PHYSICS and SOCIETY

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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
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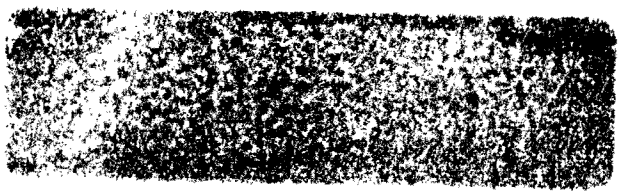
Mansfield, Pa. 16933



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. Represssion 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, incidently, 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 amendable 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 suchan 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 additonal 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. Kellog 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 initate 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 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.)

QUESTIONNAIRE FOR THE ROSTER OF WOMEN IN PHYSICS

COMMITTEE ON THE STATUS OF WOMEN IN PHYSICS

THE AMERICAN PHYSICAL SOCIETY

The information from this questionnaire will be used to compile rosters of women in physics, to select women to receive announcements of probable interest to them, and to compile demographic data on women physicists. This information will not be made available to commercial or political organizations as a mailing list. Being listed on the roster only identifies the woman as a physicist and does not imply agreement with or support for the activities of the Committee on the Status of Women in Physics.

INSTRUCTIONS: Please indicate your responses to the following by printing one character within each pair of tick marks. Abbreviate as necessary.

DATE: (mo) (da) (yr)

NAME: (last) (first)

(middle) optional: (maiden)

On the following line, please enter your full name and title of address exactly as you wish it to appear on your mailing label.

Please enter the address and phone number at which you prefer to be contacted and indicate whether: ☐ Home or ☐ Business

Address line 1:

Address line 2:

Address line 3:

City/State/Zip: (city) (state) (zip)

Primary phone: (area) / (number) Alternate phone: (area) / (number)

DEGREES	YEAR received or expected	INSTITUTION
BA/BS		
MA/MS		
PhD		

THESIS TOPIC (highest degree)

(continue if necessary)

EMPLOYER NAME:

DEPT/DIV ETC:

POSITION TITLE:

COMMENTS:

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)

_____

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)

_____

_____

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

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)

_____

Highest Degree (Please check one)	FIELD OF PHYSICS	Current Interest (Please check one)
1__	Astronomy & Astrophysics	1__
2__	Acoustics	2__
3__	Atomic & Molecular Physics	3__
4__	Biophysics	4__
5__	Chemical Physics	5__
6__	Education	6__
7__	Electromagnetism	7__
8__	Electronics	8__
9__	Elementary Particles & Fields	9__
10__	Geophysics	10__
11__	High Polymer Physics	11__
12__	Low Temperature Physics	12__
13__	Mathematical Physics	13__
14__	Mechanics	14__
15__	Medical Physics	15__
16__	Nuclear Physics	16__
17__	Optics	17__
18__	Plasma Physics	18__
19__	Physics of Fluids	19__
20__	Thermal Physics	20__
21__	Solid State Physics	21__
22__	General	22__
23__	Other _____ (specify)	23__

STATUS OF WOMEN IN PHYSICS: A Progress Report by Carol Jo Crannell, Code 684, Laboratory for Astronomy and Solar Physics, NASA Goddard Space Flight Center, Greenbelt, MD 20771. This report is written by Carol Jo Crannell under the auspices of the APS Committee on the Status of Women in Physics, which she currently chairs.

The Committee on the Status of Women in Physics of the American Physical Society was established in 1971 in response to the recognized need to do something about that status. Since that time, the Committee has served two major functions: as a source of contact among women physicists and as a source of information and advice for the Society. The Committee also has reached out, through pamphlets and personal contacts, to encourage more girls and young women students to acquire the academic background which would enable them to pursue careers in physics. As it dramatically illustrated in the recent article by Vera Kistiakowsky (**Physics Today 33,** No. 2, 32-40 (1980)), the original need has not been dissipated, but the status shows some specific improvements. These include increases in the percentage of women preparing themselves for graduate school in physics. Some evidence links these gains with efforts to provide supportive environments in which the isolation and inappropriateness often felt by women and minorities is ameliorated.

If we can conclude, optimistically, that progress begets progress, than we can take real encouragement from the knowledge that a framework for making improvements, in the numbers of women in physics and in their career opportunities, has been established and is being utilized. The activities of the Committee during the past year have been reported in the Bulletin (Bull. Am. Phys. Soc. **25** (1980) 633-634). One of these, the development of a Roster of Women in Physics, will greatly enhance the communication capabilities of the Committee. Entries for the Roster are being solicited, (see page 7 of this newsletter for a copy). Additonal forms can be obtained by contacting: **Dr. Nancy O'Fallon, Building 316, Applied Physics Division, Argonne National Laboratory, Argonne, IL 60439. (312) 972-6053 or FTS 972 6053.**

Assistance in making contact with women not yet included in the Roster will be most appreciated.

Because less than 3% of the physicists holding Ph. D. degrees in this country are women, it is of primary significance that these approximately 700 women realize their full potential - not only for themselves but also for the younger women for whom they set an example. Those women physicists who have overcome the obstacles that have stopped the vast majority, unfortunately, receive lower salaries, serve in positions of lesser rank, and experience five times higher rates of unemployment than their male counterparts. One of the remedies being sought by the Committee is the establishment of midcareer fellowships designed to provide research opportunities for those whose careers have been handicapped or thwarted by discrimination and other societal factors. Legislation is pending in the Senate, whereby the National Science Foundation will provide fellowship support for a restricted subset of those so affected.

The committee members and friends view the future with optimism, enthusiasm, and, most of all, determination.

REPORT OF THE FORUM COUNCILLOR, Mike Casper, Department of Physics and Astronomy, Carleton College, Northfield, MN 55067.

Among the many topics discussed at the APS Council's 27 April 1980 meeting are a few of particular interest to the Forum.

1. POPA studies. Two are in the works, one on Coal Utilization and the other on Breeder Reactor Safety. The Coal Utilization Study, to be chaired by Barry Cooper of the University of West Virginia, has been approved by the DOE, although funds have not been allocated. $5,000 was appropriated by the APS Council to get the study started. Support for an 18 month, $650,000 APS study of "Selected Safety Aspects of Breeder Reactor Technology" is also being sought. The Forum might consider sponsoring sessions on some POPA studies while they are in their early stages, before a determination of which issues are to be included and which excluded has been made. That might have been a useful exercise in the Photovoltaic Study, where it was decided to include large, centralized applications and exclude small, decentralized applications. It might also be useful in the case of the Breeder Safety Study, when, for example, the tentative plan is to exclude the issue of the impact of breeder development on nuclear weapons proliferation.

2. It was announced that David Lazerus will be the new editor-in-chief of all APS journals. He asked for suggestions of what he should be thinking about, (see Rev. Mod. Phys. **52**, 513 1980)). Should we resurrect the Forum proposal for Phys. Rev. E, The Journal of Physics and Society?

3. There was renewed discussion of the APS policy of not holding national and divisional meetings in states which have not ratified the Equal Rights Amendment. The Southeastern section of the APS requested that a referendum be held on the policy. It seems that Kentucky is the only Southeastern state that has ratified the ERA. After considerable discussion the matter was tabled until the next council meeting. Any Forum member wishing to contribute to the discussion should send comments to Bill Havens at the APS New York office.

4. Congressional Fellows. Two have been selected for 1981 (fellows will serve next year from January 1 to December 31 rather than September 1 - September 1 as in the past). They are Burton Muller from the University of Wyoming and Samuel Baldwin from the University of Maryland. The fellowship carries a stipend of $25,000.

5. Dues Policy. Any APS member can join the Forum (or other divisions of the Society) for free again this year. It was reported that this policy may not be continued in the future, so it represents an opportunity to recruit new members that we may not have for long. All it takes is to send the name of any APS member who wishes to join the Forum to the Forum Secretary/Treasurer, Dietrich Schroeer, Physics Department, University of North Carolina, Chapel Hill, North Carolina 27514. Dietrich will send a list on to the APS office. PLEASE TRY TO RECRUIT ONE NEW FORUM MEMBER.

LETTERS TO THE EDITOR:

AAAS ARMS CONTROL RESOLUTION:
(FORUM NEWSLETTER 9, No. 1, 7 (1980))

I also have an opinion about the AAAS Resolution. It is noble in gesture - but probably not workable in format. Even though I am biased -

(a) The U.S. would be extremely foolish to convert weapons labs to peaceful uses unless our own enemies, and friends alike, do the same.

(b) It is a noble gesture to want to devote an entire organization to the direction of science toward peaceful uses for one year - but what is more likely to produce a tangible result is to devote the organization's strength toward one direction: i.e. reversing Carter's decision to sell India a reprocessing plant, or working toward a goal of making nuclear power safe for civilian use while the country finds a way to use new, less controversial sources in the future, or other more controlled projects.

I believe the reason why some organizations put forth such idealistic gestures is that

(a) they know they will accomplish little, if any, of the gesture within the year

(b) the gesture is bound to fail, just based on time constraints alone.

(c) it is easier to "pass the buck" when such a gesture fails!

The Forum should adopt concrete issues for resolution: issues which **can** be resolved within the time frame - or if a **noble** gesture is deemed really necessary - then divide it into many pieces - attack each piece until resolved, and then, the whole is within our grasp.
I'm for doing something worthwhile, not just for doing something.

26 May 1980
Lee A. Licata
USS Gilmore AS-16
FPO, New York, NY 09535

I am writing to support the suggestion that there be a Forum session on the question "should the APS Council issue a statement on the arms race such as that adopted by the AAAS?" As a Councillor-at-Large I would find it very useful as well as interesting to attend such a session. Such a session would stimulate and allow expression of thought on the question. If indeed general APS feeling supports the idea that the Council should make such a statement, it is very important that we learn this.

1 August 1980
Nina Byers
APS Councillor-at-Large
Dept. of Physics
University of California, Los Angeles
Los Angeles, CA 90024

My failure to have the AAAS resolution for control of nuclear weapons adopted by the Canadian Association of Physicists at the annual general meeting in June 1980 may be relevant to the proposal that such a resolution be adopted by the Forum (and/or APS). Among Canadian physicists the resolution met almost total lack of interest.

31 July 1980
Eric Fawcett
Dept. of Physics
U. of Toronto
Toronto, Ontario M5S 1AF

The following letter was addressed to the Forum President, Brian Schwartz. It is published here because it concerns issues of general interest to The Forum.

One question I would have liked to have asked at the Executive Committee meeting concerns the once-proposed Journal of Physics and Society, which was discussed at the 1978 Washington meeting. At that time it looked as if such a journal might see the light of day. Shortly after I returned to El Paso from the 1978 Washington meeting I wrote a letter to Barry Casper with some thoughts about the journal, but I received no reply and have heard nothing since that time concerning the journal.

Another question concerns the goals of the Forum. What are we really trying to accomplish? I sometimes wonder if we are kidding ourselves when we call ourselves the "Forum on Physics and Society". Are we really concerned with society or are we simply trying to broaden the base of operations of physics community, to sell one or more of our pet projects, or to try to transform the world into what we believe would be a better place to live, without concern whether the public is willing to accept such a transformation? One of the difficulties I believe exists is both a complacency and a confusion among much of the public regarding the true nature of most problems which use science, engineering and technology as their basic foundations. I can elaborate on this opinion, but I would need several pages to do so and time does not permit the preparation of such a lengthy letter at the present time.

17 April 1980
C. Sharp Cook
Dept. of Physics
U. of Texas
El Paso, TX 79968

THE EXPERIENCES OF A NUCLEAR WEAPONS LAB PHYSICIST IN THE PROGRESSIVE CASE by Hugh E. DeWitt, University of California, Lawrence Livermore Lab, P.O. Box 808, Livermore, CA 94550.

The Forum on Physics and Society did the American physics community a good service by sponsoring the "Born Classified" session on April 30 at the Washington APS Meeting. At the time the legal and political issues involved in the 1979 **Progressive** magazine H-bomb article and the U.S. Government's attempt to suppress publication using the 1954 Atomic Energy Act were thoroughly discussed by some of the speakers (see Physics Today **33**, No. 7, 9-13 (1980) for Congressman Pete McCloskey's speech on this matter). I was one of the scientists from national labs (Livermore and Argonne) deeply involved in the Progressive case last year. In these pages I want to describe what has happened to me since the filing of my affidavits in the spring of 1979 in connection with the **Progressive** case.

Early in March 1979 the Government obtained a preliminary restraining order to prevent the **Progressive** from publishing an article by Howard Morland that purported to contain some conceptual secrets of the H-bomb. The **Progressive** editorial staff had only a few days to try to find knowlegeable scientists who could confirm their claim that the information in the article was available from public sources. With permission of the Federal Court in Wisconsin the editor of the **Progressive**, Sam Day, brought a copy of the then classified Morland article to the West Coast seeking affidavits from scientists concerning the content of the article. Arrangements were made for Day to interview Livermore staff members at the Lab's Pass Office, and four Lab staff members did in fact submit affidavits. Two of us, Dr. Ray Kidder and myself, submitted several affidavits to the Court that spring, and most of these affidavits were classified as Secret/Restricted Data (SRD) and went into the in camera file of the case.

My first affidavit was completed at the Lab Pass Office on March 20,1979 in the presence of Lab Security people. This affidavit was concerned with what I had read in several physics journal articles that were attached to some of the other affidavits which Sam Day had with him (with Court permission). I also discussed the H-Bomb article by Edward Teller in the Encyclopedia Americana, in particular the diagram in that article, which I then saw for the first time. At that time I believed that what I could read in open documents was not secret and therefore not classified; later I was to learn that this naive assumption was not correct.

My initial reaction to the Morland article was negative but I did not believe that the Government had a case that would justify the drastic measure of imposing prior restraint against publication for the first time in American history. My affidavit was written in the belief that it was unclassified. Lab staff members who talked with Sam Day were warned not to discuss classified information, and that Sam Day did not have permission to take back to Madison, WI affidavits with classified information. No one from the Lab's classification office came to check the affidavits for classification, thus it was up to each of us to know the limits of what was classified and what was not. I wrote my affidavit based on open sources, assumed it to be unclassified, and allowed it to be typed and notarized by a stenographer hired by Day. The affidavit was packed in double-sealed envelopes and that night was flown to Federal Court Building in Madison, WI by Dr. Ted Postol, a physicist on the Argonne staff who does not have a Q clearance. There was an urgency in this matter because we understood that there was a deadline for the affidavits to reach Madison, namely the next day. My affidavit was delivered unopened to the Federal Court Building in Madison, opened by DOE officials, who immediately classified portions of it. I heard no complaint about any of this until eight months later.

On Dec. 11, 1979 I was informed that I was charged with letting uncleared people handle and carry my affidavit. The charges were contained in a Secret memo even though the charges seemed to be derived from an article in the May issue of the **Progressive** that discussed the role of the Livermore scientists in the case. Because of the SRD classification of the memo with the charges against me I could not show the document to my legal counsel. Fortunately the situation changed on Dec. 28, 1979 when the Court in Wisconsin ordered many of the documents in the in camera file to be declassified, including all three of my affidavits. An internal Lab investigation into my "Conduct" was initiated and went on for three months. I was asked at the beginning to give a written chronology about my first affidavit, but thereafter I was left in suspense about what was going on. On March 11, 1980 John Anderson, Associate Director for Physics, gave me a disciplinary notice, a letter of warning. I was also given the complete file of documents concerning my case. Many of the Lab documents had been classified SRD, but they were now declassified since my affidavits were no longer SRD. In reading through this file I learned for the first time that I was also in serious trouble about something I had not even known about, and which had not been mentioned in the original memo of charges against me. This concerned my apparent mistakes in connection with my second affidavit to the Court in Wisconsin dated May 4, 1980. This affidavit had been prepared entirely inside the Lab with what I thought was the full cooperation of Lab authorities, and as an SRD document it had been sent in the proper manner to a classified address in Madison.

The second charge seemed very strange to me. The **Progressive** had urgently requested that I comment on the content of an H-Bomb story that had appeared in the May 1 issue of the **Milwaukee Sentinel.** This newspaper story had been written by a reporter who had spent a week in public libraries. The **Progressive** believed that the information in this story would help in their appeal, scheduled May 8, to the VII Federal Court of Appeals in Chicago to reopen the case at the lower court in the light of new evidence. The article was flown to San Francisco, delivered to my house by courier, and in the morning of Friday, May 4, I wrote a long and detailed affidavit concerning the information uncovered by the reporter. I knew that what I had to say would be considered as secret by DOE, and I also knew what I had to say would seriously damage the Government's case. My affidavit was to have been mailed that afternoon in the proper manner for sending classified documents (registered U.S. Mail) to the prearranged classified address in Madison. Several procedures had to be done including notarization by a Q cleared notary, proper legal typing, and logging in as an SRD document. Lab officials involved in these procedures were very helpful and cooperative with my efforts, and I thought there was no problem other than the short time required to get everything done. Early in the afternoon I was informed that my affidavit had to be read by DOE officials in Washington before authorization would be given for me to send it to Madison. This requirement was possible because of a scrambled teletype call TWX between the DOE in Washington and the Livermore Lab. The various operations on my affidavit had to be done in different buildings and time was getting very short because of the three hour time difference between Washington, DC and California. During those rushed hours I was trying to find out all the rules and comply with them. The affidavit was finally transmitted to Washington at about 4 p.m., but this was too late, and approval for mailing to Madison was delayed until Monday morning. **Ten months** later I learned that I was charged with **attempting** to transmit an unauthorized document, i.e. trying to have it sent before it had been stamped Secret. Apparently my questions at the Lab's communication center about required procedures were interpreted as pressure on my part to send the affidavit prematurely.

Obviously my account of the writing and sending of these affidavits may differ from what Lab officials

may say. So far from the Lab there has been no suggestion that information in my affidavits has been "leaked". The charges against me concern only violations of rules, and I feel that the purported violations have been blown out of all reasonable proportions. While the Lab's internal investigation was proceeding on me, there has been another threat against all government scientists involved in the **Progressive** side. Since September last year the Justice Department has been conducting a preliminary inquiry for a criminal investigation into the activities of participants in the **Progressive** case. Apparently DOE suspects that somebody leaked secrets. So far in the Justice Department investigation nobody has been questioned, and after ten months of investigating there is no hint about whether inditements are forthcoming or when the investigation will be finished. However, the continuing investigation has been used as an excuse by Duane Sewell, Assistant Secretary of Energy for Defense Programs, to avoid answering questions at the March 20, 1980 hearing before the House Government Information and Individual Rights Subcommittee concerning Government misdeeds during the **Progressive** case.

The March 11, 1980 letter of warning to me represents a formal censure by the Lab and is a very serious matter for my future at the Lab. I have filed a formal grievance which will be heard before an outside arbitrator in October. In the meantime the letter of warning is doing damage to me. In June I was given my annual performance evaluation. In spite of several publications and acknowledged useful scientific activity my performance was judged to be **marginal/unsatisfactory.** The letter of warning was explicitly cited. Possibly this judgement of accomplishments as a physicist will be changed later on appeal, but right now this is what I have to live with.

Since last September I have been living in a state of continuing anxiety and suspense because of the interminable Justice Department criminal investigation and the Lab actions against me. Actions like this against a Livermore Lab staff member who takes position against DOE in an important court case can have a very chilling effect on Lab staff members who in the future might venture to argue with the Lab or DOE. I believe that scientists in the weapons labs are also American citizens and should have the same rights and responsibilities to testify in court as anybody else. Furthermore I regard what has happened in my case as a violation of academic freedom; the Livermore Laboratory is still operated by the University of California. The charges I have faced are based on trivial technicalities, and I regard the entire matter as harrassment and punishment for opposing the Government in the **Progressive** case.

(Editor's note: Hugh DeWitt's performance evaluation was rewritten on 5 Aug 1980. His performance assessment was upgraded to **satisfactory-second half.** The change seems to have been a direct result of pressure from the University of California Administration.)

THE INTERFACE BETWEEN NUCLEAR POWER PLANTS AND THE HUMAN BEINGS WHO OPERATE THEM by Paul Horwitz of Bolt, Beranek and Newman, Inc., 50 Moulton St., Cambridge, MA 02138.

"Houston, we've got a problem here." - Astronaut Jack Swigert on the Apollo 13 mission, 9:08 PM, April 13, 1970.

"Something's going wrong in the plant." - Craig Faust, operator at the Three Mile Island II nuclear reactor, 4:00 AM, March 28, 1979.

Thirty minutes after the first quoted statement was made the three astronauts had correctly diagnosed the problem and had evaucated the command module, the lunar landing mission had been scrubbed, and teams of experts all over the nation were starting to work on the task of bringing the crew home safely. The second statement was followed by many hours of ineffectual action and failure to diagnose the problem, the disabling of a critical safety system resulting in the loss of a major fraction of the coolant inventory, and the worst accident in the history of the U.S. nuclear power industry.

What caused the disparity between the two responses to such similar emergencies? Why was it possible for the three Apollo 13 astronauts to deal effectively and rapidly with a critical situation involving the malfunction of a complicated piece of technology operating in an unfamiliar environment, while at TMI two control room operators, a shift foreman, and a supervisor were unable to recover from what should have been a minor accident?

In 1974, the APS commissioned a study of light-water reactor (LWR) safety (Rev. Mod. Phys. **47**, Supp. No. 1 (1975)). A group of twelve distinquished physicists was convened to study the problem and suggest ways in which the safety of LWR's could be improved. Nine recommendations were made in all, of which the first was that "human engineering of reactor controls, which might significantly reduce the chance of operator errors, should be improved". In the light of what took place at TMI five years later, this is a remarkably prescient observation -- particularly given the fact that

it was made by physicists, not psychologists or reactor operators!

For the past year or so I have been working with a group of psyschologists, control engineers and computer scientists at Bolt, Beranek and Newman, Inc. on the general problem of improving the interface between nuclear power plants and the human beings who operate them. A team composed of cognitive psychologists and human factors specialists, sponsored by the Electric Power Research Institute, has been looking in detail at several accidents that have taken place at nuclear plants other than Three Mile Island, interviewing the operators who where on shift at the time of the accident, and analyzing their decisions and actions. What did the operators know when they made the decision, what did they think they knew, why did they make the decision they did, and what did they expect would be the result of their actions?

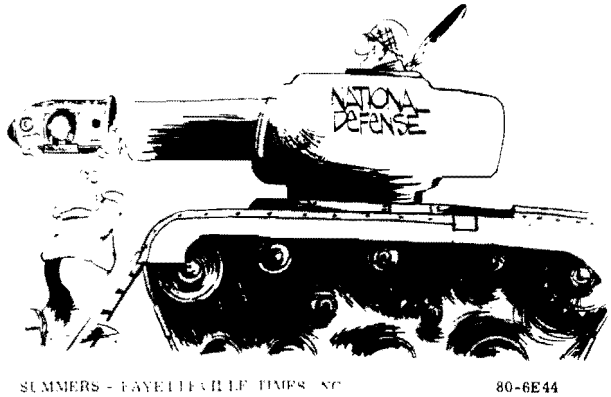
In the course of this work we analyzed both good decisions and bad ones, in an effort to characterize the decision-making process itself, so as to arrive at a model with sufficient predictive capacity to be useful in evaluating alternative improvements in the operating environment.

The development of this decision making model will be completed this Fall. In the meantime, we are also planning a series of psychological experiments, testing trained reactor operators subjected to simulated accident conditions (in a computer-driven simulator, not in a plant!) both with and without certain kinds of electronic disturbance analysis systems made available to them. This work is intended to test the model, as well as to check on the relative utility of the different electronic aids.

As this human factors work progresses, we are also actively exploring the possible application of modern control theory to nuclear power operations. In recent years significant advances have been made, largely as the result of research sponsored by NASA and the Defense Department, in the quantitative modelling of the performance of human operators considered as components of an overall system with their own special abilities and limitations. It has proved possible, for example, to describe the performance of pilots by a simple, quantitative model, based on a few parameters such as, for example, their motor (output) bandwidth. The model can then be used to predict very accurately how they will perform on an unfamiliar task quite distinct from the one which was used to set the original parameters. This kind of modelling has yet to be applied to the nuclear reactor case, but there is no reason to doubt that it could be very useful there.

More futuristic, perhaps,but by the same token challenging and exciting, are the possible applications to the reactor control problem of recent advances in the field of artificial intelligence. There is a group at Bolt, Beranek and Newman that has been involved for many years in learning how computers can understand natural languages, recognize patterns, and diagnose fault conditions. The combination of this work with a knowledge of how people assimilate, process, and use the information available to them, opens up a variety of exciting possibilities for advanced control systems in which the computer, rather than controlling the plant directly, will help operators to understand what is going on during an emergency, and leave to them the final choice of what to do.

A couple of words about what all this has to do with physics: not much. My role is really to be a square peg in a round hole. I am neither a psychologist, nor a systems engineer, nor a computer scientist. I'm not even a nuclear engineer! But I know a little about each of these disciplines, and it turns out that I know enough to see some of the interconnections between them that might otherwise go unnoticed. And I know a little – and care a great deal more – about reactor safety problems. So although my job here is technically more marketing than research, I have found it to be both challenging and rewarding. And in its potential for affecting, to some degree, our ability to master and control the technology we create, it may prove more significant than anything I could have accomplished by sticking to physics.



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A POSSIBLE FORUM VIEW FOR THE DEVELOPMENT OF MINORITY PHYSICISTS by Ernest C. Hammond, Jr., Morgan State University, P.O. Box 124, Baltimore, MD 21239

The American Scientific Community must be ever cognizant of potential contributions that the American minorities can make to science and technology in general, and physics in particular. It is true that the nation is experiencing bleak economic times; indeed research funds are being cut from the most prestigious federal and private agencies. In general, all areas of the society are in ecomonic decline. It might be argued that with this bleak economic situation facing every segment of the nation, there are no resources available to support or encourage minority participation in physics. Any of the statistics show that the Black American is the least represented in many of the natural science fields.

The Forum on Physics and Society must take an aggressive position to set up programs and discussions that will aid in increasing the number of minorities in physics in particular, and in the other sciences in general. There are many programs and projects which might be developed in cooperation with the National Urban League and the National Association for the Advancement of Colored People and other leading civil rights organizations on an ongoing national scope to attract minority students to science from kindergarten through graduate school. It is interesting to note that many of the nation's civil rights organizations have themselves held a low profile towards the encouragement of the participation of minorities in science.

As of 1973, Whites held 90% of all Ph.D's, Masters and Bachelors degrees in physics. Out of that number, only 206 or 6 percent were Black physicists, whereas there were almost seven times as many Oriental physicists. Looking at the production at all levels of physicists on a state by state basis, one finds that statistics tend to reflect a very small number of Black physicists obtaining their degrees at any level.

The additional impetus of the Forum's activities and programs would attract minority interests in science in America and would have tremendous impact on science and technology in developing nations, because many problems encountered by minorities in this country in training scientists and technologists are similar to the problems encountered in the Third World nations. Many observers have seen the contributions and training of Third World scientific personnel as a limited experience based on the scientific and technological economic necessity required by western governmental interests. A program sponsored by the Forum would have tremendous international implications. Therefore, even in times of tight economic pressures upon the scientific community, new minds and new ideas infiltrating the formal scientific community indeed would have positive effects on the quality and quantity of physics being practiced in this nation. If American scientists would lead the Third World nations in the development of scientists and technologists, it would indeed enhance those nations and improve the lives of more advanced nations.

The Forum might also establish a speakers bureau of physicists interested in this problem. Members of institutions, including both universities and government agencies, might develop a voluntary plan on their own. To expedite these programs, municipal or urban governments might work to set up programs to attract the young minorities to expose them to the potentials of science and technology. These and other activities might be instituted by The Forum on a minimum budget.

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FROM THE PRESIDENT OF THE FORUM

Dear Forum Member:

The last decade has seen a period of involvement of physicists with issues of science and society. The Forum has shared this concern and hopes to do more with your help. The Forum has been instrumental in the development of the CONGRESSIONAL FELLOWS PROGRAM, THE FORUM AWARDS, CONFERENCES ON PHYSICS EDUCATION AND EMPLOYMENT CONCERNS, Symposia at national meetings, and the establishment of the APS Panel on Public Affairs.

At present The Forum membership numbers approximately 2,700. For the next year, there are no Forum dues for current APS members. The Forum will, however, be given $2.00 per member to support the Newsletter and other Forum initiatives. As a member of the Forum, I would like you to recruit at least **one** (preferably more) of your colleagues to join The Forum. To do this you (or your colleagues) should send this form with names and addresses to the Secretary of The Forum: Professor Dietrich Schroeer, Department of Physics and Astronomy, University of North Carolina, Chapel Hill, North Carolina 27514.

This form can be detached, folded and mailed. The reverse side is already addressed.

Very truly yours,

Brian B. Schwartz, President
Forum on Physics and Society

YES, I want to join the Forum on Physics and Society

NAME_____ NAME_____

ADDRESS_____ ADDRESS_____

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