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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Forum Elections: Now is the time for all good **Forum** members to elect their officers. This year the office of Vice-Chairperson and two positions on the Executive Committee are up for election. **Forum** members should have received this newsletter plus a ballot plus an addressed envelope to return their ballot to Dietrich Schroeer, Department of Physics and Astronomy 039A, University of North Carolina, Chapel Hill, NC 27514. The **Forum** wishes to thank this years' Nominating Committee for their fine work. The Committee was chaired by Caroline Herzenberg (Argonne); members were Mike Casper (Carleton College), Bill Colglazier (Harvard), and Brian Schwartz (Brooklyn College). Please return your ballots as soon as possible (but before 14 December 1982) to Dietrich Schroeer.

DAVE HAFEMEISTER: VICE-CHAIRPERSON

Dave Hafemeister is Professor of Physics at the California Polytechnic State University, San Luis Obispo, CA 93407. He received his Ph.D. in solid state and nuclear physics from the University of Illinois and has performed further research at Carnegie-Mellon University, Los Alamos, and University of Groningen in the Netherlands. He has served as Congressional Fellow, Legislative Assistant to the U.S. Senate, Special Assistant to the Under-Secretary of State, and "expert" consultant to the Department of State. This work was divided between nonproliferation and energy matters. **Forum** involvement includes his service as co-oranizer of the Arms Race Short Course at the 1982 San Francisco APS meeting, past Chairperson of Forum Awards and Nominations Committees, Co-chairperson of Membership, Chairperson of a variety of Forum APS sessions, and member of the Organizing Committee for the Penn State I & II conferences on employment. His publications include approximately 15 articles on the broad spread of physics and society. His latest effort on transferred hyperfine magnetic fields has been accepted for publication in **The Physical Review.**

Statement: If science and technology are the driving force of history, it follows that it is the responsibility of the physics community to investigate, publish, and debate the very complex issues of science and public policy (arms race, energy/environment, etc.). The agenda I propose is to continue the present menu of invited paper symposia, **Forum** awards, and Short Courses on the Arms Race, to establish further short courses, e.g., on energy and for congressional fellows and summer workshops, perhaps of the Gordon type, on the arms race; to assist the **Forum** committee on the Study of the Arms Race so that we produce a work that is publishable in a journal; to consider (again) a journal to publish articles on physics and society; to develop a "Science and Public Policy diskette" that would easily transmit data and equations to Apples; and to establish an "institutional memory for the **Forum** so that ideas/procedures are available to office holders.

LEO SARTORI: VICE-CHAIRPERSON

Leo Sartori is Professor of Physics at the University of Nebraska, where he was chairman from 1972 until 1978. He has taught also at Princeton, Rutgers, and MIT. His research has been primarily in theoretical astrophysics. From 1978 until 1981 he was on leave at the US Arms Control and Disarmament Agency, Strategic Affairs division. In the spring of 1979 he was a senior advisor to the US SALT delegation in Geneva.

Sartori has served on the **Forum** Executive Committee (1979-81) and the **Forum** Awards Committee (1982). He was chairman of an ad hoc committee on a Journal of Physics and Society, and currently chairs the ad hoc committee on arms control studies.

Statement: The danger of nuclear war will continue to be the **Forum's** principal concern for the foreseeable future. The question is how the **Forum** and the Society can best contribute to the effort to control and reduce nuclear weapons and lessen the chance of war.

I do not favor APS endorsement of political initiatives such as the nuclear freeze proposal. Such action would be divisive and inappropriate for a professional organization. Those of us who support the freeze (or any other proposal) have ample outlets through which to demonstrate that support.

The most effective way the Society can contribute, in my judgment, is through research and education, utilizing our professional skills. The program of arms control studies, now getting under way, should receive strong support, including financial. We should establish a speaker's bureau on nuclear issues and publicize its existence. A logical follow-up to the successful Short Course on the Arms Race would be a resource center to provide syllabi, up-to-date bibliographies, and other materials for courses to be offered either on the college level or to the general public. This effort should be closely co-ordinated with the FAS Nuclear War Education Project, in which several **Forum** members are already active. The AAPT could also become involved.

My recent experience at ACDA would be useful in implementing these ideas, and in developing others.

RAYMOND BROCK: EXECUTIVE COMMITTEE.

Raymond Brock received his B.S. in Electrical Engineering in 1972 from Iowa State University, and his Ph.D. in experimental high energy physics in 1980 from Carnegie-Mellon University. Since 1980 he has been a Research Associate at Fermilab, participating in a large-scale electronic neutrino experiment. While at Fermilab, he organized a ten month seminar series featuring notable speakers who addressed the research community from Fermilab and Argonne National Laboratory on the technical aspects of arms control and the consequences of nuclear war. He has been active in the Chicago Chapter of Physicians for Social Responsibility as a speaker and co-chair of the Chapter's Technical Study Group. In September of 1982, he joins the physics faculty at Michigan State University.

Statement: The increased concern over the possibility of nuclear war is an indication that we may be approaching an unprecedented public discussion and reexamination of national defense policy. Physicists are in a unique position to participate in this discussion through independent and responsible reviews of technical issues such as first strike scenarios, counterforce feasibility, ICBM vulnerability, the viability of civil defense, and so on. In order to facilitate this participation, the **Forum** should investigate the feasibility of helping to coordinate the efforts of already established analysis groups and perhaps consider the possibility of initiating devoted APS studies on such topics of enormous concern. Invited sessions at APS meetings on arms control, energy, secrecy, etc., should be continued and perhaps strengthened to the extent that a platform at an APS general meeting will be regarded by government officials and researchers reporting on their analyses as **the** manner to reach the physics community. If I am elected to the **Forum** Executive Committee, I will energetically pursue successful completion of these projects.

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CAROL JO CRANNELL: EXECUTIVE COMMITTEE

Carol Jo Crannell is an Astrophysicist with the NASA Goddard Space Flight Center and an Adjunct Associate Professor of Physics with the Catholic University of America. She earned her BA degree in Physics from Miami University in 1960 and her PhD in Physics from Stanford University in 1967. Her current research interests are focussed in the areas of high-energy phenomena in solar flares and gamma-ray astronomy. She has been elected to the Committee of the High Energy Astrophysics Division of the American Astronomical Society and has served on the Nominating Committee. She has chaired the American Physical Society Committee on the Status of Women in Physics and has been instrumental in developing a number of programs to promote the full participation of women in physics; she is an active member of the cosmic Ray Division of the APS.

Statement: Two challenges confronting those who would pursue research and teaching physics are diminishing support from the public sector and a shrinking talent pool. The **Forum** can play a key role in meeting both these challenges by suggesting and helping to implement APS initiatives in public education. Broadbased public support needs to be re-established with mature, realistic expectations of the capabilities and limitations of scientific investigation and technological development. Through independent efforts and through cooperative programs with other scientific societies, the **Forum** can help to provide access and career guidance to those traditionally barred from achieving their full potential in science careers. I am particularly interested in the creative employment of human resources in the pursuit of physics.

LAWRENCE KRAUSS: EXECUTIVE COMMITTEE

Lawrence Krauss is currently a Junior Fellow of the Society of Fellows at Harvard University. He received a B.Sc. in Mathematics and Physics from Carleton University, Ottawa and his Ph.D. in physics from M.I.T. in 1982. His research includes theoretical particle physics and cosmology. Besides membership in the APS, he was a member of the Canadian Association of Physicists and served on its Board of Directors in 1976-77. He has taken an active interest in science and society issues since his student days and recently has been active professionally in a number of activities dealing with the threat of nuclear war. These activities included being a campus organizer for the Union of Concerned Scientists convocation on the threat of nuclear war on November 11, 1981, and organizing the writing of a letter from 12 Nobel Laureates in Physics to President Reagan on this issue. He has written popular pieces on science and society, including most recently an article for the **Journal of Science, Technology, and Human Values** (Fall 1981, with B. Casper). During his period at M.I.T., he was active in teaching physics courses for nonphysicists and ran a weekly live television program on physics for M.I.T. undergraduates.

Statement: As in the late 1960s, this is a time of growing concern among physicists and nonphysicists alike about the current direction of science and technology in society. This concern centers on a widespread fear of the threat of nuclear war and a concern over large expenditures on arms at the expense of funds for more beneficial aspects of science and technology, including basic research, science education, and research on energy and environmental issues.

I believe the **Forum** can and should play a central role in providing a focal point for physicists to express their professional concerns and to organize as a body in order to make useful contributions to issues of science and society. There are a number of ways to promote these ends. There is a new generation of young physicists whose vast reservoir of professional talents and enthusiasm are going largely untapped by the Society while they direct their concern and activities through the growing number of organizations that are involved in public education and scientific issues. Many are unaware of the existence of the **Forum.** Special efforts should be made to bridge this gap, to build the base of the **Forum** and the APS by contacting campus faculty and student study groups, by making use of the new graduate enrollment in the APS, and by publicity in areas that are likely to reach this group. Also, the **Forum** should build and maintain contacts with professional groups interested in similar issues such as the Physicians for Social Responsibility, the Nuclear War Education Project, the Union of Concerned Scientists, etc., so that it can play a coherent role in the broad-based efforts now underway, and so that talents can be shared and the existence of the **Forum** publicized.

Next, the **Forum** should not only continue its workshops at APS meetings and promote POPA studies, but should investigate the possibility of sponsoring wider-based local educational workshops for physicists in order to help train them in public education. Another possibility is to work with other groups to develop general educational materials on science and societal issues for use by the public and in physics curricula. Finally, the **Forum** must remain a strong force in the APS, promoting ways in which the physical society as a body can use its resources to support these vital concerns of the physics community.

GERALD E. MARSH: EXECUTIVE COMMITTEE

Gerald E. Marsh is a research engineer with I.I.T. Research Institute in Chicago, Il. Until Spring of this year, he was with the Reactor Analysis and Safety Division of Argonne National Laboratory. He has been actively involved in nuclear policy and secrecy issues , including those related to the Comprehensive Test Ban Treaty and the military uses of the civilian nuclear fuel cycle. His statement on the Atomic Energy Act appears in the House Subcommittee on Government Information and Individual Rights report, "The Government's Classification of Private Ideas." He is co-author of the book "Born Secret: The H-Bomb, the **Progressive** Case and National Security."

Statement: Because of the overwhelming immediate importance of arms control, the **Forum** should address itself to this issue both in organizing symposia at APS meetings and in making available the expertise of its members to congressional staffs. Increasing the interaction between Congress and the physics community would also be useful in other areas. The recent government efforts to control the dissemination of unclassified information, largely a result of a misunderstanding of the scientific-technological process, might have been averted if there had been greater understanding and discussion of the relevant issues.

In an increasingly technological society, many citizens feel a growing alienation and impotence with respect to the decision making process. This does not bode well for the future of democracy in our republic. The **Forum** should therefore also promote an understanding of the social impact of science and technology both within the scientific community and among the general public.

NATALIA MESHKOV: EXECUTIVE COMMITTEE

Natalia Meshkov is at the University of Chicago with the Committee on Public Policy Studies. Her research interests for the past five years have been in the area of Energy and Resource Analysis. Before coming to Chicago, while at George Mason University, she had, with the help of an NSF grant, initiated and directed an educational project in the energy area designed to help women to return to science careers. Her physics research has been in nuclear and many body theory Her professional activities included serving on the APS Committee on the Status of Women in Physics and on the executive board of the Association for Women in Science.

Statement: I am very concerned about the continuing erosion of support for basis research and the large increases for defense spending. In addition to current **Forum** activities dealing with these issues, I would like the **Forum** to consider the effect of these policies, not just on the scientific community but on the nation as a whole. Of specific concern to me are the economic and social consequences of the large scale diversion of resources and talent to nonproductive ends. My other major concern has been education and professional opportunities for women in science. I would like to see continuing cooperation in this area between the **Forum** and the APS Committee on the Status of Women in Physics and the AAPT Committee on Women in Physics.

THOMAS MOSS: EXECUTIVE COMMITTEE

Thomas Moss is currently Staff Director of the House Science, Research and Technology Subcommittee, but will be re-entering academic life this fall as Director of Research Administration and Adjunct Professor of Physics at Case Western Reserve University. He was a Research Staff Member at the IBM Watson Research Center, and on the Physics faculty at Columbia University from 1968 to 1975 and 1976 to 1977. He spent intervals as an American Physical Society Congressional Fellow, and as Staff Director of the Congressional Office of Congressman George Brown. During this time he has also served as Co-chairman of the New York Academy's retrospective Three Mile Island Conference, as a Trustee of the Institute of Ecology, Member of POPA, and elected Fellow of the Scientists Institute for Public Information.

Statement: On re-entering academic life after a period in the science and public policy arena, I am more conscious than I have ever been of the need to bring the insights of science to long-range policy planning, and to build public understanding of those insights. There are many technical forces capable of totally transforming society, ranging from nuclear weapons to microelectronics and genetic engineering. I feel it would be reckless for those of us in the scientific community to leave the planning for these transformations completely to others. It would be even more reckless for us to assume that strong efforts to improve scientific education and public science literacy can be left to those outside the community itself. Public trust, respect and understanding of our findings and methods are essential for society's and our own well being. On the Executive Committee I would like to be part of **Forum** efforts to bring ours and other scientific societies into cooperative efforts in this area.

JOSEPH ST. AMAND: EXECUTIVE COMMITTEE

St. Amand is affiliated with Boston College engaged in research on high energy nucleon/nucleon scattering. Since 1960 he has held a number of key positions in academe, the federal government, and private industry. He has been active in numerous professional organizations including the APS, the AAPT, and Sigma Xi. Most recently, he chaired an APS session on **Solar Power Satellites.**

Statement: The most tragic development in the history of humankind has been the application of fundamental laws of physics for creation of the final solution to the human problem. As representative of the consciousness of the American physics community, the **Forum** is uniquely positioned to provide leadership in removing the specter of nuclear weapons from the arsenals of the world. All other issues pale by comparison.

If elected to the Executive Committee, I would attempt to direct some of the **Forum's** energy towards elimination of the one reality that may well render moot all other issues of concern to physicists and nonphysicists alike.

ANNOUNCEMENTS.

Second Short Course on the Arms Race to be held at the Baltimore APS meeting (DC meeting) on April 17, 1983.

The **Forum on Physics and Society** and the American Association of Physics Teachers will be holding its second short course on the arms race in Baltimore on Sunday, April 17, 1983. The first short course on the arms race was held in San Francisco before the annual APS meeting and was very successful. Our intent is to supply information to physicists who either plan to teach about the arms race, or who want to study the issues more deeply. Our intent is to conduct an informational, not a political event. Since the second short course will be held near Washington, we have been able to obtain a very strong faculty for the course. Thus far the following speakers (topics) have accepted: Gerard Smith (SALT), Richard Garwin (technology), Kosta Tsipis (technology), Frank von Hippel (effects of nuclear war), Dietrich Schroeer (courses on arms race), John Dowling (films on arms race), David Hafemeister (interactive computer graphics). In addition we will have speakers on the technical aspects of seismic verification, satellite verification, Senate ratification, and think tank thoughts.

Most of the talks during the day on Sunday will be technically oriented for the physicists and will take place between 10 am and 5 pm; the evening session will be broader in content and will be presented by "policy makers." In addition, we will be handing out a book of about 300 to 400 pages for the participants. If you are interested in enrolling in the short course ($25 to cover the nine-hour event and the proceedings), please write Dietrich Schroeer.

David Hafemeister
Department of Physics
California Polytechnic U.
San Luis Obispo, CA 93407

Dietrich Schroeer
Department of Physics
U. of North Carolina
Chapel Hill, NC 27514

Interactive Computer Graphics Diskette for Science/Society Issues.

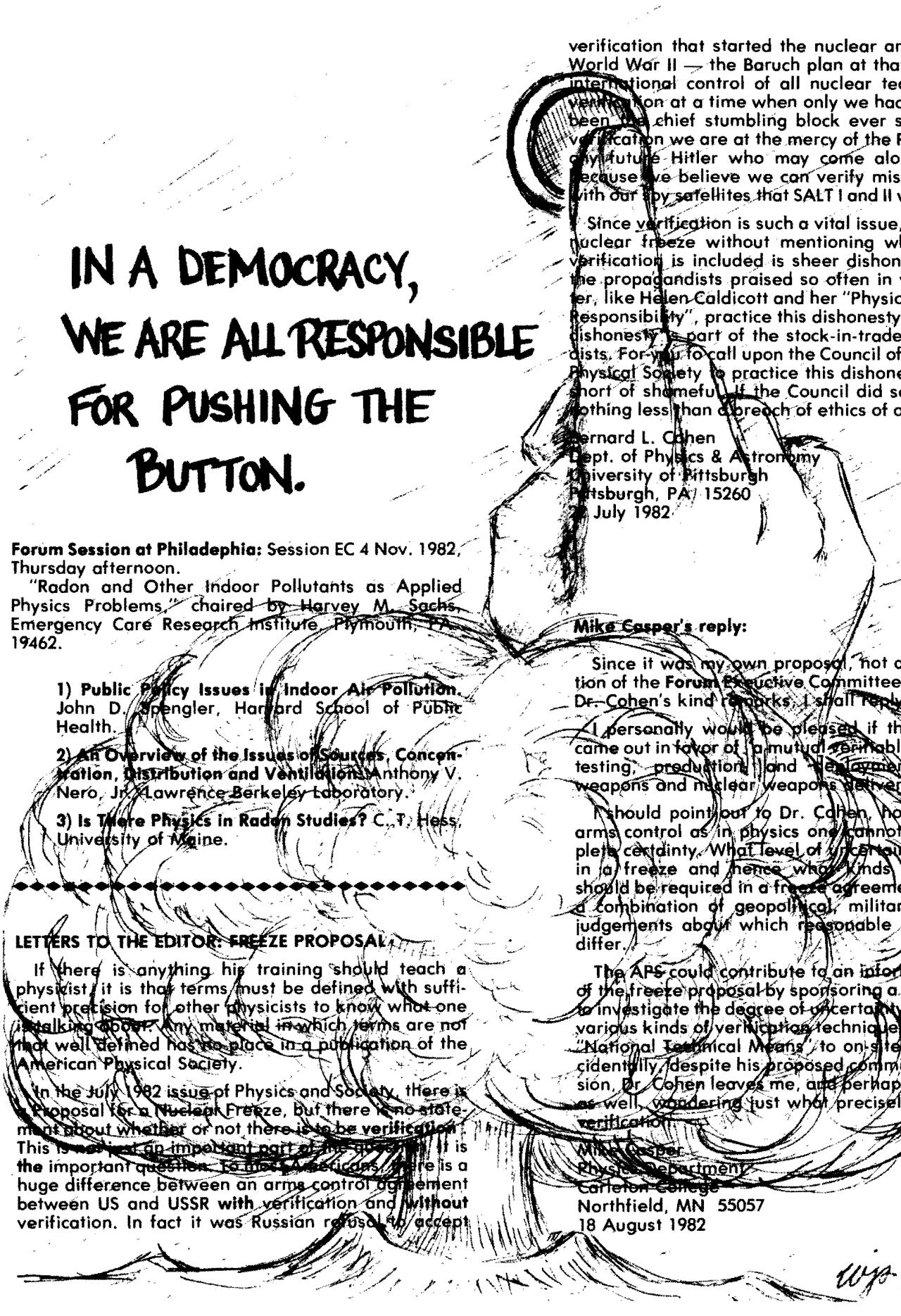
As an alternative to words and equations, it might be useful for you to try an interactive computer graphics diskette. With this 3.3 diskette (for Apple II) it is possible to discuss (and debate) the issues of the arms race, energy, and the environment in a new way. For example, the issue of the arms race can be discussed for the case of an SS-18 missile on normal cities, and on hardened cities. This program also allows one to adjust accuracy (CEP), gravitational bias error, and reliability. Other programs discuss the issues of economics (Pu, buildings, auto), MIRV, generic payback (for most conserving technologies), ASW, Richardson Equations, Pressure = f (yield, distance), future oil, etc. This diskette is available on a nonprofit-noncopyright basis for $6 ($10 with manual). It is hoped that over the years other physicists will write interesting Apple programs, mail them to me, and then we can increase the library size. If interested write David Hafemeister, 553 Serrano, San Luis Obispo, CA 93410.

Forum/AAPT Book

The AAPT has published the proceedings of the Symposium of the Forum on Physics and Society **Nuclear Energy, Nuclear Weapons Proliferation, and the Arms Race** which was presented at the 1982 APS/AAPT San Francisco Meeting. This publication was edited by Jack Hollander and includes the following articles:

> Nuclear Power and Nuclear Weapons: The Connection is Dangerous - John P. Holdren
>
> Nuclear Power and Nuclear Weapons: The Connection is Tenuous - Bernard I. Spinrad.
>
> Horizontal Proliferation: The Spread of Nuclear Weapons to Other Countries - Gene I. Rochlin.
>
> Vertical Proliferation: The Nuclear Arms Race of the Superpowers - Herbert F. York.

The publication is available from AAPT, Publications Department, Graduate Physics Building, SUNY, Stony Brook, NY 11794. Cost is $2.50 in U.S. and $3 for foreign purchasers.



verification that started the nuclear arms race after World War II — the Baruch plan at that time offered international control of all nuclear technology with verification at a time when only we had it — and has been the chief stumbling block ever since. Without verification we are at the mercy of the Russians, or of any future Hitler who may come along. It is only because we believe we can verify missile launchers with our spy satellites that SALT I and II were possible.

Since verification is such a vital issue, any call for a nuclear freeze without mentioning whether or not verification is included is sheer dishonesty. Some of the propagandists praised so often in your Newsletter, like Helen Caldicott and her "Physicians for Social Responsibility", practice this dishonesty routinely, but dishonesty is part of the stock-in-trade of propagandists. For you to call upon the Council of the American Physical Society to practice this dishonesty is nothing short of shameful. If the Council did so, it would be nothing less than a breach of ethics of our profession.

Bernard L. Cohen
Dept. of Physics & Astronomy
University of Pittsburgh
Pittsburgh, PA 15260
7 July 1982

Forum Session at Philadephia: Session EC 4 Nov. 1982, Thursday afternoon.

"Radon and Other Indoor Pollutants as Applied Physics Problems," chaired by Harvey M. Sachs, Emergency Care Research Institute, Plymouth, PA 19462.

1) Public Policy Issues in Indoor Air Pollution. John D. Spengler, Harvard School of Public Health.

2) An Overview of the Issues of Sources, Concentration, Distribution and Ventilation. Anthony V. Nero, Jr., Lawrence Berkeley Laboratory.

3) Is There Physics in Radon Studies? C. T. Hess, University of Maine.

LETTERS TO THE EDITOR: FREEZE PROPOSAL

If there is anything his training should teach a physicist, it is that terms must be defined with sufficient precision for other physicists to know what one is talking about. Any material in which terms are not that well defined has no place in a publication of the American Physical Society.

In the July 1982 issue of Physics and Society, there is a Proposal for a Nuclear Freeze, but there is no statement about whether or not there is to be verification. This is not just an important part of the question, it is **the** important question. To most Americans, there is a huge difference between an arms control agreement between US and USSR **with** verification and **without** verification. In fact it was Russian refusal to accept

Mike Casper's reply:

Since it was my own proposal, not an official position of the **Forum** Executive Committee that prompted Dr. Cohen's kind remarks, I shall reply.

I personally would be pleased if the APS Council came out in favor of "a mutual verifiable freeze on the testing, production, and deployment of nuclear weapons and nuclear weapons delivery systems."

I should point out to Dr. Cohen, however, that in arms control as in physics one cannot demand complete certainty. What level of uncertainty is tolerable in a freeze and hence what kinds of verification should be required in a freeze agreement depends on a combination of geopolitical, military, and ethical judgements about which reasonable physicists may differ.

The APS could contribute to an informed discussion of the freeze proposal by sponsoring a technical study to investigate the degree of uncertainty expected with various kinds of verification techniques, ranging from "National Technical Means" to on-site inspection. Incidentally, despite his proposed commitment to precision, Dr. Cohen leaves me, and perhaps other readers as well, wondering just what precisely he means by verification.

Mike Casper
Physics Department
Carleton College
Northfield, MN 55057
18 August 1982

RESPONSE OF APS CANDIDATES TO FORUM QUESTIONNAIRE

The **Forum** traditionally asks candidates for the American Physical Society Office 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 Brian Schwartz and Malvin Ruderman) and approved by the **Forum** Executive Committee.

1. **Should the APS play a role in the current actions on arms limitation and reduction? If so, how should this be done and what sort of role would you advocate?**
2. **Recently industry has been getting more involved in the support of university research.**
   - a. **How do you feel about this trend?**
   - b. **What do you see as the benefits and liabilities of this cooperation?**
   - c. **Do you see any threats to academic freedom?**
   - d. **Should the APS play a role?**
3. a. **What is your assessment of the current situation in the secondary (or even earlier) teaching of science and mathematics?**
   - b. **What role, if any, should the APS play in improving secondary science and mathematics education?**
   - c. **If the APS should play a role, what are the forces that are likely to make improvements difficult?**
4. **What specific actions, if any, would you propose that the APS undertake on 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.**
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:

N. Bloembergen: Candidate for Vice-President Elect
Division of Applied Sciences, Pierce Hall
Harvard University, Cambridge, MA 02138

1. The APS should keep informing and reminding the general public and politicians of the physical facts of radiation and other hazards. It could issue a statement of a similar nature to that adopted, for example, by the National Academy of Sciences at its annual meeting in Washington, D.C., April 1982. The APS should support attempts at limitations of nuclear armaments and oppose measures that escalate the dangers of war. It should, however, avoid advocacy of particular political approaches toward these ends. As a scientific society it should not get involved, for example, in questions of negotiating strategy, such as a unilateral freeze of nuclear arms production. A proper way to initiate official APS action in this area would be for the APS **Forum on Physics and Society** to submit a scientific statement about technological hazards threatening mankind to the APS Council for action and publication.

2.a. It is too early to tell how this trend will affect physics research at universities.

2.b. The interplay between industry and academia can be mutually beneficial. I have always valued my contacts with industry and feel they have widened my perspectives in physics research.

2.c. Contracts should be carefully drawn, so that freedom of inquiry and of publication of research findings is guaranteed. The rights of graduate students and postdoctoral fellows should not be prejudiced, and they should be informed of the nature of the research contract they are working on.

2.d. The APS **Forum on Physics and Society** could help in identifying the issues and problems as they emerge over the next few years.

3.a. The level of instruction of mathematics and science in secondary schools, **averaged** over the **whole** United States, is dangerously low.

3.b. & c. The APS cannot play a direct role in the improvement of this regrettable state of affairs because of the political organization of U.S. secondary education at the state and local level.

4. The APS should resist, by all legal means, any attempt by the federal government to restrict attendance and discussion at any APS sponsored conference. Attempts to apply such restrictions to basic scientific knowledge at colleges and universities should also be vigorously opposed, except for advanced technology research contracts which have been designated **in advance** as sensitive and restricted.

5. Physics clearly plays a role in environmental questions. The **Forum on Physics and Society** should continue the discussion of such problems. I do not recommend any specific APS action at this time.

Robert R. Wilson: Candidate for Vice-President Elect
Dept. of Physics, Columbia University, New York, NY 10027

1. We as physicists do have a responsibility to make our views heard about arms limitation and reduction. Generally speaking, the APS is not an advocacy organization and we should turn to other groups for that purpose. However, we might respond favorably to a request for a study or a report from outside the APS if we should have a special competence and interest. We should also respond to such initiatives from within the APS.

The Council of the APS, as an elected body, should determine our role in this matter. I can imagine situations in which the president of the APS or another responsible authority might be asked to testify before a congressional committee, in which case he should respond carefully, competently, candidly, and

courageously, remembering that he speaks as an elected representative and that his remarks should reflect as accurately as possible the attitudes and beliefs of the APS membership.

2.a. I favor industrial support of university research; it should be encouraged.

2.b. Clearly at a time when government funding is decreasing industry should augment the support of university research for that is an important well spring of future technology. It is good to have a broad base for the support of university research. The liability of industrial support, if any, might be that a condition, such as secrecy, be put on the research. This was not a problem before World War II when university research was strongly supported by industry, nor will it be if we continue to be as jealous of our academic freedom as we have been in the past.

2.c. No (see above).

2.d. Yes, the APS should cooperate closely with the efforts of the American Institute of Physics to encourage industrial support of university research.

3.a. For whatever reason, the quality and quantity of students with an adequate scientific education appear to be diminishing. We physicists have a responsibility for understanding the significance and cause of this situation and should help to rectify it.

3.b. I would defer to people more experienced in secondary education than I am before discussing the role, if any, the APS should play in improving secondary science and mathematics education.

3.c. There is probably some truth in past criticism of professional educators for emphasizing procedure rather than content in teaching secondary physics. We might cautiously investigate the mores of scientific educators, and, if indicated, try to have a beneficent influence. Perhaps a method can be devised for physicists to volunteer to cooperate with physics teachers so as to appreciate their problems more fully. We might help to motivate students to study physics were we to be more aggressive about public discussion of the interest and value of our work.

4. If we are to continue to play a strong role in international science then we must insist that our meetings be open and that the discussion be free. We do have strong and understanding friends, in government and out, to whom we can appeal for help if the government should unnecessarily interfere with long established scientific tradition in this regard.

I strongly oppose security-related restrictions on university research. One of the reasons we are a great nation is that we have an open society. A seemingly innocuous regulation may accomplish a narrowly viewed advantage, but have serious adverse consequences from a larger view - the analogy being to freedom of speech. We must take care to understand what is happening and to be outspoken if a threat to open research is implied.

5. We should continue to play a strong role in increasing the participation of women and minorities in the profession of physics.

Robert K. Adair: Candidate for Councillor at Large
J.W. Gibbs Lab, Yale University
P.O. Box 6666, New Haven, CT 06511

1. I consider arms limitations and reduction important only inasmuch as constraints on arms may reduce the probability of war or the impact of war. The important matter is the elimination of war, not arms reduction per se. Moreover, reasonable men have seldom been able to agree on the impact of specific arms control mechanisms on the probability of war, or even the sign of what effect there might be.

Most arms control proposals contain technical elements. The APS should make available any service it may render towards the construction, clarification, and evaluation of the technical components of arms control proposals. However, I question any assumption that the APS has special competence on non-technical aspects of arms control proposals and I would take a reserved position on any suggestion that the APS support a particular proposal. In particular, my strong belief in minority rights of APS members would direct me to oppose any position by the APS which was not demonstrably held by a **near consensus** of its members.

2. I approve increased support of university research by industry subject to the same kinds of checks and balances imposed on support by government and eleemosynary bodies. Inevitably, the acceptance of **any** outside support carries the possibility of interference with views of academic freedom. I do not see that industrial support need result in more onerous compromises than are now made in regard to other sources of support.

It seems to me to be premature to consider what role the APS might play with respect to problems which are now only on the horizon.

3. I believe that there are now very serious deficiences in secondary **public school** teaching of science and mathematics. I do not consider myself sufficently well informed on these problems to construct viable programs myself, but I do believe that the APS has a responsibility towards secondary education and I would support any good ideas proposed by others.

It seems probable that the structure of secondary public education may be too inflexible to allow necessary changes. In particular, I am concerned over the emphasis, in schools of education, on teaching mechanisms rather than subject matter which leads to certification processes which are ill-matched to competence. Also, the emphasis of teachers unions on the equivalency of all certified teachers may make it difficult to improve the teaching of subjects like science and mathematics where special problems exist.

4. I would dislike to make a completely categorical statement opposing **all** attempts by the government to restrict the exchange of information, but I feel that there are very few areas in which such restrictions will do the United States more good than harm. Unless, very special circumstances obtain, I believe that colleges and universities should not accept research support which requires any serious restrictions on the dissemination of the results of the

research. If classified or restricted conferences are necessary in some areas, the meetings should not be held at universities -- or in other public areas.

Henry H. Barshall: Candidate for Councillor at Large
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1. Obviously Arms Control is of vital concern to all. If APS can contribute to the issue, it certainly should. I favor the proposals of the **Forum** Ad Hoc Committee on Arms Control that studies be carried out under the aegis of POPA and that the results be published in a manner similar to previous POPA studies. While some of the proposed subjects appear appropriate to me, others, such as chemical and biological warfare, are in my opinion not topics on which physicists should consider themselves as experts.

2. While I would welcome increased industrial support for physics research in universities, I am afraid that most industrial support will go to other disciplines. In the case of industrial support with which I have had contact in our Engineering College, the support was of mutual benefit. Both the faculty and the university administration must be vigilant to prevent abuses, which occur occasionally both on the part of industry and on the part of the faculty. These abuses have been more in the area of improper financial arrangements than threats to academic freedom. In view of the minor role of physics in this area, I do not think that APS can make any important contributions, but I do think that the AIP Corporate Associates program has been most helpful in improving relations between industry and the physics community and should be encouraged by APS.

3. As has been pointed out, a major problem in providing adequate physics instruction in secondary schools are the inadequate salaries paid to teachers, a problem which APS cannot solve. The suggestion, discussed by the Committee on Opportunities in Physics, to involve retired physicists in secondary school teaching is worth pursuing. While college physics departments can make important contributions to the physics instruction in their neighborhood, the APS may not be able to contribute much. In my opinion any APS activity should be joint with AAPT.

4. I hope that the bubble memory fiasco was an isolated case and that the subsequent outcry has been heard by the Commerce Department. If a similar problem were to arise at an APS meeting or a meeting cosponsored by APS, I am confident that the APS officers would react vigorously.

Universities have struggled for several decades to oppose restrictions on foreign visitors from proscribed areas. Faculty members should not be expected to enforce government restrictions. The National Academy Panel on Scientific Communication and National Security, chaired by Dale Corson, is working hard on the problem, which affects engineering and computer science more than physics. APS should cooperate with the Corson panel rather than initiate a separate activity at this time.

5. The fact that only a small fraction of high school students take a physics course has resulted in a lack of understanding and appreciation of physics in a large fraction of the adult population. Any educational effort through the publication of science articles in newspapers and magazines or through radio and television programs appears to me worthwhile. APS, in cooperation with AIP, should encourage such educational activities.

Edward Gerjouy: Candidate for Councillor at Large
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1. I answer the questions of the proper APS role in the arms limitation area on the basis of the following two guiding principles. (1) The APS should take the appropriate actions to help develop desirable public policies; to do otherwise, in this nation whose enunciated governmental policies invariably are a balance of competing influences, is to leave the field to the forces of darkness. (2) The APS should not take a stand on controversial public policy issues unless there is good reason to believe the stand is favored by a large majority of APS members; to do otherwise is to risk divisiveness and bitterness which the Society can't afford and which ultimately may destroy whatever influence the APS has.

On this basis I do not favor a public stand by the APS for or against specific arms limitation policies, such as whether the US Senate should approve SALT, or whether the Administration should sign a treaty totally banning nuclear tests. Although I personally advocate a positive response to each of these propositions, I do not believe the APS membership is sufficiently agreed on them to warrant an official Council declaration of APS support.

In the arms limitation area, therefore, I would confine the APS role to studies attempting to delineate the technical facts on which arms control policies should be founded, performed by responsible, knowledgeable physicists whose objectivity and competence all our members can respect. Suitable topics might be: verifiability of a test ban agreement, vulnerability of our nuclear submarines, present and foreseeable missile accuracies, etc. The possibilities of organizing such APS studies have been discussed before, during and since my tenure as POPA chairman; in the past these possibilities have floundered on difficulties in finding financial support and an APS unwillingness to undertake studies requiring major reliance on classified material. I am not sure the pros and cons of such arms control studies have been completely thought through, however, and urge continued examination of their feasibility.

2. I am troubled when any single monied segment of our society becomes a major supporter of university research, because of the obvious potential pressures on university freedoms, including academic freedom. However recent trends in federal research support policies, including the proposal (in the DOD January 1982 Report "University Responsiveness to National

Security Requirements") that awarding of **unclassified** research grants be contingent on willingness to accept pre-publication review of all results obtained, suggest that an industrial leavening of our universities' present almost total reliance on federal research funds might not be a bad idea at this time. But the patent policies inevitably associated with industrial research support also restrict the free dissemination of research results. These restrictions may be justified on the grounds that they provide increased incentives to ingenuity. Nevertheless, it would be worthwhile for Council **now** -- while industry-university relationships still are comparatively rare -- to ask an appropriate APS Committee to establish guidelines for such relationships, which physics departments could use to assess proposed industrial research involvements at their individual academic institutions.

3. The current situation in the secondary and earlier teaching of science and mathematics is a disaster. Because our current and growing shortage of native American undergraduate physics majors and physics graduate students is directly attributable to our poor elementary school and high school science and mathematics instruction, the APS has to be concerned about the weakness of such instruction. What the APS usefully can do is less clear; a huge amount of money is needed to reverse the trend, which is strongly rooted in cultural aspects of our society, e.g., the increasing deification of sports personalities. The APS should seize every opportunity to urge Congress and the Administration to provide funds for improving precollege science and mathematics instruction. The APS -- probably through the AIP -- might be able to enlist the rising pool of competent retired industrial and university physicists in efforts to enlarge the number of high school students intending a college physics major.

4. I have been advising Council on problems connected with the increased use of export restriction to limit the dissemination of unclassified technical information ever since the new export control policy surfaced, at the February 1980 American Vacuum Society Bubble Memory Conference. My views on this subject have been made known in an editorial for **Physics Today** (October 1981) and in an invited talk at the April 1982 Washington APS meeting, as well as in the testimony to a Congressional Committee for the APS (March 1982). These activities have been educational, to alert APS members, Congress and the public to the deleterious effects on American science that unwise export restrictions could produce. The APS certainly must continue to support such activities. The APS has organized a group of physicists who have volunteered to analyse new export controls which momentarily are expected to be promulgated for public comment; this is an excellent provident APS action. In addition I favor an attempt by the APS to obtain for analysis proposed new export regulations while they still are being drafted, before regulations have reached the hard-to-modify stage of promulgation for public comment.

5. My answer to this question is in the Candidate's Statement I prepared to accompany the APS ballot. I will refer Newsletter readers to that statement.

Joel L. Lebowitz: Candidate for Councillor at Large
Department of Mathematics and Physics
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1. Yes! I believe the APS can and should play a dual role in this area. The first role is that of concerned human beings and citizens who are also scientists and, therefore, knowledgeable about the terrible destructive effects of atomic weapons. In that capacity we should consider cooperation and support with organizations like the Federation of American Scientists when appropriate. The second and equally important role is to develop and distribute objective information which might be helpful in achieving arms reductions. In particular, the Society should consider appointing study committees on problems related to verification of a test ban treaty and other aspects of arms reductions. This, of course, involves problems of clearance, but I believe that this is not insurmountable. An objective study of the type done on energy and nuclear power would be useful.

2.a. Positively

2.b. The benefits are getting more support for research and education. The multiplicity of funding sources has always been one of the strengths of research in this country and a new industrial component is definitely to be welcomed. There are, of course, always liabilities too; one is beholden to the source of support and this sometimes requires slanting research in particular directions, but I simply do not see any way in the present world of avoiding these problems altogether. We simply have to live with them and use good judgment.

2.c. As mentioned before, there are the liabilities, but I don't think that the threat to academic freedom is any bigger than that coming from the government support of research. As mentioned earlier, multiplicity of sources of support is definitely desirable.

2.d. I do not see any different role for the APS here than what it has with respect to government supported research. Hopefully, the APS can expand its corporate research support to help with projects involving education and dissemination of research.

3.a. Terrible

3.b. I think the APS should take a more active role in improving science education in elementary and secondary schools. The New York Academy of Sciences, with which I have been connected for many years in various capacities, has a very active program of bringing science to elementary and secondary school students in the New York metropolitan area. The New York Academy of Sciences, in cooperation with the Junior Academy of Sciences, sponsors lectures and programs in both the local schools and the New York Academy. I think the APS should try to organize similar types of programs nationwide.

3.c. There are many forces which make improvements difficult. They range from the general culture in which intellectual activity is considered something peculiar for young people to indulge in and to a lack of properly trained and motivated teachers. Getting professional scientists involved in educational activities is one way to alleviate some of these prob-

lems. Funding is, of course, a perennial problem and, as indicated, in my reply to 2.d., I would hope that the APS would get industry to support such programs. Developing publications and programs describing the excitement of science which are directed specifically to young people would be a positive step that we could make in that direction.

4. Here, as in the problem of arms reduction, the APS should play a dual role, that of concerned citizens and that of objective scientists. The APS should give whatever support it can to the study now being conducted by the National Academy of Sciences on this problem.

5. I have been personally very much concerned with the plight of scientists in many countries where human rights violations are frequent occurences. This includes equally countries on the right and the left of the political spectrum from Argentina to the U.S.S.R. I think it is the duty of scientists as human beings and as scientists dedicated to freedom of pursuit of knowledge to help our colleagues in these countries in every way we possibly can. I think the APS should continue the activities it is currently carrying out on behalf of such colleagues including protests to the authorities, free membership and subscriptions to journals, and organizing sessions at meetings to discuss this matter.

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Boyce D. McDaniel: Candidate for Councillor at Large
Nuclear Lab, Cornell University, Ithaca, NY 14853

1. I do not think the APS should involve itself in the arms limitation and reduction activities. This is an extremely complex and highly technical issue and I do not feel that the limited effort which the APS could make would be useful.

2.a. I believe that it is very important that industry have an involvement with research.

2.b. Such involvement can result in the strengthening of both the university research base and the technical growth of the industry. It can bring much-needed additional research funds to the university and support of graduate students. In return, it will also lead to better assimilation of trained personnel into industry.

2.c. Such involvement brings the liabilities of increased complexity of relations within the university, especially in the field of patent rights, industrial secrets, free publication and distortion of departmental goals by growth in highly profitable industrial areas without comparable support in other areas.

2.d. I think that the APS should play a role in establishing recommended policy to be followed by universities and principal investigators in working with industry. A panel should be set up to review existing policies of various universities and to study industrial practice in this type of involvement. The committee should then make an appropriate set of recommendations.

3.a. I believe the teaching of science and mathematics in secondary schools is generally being done very poorly.

3.b. I see no effective role which the APS can play in improving science education. It should continue its association with the AAPT in the national and regional meetings and encourage personal initiative in this area, but the usefulness of such efforts is very limited.

4. The APS should establish a panel to consider the problem of attempts by the federal government to restrict attendance and free discussion at conferences on advanced technology, and the export of information. There already exists a high level committee (The "Corson Committee") set up by the National Academy of Sciences to consider these questions. The APS panel members should discuss the issues with members of this committee, have a few public discussions at APS meetings to sample the opinion of the membership, prepare its own recommendation, and seek approval by ballot from the APS membership of the policy recommended by the panel. This recommendation should then be transmitted to the "Corson Committee" and to the executive and congressional representatives of the federal government, togther with a well-controlled effort to obtain broad publicity for the policy through the news and television media.

5. A serious review, by an ad hoc committee of the APS, should be made of the organization and subject matter to be emphasized in the various national meetings of the APS. Over the last 30 years, very important changes have taken place within the society to affect the distribution of numbers in the various fields, the nature of the function to be served by the meetings, and many other factors. I feel that it is time that a critical study should be made on a broad basis with the hope that a means can be found to improve the usefulness of these meetings to the physics community.

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F. L. Vook: Candidate for Councillor at Large
Sandia Laboratories, Orgn 5100, Albuquerque, NM 87185

1. Yes, I would advocate that the APS try to establish the **facts** upon which the citizens of this country would determine **policy.** The method could be workshops or study group reports. I don't think the APS should become involved in arguing what U.S. policy should be. I don't feel we have a special expertise as physicists in establishing policy.

2.a. I think it is a good thing.

2.b. Benefits to physicists are increased support of physics research, suggestions for new areas of research, and access to new technological materials and sophisticated analytical capabilities of industry. Benefits to the U.S. are preservation of economic vitality.

2.c. No, provided the arguments are carefully structured.

2.d. Yes, I think it would be useful for the APS to publish and keep track of the form of the agreements as they become known. This would allow others to have the benefit of considering possible options in the form of those agreements.

3.a. I think there needs to be more emphasis on quality teaching of science and mathematics in secondary schools. There are many factors involved: low pay for science and math teachers, perception of dif-

ficult subjects by students, lack of parental motivation, etc.

3.b. The major role the APS could play is in having scientists and mathematicians visit schools to try to convey some of the excitement and opportunities in science and mathematics to secondary school children. The children need a vision to provide motivation.

3.c. Some of the forces that make improvement difficult are indifference, lack of incentive pay for science and math teachers, perception that the subjects are too difficult to master, etc.

4. This is an excellent topic for discussion by the **Forum on Physics and Society.** In general, I feel scientific discussions should be unrestricted and open. However, we certainly realize the leading role physicists had on the secret development of the atomic bombs in World War II. I don't think looking back that we would now advocate that all their meetings and discussions should have been open. We might ask ourselves what would our attitudes be about an open meeting in the year 1938 regarding the theory and advanced technology relevant to building a device exhibiting an uncontrolled chain reaction (atomic bomb). I think there is no general pat answer for all situations, but the issues are certainly legitimate issues for discussion by the APS, and especially on a case by case consideration.

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Draft Statement for APS Executive Committee from Nina Byers, Chairperson, **Forum on Physics and Society**, Department of Physics, University of California at Los Angeles, Los Angeles, CA 90024.

At the Washington meeting of the APS various members of the Executive Committee of the APS Council, responding to Mike Casper's suggestion that some action be taken on the peril we face owing to the threat of nuclear war, asked for suggestions to be considered at the June APS Executive Committee meeting. In response to this request I sent a memo to the **Forum** Executive Committee asking for their input. I received a good resonse and tried to integrate the various suggestions. I called upon Willie Chinowsky for help. Together we formulated the draft statement printed below. There was no opportunity to circulate this statement for approval by the **Forum** Executive Committee. I hope they will approve it when it is submitted to them at the next **Forum** Executive Committee meeting. In the meantime, it was sent as a personal suggestion from me under a covering letter to APS President Maurice Goldhaber, with a few additional suggestions that were essentially supporting, with some modification, proposals Mike Casper sent in separately. Those have already been published in the last issue of the Newsletter. Here is the draft statement:

We believe that it is a particular responsibility of physicists, who were the creators of nuclear explosives, to try to make clear the unique character of nuclear weapons and the calamitous consequences of their use. Nuclear war presents an unprecedented threat to the continuation of civilized existence. Prospects for technological developments that will produce measures to counter the blast, heat, and radiation effects of nuclear explosions are extremely poor. The basic physical principles governing nuclear explosions are well-known and can be applied to construct weapons at relatively low cost. Countries who as yet possess no nuclear weapons can acquire them with relative ease. These dangers have been present and alarms have been articulated since the beginning of the nuclear age, but there has been little success in achieving international agreement to limit or reduce stockpiles of nuclear weapons. Now we are at an important moment in history. The situation is one in which there is simutaneously danger of acceleration of the pace of the arms race between the United States and the Soviet Union, and an opportunity to halt and reverse that arms race. At present neither side is in an inferior strategic position, and thus an essential precondition exists for meaningful arms reduction negotiations. We welcome the prospect of such negotiations. To this end, the Executive Committee of the American Physical Society calls upon the Congress and the President of the United States, the corresponding authorities in the Soviet Union, and other national and international authorities with responsibilities in these matters to seriously consider the following with utmost urgency and commitment to human values:

1. Rejection of military doctrines that treat nuclear weapons as ordinary weapons of war.

2. Adoption of a policy of no first use of nuclear weapons.

3. Renunciation of the use of nuclear weapons as instruments of political power.

4. Resumption of negotiations leading to an agreement to ban further testing of nuclear weapons.

5. Continued observance of all existing arms control agreements including the provisions of the Salt II treaty.

6. To further stabilize the present situation and to provide incentive for further negotiations, to agree upon an immediate bilateral verifiable freeze on the testing, production, and deployment of nuclear weapons and their delivery systems.

7. New initiatives that would lead to the mutual withdrawal of tactical and theater nuclear weapons from Europe, and prohibition of their introduction into other areas of the world.

8. Renewed efforts to obtain mutual-phased reductions of existing stockpiles leading to eventual elimination of nuclear weapons and their delivery systems.

9. Preparation of new initiatives designed to curtail the spread of nuclear weapons. These will be credible only if the United States and the Soviet Union pursue their own program of mutual arms reductions.

In our view, a carefully considered series of measures designed to achieve nuclear disarmament is the only way to security in a world perilously threatened by nuclear holocaust. Attempts to regain a superior position through advances in weapons technologies are futile. The present stockpiles of nuclear weapons and the continual increase in their number and sophistication threatens the extinction of life on earth as we know it. Security for the United States and its allies, and for the Soviet Union and its allies, can be achieved only with the reduction in number and eventual elimination of nuclear weapons.