

# PHYSICS and SOCIETY

## The NEWSLETTER of the FORUM on PHYSICS and SOCIETY

Published by the American Physical Society, 335 East 45 Street, New York, New York 10017

Volume 8, Number 1

February 1979

### FORUM AWARDS GO TO ROWLAND AND STONE

The 1979 Leo Szilard Award for Physics in the Public Interest of the Forum on Physics and Society has been given to F. Sherwood Rowland of the University of California at Irvine. The award is for his identification and warnings of the hazards of the release of chorofluorocarbons to the earth's protective ozone layer.

The 1979 Forum on Physics and Society Award for promoting public understanding of the relation of physics to society has been given to Jeremy Stone of the Federation of American Scientists. The award is for his role as director of the Federation of American Scientists, a non-profit, civic organization, licensed to lobby in the public interest, and as editor of the influential and highly regarded FAS PUBLIC INTEREST REPORT.

### NOMINATIONS NEEDED FOR 1980 FORUM AWARDS

Gloria B. Lubkin, Senior Editor, Physics Today will chair the 1980 Forum Awards Committee. Suggestions and nominations should be sent to her by April 13, 1979 because the Forum Executive Committee will select candidates for the awards during the Washington APS meeting April 23, 1979. Her address is: Physics Today, 335 East 45 St., New York, N.Y. 10017

### IN THIS ISSUE:

Forum Awards	page 1
Nominations for Forum Officers	page 1
Two Contemporary Issues in the Politics of Scientific Research in the United States; Roger Dittman	page 2
Comments on a Paper by Roger Dittman; Earl Callen	page 9
Reprint of Proposed APS Guidelines to Professional Employment for Scientists and Engineers	page 15
Forum Programs at the APS March Meeting in Chicago	page 19

### PHYSICISTS, PROFESSIONAL CONCERNS, AND THE APS

This issue is devoted to two papers on the relations between the professional concerns of physicists, the physics community and the APS. The first paper by Roger Dittman presents a critical analysis of the Guidelines to Professional Employment for Engineers and Scientists which was proposed several years ago by the APS Committee on Professional Concerns but never adopted by the APS. Dittman also discusses a related issue, the Affirmation of Freedom of Inquiry and Expression resolution of the National Academy of Sciences. The second paper by Earl Callen is partly a comment on Dittman's paper and partly a history of the Guidelines. Callen has been one of the most prominent proponents of the Guidelines in the APS. Further papers or letters on these issues are welcome.

At the New York meeting of the APS, January 1979, the APS Council voted to replace the Committee on Professional Concerns by the Committee on Opportunities in Physics. Brian Schwartz (Dean of the School of Science, Brooklyn College) who had chaired the former committee will chair the new committee.

### NOMINATIONS NEEDED FOR 1980 FORUM OFFICERS

William A. Blanpied, Program Director, EVIST, NSF, will chair the Nominating Committee for 1980 Forum Officers.

Nominations for vice-chairperson and other officers should be sent to him by April 16, 1979 His address is:

Office of Science and Society  
National Science Foundation  
Washington, D.C. 20550

TWO CONTEMPORARY ISSUES IN THE POLITICS OF SCIENTIFIC RESEARCH  
IN THE UNITED STATES\*

Roger Dittmann  
California State University  
at Fullerton

I. Introduction

In order to illustrate the ideological condition of science and technology in the U.S., attention is focussed upon two significant relevant documents which have been submitted to the American Physical Society (APS) from the larger scientific/technological community. One of the documents, "Guidelines to Professional Employment for Engineers and Scientists",<sup>1</sup> has already been adopted by twenty scientific and technical societies.<sup>2</sup> The Committee on Professional Concerns of the APS had been considering recommending the "Guidelines" to the APS Council. The question whether the APS should adopt the guidelines was submitted to broad solicitation of opinions by publishing a statement of information and a call for comments in the July/August 1976 APS Bulletin.<sup>1</sup> It has since fallen into an administrative limbo, with no further action taken since then, but is still "pending", if not completely forgotten. The second document, "An Affirmation of Freedom of Inquiry and Expression", was passed as a resolution by the National Academy of Sciences (NAS), and has been distributed by the APS for personal endorsement.<sup>3</sup> 5,780 signed copies of the appeal were returned to the APS and forwarded to the NAS for further political use.

II. "Guidelines to Professional Employment for Engineers and Scientists"

The "Guidelines" (appended) have been defended as a progressive step for the APS,<sup>4</sup> which, even today, is reluctant to consider conditions of employment, a topic considered to be of "trade union" nature, quite outside the province of a "professional" society. Indeed, considering the reputation of the APS, the mere contemplation of such a topic may be considered to constitute progress of a sort - until one considers the content. Much of the content is bland and routine, but some issues command attention:

Loyalty:

No mention of loyalty to one's fellow man, society, or to one's country is made. Instead, (Objectives - 2) "The professional employee must be loyal to the employer's objectives and contribute his/her creativity to those goals". (my emphasis), and later, redundantly, perhaps for emphasis, (2. Terms of Employment, Professional employee (1) ), "The professional employee should be loyal to his/her employer."

Implicit is the position that the vast numbers of U.S. scientists and engineers who work for the military should, must be loyal to militaristic goals. Presumably also, professionals in the employ of corporations should be loyal to the raison d'etre of corporations, profit-taking, a process which sometimes required the performance of some public service, but which is most often antithetical to the public weal.

This attitude was perhaps a little too blatant for the APS Committee of Professional Concerns, which reviewed the document and sought to interpret "loyalty", and specifically "Objectives - 2" (cited above) as, "... the professional employee must support by his (sic) working performance the employer's objectives, and contribute his (sic) creativity to those goals." This provides little solace.

\* An earlier version of this paper was presented to the 7th International Conference "Science and Society" held in Protoroz, Yugoslavia, 25-30 June, 1977.

TWO CONTEMPORARY ISSUES (continued from page 2 )

"Whistle-blowing", such as produced the Pentagon Papers, Watergate, and which exposed germ warfare practices on the U.S. population, nuclear hazards, and myriads of other abuses, is clearly a violation of the mandated "loyalty to the employer". The Guidelines further state explicitly that, "The professional employee should not divulge technical proprietary information..." (2. Terms of employment, Professional employee (5) ). As Nader, et al., have pointed out in Whistle-Blowing<sup>5</sup>, professional employees in industry have practically no protection against reprisal from their employers, unlike organized workers who have access to grievance procedures obtained, guaranteed, and administered through legally binding, collectively bargained contracts. Professional employees who choose to serve the public interest even when it conflicts with the corporate interest are, and have been subject to dismissal, demotion, transferral, and industry-wide blacklisting. From their "professional" societies, according to the Guidelines, they can expect not support, but a reprimand, and justification for reprisals taken against them.

"Chain-of-Command" Thinking"

The "chain-of-command" structure of capitalist society, in which the employee is obedient to the orders of the bosses, is accepted and even emphasized, except for a minor interpretation referring to the statements of the American Association of University Professors describing recommendations for propriety in relations between faculty members and the University. Any concept of democracy in the workplace, peer review, syndicalism, codetermination, collective bargaining, or, heaven forbid, self-management!\* is unthinkable in such document arising out of the dominant ideology in a bourgeois society, which is, of course, the point of this paper. To cite some examples:

(from 2. Terms of employment) "The employer should establish a salary policy...", and "...performance evaluations and salary review should be conducted for the individual professional employee by his/her supervisor."

Collective bargaining is not mentioned explicitly, except to recommend against a closed shop (Employer (13) ). Probably through oversight, the possibility of an agency shop is not considered.

III. "An Affirmation of Freedom of Inquiry and Expression"

At first reading, the Affirmation (appended) reads like a resolution for apple pie and baseball (motherhood having recently declined in esteem). It is the omissions which are significant. The statement is called "An Affirmation of Freedom of Inquiry and Expression", as if freedom of inquiry already existed. The strong implication is that it is a matter of individual preference on the part of the investigator which decides the direction of research. There is absolutely no recognition of the tight control over research in the U.S. which is exercised by the agencies, foundations, and industries which control the funding<sup>6</sup>, even in the universities<sup>7</sup>, which are themselves under corporate control, as a glance at the roster of the board of trustees of any U.S. university will confirm.<sup>8</sup>

\* This paper was presented in Yugoslavia, where self-management is a constitutional guarantee and a way of life.

(continued on page 4 )

TWO CONTEMPORARY ISSUES (continued from page 3 )

The corporate foundation fronts, especially the Carnegie and Rockefeller Foundations earlier and the Ford Foundation later, magnified the extent of their influence over higher education by requiring matching funds for their significant grants<sup>9</sup>, by concentrating on the leading institutions<sup>10</sup>, and by focussing upon innovations. As Frank P. Walsh, Chair of the Congressional Commission on Industrial Relations (1915) commented,

"Mr. Rockefeller could find no better insurance for his hundreds of millions than to invest one of them in subsidizing all agencies that make for social change and progress.", and commenting on the concessions universities are willing to make to obtain funds, "It would seem conclusive that if an institution will willingly abandon its religious affiliations through the influence of these foundations, it will even more easily conform to their way any other part of its organization or teaching." (11)

It is ironic that practitioners in the field of recombinant genetic research are engaged in the process of restricting their own research because of the recognition of the dangers for the entire human race and for the environment which could result from unforeseen consequences of unrestricted research development at the same time that the NAS is circulating its Affirmation. Of course the need for restriction on research on human subjects has long been recognized.

A more subtle ideological point is deserving of attention. Repeated emphasis is placed upon the "personal freedom" of practitioners, defocussing attention from the organizations who hire the army of researchers and who really control the direction of research, as well as encouraging the debilitating attitude of isolated individualism which dooms practitioners to perpetual impotence, to the great convenience of the rulers of science.

IV. Motivation for the Documents

Despite the reactionary sentiments expressed in the Guidelines, which are used here to illustrate the domination of bourgeois ideology in the scientific and engineering communities, the document was obviously born out of concern for the regulation of the conditions of employment of behalf of the professional employee. But what prompted the NAS Affirmation?

It probably was motivated by concern about objections that have been raised about some types of research that have been conducted in recent times. Let us consider these areas of controversy briefly in order to understand what might have inspired the NAS to pass and circulate their resolution, viz., IQ and Race, Military Research, and to a lesser degree, Sociobiology, and other topics.

## IQ and Race:

Concern about objections to the racist research and statements of Shockley, Herrnstein, and Jensen led another branch of the scientific establishment, the American Association for the Advancement of Science (AAAS), to sponsor a two day program which they entitled, "Problems of Forbidden and Discouraged Knowledge"<sup>12</sup>, to which they invited Herrnstein, (who, however, did not attend, although he had initially accepted the invitation).

(continued on page 5 )

TWO CONTEMPORARY ISSUES (continued from page 4 )

Notice that the title chosen assumes that this racist research constitutes knowledge in the first place, an assumption quite effectively and devastatingly challenged by Block and Dworkin in their book, The IQ Controversy, as well as by others.<sup>13</sup> The research is referred to as "racist" advisedly, because of the solace it provides to all those who wish for justification from science to revert back to all the prejudiced racial stereotypes we have been striving to overcome, and because of the racial prejudice shown to be endemic in the methodology and interpretation of results.<sup>13</sup> A presentation by Scientists and Engineers for Social and Political Activity (SESPA) argued persuasively that the real forbidden knowledge in capitalist society consists of challenges to bourgeois ideology, such as Marxist social studies<sup>13a,6</sup> research which may conflict with profit margins, such as the uncompleted research on the some 10,000 industrial chemicals present in the workplace, and other research which may be inconsistent with ruling class interests.

#### Military Research:

The moral offensiveness of the Viet Nam war led to many objections and protests against the scientific research backing this first "scientific" war, with its electronic, automated battlefield, MacNamara line, "smart" bombs, mass spectrograph urine sniffers, and computerized tactics. At Standford Research Institute (SRI), liberated files exposed flame thrower research conducted under the code name "Heat Transfer Studies".<sup>14</sup> (The same title, ironically, was used to disguise research on more efficient ovens to burn up Jews in Nazi Germany.) The scientific establishment reacted:

"I think SRI people were upset with the notion that was expressed in some quarters of the campus that students and faculty should exercise moral control over the work at SRI. This was terribly upsetting to our professional people." --- Charles Anderson, President of SRI<sup>15</sup>

"The basis of advanced technology is innovation and nothing is more stifling to innovation than seeing one's product not used or ruled out of consideration on flimsy premises involving public world opinion."  
--- Harold Agnew, Director of the Los Alamos Laboratories Weapons Division.

The NAS Affirmation will serve to place all objectors to bourgeois research on the defensive, as opponents of "freedom of inquiry".

#### V. Character of the Sponsoring Organizations

One can also consider the nature of the organizations which have developed the documents in order to better understand their ideological orientation. The NAS has recently been subject to perceptive scrutiny by "Naders Raiders", Ralph Nader's Center for Study of Responsive Law, which has resulted in an extensive study published as a book, The Brain Bank of America.<sup>17</sup> The NAS is a self-perpetuating "old-boy" type organization of scientists at the back and call of the U.S. government for scientific advice. It's budgetary support is provided by the government on a project-by-project basis. It has a shaky record of performance, apparently manipulated, in some cases, by the Pentagon and other agencies providing scientific support for

(continued on page 6 )

TWO CONTEMPORARY ISSUES (continued from page 5 )

government programs. Overlapping appointments, and heavy dependence upon industrial and governmental scientists to man its committees detract from its objectivity. For example, former NAS president Seitz simultaneously served as chair of the Defense Science Board.

Professional societies in the U.S. are generally controlled by an establishment which quite easily manipulates at-large elections, since they are conducted with only scientific, not political, qualifications for the candidates made available to the electorate. The candidates are known personally but to a minute fraction of the electorate. They depend heavily upon corporate support to finance their operations, and have large numbers of members in management positions.

VI. The Ideological Foundations of Capitalist Science

As Habermas has demonstrated<sup>18</sup>, the self-image of science provides an ideology, a "technocratic ideology", which admirably serves to perpetuate power and legitimate privilege. Let us examine a few of the tenets of this self-image in order to better understand how the two documents naturally spring from the ideology, and serve as examples of it.

The Logical-Positivist view holds science to be objective, neutral and value-free.<sup>19</sup> It follows then that one need not concern oneself with the direction of science, its application, its choice of which facts to accumulate, or the value judgements inherent in its assumptions and interpretation. This attitude provides an uninhibited field of operation for the rulers of science, and encourages scientific workers to engage in a "Faustian bargain" in which they achieve technical knowledge at the cost of their soul (their participation in making value-laden decisions or even value judgements.) Values cannot be decided scientifically, therefore scientists who make value judgements are considered to be acting unprofessionally and unscientifically. They are admonished to stand uncritically silent as science develops into a repressive tool, "The Science of Control".<sup>20</sup>

Science is portrayed as anarchic, wherein the researcher decides what she wishes to pursue.<sup>21</sup> So it may be appear to the pure researcher who, through an exercise of "personal freedom", successfully applied for a grant to study a topic of her choice (ignoring the channelling process of graduate school and the job market for the moment). She didn't decide, however, whether the grant would be funded or what overall purpose it serves.<sup>22</sup> Peer review consisted of appointed experts making instrumentally rationalist recommendations within narrowly defined guidelines.

If an undeniable problem associated with science is confronted, it is attributed to something inherent in science itself, the "compulsion of technology"; it is technique itself which transforms ends into means,<sup>23</sup> efficiency into a purpose, contention between ideas into contests in manipulation of the mass media, political debate into tests of PR (public relations) techniques.

The message to scientific workers implicit in the ideology and in the two documents is to give unquestioning obedience and loyalty to the rulers of science, to avoid joining with other workers to overcome the impotence of individualism, to be assured that knowledge itself is inherently good in its objectivity, to allow science to be used in any manner the establishment sees fit and thereby avoid interference with "freedom of inquiry", to remain ignorant of the tight reins exercised over the scientific enterprise.

(continued on page 7 )

TWO CONTEMPORARY ISSUES (continued from page 6 )REFERENCES:

1. Bulletin of the American Physical Society, 21, No. 4, Series 11, (April 1976), pg. 493-497. Reprinted by permission from IEEE Spectrum, Vol. 10, 4 (April 1973) pg. 57-60. Copyright, 1973 by the Institute of Electrical and Electronical Engineers, Inc.
2. Seventeen societies participated in the drafting of the original document: At the time of submission to the AOS. Three other societies have approved The Guidelines: American Nuclear Society; Institute of Traffic Engineers; Society of Fire Protection Engineers.
3. Bulletin of the American Physical Society, 21, No. 7, Series 11 (July/August, 1976) 916.
4. Thomas P. Sheahan, Physics and Society 5, No. 4, (Oct. 1976) pg. 4
5. Ralph Nader, Peter J. Petkas, Kate Blackwell, Whistle Blowing: The Report of the Conference on Professional Responsibility. Grossman Pub. (1972)
6. Zimmerman, et.al., "Towards a Science for the People", Liberation (March 1972) (This article was censored from Science, the AAAS house organ, despite recommendation for publication from the review committee, shattering all precedent).
7. At the University of California, Berkeley, for example, the U.S. government provided 19% of the funding for physical and biological science research (in 1970). Owen Chamberlain, "Government Funding" Martin Brown, Ed., The Social Responsibility of the Scientist, The Free Press, MacMillan, New York (1971) pg. 43.
8. The roster of the five most important university boards in California show representation for 32 industrial corporations, 35 electronics industries, 12 oil companies, 14 agribusiness firms, 20 railroads, 7 airlines, and 8 utilities. (From SESPA Position Paper on Forbidden Knowledge).
9. It is estimated that two-thirds of the total endowment of all U.S. institutions of higher learning up to 1932 (\$660,000,000) had been directly stimulated by the foundations. See also Merle Curti, The Role of Philanthropy in the Shaping of U.S. Higher Education.
10. 75% if the Ph.D.'s come from 25 universities (where foundation money went).
11. Paul Horowitz, "Billion Dollar Brains", Ramparts (May 1969) pg. 36
12. Science 183, (11. Jan. 1974) pg. 111
13. The IQ Controversy, N.J. Block and Gerald Dworkin, Eds., Random House, New York, (1976). See also: Herbert Gintis and Samuel Bowles, "IQ in the U.S. Class Structure", Social Policy 3, Nos. 4, 5, (Nov?Dec. 72 and Jan/Feb. 73) and the March 74 issue of Science for the People.
- 13a. For example, at Simon Fraser University, the entire department of Anthropology, Sociology and Political Science was dismissed because of its deviant (Marxist) ideological orientation. The Economics Department at San Jose State University was recently put into receivership and its younger (Marxist) faculty members dismissed.

TWO CONTEMPORARY ISSUES "REFERENCES" (continued from page 7 )

14. Scientific Research (24 November 1969).
15. Noam Chomsky, American Power and the New Mandarins, pg. 25
16. Ruth Gelms, Look (2 August 1969) pg. 34.
17. Philip M. Boffey, The Brain Bank of America, McGraww-Hill (1975).
18. Jurgen Habermas, Technik und Wissenschaft als "Ideologie" , Suhrkamp (1968).
19. Jerome Ravetz, Scientific Knowledge and Its Social Problems, Oxford (1971).
20. "The Science of Control", a special issue of Viet Report.
21. Daniel S. Greenberg, The Politics of Pure Science, Times-Mirror (1967) pg. 151
22. My favorite example of this is the "Pacific Project", a bird migration study funded by the Smithsonian Institute fronting for Fort Dietrick fo find a safe place to conduct bacteriological warfare tests. (Reported by E. W. Pfeiffer, SSRS Newsletter (Jan. 1969) 3, reprinted from Scientific World).
23. Jacques Ellul, The Technological Society, Random House (1964) vi. Siegfried Giedion, Mechanization Takes Command, Oxford (1948).

COMMENTS ON A PAPER BY ROGER DITTMANN

Earl Callen (Forum Councillor, American University)

That social theories ("the Romans grew decadent") characterize distant civilizations so aptly and represent our own so poorly may be the result of historical perspective. Or it may be ignorance. The characterization, though handy, may miss essential complexities. Dittmann sees the American forest coherently from the perspective of a unifying philosophy. Events which to others of us seem dissociated are to him all part of the woods. Perhaps I will only confuse the reader by describing trees.

Some five years ago the APS Professional Concerns Committee decided that one first step in improving the welfare of physicists would be for their Society to adopt minimum standards of employment. We considered two approaches; we could write standards of our own or we could adopt existing standards. Since we physicists are not only inexperienced in "professionalism", but are small numbers, and weak comparison with the chemists and engineers, we judged it wiser to seek strength in unity. The American Chemical Society investigates complaints arbitrates, and blacklists errant employers. We could never get that through the APS Council. The chemical engineers, electrical engineers, nuclear engineers, and ten other technical societies have jointly adopted a different set of guidelines, a set that seemed capable of adoption of our needs.

There were problems - the inapplicability of standards designed for industrial engineers to the one third of our members who teach at universities and another third who work for the government and for non-profit institutes and laboratories; and the loyalty statement, with its lack of a whistleblower disclaimer.

(continued on page 10)

COMMENTS ON A PAPER (continued from page 9)

Nevertheless, we elected the recommend adoption of the engineer's "Guidelines to Professional Employment". And we appended an "APS Preamble"\*, and an "Interpretation" stressing that these were minimum standards; that since college faculty are to some extent self-governing, different considerations apply, and so the Society incorporates by reference the AAUP statements on academic freedom and on dismissal as appropriate interpretations of the guidelines for the academically employed; that the loyalty statement is interpreted to mean more or less nothing (Here I think Dittmann is right. We should have inserted an explicit whistleblower disclaimer in the Interpretation); and that "he, him, his" etc. everywhere means "he/she" (or she/he), etc. (Dittmann gives us two sics for saying "him" in the Interpretation. Dittmann gets two more sics for a bare "her" and a "she" in Section VI, Paragraph 3 of his piece.)

That the "interpreted" manifesto was not perhaps as aesthetic as one which could have been drafted ab inito seemed to us a price worth paying for the affiliation with 13 major professional societies. In any case what seemed more important to us than the content was the process. Social contracts are always open to reinterpretation and renegotiation anyway.

I think that what we started could have been good. And I am disappointed with what happened to it. I recounted the early history of the Guidelines in the August, 1976 issue of Physics and Society, and will summarize that history here. In 1976 the APS Executive and Budget Committees considered the Guidelines and recommended to Council that they not be adopted. No reasons were given in connection with the notice of this recommendation

---

\* see APS Guidelines after this paper.

(continued on page 11)

COMMENTS ON A PAPER (continued from page 10)

appearing in the Bulletin of the APS (Bull. Am. Phys. Soc. 913, 1976). However, the reasons were summarized by a letter from then past APS president Panofsky to then current president Fowler attached to the Executive Committee minutes. Panofsky wrote that the APS had "stayed clear of being considered in any way an accrediting body and the process of employment guidelines comes close." He cited four specific objections to the guidelines as "examples as to the 'can of worms' contained in the document". (These objections were in my view very much a matter of interpretation, and could have easily been clarified, altered, or merely interpreted differently). The APS Council accepted the recommendation of the Executive Committee and rejected the guidelines.

Dittmann is not wholly wrong in blaming all this on capitalism, but it seems to me that the ultimate culprit is not so much The System as the apathy and naivety of its members. It is the APS membership that have elected to Council the directors of Argonne, Brookhaven, Los Alamos, Oak Ridge, the vice-presidents of Bell Labs, IBM, Xerox, and 27 full professors. I am not ~~knocking these individuals~~. By and large those directors and vice-presidents, and the APS leadership generally, are decent, socially responsible people. They are concerned about the membership, but their priorities are traditional. They are not in there kicking and screaming for whistleblowers, job security, and pay raises for the workers. Even physicists should be able to comprehend that.

And when, at Council's urging, we held a session on the guidelines at an April, Washington meeting, nobody came. Now one can argue, as we did, that physicists, through all those hard times of the job crisis, have learned not to look toward the APS for help, that industrial physicists, for whom the guidelines

(continued on page 12)

COMMENT ON A PAPER (continued from page 11)

would have greatest immediacy, do not attend the high energy physics APS meetings, that the people who come to meetings are the ones with good jobs and grants, that like the oysters in the Walrus and the Carpenter, nobody is speaking for the ones who have been forced out of the field entirely.

And the leadership can and did argue with equal cogency that only 2,000 of the 30,000 APS members contribute \$2,00 a year to belong to the Forum, ~~hardly a mandate for greater social action, and that there is no evidence~~ of membership desire for the new departures into professionalism that we were pushing for.

We reached a compromise. The guidelines were set aside and the Professional Concerns Committee was directed to gather evidence of support for membership assistance activities. Without offering help, we were to interview APS members out of work, suffering employment abuse, with occupational grievances, and report to Council of the scope of such need. By then, in 1976, with three year's work down the drain, the Professional Concerns Committee was pretty well demoralized. But we tried. How does one get the word of discrete interviews out to those in need? -Through an insect in the bulletin of APS meetings. How many, and who, would find it there? Where would we meet? At APS meetings? Who in need would come, when we explicitly cautioned that we offered no help, we were only doing statistical fact finding?

We tried, and after another year's work we reported back to Council, in late 1977. Of course, during the four years we had been battering away - and getting battered - the membership of the Council had turned over more than once. Except for the permanent officers, few Councillors could have followed the long tug-of-war. When we reported on our dozen interviews with

(continued on page 13)

COMMENT ON A PAPER (continued from page 12)

distressed and disgruntled physicists in San Diego, in Washington, in Boston, and New York to the fresh faced of the 1977 Council, the response was "why are you telling us this? What is the APS supposed to do about those problems? We are not equipped to intervene in personnel matters." Council "accepted" the report and suggested that Professional Concerns find something better to do with its time.

At that point Professional Concerns gave up. The Chair resigned, and recommended that the Committee be abolished. Four years work had come to nothing. An April, 1978 a motion to abolish the committee as a standing committee of Council came before Council. The Parliamentarian noted that abolition of a standing committee required a By-Law change. Martin Blume pointed out that in-as-much as Council has never before accepted any recommendation of Professional Concerns, why should they start now? Some of us argued that the Society needed activity. I came away from the meeting thinking that we had convinced the APS leadership that Professional Concerns had to be re-energized. I was wrong. At its next meeting the APS Executive Committee instructed the By-Laws Committee to prepare a by-law change ~~to do away with Professional Concerns and its committee~~. Meanwhile to comply nominally with the by-law requirement, Brian Schwartz was appointed Chairman, but no committee members were appointed.

The motion to change the By-Laws came before Council at its meeting in New York, in November, 1978. I objected, and the motion was postponed until the January, 1979 meeting in New York. At that meeting I made a fuss; and the Councillors are dignified people who hate a fuss. The Professional Concerns Committee was reconstructed as the Committee on Opportunities in

(continued on page 14)

COMMENTS ON A PAPER (continued from page 13)

Physics. But will a reconstituted Professional Concerns Committee do anything? And if not, why not?

Dittmann blames the capitalist conspiracy. I see a different cause. We are always told that people get what they deserve. That is not true in the APS. APS members get better than they deserve. Presidents Phil Morse, Chien-Shiung Wu, George Pake, Norman Ramsey are better than the members deserve. The APS is traditionally dedicated to promoting substantive science - physics not physicists. Professional Concerns is pushing a different direction (not diverting the Society away from physics, but promoting a small, new, secondary activity). Council is not so much hostile as uninvolved and cautious, particularly with the barb of IRS 501(C)3 on the end of the hook. (There is also a powerful hostile minority. We could deal with them if we had a mandate.) We few activists claim that we speak in the name of the membership, but on what evidence? The membership, silent, perhaps sympathetic, perhaps desinterested, perhaps opposed, goes on electing big stars.

What other profession works for nothing? Rich doctors and millionaire lawyers charge for their services. Quabby scientists serve on a dozen panels and committees, referee papers, review proposals, consult for the government - for free. We are too fancy to organize and too proud to beg. So we get paid in the reflection from somebody else's Nobel prize. And we go on overproducing Ph.D.'s.

The Pirkei Avot (Saying of the Fathers) asks "If you are not for yourself, who should be for you?" Who? The Vice-President of IBM maybe? Incoming APS President Lewis Branscomb seems to me to be a compassionante person. Perhaps he is better than we deserve.

## SHOULD APS ADOPT THE "GUIDELINES TO PROFESSIONAL EMPLOYMENT FOR ENGINEERS AND SCIENTISTS"?

### Introduction

The Committee on Professional Concerns has been asked to suggest programs for the benefit of the membership. The Committee has been considering recommending to the Council of the APS the adoption of the Guidelines referred to above. Publication of the Guidelines is for the information of APS members and does not mean to imply any position of the APS Council either for or against their adoption. We hope the information provided here will facilitate discussion at Session CA to be held at 4:30 P.M. on Monday, 26 April in the North Cotillion of the Sheraton-Park Hotel. Those who wish to comment, but cannot get to the meeting, are invited to do so by mail before 30 June. Please send comments to the chairperson of the Committee on Professional Concerns, Esther M. Conwell, Xerox, Xerox Square W 114, Rochester, N.Y. 14644.

These Guidelines are intended for use by employers and professional employees to establish mutually satisfying relationships. Both employee and employer responsibilities are defined in four general areas: recruitment, terms of employment, professional development, and termination and transfer.

These Guidelines have been adopted by more than thirteen professional societies, including IEEE, American Nuclear Society, American Institute of Chemical Engineers, and other engineering societies. The American Chemical Society has adopted similar guidelines, which are, however, more far reaching in that they include also machinery for handling complaints by members of violations.

The Committee for Professional Concerns believes that endorsement of the Employment Guidelines will be a useful step for the APS membership also. It is important, however, for the Council to have an expression of the opinion of the members before it takes a step that is binding on all of them. We urge all members to read the text, given below, and present their comments at this meeting. Discussion of other professional concerns issues will also be welcome.

Although we did not find all statements in the Guidelines to be satisfactory or relevant to the APS, the fact that this version of the Guidelines has been adopted by at least thirteen societies makes it inappropriate to modify the document itself. We have therefore

added an APS Preamble and APS Interpretations. With particular thought to the sizable fraction of our members covered by the AAUP standards, the Preamble stipulates that adoption of these Guidelines should not be construed as lack of support for others applicable to special groups within the profession. Specifically, under Professional Development, Termination and Transfer we stipulate that the appropriate procedures for faculty members are those spelled out by the AAUP Statement on Faculty Dismissal Proceedings. ■

### Employment guidelines

#### Better employee-employer relations are the object of these guidelines to professional employment

Reprinted by permission from *IEEE SPECTRUM*, Vol. 10, No. 4, April, 1973, pp. 57-60.  
Copyright 1973, by the Institute of Electrical and Electronics Engineers, Inc.

This is the first edition of the "Guidelines to Professional Employment for Engineers and Scientists" as recently approved by the IEEE Board of Directors. The guidelines were developed as the result of the efforts of 17 engineering societies (see last section of this reprint), including IEEE, to answer the need for scientists and engineers to play a larger role in the development of employment policies—a need that became particularly evident when the large-scale layoffs and relocations of recent months revealed certain deficiencies on the part of some employers. It is emphasized that the guidelines are by no means to be considered final and complete as they stand, but are in a state of dynamic change. The document is subject to periodic review by the participating societies for the sake of keeping it current, and a mechanism has been set up for incorporating revisions and amendments into future editions. However, even in this preliminary form the guidelines should help to provide a firm basis for the employment of professional engineers and scientists and are expected to have significant impact in improving relations for employers of these professionals.

### Foreword

This publication is a guide to mutually satisfying relationships between professional employees and their employers. In this document, professional employees are defined as engineers and

scientists. These guidelines cover factors peculiar to professional employment and omit many generally accepted precepts of personnel relations which are common to all classifications of employees.

These guidelines are applicable to professional employment in all fields and in all areas of practice (including both nonsupervisory and supervisory positions), and are based on the combined experience and judgment of all of the endorsing societies.

It must be stressed in the implementation of these guidelines that they represent desirable general goals rather than a set of specific minimum standards. Wide variations in circumstances and individual organizational practices make it inappropriate to judge any given employer on the basis of any single employment policy or fringe benefit. Rather, attention should be devoted to evaluating the entire employment "package," including such intangibles as opportunity for future advancement or participation in profits, location, local cost of living, and other factors which may be important to professional employees.

Observance of the spirit of these guidelines will minimize personnel problems, reduce misunderstandings, and generate greater mutual respect. It is anticipated that they will be of use to employers in evaluating their own practices, to professional employees in evaluating both their own responsibilities and those of their employers, and to new graduates and other employment seekers in obtaining a better picture of prospective employers. Where differences in interpretation occur, they may be referred to the headquarters office of any of the endorsing societies.

### Objectives

The endorsing societies, with their avowed purpose to serve the public and their professions, recognize clearly that in order to make a maximum contribution, it is necessary for professional employees and employers to establish a climate conducive to the proper discharge of mutual responsibilities and obligations. Essential and prerequisite to establishing such a climate are

1. Mutual loyalty, cooperation, fair treatment, ethical practices, and respect are the basis for a sound relationship between the professional and his/her employer.

2. The professional employee must be loyal to the employer's objectives and contribute his/her creativity to those goals.

3. The responsibility of the professional employee to safeguard the public interest must be recognized and

shared by the professional employee and employer alike.

4. The professional growth of the employee is his/her prime responsibility, but the employer undertakes to provide the proper climate to foster that growth.

5. Factors of age, race, religion, political affiliation, or sex should not enter into the employee/employer relationship.

Effective use of these guidelines is accomplished when the employer provides each present and prospective professional employee with a written statement of policies and practices relating to each of the items covered. Adherence to these guidelines by employers and professional employees will provide an environment of mutual trust and confidence. Local conditions may result in honest differences in interpretation of, and in deviation from, the details of these guidelines. Such differences should be resolved by discussions leading to understanding which meets the spirit of the guidelines.

**1. Recruitment**

Employment should be based solely on professional competence and ability to adequately perform assigned responsibilities, with employee qualifications and employment opportunities represented in a factual and forthright manner. The employer's offer of employment and the employee's acceptance should be in writing, including a clear understanding with regard to relocation assistance; past, present, and future confidentiality and patent obligations; salary; expected duration of employment; and other relevant employment conditions and benefits.

**Professional employee**

(1) The professional employee (applicant) should attend interviews and accept reimbursement only for those job opportunities in which he/she has a sincere interest. The applicant should prorate costs for multiple interviews during a given trip on a rational basis. The guiding principle should be that the applicant receives neither more nor less than the cost of the total trip.

(2) The applicant should carefully evaluate past, present, and future confidentiality obligations in regard to trade secrets and proprietary information connected with the potential employment. He/she should not seek or accept employment on the basis of using or divulging any trade secrets or proprietary information.

(3) Having accepted an offer of employment, the applicant is morally obligated to honor his/her commitment unless formally released after giving adequate notice of intent.

(4) The applicant should not use the funds or time of his/her current employer for the purpose of seeking new employment unless approved by the current employer.

**Employer**

(1) The policy of the employer regarding payment of expenses incurred by the applicant in attending the interview must be made clear prior to the arranged interview.

(2) The applicant should have an interview with his/her prospective supervisor in order to understand clearly the technical and business nature of the job opportunity. This prospective supervisor should ethically be responsible for all representations regarding the conditions of employment.

(3) Applications for positions should be confidential. The expressed consent of the applicant should be obtained prior to communicating with a current employer.

(4) Employers should minimize hiring during periods of major curtailment of personnel. Hiring of professional personnel should be planned at all times to provide satisfying careers.

(5) Agreements among employers or between employer and professional employee which limit the opportunity of professional employees to seek other employment or establish independent enterprises are contrary to the spirit of these guidelines.

(6) Having accepted an applicant, an employer who finds it necessary to rescind an offer of employment should make adequate reparation for any injury suffered.

**2. Terms of employment**

Terms of employment should be in writing in accordance with the applicable laws, and consistent with generally accepted ethical professional practices.

**Professional employee**

(1) The professional employee should be loyal to his/her employer. He/she should accept only those assignments for which he/she is qualified; should diligently, competently, and honestly complete his/her assignments; and should contribute creative, resourceful ideas to his/her employer while making a positive contribution toward establishing a stimulating work atmosphere and maintaining a safe working environment.

(2) The professional employee should have due regard for the safety, life, and health of the public and fellow employees in all work for which he/she is responsible. Where the technical adequacy of a process or product is involved, he/

she should protect the public and his/her employer by withholding approval of plans that do not meet accepted standards and by presenting clearly the consequences to be expected if his/her professional judgment is not followed:

(3) The professional employee should be responsible for the full and proper utilization of his/her time in the interest of his/her employer and the proper care of the employer's facilities.

(4) The professional employee should avoid any conflict of interest with his/her employer, and should immediately disclose any real or potential problem which may develop in this area. He/she should not engage in any other professional employment without his/her employer's permission.

(5) The professional employee should not divulge technical proprietary information while he/she is employed. Furthermore, he/she should not divulge or use this information for an agreed-upon period after employment is terminated.

(6) The professional employee should only sign or seal plans or specifications prepared by himself/herself or others under his/her supervision, or plans or specifications that he/she has reviewed and checked to his/her personal satisfaction.

(7) The professional employee should not accept payments or gifts of any significant value, directly or indirectly, from parties dealing with his/her client or employer.

**Employer**

(1) The employer should inform professional employees of the organization's objectives, policies, and programs on a continuing basis.

(2) The professional employee should receive a salary in keeping with his/her professional contribution which reflects his/her abilities, professional status, responsibility, the value of his/her education and experience, and the potential value of the work he/she will be expected to perform. The salary should be commensurate with the salaries of other employees, both professional and nonprofessional. Sound indirect compensation programs should be provided. The most important are retirement plans, health and life insurance, sick leave, paid holidays, and paid vacations.

(3) The employer should establish a salary policy, taking into account published salary surveys, and provide equitable compensation for each employee commensurate with his/her position and performance. The salary structure should be reviewed annually to keep the assigned dollar values adjusted to the current economy.

(4) Each individual position should be properly classified as to its level in the overall salary structure. The evaluation of each position should consider such factors as the skill required for acceptable performance, the original thinking required for solving the problems involved, and the accountability for an action and its consequences.

(5) Economic advancement should be based upon a carefully designed performance review plan. Provision should be made for accelerated promotions and extra compensation for special accomplishments. At least annually, performance evaluations and salary review should be conducted for the individual professional employee by his/her supervisor. Performance evaluations should include discussion on how well he/she has performed his/her work and what he/she can do to improve. The professional employee should be clearly informed if his/her performance is considered unsatisfactory. All promotions in salary and responsibility should be on an individual merit basis.

(6) For the professional employee whose aptitude and interests are technical rather than supervisory, equivalent means of advancement and recognition should be provided.

(7) It is inappropriate for a professional employee to use a time clock to record arrival and departure, particularly since situations may arise which require unusual effort. However, if the work demanded of a professional employee regularly exceeds the normal working hours for extended periods, the employer should compensate him/her for this continuing extra effort according to a clearly stated policy.

(8) The professional employee should be included in an adequate pension plan which provides for early vesting of rights in safeguarded pension funds. Vesting should be so scheduled that it does not seriously affect either the employer's or the professional employee's decision as to continued employment. As a goal, eligibility for participation should not exceed one year after employment; maximum full vesting time should be five years, and the minimum pension upon reaching retirement should be no less than 50 percent of the average best five years' salary (based on a 40-year working career with a single employer). If a pension plan is not provided, or the benefits are less than outlined above, other compensation should be increased proportionately.

(9) The employer should provide office support staff, and physical facilities which promote the maximum personal efficiency of the professional employee.

(10) Duties, levels of responsibility, and the relationship of positions within

the organizational hierarchy should be clearly defined and should be accurately reflected in position titles.

(11) The employer should not require the professional employee to accept responsibility for work not done under his/her supervision.

(12) The employer should provide formal assurance through organizational policy that any suits or claims against individual professional employees employed by the organization in connection with their authorized professional activities on behalf of the employer will be defended by the employer.

(13) There should be no employer policy which requires a professional employee to join a labor organization as a condition of continued employment.

(14) It is the employer's responsibility to clearly identify proprietary information.

### 3. Professional development

The employee and the employer share responsibility for professional development of the employee—the employee to establish the goals and take the initiative to reach them, and the employer to provide the environment and attitude which are conducive to professional growth.

#### Professional employee

(1) Each professional employee is responsible for maintaining his/her technical competence and developing himself/herself through a program of continuing education.

(2) The professional employee should belong to and participate in the activities of appropriate professional societies in order to expand his/her knowledge and experience. Such participation should include the preparation of professional and technical papers for publication and presentation.

(3) The professional employee should achieve appropriate registration and certification as soon as he/she is eligible.

(4) The professional employee should recognize his/her responsibility to serve the public by participating in civic and political activities of a technical and nontechnical nature. Such participation, however, should be undertaken solely as a responsibility of the individual without interfering with the timely execution of his/her work and without involving the employer.

#### Employer

(1) The employer, as a matter of policy, should provide an atmosphere which promotes professional development. This will include, among other

programs, encouraging and supporting membership and attendance at professional society meetings and at formal courses of study which will enable the employee to maintain his/her technical competence.

(2) The employer should consider compensated leaves of absence for professional study as a means of enabling the employee to improve his/her competence and knowledge in a technical field.

(3) Consistent with employer objectives, the employee should be given every opportunity to publish his/her work promptly in the technical literature and to present his/her findings at technical society meetings.

(4) It is in the best interest of the employer to encourage continuing education to broaden the qualifications of employees through self-improvement, in-house programs, formal education systems in the institutions of higher learning, and meetings and seminars on appropriate subjects.

(5) The employer should encourage and assist professional employees to achieve registration and/or certification in their respective fields.

### 4. Termination and transfer

Adequate notice of termination of employment should be given by the employee or employer as appropriate.

#### Professional employee

(1) If the professional employee decides to terminate his/her employment, he/she should assist the employer in maintaining a continuity of function, and should provide at least one month's notice. When termination is initiated by the employee, no severance pay is due.

#### Employer

(1) Additional notice of termination, or compensation in lieu thereof, should be provided by the employer in consideration of responsibilities and length of service. As a desirable goal, permanent employees (after an initial trial period) should receive notice or equivalent compensation equal to one month, plus one week per year of service. In the event that the employer elects notice in place of severance compensation, then the employee should be allowed reasonable time and facilities to seek new employment.

(2) Employers should make every effort to relocate terminated professional employees either within their own organizations or elsewhere. Consideration should be given to continuing major employee protection plans for some period following termination, and to their full reinstatement in the event of subsequent reemployment.

(3) If a professional employee is involuntarily terminated on the basis of early retirement, the employer should consider an equitable provision for an adequate income for the period remaining until the employee receives a pension at his/her normal retirement age.

(4) In a personal interview, the employer should inform the employee of the specific reasons for his/her termination.

(5) The employer should provide an adequate transfer-time notice, with due consideration to the extent of personal matters which the professional employee must settle before moving. All normal costs of the transfer should be paid by the employer, including moving expenses, realtor fees, travel expenses to the new location to search for housing, and reasonable living expenses for the family until permanent housing is found. Unusual moving expense reimbursement should be settled in a discussion between the employee and employer.

**Participating societies**

American Association of Cost Engineers; American Chemical Society; American Institute of Aeronautics and Astronautics; American Institute of Chemical Engineers; American Institute of Chemists; American Institute of Industrial Engineers; American Institute of Mining, Metallurgical and Petroleum Engineers; American Society for Metals; American Society for Quality Control; American Society of Civil Engineers; American Society of Heating, Refrigerating and Air-Conditioning Engineers; American Society of Mechanical Engineers; Engineers Council for Professional Development; Engineers Joint Council; Institute of Electrical and Electronics Engineers, Inc.; National Institute of Ceramic Engineers; National Society of Professional Engineers.

The following Societies have been added since date of original publication: American Nuclear Society; Institute of Traffic Engineers; Society of Fire Protection Engineers. ■

**American Physical Society Preamble**

In the interest of uniformity the American Physical Society subscribes to these guidelines, which have the endorsement of a large number of professional organizations representing several hundred thousand professional employees. Uniformity provides a double advantage: it brings greater effectiveness, through widespread community acceptance both by employers

and employees, and it eases interpretation by appeal to the common experience. Such phrases as "safe working environment" have become words of art of well defined meaning through an accumulated record of many negotiations and discussions.

On the other hand, each endorsing Society, and each employment sector (industrial, nonprofit laboratory, government, academic) being different, it is necessary to modify interpretations to conform to different situations. Particularly with respect to academic faculty employment, interpretation is required, because college faculties are to a varying but considerable degree self-governing. The interpretations we feel are appropriate to our situation are detailed in American Physical Society Interpretations, following the Guidelines.

The adoption of these Guidelines, which are minimum standards, should in no way be construed as lack of support for any more specialized Guidelines applicable to particular sectors of the profession. ■

**American Physical Society Interpretations**

The headings and numbers below refer to designated sections of the Guidelines on which American Physical Society interpretive comment is made.

**Objectives**

1. The Guidelines refer to loyalty. Loyalty means satisfactory performance in the work place. Loyalty does not go to thoughts, beliefs, opinions, or off-site, own-time, social or political activities. Paragraph 1 is interpreted to mean mutual respect, cooperation, fair treatment, and ethical practices are the basis for a sound relationship between the professional and his employer.

2. Paragraph 2 is interpreted to mean that the professional employee must support by his working performance the employer's objectives, and contribute his creativity to those goals.

5. This paragraph on nondiscrimination is implemented by interpreting "his" in the Guidelines as "his or her" (or "his" or "hers" where appropriate), "he" as "he or she", and "himself" as "himself or herself".

**II. Terms of Employment; Professional Employee**

1. The paragraph is interpreted to mean that the professional employee should accept only those assignments for which he or she is qualified; should diligently, competently, and honestly complete assignments; and should con-

tribute creative, resourceful ideas to his employer while making a positive contribution toward establishing a stimulating work atmosphere and maintaining a safe working environment.

4. This paragraph is interpreted to mean that the professional employee should avoid any conflict of interest with his employer, and should immediately disclose any real or potential problem which may develop in this area.

**III. Professional Development, Termination and Transfer**

The American Association of University Professors statement of Academic Freedom, as subsequently interpreted, and their statement on Procedural Standards in Faculty Dismissal Proceedings appropriately elaborate on Sections III and IV as descriptive of the proper relationship between the faculty member and the University. ■

The above is reproduced from pages 493-496 of Volume 21 of the Bulletin of the American Physical Society (April 1976) by permission of the American Physical Society. The material preceding the American Physical Society Preamble is copyright 1973 by The Institute of Electrical and Electronics Engineers, Inc. Reprinted by permission, from IEEE SPECTRUM, vol. 10, no. 4, April 1973, pp. 57-60

FORUM PROGRAMS AT THE CHICAGO  
MEETING OF THE AMERICAN PHYSICAL SOCIETY  
(March 19-23, 1979)

Physicists in Alternative Settings  
Chairman: David Kraft  
Monday, March 19, 1979

Joseph B. Asbury, Argonne National Laboratory,  
The Economics of Energy Technology Assessment

Donald W. Connor, Argonne National Laboratory,  
Physics as Training for the Retired Bureaucrat

Hans Severiens, Merrill, Lynch, Pierce, Fenner &  
Smith,  
Capitalizing on Physics: The View from Wall Street

Harry Ploss, Zurich-American Insurance Companies,  
The Mathematics and Business of Risk: Actuarial  
Possibilities

Technological Innovation  
Chairman: Paul Horwitz  
Friday, March 23, 1979

Betsy Ancker-Johnson, Argonne National Laboratory,  
Innovation on the Skids? Patent Policy is Grease

William C. Norris, Contral Data Corporation  
Rebirth of Technological Innovation via Small Business

George Lockwood, Monterey Abalone Farms,  
The Impact of Government Regulation upon Small Innovative  
Business

Elmer H. Burack, University of Illinois,  
Human Resource Planning for Innovation

APS MEMBERS: JOIN THE FORUM ON PHYSICS AND SOCIETY. IF YOU JOIN BEFORE JULY 1, 1979 THERE ARE NO 1979 DUES.

To become a member of the Forum fill this form and mail to:

E. William Colglazier  
Center for Science and International Affairs  
John F. Kennedy School of Government  
Harvard University  
79 Boylston Street  
Cambridge, Massachusetts 02138

I wish to join the Forum on Physics and Society

Name (Please print) \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_

PHYSICS AND SOCIETY

Editor

MARTIN L. PERL

Production Editor

IRMGILD HANNASKY

PHYSICS AND SOCIETY, the Newsletter of the Forum on Physics and Society of the American Physical Society is published for, and distributed free to, the members of the Forum. It presents news of the Forum and of The American Physical Society; and provides a medium for Forum members to exchange ideas. PHYSICS AND SOCIETY also presents articles, letters and columns on the scientific and economic health of the physics community; on the relations of physics and the physics community to government and to society, and on the social responsibilities of

science. Space is preferentially given to those analyses and opinions which are less likely to be published in the established journals such as Physics Today and Science. Letters, short articles, suggestions for columns, and Forum news items should be sent to the Editor: Martin L. Perl, SLAC, Stanford, California, 94301

PHYSICS AND SOCIETY is also distributed free to Physics Libraries upon request. Such requests and requests for other information should be sent to I. Hannasky, SLAC.

PHYSICS AND SOCIETY  
The Newsletter of the  
Forum on Physics and Society  
of the  
American Physical Society

Volume 8, Number 1 February 1979

The American Physical Society  
335 East 45th Street  
New York, New York 10017

Non-Profit Org.  
U. S. POSTAGE  
**PAID**  
New York, N. Y.  
Permit No. 6842

\*\*\*\*\*  
ARTHUR J. ROSEN  
PHYSICS DEPARTMENT  
CAL POLY STATE UNIVERSITY  
SAN LUIS OBISPO CA 93407