letters

I do not say that PHYSICS TODAY shares any responsibility for a rejection of nuclear energy (especially since PHYSICS TODAY has been generous in allowing me to present my views in its columns). I do think that a magazine for physicists and by physicists could have done better in reviewing these strongly anti-nuclear books.

ALVIN M. WEINBERG
Director
6/84 *Institute for Energy Analysis*

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The lead book review in June marks a despicable departure from what I view as the function of a book section in a journal sponsored by a professional scientific society. It is written by a very political non-scientist, reviewing three books attacking scientists, each authored by politically active non-scientists. The review is extremely supportive of these attacks, and introduces not a shred of evidence of objectivity in expressing this support. It lumps nuclear power and nuclear weapons together as a single evil entity, and maligns the former with an intensity unusual even for anti-nuclear activist organizations.

The only information in it definite enough for a scientist to evaluate is *wrong*. It states "Mancuso's refusal to cover up the risks of radiation led to AEC termination of funds for his work." Actually it was only after he received his termination notice that Mancuso *began* the analysis, with new collaborators, that led to his higher risk estimates. That work has received well over 20 scientific critiques, including some by long-time collaborators on the project, and it has been rejected by all national and international scientific groups charged with responsibility in radiation health. The withdrawal of his support was investigated by a congressional committee and by the General Accounting Office, and they found it to be justified.

Everything else in the review is political demagoguery without even an ounce of moderation. How can the community of physicists tolerate such trash in their journal?

BERNARD L. COHEN
6/84 *University of Pittsburgh*

Hospitality Abroad

You recently published a letter (January 1984, page 109) from two disgruntled American scientists who were unhappy with their conditions of employment at a prominent foreign institution. They stated that your practice of publicizing such complaints "render[ed] a great service to the scientific community." I disagree.

The Societies of the American Institute of Physics have many foreign members; each is part of the scientific community. The printing of letters that find fault with foreign institutions is inequitable when you have not published letters critical of US laboratories; yet there are scientists in this country—academic, governmental, and industrial—who also believe that their employment conditions or professional opportunities were not what was promised or that promotion experience was less than had been assured. Do you have an announced policy regarding your basis for selecting and publishing letters that are critical of institutions?

I believe that publication of such critical letters is problematic. The negative impression produced by the opinions, justified or not, of complainers cannot be overcome by appending a defensive reply. There may be a need for a general forum for employment complaints of all types, but the pages of PHYSICS TODAY are inadequate—if you permit complete and open discussion—and inappropriate.

PETER L. SMITH
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Laser cooling

My article, "Laser cooling of atomic beams" for *Physics News in 1983*, which was reprinted in PHYSICS TODAY (January 1984, page S-26), had an unfortunate omission. In discussing the history of laser cooling I mentioned the 1975 proposal[1] of Hänsch and Schawlow for cooling a gas of atoms, but neglected to include the independent and nearly simultaneous proposal[2] of Wineland and Dehmelt for cooling trapped ions. Their ideas led, in 1978, to the first observation[3] of laser cooling of trapped ions. I regret any confusion or misunderstanding that may have resulted from this omission.

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Marshak

At the risk of being labeled as a "Marshak ally," the letter by S. N.

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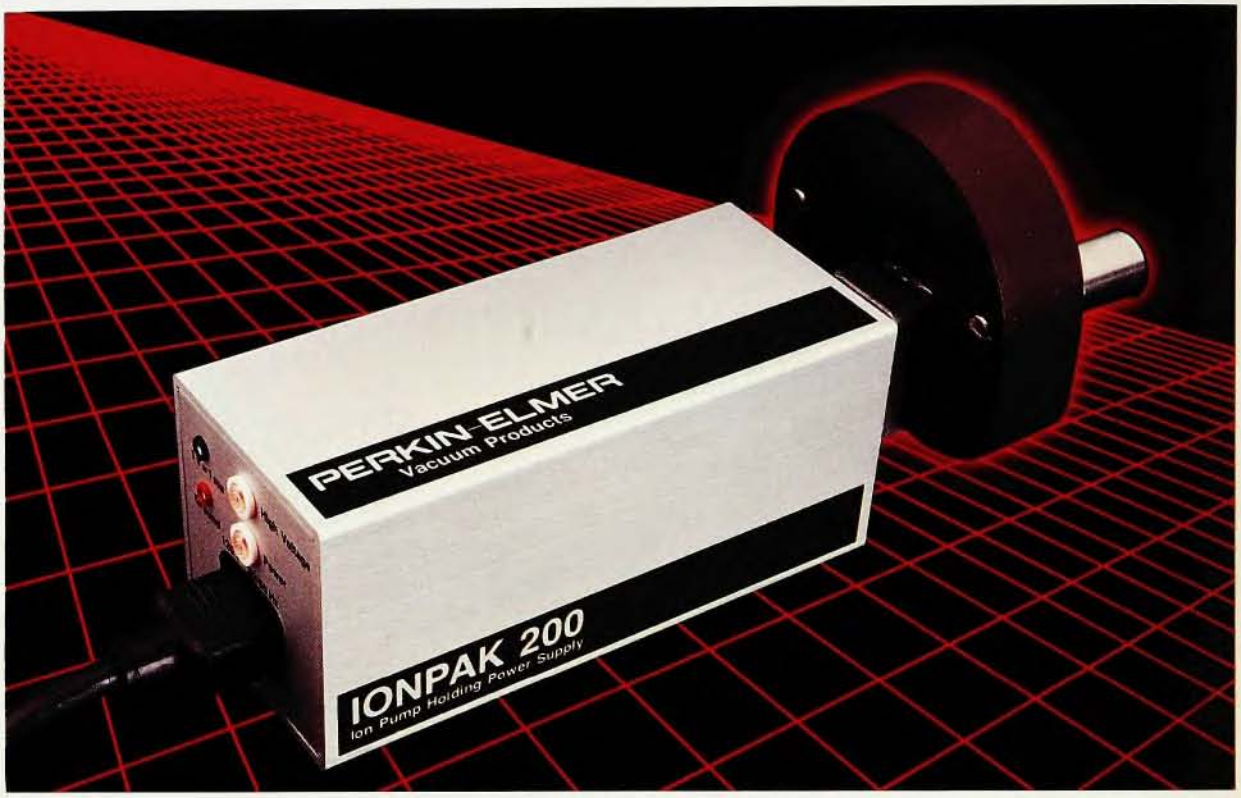

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PERKIN-ELMER

Gupta (February, page 86) must be protested.

The comment that "Marshak never made any really great contribution to physics" is unfair. His work on weak interactions and N-N scattering satisfy most theoretical physicists as being important contributions. His taste and judgement in both science and people account for his "influence" and possibly explain the lack of such influence of Gupta.

Bragging about his critical evaluation to CCNY officials in PHYSICS TODAY reflects far more adversly on Gupta than on Marshak. Finally, this letter writer is not a student, nor a present or former coworker nor a colleague of Marshak. I did, however, largely agree with his Guest Comment (May 1983, page 9).

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Don't forget Thomson

Writing in PHYSICS TODAY (November 1981, page 69), Victor F. Weisskopf tells the remarkable story of the development of field theory throughout the last 50 years. The triumph of Dirac's quantum electrodynamics was, however, left in sharp contrast by the awesome remarks that "we have no explanation for the mass of the electron; that is, the smallness of the ratio ($^1/_{1836}$) between the electron mass and the proton mass" and "there is not the slightest indication why electrons with different masses should exist." Here Weisskopf had in mind the normal electron, the τ-electron and the muon.

Forgotten, it seems, in these modern developments is the classical basis of electrodynamic theory developed by J. J. Thomson. Thomson gave a formula specifying the energy of the electron as $2e^2/3a$, where a is the radius within which its electric charge e is confined. He did not know about muons and antimatter, but it needs little imagination to write $\mu^+ + \mu^- = Q^0$, where Q^0 is an energy quantum formed from the mutual annihilation of a positive and negative muon. Adding energy to such a quantum could well produce a pair of Thomson-sized charges, including Q^-. Thus, for charges e and $-e$ in touching relationship, the total energy, including that of the Coulomb interaction, is:

$$W = P^+ + Q^- - e^2/(x+y) \quad (1)$$

where $P = 2e^2/3x$ and $Q = 2e^2/3y$. Eliminating x and y:

$$W = P + Q - 3PQ/2(P+Q) \quad (2)$$

Given a background source of muon pairs and an amount of energy P used to create N protons, we have N systems given by equation (2), NP constant and NW tending to a minimal value, for optimum stability. We can therefore differentiate W/P with respect to P to find its minimum. This occurs when $P/Q = [(^3/_2)^{1/2} - 1]^{-1}$ and tells us that $P \simeq 1836$ because $Q \simeq 2\mu \simeq 413$ in electron mass–energy terms.

This is such a remarkably simple result based on the Thomson formula, that one really must exclaim, "Let us not forget the heritage he left us."

Proton creation follows naturally from the existence of the dimuon energy quantum. Also remarkable is the fact that W is exactly half the mass energy of the τ-electron (half of 1.782 GeV or 1743 electron units). Put $P = 1836$ and $Q = 413$ in equation (2) and W is 1743.

Such results cannot be fortuitous; bear in mind that the formal derivation of the proton–electron mass ratio using equation (2) in terms of a theoretical determination of Q gave 1836.1523. This was published in 1975 in a paper I coauthored[1] with D. M. Eagles of CSIRO in Australia. It antedates by eight years the measurement by Van Dyck, Moore and Schwinberg,[2] which puts the ratio at 1836.152 470(80). The discrepancy is one part in ten million, but even this is explicable from the basic theory as it stood in 1975, as I have recently shown.[3] Using the same Thomson formula, the muon–electron mass ratio of 206.7683 has also yielded to theoretical explanation at its one-in-a-million level of measurement. Classical electromagnetic theory can, therefore, be usefully combined with quantum electrodynamics to solve some of the mysteries of particle mass.

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Unions of the campus

I have read with interest the debate involving Edward Harrison and Charles Nissim-Sabat about unions in the universities (January, page 11; June, page 11; October, page 11) and I wish to contribute a few remarks from a somewhat different viewpoint. Italy

continued on page 134