

PHYSICS and SOCIETY

THE NEWSLETTER OF THE FORUM ON PHYSICS AND SOCIETY, PUBLISHED BY
THE AMERICAN PHYSICAL SOCIETY, 335 EAST 45th ST., NEW YORK, NY 10017

Volume 9, Number 3

October, 1980

TABLE OF CONTENTS

APS Candidates' Responses to Forum Questionnaire.....	2
News of the Forum.....	6
Questionnaire for the Roster of Women in Physics.....	7
Status of Women in Physics, Carol Jo Crannell.....	9
APS Council Report, Mike Casper.....	9
Letters to the Editor.....	10
The Experience of a Nuclear Weapons Lab Physicist in the Progressive Case, Hugh E. DeWitt.....	11
Interfacing Nuclear Power Plants and their Operators, Paul Horwitz.....	13
Minority Physicists, Ernest C. Hammond, Jr.....	15
Letter from The Forum President, Brian Schwartz.....	16

PHYSICS AND SOCIETY is a quarterly newsletter of the Forum on Physics and Society, a division of the American Physical Society. The newsletter is distributed free to members of the Forum and also to physics libraries upon request. 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 and letters 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 the social responsibilities of scientists. Contributions should be sent to the Editor: John Dowling, Physics Department, Mansfield State College, Mansfield, PA 16933, 717-662-4275.

**Forum on Physics & Society
Physics Department
Mansfield State College
Mansfield, Pa. 16933**

**BULK RATE
U. S. POSTAGE
PAID
Mansfield, Pa.
Permit No. 3
Educational
Non-Profit**



**RESPONSES OF APS CANDIDATES
TO FORUM QUESTIONNAIRE:**

The Forum on Physics and Society is again asking candidates for the American Physical Society offices of Vice-President-Elect and Councillor at Large to respond to a set of questions. The following questions were constructed by the Forum's Voting Questionnaire Project (Kristl Hathaway and Robert Cahn) and approved by the Executive Committee of the Forum.

1. In January 1980 the AAAS adopted a resolution on nuclear weapons control. Would you favor the APS adopting a resolution on nuclear weapons control? Would you favor establishment by APS of a working group on nuclear weapons control?
What specific actions, if any, would you propose that the APS undertake on the following topics?
2. Repression of foreign scientists.
3. Employment problems facing physicists.
4. Energy alternatives.
5. What other areas involving physics and society, if any, do you feel that the APS should be actively involved in, and what specific actions would you recommend in those areas?

The candidates' responses are as follows:

Hans Frauenfelder: Candidate for Vice-President-Elect
Department of Physics
University of Illinois at Urbana-Champaign
Urbana, IL 61801

1. I favor establishing a POPA working group on nuclear weapons control, but would consider a resolution only after the group has come to a conclusion.
2. I believe that the APS should continue to support suppressed scientists, wherever they are, through invitations, rare but well selected statements, and personal interactions.
3. The Committee on Opportunities in Physics continuously monitors the employment problem.
4. APS should continue to create, through POPA, well selected and staffed study groups to investigate crucial problems not just in energy alternatives, but in all relevant fields in which physicists are particularly well qualified.

5. The success of semi-popular journals (Scientific American, Science 80, Geo, Science section of NYT) indicates there may be a narrowing of the gap between scientists and the general public. Since the future of physics depends on continued understanding and support, the APS should play a role in explaining the nature and beauty of physics to nonphysicists and, in particular, in trying to get young people more interested in physics.



Robert E. Marshak: Candidate for Vice President-Elect
Dept. of Physics
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

I am responding to the five questions which you are putting to the nominees for Vice-President-Elect of the American Physical Society. My brief answers are:

1. I would be inclined to disfavor the APS adopting a resolution on nuclear weapons control. I personally feel strongly about the necessity for nuclear weapons control, including the adoption of SALT II and then pushing negotiations on SALT III. (My personal involvement has been expressed through the Chairmanship of the Federation of American Scientists, involvement in the Pugwash movement, etc.) However, I do not think that the APS is the proper organization to be adopting resolutions on this matter. I would strongly favor the establishment by APS of a Working Group on Nuclear Weapons Control, under the aegis of the Forum on Physics and Society. Any resolutions that might then emerge could be signed by members of APS as individuals and should be equally effective without creating a troublesome precedent for APS.
2. The vigorous pursuit of an international community of science is a proper objective of the APS and any actions on the part of national governments or international agencies which sanction the repression of our colleagues abroad falls within the purview of the APS. I wholeheartedly endorse the work of the Committee on International Freedom of Scientists of APS. I have personally taken a strong stand on this question, (e.g. refusing to attend a Moscow symposium at the time of the Orlov trial - see my article in the Bulletin of Atomic Scientists, September 1978). The effectiveness of the APS in dealing with the problem of the repression of foreign scientists could be greatly increased by coordination with the National Commission of I.U.P.A.P. (of which Arthur Schawlow is Chairman).

3. Employment problems facing physicists should be a matter of serious concern to APS and its Committee on Opportunities in Physics should be given every encouragement to come up with helpful recommendations. I also believe that the APS could be more effective in this area by working closely with the Commission on Human Resources of the National Academy of Sciences (of which, incidentally, I shall be a member starting this fall).
4. Intense discussion has evidently been going on in many forums concerning energy alternatives. I am concerned that some of the views being advocated with the physics community are on a collision course with decisions that would reduce the probability of thermonuclear war. In my view a specific APS action that could be useful in the near future is to urge the Forum on Physics and Society to arrange a symposium on "Energy Alternatives and Nuclear Weapons Control" that would induce a serious reconsideration of priorities.
5. There are obviously many other areas at the interface of physics and society in which the APS could be actively involved. I have discussed some of these in Guest Comment published in the November 1979 issue of "Physics Today". I would argue for giving special attention to the pressing global problem of science and technology for development through the creation of a committee on "Physics and the Developing World". This is an area where so much remains to be done and so little has so far been undertaken by the American scientific community. I do think that the APS could take a highly beneficial leadership role in this area.



Dean Eastman: Candidate for Councillor at Large
T. J. Watson Research Center, IBM
P. O. Box 218
Yorktown Heights, NY 10598

Dr. Eastman was unable to respond to the Forum Questionnaire.



Neal F. Lane: Candidate for Councillor at Large
Division of Physics
National Science Foundation
1800 G St. NW
Washington, DC 20550

The Forum on Physics and Society has been a valuable addition to the APS organization in providing a needed focus for open discussions on a broad range of topics of interest and importance to the membership and the field itself.

On the question of repression of foreign scientists, I feel the activities of POPA and of the APS Council have been responsible and effective to a degree. Unfortunately, this issue is likely to be with us for a very long time. It is fundamental to the science and should be the subject of continued patient attention.

The problem of employment for physicists also is likely to be of concern for some time. However, the nature of the problem changes with time. The shortage of **attractive** tenure-track positions in universities is serious, and when combined with the inadequate level of support for basic research the image is demoralizing for young bright students who otherwise would be attracted to such a career. A large federal job program is not the answer. However, some kind of carefully thought out cooperative arrangement involving the universities and the leading funding agencies for physics might provide a base on which to build. One should not ignore the fact that there are fine career opportunities for physicists in industry and government. Wider recognition by the universities of some special background requirements for these career areas would be helpful to our students.

The issue of "Energy Alternatives" is obviously important and appropriate for APS. This includes the challenging issue of public science education. POPA and the APS Council have been active and should continue to give this issue high priority.

On the question of nuclear weapons control, I simply have not been able to give sufficient careful consideration to a possible APS position. I believe all reasonable people favor some form of nuclear weapons control. Certainly discussion of the issue by POPA is appropriate.

In general, I feel the APS must accept the responsibility to explain in a clear and objective manner to the public the opportunities and the limitations of this science, to the extent that we know them, and possible impacts on society.



Richard F. Post: Candidate for Councillor at Large
Lawrence Livermore Lab
University of California
P.O. Box 808
Livermore, CA 94550

The Forum has solicited my opinion on how the APS might be involved in the solution or alleviation of problems arising in the following areas:

1. Nuclear weapons control.
2. Repression of foreign scientists.
3. Employment problems facing physicists.
4. Energy alternatives.
5. Other areas involving physics and society.

Some of these problems - for example #1 and #4 - are amenable to quantitative assessment and involve physics-related technical issues. Others, #2 and #3, concern areas where society impacts on the physicists, and the issues are largely non-technical. What the APS can or should do about the various issues then depends very much on which category is involved.

To repeat something that has been said before, physicists, in dealing with societal issues, are most likely to make effective contributions when they use their analytical skills, and their talent for innovative problem solving, to present unbiased **quantitative** assessments of the issues at hand. Thus the pattern of ad hoc working groups, convened to address specific issues (as for example the 1975 Study Group on Light Water Reactor Safety) seems to me to be a good one to follow.

Therefore, with respect to #1, the issue of nuclear weapons control, I believe it would be fruitful for the APS to offer its services, through the convening of working groups, to study specific technically-oriented issues. Among such issues might be, for example:

- Technical limits on and techniques for independently monitoring the production, testing, or deployment of nuclear weapons.
- The technical feasibility of various alternative proliferation-resistant nuclear fuel cycles.

I feel that activities of the above sort are more likely to make a significant contribution than is the adoption, prior to such studies, of an APS resolution on nuclear weapons.

With respect to the second technical issue, #4, energy alternatives, I feel that there are several topics where APS-sponsored working groups would be of use. Among these are:

- The energy "pay-back ratio" of various energy-producing means. Some proposals may require more energy to implement them than is recoverable. This objection applies to some biomass proposals and to some proposed solar-electric schemes. Identification of the pay-back ratios for a wide variety of alternative energy proposals in a single study could represent a valuable contribution.
- Analysis of the first and second law of thermodynamics limits on energy requirements for the transportation sector would be useful and informative. It is a fact that the present gross inefficiency of the automobile in short-range and urban driving (which accounts for the lion's share of U.S. automobile usage) is a major contributing factor to the present petroleum crunch. In terms of actual energy requirements, urban driving should require much less, not more, fuel per mile travelled. There are innovative solutions to this problem that an APS panel could address.

Turning to item #2, the repression of foreign scientists, I find myself in rather close agreement with the opinion expressed by Weisskopf and Wilson (Science, 208, 977 (1980)). Choosing between the alternatives of "shock treatment" and "friendly persuasion", I come down close to the latter. Still, within this approach there are valuable steps that can be taken, such as acquainting foreign scientists in those countries where repression is practiced of the several statements and positions taken in this country that deplore this practice. More human misery arises from lack of communication than from the opposite, and the pursuit of science is a channel of communication between scientists - who need not agree with the policy of another scientist's government - and should feel free to say so in personal contacts.

On #3, employment problems facing scientists, I feel that realistic assessments, of the likely needs of our society for physicists (not everyone should be one!) and studies by APS panels of interdisciplinary activities and of other crossing of the lines by physicists are indicated. These studies would help us - and potential employers of physicists - to get a handle on this painful, but essentially transitional, problem.

Concerning item #5, "Other areas...", I feel that there are indeed additional areas where the APS could play an important role. One such is that of the reporting of physics-related issues affecting our society. How often have we seen media reports concerning important technical developments or technically-related societal issues where as physicists we know from elementary

physics considerations that there are gross inaccuracies involved in reporting. Such cases are but a symptom of a deep underlying problem of communication between the scientific community and the general public.

Though the APS membership is certainly aware of this problem, more efforts to solve it could be made. One possibility (one that has no doubt been suggested on previous occasions) might be to comb the membership for articulate and knowledgeable volunteers who would be willing to be on call to reporters and/or writers when questions arise in the reporting of news or views where technical/scientific issues are involved.



Malvin Ruderman: Candidate for Councillor at Large
Dept. of Physics
Columbia University
New York, NY 10027

The great number of societal problems which have a dominant technological component have not, I think, suffered from a lack of study groups, committees, and reports, supported by public, private, and foundation funded agencies. To be effective in such an environment the APS should devote its relatively limited resources only to very carefully chosen subjects. These are ones for which there is reason to believe that the existing or ongoing technical studies are somehow insufficient, that certain previously uninvolved physicists can make important additional contributions, and that the APS will be able to assemble those particular physicists for its own special working group. I do not see that the first two criteria are now met for yet another study, at this time of energy alternatives, or even for another study of the vital question of nuclear weapons control where in addition, the crucial problems seem to be much more political than technical. (With respect to a proposed APS resolution in favor of the control of nuclear weapons, I do not understand just what it would accomplish. And so I would not advocate its introduction. But if a suitable resolution were offered to the APS membership I would expect to vote for it.) I would like to see an APS working group consider how much of the resources of our country should be devoted to basic physics research for which there is no immediate or even potential prospect of application. Putting aside the historical accidents which have resulted in our present level and mechanisms of public support, how should a free society decide such a question? How should the required funds be raised and distributed?

The APS can and should play an important role in publicizing the plight of dissident physicists to its members and to the public. But I would prefer to see it limited to such a role rather than be an advocate of

policies which would have to be compromises derived from divergent views. The publicity may be all that even partially protected the more prominent dissidents and we must not let them be forgotten, for their sake and ours. But I believe the most appropriate actions are the unpredicted diverse responses of various *ad hoc* groups and representatives of subfields such as followed the punishments of Orlov, Scharansky, and Sakharov. I do not advocate that the entire APS membership refuse to attend the international meetings in the USSR, but I am happy that a significant group among us has taken this response.

The APS should try to put directly into the hands of every undergraduate physics major and beginning graduate student as good an assessment as we can now make of postgraduate employment prospects now and in the next decade. How many permanent positions may open up in major universities? In other colleges? Will industrial opportunities expand? How will various subfields prosper? Will relative salaries slip? How do the projected openings compare with the expected number of physicists? Such an assessment will probably turn out to be as poor as most forecasts but if we see problems ahead we must speak out to those who would mainly be affected as well as we can.



Andrew Sessler: Candidate for Councillor at Large
Director, Lawrence Berkeley Lab.
University of California
Berkeley, CA 94720

I believe the APS could contribute more through analyses of weapons systems like the MX than by endorsing general resolutions. Such studies could be initiated by the Panel on Public Affairs (POPA). Recently, the Society has been concerned with the welfare of physics, here and abroad (for example, through the Committee on Opportunities in Physics and the Committee for the International Freedom of Scientists) and with problems of society where physics is germane and objective analysis of value (for example, through POPA). These new activities are, in my judgment, proper activities for the Society and they are activities to which I would plan to devote considerable effort.



Thomas A. Tombrello:
Candidate for Councillor at Large
W.K. Kellogg Radiation Lab.
106-38
California Institute of Technology
Pasadena, CA 91125

I feel strongly that the Councillors-at-Large should take a major role in dealing with those issues and interests that affect us as a community of physicists. In this regard, I am in favor of the APS organizing study and working groups, holding meetings and symposia, and putting forward resolutions for endorsement by the membership in all areas where we have special scientific competence or where external conditions affect us professionally. Obviously, among examples of the former are questions related to weapons control and energy issues; examples of the latter include discrimination in employment and suppression of scientific freedom. Within the APS the Forum and the Panel on Public Affairs have the responsibility to initiate discussion and make recommendations to the Council in such areas; however, it should be recognized that matters of concern may arise elsewhere in the APS, and the Councillors should also be active in bringing these items to the attention of the Council and the membership as a whole. In general, I enthusiastically support the expansion of the educational role of the APS; not only to educate ourselves in matters of mutual concern but also to inform the public where their interests are involved.

NEWS OF THE FORUM

FORUM SESSIONS at the New York Meeting

Ken Ford (New Mexico Tech, Socorro, NM 87801) has set up the following Forum Sessions for the joint annual APS-AAPT Meeting in January, 1981.

Human Rights: Jointly sponsored by the Committee on International Freedom of Scientists and the Forum. Chaired by Edward Gerjuoy, Department of Physics, University of Pittsburgh, Pittsburgh, PA 15260.

The MX Missile: Sponsored by the Forum. Chaired by Leo Sartori, U.S. Arms Control and Disarmament Agency, Washington, DC 20451.

Elementary and Secondary Science Education: Jointly sponsored by AAPT and the Forum. Chaired by John Layman, Department of Physics, University of Maryland, College Park, MD 20742.

ENERGY RESEARCH SESSIONS SPONSORED BY POPA AND THE FORUM.

The Panel on Public Affairs and the Forum on Physics and Society encourages members of the APS to submit contributed papers on energy research for the New York meeting, January 26-29, 1981, with the expectation that such papers contributed to this and subsequent meetings would be organized into their own sessions. The Society has often sponsored sessions of invited papers on energy, typically with the purpose of informing the membership as a whole on topics of general interest. In contrast, the planned sessions of contributed papers would serve the usual purpose of ordinary meeting sessions, i.e., to permit physicists working in a particular research area, in this case the physical aspects of some energy area, to report the results of their research to their peers. The deadline for abstracts for the New York meeting is October 31, 1980. (Further information may be obtained from Anthony Nero, Lawrence Berkeley Laboratory, Berkeley, CA 94720.)



"All rights reserved. May be reprinted only with permission."

TYPE OF WORKPLACE FOR CURRENT OR LAST WORK (Please check one or more as applicable)

- 1 University
- 2 College - 4 year
- 3 College - 2 year
- 4 Secondary School
- 5 Government
- 6 National Laboratory
- 7 Industry
- 8 Non-Profit Institution
- 9 Consultant
- 10 Other (please specify below)

CURRENT WORK STATUS (Please check one or more as applicable)

- 1 Student
- 2 Post Doc/Res Assoc
- 3 Unemployed
- 4 Retired
- 5 Employed
- 6 Self-employed
- 7 Full time
- 8 Part time

FOR HIGHEST DEGREE (Please check one)

- 1 Theoretical
- 2 Experimental
- 3 Both
- 4 Neither (please explain below)

TYPE OF ACTIVITY (Please enter a 1 for the activity in which you engage most frequently, 2 for the second most frequent, etc. for all significant aspects of your current or last work)

- 1 Basic Research
- 2 Applied Research
- 3 Development and/or Design
- 4 Engineering
- 5 Manufacturing
- 6 Technical Sales
- 7 Administration/Management
- 8 Writing/Editing
- 9 Teaching - Undergraduate
- 10 Teaching - Graduate
- 11 Teaching - Secondary School
- 12 Committees/Professional Org.
- 13 Proposal Preparation
- 14 Other (please specify below)

Highest Degree (Please check one)	<u>FIELD OF PHYSICS</u>	Current Interest (Please check one)
--------------------------------------	-------------------------	--

- | | | |
|-----------------------------|-------------------------------|-----------------------------|
| 1 <input type="checkbox"/> | Astronomy & Astrophysics | 1 <input type="checkbox"/> |
| 2 <input type="checkbox"/> | Acoustics | 2 <input type="checkbox"/> |
| 3 <input type="checkbox"/> | Atomic & Molecular Physics | 3 <input type="checkbox"/> |
| 4 <input type="checkbox"/> | Biophysics | 4 <input type="checkbox"/> |
| 5 <input type="checkbox"/> | Chemical Physics | 5 <input type="checkbox"/> |
| 6 <input type="checkbox"/> | Education | 6 <input type="checkbox"/> |
| 7 <input type="checkbox"/> | Electromagnetism | 7 <input type="checkbox"/> |
| 8 <input type="checkbox"/> | Electronics | 8 <input type="checkbox"/> |
| 9 <input type="checkbox"/> | Elementary Particles & Fields | 9 <input type="checkbox"/> |
| 10 <input type="checkbox"/> | Geophysics | 10 <input type="checkbox"/> |
| 11 <input type="checkbox"/> | High Polymer Physics | 11 <input type="checkbox"/> |
| 12 <input type="checkbox"/> | Low Temperature Physics | 12 <input type="checkbox"/> |
| 13 <input type="checkbox"/> | Mathematical Physics | 13 <input type="checkbox"/> |
| 14 <input type="checkbox"/> | Mechanics | 14 <input type="checkbox"/> |
| 15 <input type="checkbox"/> | Medical Physics | 15 <input type="checkbox"/> |
| 16 <input type="checkbox"/> | Nuclear Physics | 16 <input type="checkbox"/> |
| 17 <input type="checkbox"/> | Optics | 17 <input type="checkbox"/> |
| 18 <input type="checkbox"/> | Plasma Physics | 18 <input type="checkbox"/> |
| 19 <input type="checkbox"/> | Physics of Fluids | 19 <input type="checkbox"/> |
| 20 <input type="checkbox"/> | Thermal Physics | 20 <input type="checkbox"/> |
| 21 <input type="checkbox"/> | Solid State Physics | 21 <input type="checkbox"/> |
| 22 <input type="checkbox"/> | General | 22 <input type="checkbox"/> |
| 23 <input type="checkbox"/> | Other _____ | 23 <input type="checkbox"/> |
- (specify)

Thank you for your participation.
Please return the questionnaire to:
Dr. Nancy M. O'Fallon
Applied Physics Division, Bldg. 316
Argonne National Laboratory
Argonne, IL 60439

Are you interested in receiving information on employment opportunities? Yes No