's letter was inadvertently printed without its headline: "Advances Made in Synchrotron Radiation Deserve to Be Prized."

April, page 60—The November 1996 loss of the HETI-I spacecraft was due to a power failure on an Orbital Sciences Pegasus XL rocket, not an Ariane-5 rocket as stated in the third footnote of the table on the budgets of NASA's physics-related programs. ■