# 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
PRINTED BY THE PENNY-SAVER, MANSFIELD, PA 16933

**Volume 10, Number 4** **October 1981**

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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.

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## RESPONSE OF APS CANDIDATES TO FORUM QUESTIONNAIRE

The Forum 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 (William J. Gallagher with the help of Robert Cahan and Kristl Hathaway) and approved by the Executive Committee of the Forum.

1. Does the APS have a special responsibility to work for arms control? If so, how can this be carried out?

2. What specific actions, if any, would you propose that the APS undertake on the following topics:

   a. Attempts by the federal government to restrict attendance or free discussion at conferences on advanced technology, or to extend export restrictions to colleges and universities.

   b. Maintaining the vitality of physics faculties in universities during a period of little growth and few retirements.

   c. The preparation of students for industrial careers.

   d. Increasing the number of women and minorities in physics.

3. 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:

**Robert Hofstader: Candidate for Vice-President Elect**
**Physics Department**
**Stanford University**
**Stanford, CA 94305**

1. The history of the development of atomic weapons places on physicists and government leaders a greater than normal responsibility for supporting arms control measures. The APS, by virtue of experts within the Society, can assist such an effort by helping to sponsor a coherent position favoring arms control.

2.a. In principle, my view is that attendance should be unrestricted and free discussions should be permitted at unclassified conferences on advanced technology. If APS advice is needed, it should be given.

2.b. By its encouragement of developments that favor the advancement and diffusion of the knowledge of physics, the APS helps and will continue to help to maintain the vitality and high quality of physics and physics faculties in the universities. The APS employment services should be actively supported.

2.c. Where possible within its charter the APS should help to prepare students for industrial, governmental and academic careers.

2.d. The number of women and minorities in physics is increasing. This should be encouraged. This process of growth seems to be developing through better educational opportunities in general, and an increased awareness of the contributions of these groups. The APS should support such progress.

3. In addition to the above items, there is room for further development of improved relationships between the APS and the public, the governmental agencies, the universities, the national laboratories, and industry. Sessions at APS meetings could be devoted to exploring ways to improve these relationships.

**Mildred Dresselhaus: Candidate for Vice-President Elect**
**Department of Electrical Engineering, Room 13-2090**
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1. It is in the technical areas of the evaluation of the performance of specific weapons and weapons systems where significant numbers of APS members have special expertise and insight, and where large numbers of members have more general knowledge and interest. I believe that it is highly appropriate for our top physicists to concern themselves with these important issues because of the unique contributions they can make to maintaining national security and to preserving our society and opportunities for future generations. I feel that these activities should continue and be encouraged and that mechanisms be found to attract leading physicists to contribute to these areas.

I also favor formally organized studies by POPA on technical issues related to weapons systems where such studies would be of interest and value to the physics community and/or government agencies.

Since the political issues cannot be separated from the technical ones, many APS members have actively contributed to the formulation of national policy on arms control and have participated on teams involved with international negotiations. APS members should be encouraged to speak out and contribute.

The dissemination of technical information relevant to arms control is an area where the APS can contribute significantly. The publication of articles on arms control issues in **Physics Today** provides an excellent vehicle for informing the membership. I also favor the APS taking a leadership position in more widespread dissemination of such information to the general public through collaborative efforts with the news "media".

2.a. I feel strongly that a restrictive policy on attendance and on free discussions at conferences on advanced technology is not in the best interests of science and technology in this country. Free access to people and ideas is critical to discovery and innovation.

I believe that the President of the APS should join with leaders in academia in strong advocacy of free access to conferences and to education on the fundamentals of advanced technology. By the same token, proprietary and classified R & D should be discouraged on university campuses.

2.b. The role of the APS is to focus on the new areas of opportunity and to encourage faculty members to become contributing members. Exchanges between universities and industry or National/government research laboratories represent one realistic mechanism for increasing the vitality of faculty members who are losing their cutting edge. Joint appointments with industry and National/government laboratories may provide a viable mechanism for creating positions which could be used to bring in young people. Many universities find difficulty in staffing applied physics areas because of the great industrial demand for people in these areas. To increase vitality, physics departments should be encouraged to expand into more applied areas.

Particular emphasis should be given to mechanisms to create more opportunities for young people in academia. The encouragement of second careers for faculty in mid-career could perhaps provide an effective mechanism to create more opportunities for young people.

2.c. It is important that students be encouraged (and not discouraged) to pursue industrial research as an attractive career option.

Students should be prepared for careers in industry and elsewhere by receiving a strong basic training in physics which includes broad exposure to areas where professional physicists practice their trade. The APS has aggressively encouraged and stimulated the industrial visitors program. I feel that the APS should continue to support it enthusiastically.

Industrial summer employment opportunities provide physics students with excellent research experience and with exposure to new research fields. This program could be further reinforced by increased exposure of faculty members to more applied areas through industrial contacts, summer positions in industry and industrial sabbatical leaves.

COOP programs for undergraduates, common in engineering schools, should be encouraged also in physics.

2.d. Women and minorities represent a major reservoir of physics talent that remains largely untapped. The APS can help to make physics more accessible to women and minorities by demonstrating that they too can particpate and contribute. An impressive increase has occured in recent years in their participation in the technical sessions of APS meetings. This trend should further be encouraged and reinforced by supporting the present policy of giving increased visibility to women and minorities within the Society through appointments to APS committees and offices and by their selection to chair technical sessions. Increased opportunities for women and minorities to help each other and to seek help from the physics community has come from the special APS Committees on Women and Minorities in Physics. These committees have been very effective and their work should be encouraged to continue. Industrial and government fellowship programs, particularly at the entry level to graduate school should be stimulated and encouraged. Emphasis should also be given to encourage a visiting program of women and minority APS members to spend a few days each year at high schools and small colleges to stimulate interest in physics.

3. The APS should exercise a leadership role in the international physics community. Topics affecting the international physics community include planning multi-nation research facilities, international collaborative research ventures between individual investigators, and exchange of physicists. Exchanges of people should be directed particularly to young people: students and post-docs, for whom such exchanges are most easily arranged.

The APS should continue to speak out against incidents where free and open professionalism in physics is threatened by political or ideological intervention.

The APS Congressional Fellows Program should be continued and enlarged.

The APS has traditionally been concerned with the status of the health of the physics enterprise and this should continue. Particular emphasis should be given to providing support and encouragement to young people in establishing their careers.

The APS should give more attention to elevating the general level of public knowledge of physical principles and public awareness of discoveries in physics. In this connection the APS should advocate the strengthening of the science curriculum in the schools. If the physics community expects public support for its operation, this community should assume an interest and responsibility for explaining to the public the importance of physics generally and new breakthroughs in particular. Cooperative efforts along these directions between the APS and the news "media" should continue and be strengthened.

**Editor's Note:**
Due to space limitations the above responses of Dr. Dresselhaus were shortened. All efforts were made to retain their essence.

**John G. Cramer, Jr.**
**Candidate for Councillor at Large**
**Nuclear Physics Laboratory GL-10**
**University of Washington**
**Seattle, WA 98195**

1. I do **not** feel that the APS, as an organization, has any special responsibility to work for arms control. I do, however, feel that there are individual members of the APS who have made (and will in the future make) significant contributions to some of the problems involved in arms control and the larger problem of stabilizing our civilization against a drift toward nuclear war. I feel that it is highly appropriate for the APS to give recognition to such members for their achievements in this area.

2.a. I believe that the APS should support the free exchange of scientific information and oppose limitations to this principle. In situations involving "advanced technology," where the application of this principle is in conflict with questions of proprietary information, industrial secrets, and national security, some compromises will be necessary. I believe, however, that it would be quite appropriate for representatives of the APS to provide advocacy of the principle of free exchange of scientific information in the effecting of such compromises.

2.b. The problem of maintaining the vitality of university physics faculties during the present period of saturation is a difficult one, but I believe that there are ways of alleviating the problem. In a large fraction of the universities the demography of the physics faculty is such that there was a large buildup immediately after WW II and that a large number of faculty members hired during that period will be retiring within the next decade. In fact, it is likely that five to ten years from now the retirement of this group will create a problem which is the **inverse** of the one we are now facing. Therefore, the problem is not one of creating positions out of nothing, but of "bridging over" the period until this mass of retirements takes place, so that the positions can be filled in a better and more orderly way. When viewed from this perspective, there are a number of ways in which this might be brought about , and the APS can and should play an active role in promoting some of these mechanisms.

2.c. Physics is not a branch of engineering, and the preparation of students for industrial careers cannot be a central concern of the field, at least insofar as that goal is in conflict with more central ones. The training of physicists to devise mathematical models of physical systems and to apply forefront technology in experimental investigations are very valuable skills in an industrial context. I believe that the APS should do more to identify the aspects of physics training which the industrial employers of physicists do find valuable, and to make this information available to university physics departments to use as they wish. I believe that the encouragement of industrial consulting by physicists on university physics faculties would also do much to promote a better awareness of the problems and needs of the industrial firms which employ physicists.

2.d. I believe that the APS should do more to create an awareness of the field of physics and of physics as a career available to all who have the necessary aptitudes and intellectual abilities. This campaign would be aimed at students at the elementary and middle school levels, before their career plans become "frozen in." In this way we can begin to overcome the widely held belief that physics is not an appropriate career for women or for minorities. We need to work at elementary/middle school level to attract qualified individuals who would otherwise gravitate by default to other fields.

3. We physicists have done a remarkable job of ferreting out the secrets of the universe and of devising clever ways for investigating and using them. In communicating the progress, the challenge, the excitement, the practical applications, the intellectual rewards, and the intrinsic value of our work to the general public and to government and private organizations which provide funding, our accomplishments are far less impressive.

The committees of the U.S. Congress concerned with scientific research still operate much of the time in an information vacuum. Public interest in science is growing, as evidenced by the growing number of science-oriented magazines now being published, but the fraction of popular language articles on physics related subjects appears to be shrinking. At the same time, an anti-technology, anti-science movement is on the rise in our society, due at least in part to a lack of understanding of what science really is.

In the Division of Nuclear Physics we have made a start at dealing with some of these problems. However, it is clear that the problems are not peculiar to nuclear science but are shared by all physics and indeed all of science. I believe that the APS should be working actively on a broad front to improve understanding of and appreciation for physics research, and I would like to participate in this work as a member of the APS Council.

**Editor's note:** due to space limitations the above responses of Dr. Cramer were shortened. All efforts were made to retain their essence.

**Horace D. Taft:**
**Candidate for Councillor at Large**
**Physics Department**
**Yale University**
**New Haven, CT 06511**

I would like to begin by stating my views on the role which the APS should play in public affairs. The Constitution of the Society states that its purpose is "the advancement and diffusion of the knowledge of physics". Any persons sharing this goal may be candidates for membership and no members should be forced to withdraw because of positions taken by the Society on issues not directly related to its purpose. Further, even on related issues such as individual cooperation with Soviet scientific programs the Society must recognize that a variety of reasonable positions may be taken by reasonable persons. For example, I particpated some time ago in the statement of conscience promulgated by Scientists for Sakharov, Orlov and Shcharansky, but I am aware that many of my colleagues feel that other kinds of protest are likely to be more productive. While I believe that it is appropriate for the APS to express its deep concern in this case, I strongly oppose a statement by the Society either endorsing or disavowing any particular means of expressing this concern.

The APS has properly demonstrated its awareness of its responsibility to share its expertise with policy making agencies through the establishment of the Panel on Public Affairs (POPA). As a member of POPA I have supported the production of technical studies on important public issues and I will continue to do so. The Society has also recognized its responsibility to stimulate discussion of these issues through the establishment of the Forum. In my view, however, such discussion and shared expertise should generally lead to action not by the Society as a whole but by members of the Society, including its officers, or to the establishment of separate, dedicated organizations independent of the Society while deriving from it. Such organizations are not only more likely to be effective in pressing for specific policies but are also less likely to be misunderstood and to place unwarranted pressue on members with divergent views.

Following are my answers to your specific questions.

1. I do not believe that the APS has a special responsibility to work for arms control. I do believe that every individual has a responsibility to work towards this goal and many members of the APS do have special expertise in this area. It is fair to say therefore that the APS has a responsibility to make this expertise available to responsible agencies and organizations by carrying out studies, both solicited and unsolicited, on the technical aspects of arms control. The APS should also keep the general public informed on the technical aspects of arms control but it should not, as an organization, endorse one or another form of control.

2.a. The "attempts by the federal government to restrict attendance or free discussion at conferences on advanced technology, or to extend export restrictions to colleges and universities", comes very close to the central purpose of the Society. It is therefore in my view appropriate for the officers of the Society to oppose, in the name of the Society, policies which would restrict the free trade of ideas between scientific communities in different nations. The arguments in favor of such free exchange are numerous and powerful and the APS should ensure that they are properly presented, especially to those who must shape government policy on this issue.

2.b. This can best be achieved by making sure that support for physics research by universities is maintained and strengthened. I believe that this can be done in part at least by strengthening both secondary and post-secondary education in the physical sciences. The APS has already been active in this field and I am interested in helping to make these activities more effective.

2.c. I do not see much of a role to be played by the APS in the preparation of students for industrial careers. While students should be fully informed as to the opportunities available in both basic and applied research careers, it is up to the student to choose. The quality of the educational opportunities available to students opting for industrial careers seems to me to be a legitimate concern for societies other than the APS.

2.d. I am deeply concerned about increasing the number of women in minorities in the academic and research community in the United States, particularly in the physical sciences where the situation is especially serious. In the long run, the most obvious way to remedy the situation is to increase the number of women and minorities in educational programs,

particularly in the physical sciences, leading towards academic and/or research careers. Further, it is probably necessary to reach students at the secondary, or even pre-secondary level. The APS has already initiated studies of science education at early levels and I believe strongly that these studies should be supported and strengthened. Beyond studies, however, the APS should seek to cooperate directly with schools through consultation on curriculum, through programs of visiting teachers and through a variety of competitions and awards. Such methods are of course aimed at more effective recruitment of students in general into the physical sciences. However, since the pool of women and minority students at this level is far higher than at the advanced level in the physical sciences, these methods should help to improve the serious underrepresentation which we now have.

3. You ask about other areas involving physics and society in which I feel that the APS should be actively involved. In reply I will simply refer you to the POPA studies and proposed studies in such areas as coal utilization, alternate energy sources, science and technology in developing nations and others.

**Esther M. Conwell:**
**Candidate for Councillor at Large**
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2.a. Actions by the federal government to restrict attendance or free discussion at conferences on advanced technology, or to extend export restrictions to colleges and universities come from a lack of understanding of the way in which science and technology work. Efforts must be made to educate the executive branch and members of Congress, particularly those on committees concerned with legislation in this area. This is an area in which all universities and professional societies can certainly agree and combine efforts to send letters to the appropriate people in government explaining that such restrictions have serious, deleterious effects on science and technology and do not accomplish the desired withholding of information. The APS could be a leader in organizing the professional societies to write such letters, and to monitor the situation in the government so that we can, for example, offer testimony to Congressional committees considering legislation, etc. The APS could also suggest that the National Academies of Science and Engineering study this matter and come out with their own statements.

2.c. The APS has taken some good initiatives toward preparing students for industrial careers but more could be done. Of primary importance would be getting to the students the information as to what kinds of physicists are being hired by industry -- such as the fact that theoretical physicists are much less frequently hired than experimental, many people are hired in optical and acoustical specialties, etc. The AIP does an excellent job of collecting and publishing the statistics but I doubt that the information gets to most of the students. We might publish it in **Physics Today** or send it directly to new graduate students. the program sponsored by the Education Committee of bringing industrial speakers into the universities has been useful, in my estimation, but as I hove seen it work the speakers have been from relatively academic, basic-research, areas of industry. There are few open positions in such areas; the openings are much more numerous in highly applied, development areas. If the university department is not willing to devote a colloquium to a speaker from such an area, it could set this up as a special talk for graduate students, research associates, etc.

There has been considerable discussion about finding positions for physcists in industries that do not ordinarily hire them. A prerequisite seems to be the identification of jobs that physicists could do in these industries. This is not trivial, and is obviously not always done by the industry in question. I suggest that it could be undertaken by study groups appointed by the APS, one for each of several industries. The results could be published as articles in **Physics Today**, which I for one would find quite interesting.

2.d. Apart from exerting what influence it can toward equal treatment of women in graduate school, on faculties and in industry, the most important effort the APS could make toward increasing the number of women and minorities in physics would be at the junior high school level. It is there that the important decision must be made to take more math, to keep the door open to a science career. I would suggest that the APS work through the Committee on Minorities, sending women and minority representatives into the junior high schools within driving distance to talk with students and guidance counsellors. A particularly good occasion is a career day, which many junior high schools and high schools hold regularly. Even without a career day, the visitor could give a talk about what physicists do, the opportunities for women and minorities, etc., and answer questions. I believe this would be a valuable supplement to the career booklet now being prepared by the APS for the junior high level.

**Albert Overhauser:**
**Candidate for Councillor at Large**
**Department of Physics**
**Purdue University**
**West Lafayette, IN 47907**

1. NO! The APS is a professional society for physics and all physicists. It should not take stands on political, ethical, or social problems. It is fine that these subjects be discussed at APS meetings. All are free to join or create organizations that strive for political goals. No one should feel the need to resign from the APS for a matter of conscience.

2. In general I am against (a) and for (b), (c), and (d). Regarding (c), I have spent considerable effort to develop an undergraduate applied physics curriculum at Purdue. Surely it can be helpful to have the problems discussed in special sessions at APS meetings, to provide a stimulus to individual action.

**George L. Rogosa:**
**Candidate for Councillor at Large**
**Department of Physics**
**Duke University**
**Durham, NC 27706**

I am spending the major part of my time studying and teaching physics. I read the APS **Bulletin, Physics Today** and **Science** so I am generally aware of what is going on. At this stage, I do not have a platform. I do not have a briefcase full of proposals to toss out on the subjects of interest to the Forum. I recognize the importance of these subjects. If elected, I will put time into reading, understanding, thinking, talking and try to contribute to those activities of interest to the Forum.

1. The importance of this subject comes through simply and clearly from reading Panofsky's article in the June 1981 issue of **Physics Today**. "The arms race, in particular the nuclear weapons competition between the Soviet Union and the U.S., threatens the very existence of man's civilization." This matter is the responsibility of national governments. Without question, the Administration needs to get the best possible advice feeding into Keyworth, Rostow and all parts of the government involved in this activity. The input is important but I worry less whether it is by individual, group, committee or through the APS. Feshbach, in his address printed in the April 1981 issue of **Physics Today**, included a section on the role of APS. "The Society has undertaken studies in which it contributes to the resolution of important issues by providing an objective analysis of their important technological components." Arms control is an important public issue.

I am aware that over the years a number of exceptionally talented physicists have given generously of their time in studying defense matters and arms control, e.g., Bethe, Drell, Feld, Garwin, Goldberger, Panofsky, Teller, Townes, etc. To not have input from these scientists who would rank on the Landau scale at 2 or 1 would not make sense. (I believe ½ is reserved for Einstein). If the APS can assist in providing input, then fine.

2.a. Sometimes I can understand the federal government's view, having served there for 23 years. The October 1980 issue of **Physics Today** contains responses to questions on science policy from Candidates Anderson, Carter and Reagan. The Reagan response ended with a statement on international science, "I believe that transfers of high technology and information should be examined within the context of our overall foreign policy objectives. I believe that our national security could be jeopardized by the flow of technology and information which may materially assist the Soviet military. As President, I would carefully review contacts to see if they should be regulated." I voted for Mr. Reagan.

This issue is reported under News of the APS in the May/June 1981 **Bulletin**. "The rather complex legal issues related thereto have been investigated by CIFS in cooperation with the American Vacuum Society, the sponsor of the conference in question. The issues raised by this case continue to be of deep concern to the whole physics community for they pose a threat to all conferences devoted to scientific subjects that can be construed as closely related to manufacturing processes." Since the matter has been transferred to the Committee on Public Policy of the AIP, I would wait to hear from that Committee.

2.b. Feshbach touched on this subject in his address cited earlier. In the section on Manpower he discusses the predictions of the Grodzin's data which foresee university problems becoming acute during the middle and late eighties when a steady stream of retirements will begin. Feshbach states: "Some universities are attempting to bridge the retirement gap through the creation of soft money research positions." I believe this is a reasonable approach but it does have some pitfalls as pointed out.

2.c. I'll go back to the paper on industry-university interactions by George E. Pake (**Physics Today**, January 1981) and start from there. I would also have to read up on the activities of the Committee on Education to the APS Council.

2.d. I would study the work of the Committee on the Status of Women in Physics and the work of the Committee on Minorities in Physics. I would also take special note of the article by Vera Kistiakowsky in the February 1980 **Physics Today**. I strongly believe "participation in physics should be based on interest, aspiration and ability" as she states.

3. I am not prepared to respond until I have caught up with all the activities the APS is engaged in.

**John A. Armstong:**
**Candidate for Councillor at Large**
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1. The APS should encourage its members who have special technical knowledge relevant to arms control to make that expertise available, as a public service, where it can make a useful contribution in arms control studies. However, I believe that the essential difficulties of arms control are more political than technical, and I do not believe that the APS is, or should expect to be, particularly effective in the political arena.

2.a. I believe the APS should ask to be heard in a direct manner on any changes in federal regulations of the kind outlined in this question. Officers of the Society should testify before the authorities competent to make changes in the regulations, and should seek to make clear the risk that such expanded regulations and the accompanying bureaucratic procedures will be, in fact, counter-productive to our national interests. The organization of, and attendance at, conferences, as well as the interchange of findings between university scientists is at the heart of the professional work of physicists, and it is entirely appropriate that the Society develop and promulgate an official positon on these matters.

2.b. The fundamental attack on this problem is to increase the enrollment of physics students in universities and colleges. My thoughts on this topic are expressed under Question No. 3. Interim means of dealing with the problem include strongly increased support for post-doctoral positions, increased cooperation between physics departments and industrial laboratories, with the aim of facilitating movement between assistant professorship positions and industrial careers, and increased attention to sabbatical programs for already-tenured faculty members.

2.c. In this regard there would be great benefit from increased knowledge on the part of physics faculties of the nature of industrial physicists' work. Whereas all Ph. D. physicists, wherever employed, have a personal familiarity with the university as a environment for doing physics, only a small fraction of physics faculty have, in my observation, any first-hand acquaintance with the nature of physics in industry. This makes the preparation of students for industrial careers a very chancy business. There are several ways to improve the situation. I am a strong believer in the APS Visiting Physicist Program, sponsored by the Committee on Education. The exchange of visits between industrial physicists and university faculty members and graduate students has, I believe, greatly contributed to improved understanding of how to prepare students for industry. I endorse this program and believe it should be expanded. Moreover, it would be very helpful to individual faculty members to have had the experience of either summer employment in industry or the spending of a sabbatical year in industrial laboratories. The insight into the nature of the work, and the individual contacts so gained, will be very valuable to the students of such faculty members.

2.d. My thoughts on this topic really are included in my answer to Question No. 3.

3. I believe that the uneven quality of physics education in the secondary school system and the low number of students enrolled in such programs, constitute the greatest long term problems with which the Society should be concerned. Enthusiasm among young people for careers in physics is not what it once was, nor what it should be, to ensure the long term vitality of our profession and of our role in society. This situation exists despite substantial efforts in recent decades to upgrade the caliber of physics instruction both in the secondary schools and in colleges. I believe it may be appropriate for the Society to look into this set of questions again to try to determine what action the Society can take to help attract more students, including a broader representation of young women and minorities, in the study of physics.

The preceding opinions are those of the candidate and do not necessarily reflect those of his employer.

**Charles P. Bean: Candidate for Councillor at Large**
**Research Laboratory**
**Knolls General Electric**
**Schenectady, NY 12301**

1. The Constitution of our society states that "The object of the Society shall be the advancement and diffusion of the knowledge of physics." It is difficult to read from this statement any special responsibility to work for arms control. Arms control is a major question of our times. Many physicists have been active in both the creation of weapons and countermeasures as well as the search for effective arms control. The Forum is a useful mechanism to educate APS members concerning the problems and progress (or regression) of arms control.

2.a. In some instances, the security of the nation requires that access to information concerning specified advanced technologies must be restricted. For the advancement of physics as well as insuring the vitality of our defense establishment, these areas should be sharply delimited. In particular, military classification of work supported by non-military agencies or by non-governmental channels should be firmly opposed. Export restrictions have no place in a free university system.

2.b. One mechanism to ameliorate this problem is to emphasize interdisciplinary activities. Formation of new Divisions can help this process along. Perhaps we should have Divisions in Geological Physics, Device Physics or Applied Physics to emphasize some opportunities for physics and physicists. Another mechanism is that of the short course just prior to meetings.

2.c. The problem in this area is at least threefold. Industry is often insensitive concerning the most effective ways to deal with creative people. Professors have inadequate information concerning the diversity of opportunities in industry. Students often have either no information or have inaccurate preconceptions concerning industrial physics. The solution to all of these lies in communication. The Visiting Physicist Program of APS so ably run by Sidney Millman has been of great value in closing this communication gap. Its activities should be expanded.

2.d. It is both morally wrong and wasteful of the Nation's resources to limit opportunities in any field. Happily, it is now also illegal. To remove vestiges of past prejudice it is important to have and publicize role models for all minorities - not only the obvious minorities but those less obvious such as the handicapped. It seems to me, however, against the ultimate public good to have quotas established.

3. Two further areas are crucial to the progress of physics. First, most people - and, most importantly, legislators - do not appreciate the seminal role of physics to all science and technology. Our efforts in public education should be reviewed and expanded. Secondly, it is important that the Grodzins physics manpower projections reach young people and their teachers. We should be able to damp out a roller coaster trajectory of recent physics education.

**Paul C. Martin: Candidate for Councillor at Large**
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1. Arms control is a fundamental issue. Physicists, who can appreciate many of the technical questions, have a special responsibility to keep informed about, and assess the potential effects of, weapons and weapon systems. It is appropriate for the APS to sponsor studies and hold symposia on such topics. However, political considerations that have little scientific basis play so large a role in the formulation of arms control policy that a professional organization, such as the APS, probably cannot and should not attempt to develop or work for the adoption of a specific arms control program.

2.a. I am opposed to government restrictions on the free flow of information and ideas on both philosophic and pragmatic grounds. History has shown such restrictions to be counterproductive, ineffective, and subject to great abuse. Free and open exchange is crucial to physics. The APS should not sponsor closed conferences, and its participation in studies of the effects of restrictions on the advancement of physics would be welcome. I believe such studies would substantiate my view and make less likely the imposition of export restrictions on our colleges and universities.

2.b. Since a university physics faculty that is able to grow rapidly may lack vitality, and another with few new positions may possess it, this question should have two parts: (i) What can the APS do to improve current opportunities for bright, young physicists at universities? It can remind universities that the demand for academic physicists will grow rapidly in about a decade, when the bulge in the age distribution of university faculty reaches retirement, and stress the advantages of acting now, when the competition for outstanding faculty is less intense. (ii) What can the APS do to help maintain or increase the vitality of university physics? It can strive for more support for physics at universities, foster exchange programs and conferences, and, in general, carry out its normal functions imaginatively and effectively. Good physics, well communicated, will increase the demand for, and the vitality of university physics.

2.c. A good, broad education in physics is excellent preparation for students seeking industrial careers in physics. If it introduces students to some of the deep and interesting problems in classical as well as quantum physics, and gives them some experience with modeling and computing, so much the better. Exposing students to stimulating physicists with industrial experience and practical interests can be very effective. Together with the AAPT, the APS provides fora for the discussion of course and curricula. In addition, through its Corporate Associate Program, the APS already has taken several steps that help orient students toward industrial careers: it coordinates summer job programs and sponsors visits by industrial physicists to universities, by students and faculty to industrial laboratories, etc. Those activities which are proving worthwhile should be continued.

2.d. Efforts at all levels to encourage women and members of minority groups to study physics and to demonstrate that they will be welcomed and treated fairly should be maintained. They are having a positive effect. Since much of the diversion of talented individuals occurs during childhood, it is unrealistic to expect constructive policies to produce dramatic changes on a time scale shorter than a generation. Persistence and patience are required.

3. More than at any time during the past generation, the premises underlying the relationships between scientists, universities, government, and industry are being scrutinized, and modifications are being suggested. The APS should be studying these proposals, identifying and attempting to prevent harmful changes, and helping to identify and take advantage of possible new opportunities.

**Letters to the Editor:**

I support Earl Callen's proposal (**Physics and Society, 10** (3) 3-4 (1981)) that physicists should speak out on the creation-evolution issue. A well-publicized session at an APS meeting could draw attention to the following points:

--The issue is not the validity of a specific hypothesis about **how** evolution occurred (Darwinian natural selection or whatever) but whether it occurred at all. One does not need an extensive knowledge of biology to understand this issue.

--An integral part of the "scientific creationism" model is the postulate that not only the human race but the earth and the entire universe were created less than 10,000 years ago.

--In order to maintain this postulate the creationists reject the validity of radioactive dating which leads to a billion-year time scale for the earth.

--To justify their rejection of the accepted theory of radioactive decay, creationists are willing to discard both quantum mechanics and special relativity theory, and revert to a model which combines the postulate of a "subquantic medium" involving hidden variables, with a 19th-century ether theory.

--To justify their postulate that the rest of the universe is less than 10,000 years old, the creationists are willing to adopt the long-discredited Ritz emission postulate (speed of light depends on speed of source) and to discard general as well as special relativity theory.

These and many other bizarre examples of anti-science can be found in creationist publications such as Harold Slusher's **Critique of Radiometric Dating** (Institute for Creation Research, San Diego, 2nd ed., 1981). I am preparing an article on this subject (tentative title, "How do we know the age of the earth?") and would be glad to correspond with anyone who is interested in the gory details.

--In spite of the above, many creationists flaunt degrees in physical science and engineering, and try to use the prestige of physics to denigrate the scientific status of evolutionary biology. They claim that evolution does not make testable predictions and therefore does not satisfy philosopher Karl Popper's criterion for being a scientific theory. This claim is false, both as a statement about evolutionary theory and as a description of Popper's position (see the recent letters in **Science**).

The creationists are not just attacking evolution; they **are** threatening the integrity of science as a whole (at least as it is presented to students and public), and in the process are both mangling and exploiting physics.

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**Thoughts on APS Studies** by Joseph St. Amand, Sylvania Systems Groups, Strategic Systems Division, GTE Products Corporation, 189 B St., Needham Heights, MA 02194.

In the last (July 1981) issue of **Physics and Society**, the Forum councillor, Mike Casper, expressed concern regarding APS studies. Like Councillor Casper, I too fear that "the good name of our Society" might be tarnished by the perception (founded or unfounded) that APS studies lack credibility. The credibility issue arising not for want of technical competency but because of the perceived role of study sponsors in influencing study conclusions.

Three particularly damaging charges that I have heard regarding APS studies are:

* The nature and scope of a study is determined by the interests of the sponsoring bodies.
* Study conclusions serve the self-interests of sponsoring bodies.
* Study members, while acknowledged experts, display strong biases in favor of positions maintained by the sponsoring bodies.

It would be a disservice to the physics community to have APS studies dismissed for lack of scientific objectivity. Even if the conclusions of a study can be supported with unassailable facts, the **impression** that

the APS, in its quest for funds, has become a tool in the hands of sponsoring bodies is an unfortunate possibility.

I second the councillor's call for a Forum committee to review past APS studies and to offer constructive proposals for protecting the reputation of the Society. The Society should institute measures that would minimize the impression (no matter how unfounded) of producing biased and unobjective studies.

It is not my contention that conclusions of APS studies have been unduly influenced by the interests of sponsoring bodies. It is my contention that a prudent individual might contend that appearances suggest such a conclusion. Measures should be implemented to:

* determine the extent to which the credibility of past studies might have suffered from an image problem.
* prevent similar losses of credibility for future studies.

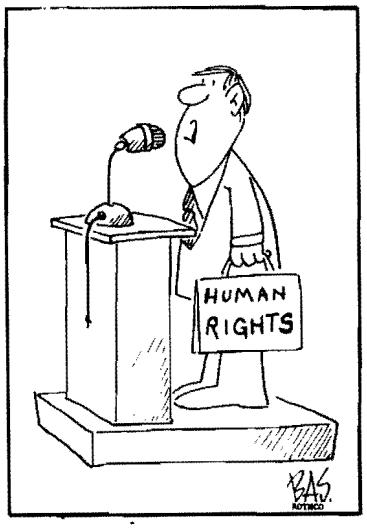
It is recommended that:

* the means for collecting study grants be changed to eliminate the appearance that study sponsors influence study conclusions.
* the experts commissioned to participate in the study should have no stake (directly or indirectly) in the outcome of the study.
* increased visibility be granted the process whereby study goals are defined and study participants selected.
* the selection of study participants take into account the biases of potential participants.
* all studies contain minority reports.

Regarding the planned breeder reactor study it can be said that EPRI, NRC, and DOE are indeed reputable organizations. Regrettably, not only do the three likely sponsors have a more than casual interest in the outcome of the study, each is perceived as favoring the development of breeder reactors. Given this reality, a study conclusion in favor of breeder reactors would have less impact than a conclusion unsympathetic to breeder reactors. Should a different set of sponsors, opposed to breeder reactors, be found, a conclusion opposing breeder reactors would lack credibility. In either case, the conclusions of the study may well be viewed with skepticism irrespective of the merits of the study. Such skepticism can seriously undermine the study's impact. For this reason alone, it is desirable to eliminate *a priori* sources of doubt.

Any study conducted by a nationally prominent organization with a reputation for technical competence and disinterested objectivity best serves the nation by being as disinterested as competent.

If the politics of funding is such that a quid pro quo mentality permeates study arrangements, it is better that the APS be guilty of the lesser of two evils (no study as opposed to one biased and, as a consequence, technically flawed).






**ANNOUNCEMENTS**

Forum Elections: Now is the time for all good Forum members to elect their officers. If you are a Forum member you should have received with this newsletter a candidates' information sheet, a ballot, and a return envelope to Dietrich Schroeer. Please fill the ballot out and return it to Dietrich Schroeer, by 14 December 1981. If you did not receive a ballot, contact Dietrich Schroeer.

**FORUM MEMBERSHIP:** If you are currently a member of the American Physical Society, you can become a member of the Forum on Physics and Society by filling out this form and returning it to: Dietrich Schroeer, Dept. of Physics and Astronomy, University of North Carolina, Chapel Hill, NC 27514. There is no charge to join the Forum if you are an APS member.

**Name** _____

**Address** _____

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## Short Course on the Arms Race

The Forum on Physics and Society of the APS, together with the AAPT will hold a Short Course on the Arms Race the day before the joint annual meeting in San Francisco, Sunday, 24 January 1982.

The meeting will be in the San Francisco Hilton Hotel (Continental Parlors) from 10 am to 5 pm. A $25 fee will cover the cost of materials to be distributed, the room, speaker expenses, and tea. This course is intended to supply information to physicists who either plan to teach about the arms race or who want to study the issues is the arms race more deeply. The talks will cover technical aspects of such topics as the effects of nuclear war, the MX missile and electromagnetic pulse problems. The course will be taught on a range of levels from teaching non-science undergraduates via order-of-magnitude calculations to graduate research and full scale international security programs. Tentatively, speakers include Kosta Tsipis, Henry Kelly, Robin Staffin, John Dowling, David Hafemeister, Dietrich Schroeer, and Marvin Goldberger. Resource materials will be made available.

1982 Joint APS-AAPt Meeting
Short Course on the Arms Race
24 January 1982

_____I will attend the Short Course on the Arms Race

_____I hope to attend the Short Course on the Arms Race

Name _____

Mailing Address _____

_____

_____

_____ Zip_____

_____Enclosed is $25 (checks payable to Dietrich Schroeer) to cover course costs.

_____I shall pay $25 at the session.

Return this form to:

**Dietrich Schroeer**
**Dept. of Physics and Astronomy**
**University of North Carolina**
**Chapel Hill, NC 27514**