

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 University, Mansfield, PA 16933, 717-662-4275.

Forum on Physics and Society
Physics Department
Mansfield University
Mansfield, PA 16933

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Program in Science/Technology
for International Security
Bldg. 20A-011
MIT
Cambridge, MA 02139 (617)-253-4235

Secretary-Treasurer

Peter Zimmerman (Jan. 1984-Jan. 1986)
Dept. of Physics and Astronomy
Louisiana State University
Baton Rouge, LA 70803 (504)-388-8477/8443

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Molecular Biophysics Technology
3508 Market Street.
Philadelphia, PA 19104 (215)-386-9800

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New Haven, CT 06511 (203)-436-1582.

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University of California at Los Angeles
Los Angeles, CA 90024 (213)-825-3588.

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Department of Physics
University of California at Berkeley
Berkeley, CA 94720 (415)-642-4966.

Elected to Executive Committee

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Goddard Space Flight Center
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Cleveland, OH 44106 (216)-368-4510.

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Center for Energy and Environmental Studies
Princeton University
Princeton, NJ 08540 (609)-452-5692

Henry Kelly (Jan. 1984-Jan. 1986)
Office of Technology Assessment
Washington, DC 20510 (202)-226-3960

Editor of FORUM Newsletter

John Dowling
Physics Department
Mansfield University
Mansfield, PA 16933 (717)-662-4275.

Forum Representative to APS Committee on the Intellectual Freedom of Science

John Parmentola
Dept. of Physics & Astronomy
University of Pittsburgh
Pittsburgh, PA 15260 (412)-624-4290

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Membership free to APS members
Please write Peter Zimmerman at the above indicated address.

The Second Short Course on the Arms Race held at the Baltimore APS Meeting in March 1983 is now available in book form as part of the AIP Conference Proceedings. The Table of Contents is given below. The cost is about \$36 and is available from AIP, 335 E. 45th St., New York, NY 10017.

**AIP Conference Proceedings
No. 104**

Physics, Technology and the Nuclear Arms Race

(APS Baltimore - 1983)

Edited by - D. W. Hafemeister and D. Schroeer
American Institute of Physics

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Forum Study Reports

Leo Sartori, the guiding genius behind the Forum study groups, called a meeting of the leaders of each group and selected members of same. They all met for a two-day work session in Washington on 3-4 Dec. 1983. Each group leader reported for about two hours with questions, suggestions, and comments interspersed throughout. After all of the reports were made a general discussion followed on which direction each group should take. A report from each of the four active groups follows. These include the groups on EMP, Civil Defense, Verification, and Vulnerability. The group on Nuclear Proliferation has atrophied, perhaps to be resurrected later. It was a group consensus that the studies on EMP, Civil Defense, and Vulnerability should proceed apace. The study on Verification will probably be preempted by Tsipis/Hafemeister's work at MIT.

EMP Study by John Mattox, Ginzton Lab., Stanford CA 94305.

Under the direction of Bernard Cooper of West Virginia University, the Forum EMP study group will focus on the electromagnetic pulse created by an exo-atmospheric nuclear explosion. As gamma radiation from the explosion enters the atmosphere, it creates a radio frequency pulse over areas on the scale of a continent.

The first aspect of the study will model the pulse. This effort will lead to the production of a computer code which will give a numerical approximation of the magnitude of the pulse at any point in the earth's atmosphere. This part of the study is being directed by Charles Vittitoe of Sandia Labs in Albuquerque.

The second aspect of the study will be an investigation of the 1962 failure of a string of street lights in Honolulu when a nuclear test took place in space over Johnston Atoll, 800 miles away. The details and geometry of the string of lights will need to be determined. The circuit will be modeled numerically. The effect of a pulse predicted by the calculation of the first part of this study will be compared with what was observed in 1962. More information will be gained by analyzing similar strings of street lights which did not fail. This aspect of the study will be directed by John Mattox of Stanford University.

Forum members are invited to participate in either of the first two aspects of the EMP study. Other aspects of the EMP threat could be included in the study. An analysis of the national power grid or the telephone system could be undertaken if there is sufficient participation in the study.

Forum Civil Defense Study Group Report by John Dowling, Physics Department, Mansfield University, Mansfield, PA 16933 (717)-662-4275.

Evans Harrell and I participated in the work session for the four Forum study groups the weekend of Dec. 3-4. The whole working group decided that the CD group should concentrate on the following:

1) Review the large body of literature and gather the best sources for each important topic. This involves many people helping to sift and sort the literature. We've got a good start on this. Any volunteers out there to help?

2) Since the CD group is composed of people with opinions from very pro to very con, it was thought worthwhile to set forth the major points dealing with CD and delineate the various positions associated with each item. For example, some people in the group think that Sagan's latest on "nuclear winter" makes any study of fallout shelters an exercise in futility, others discount Sagan's work and want to promote a blast shelter program. Major points to be considered include: appropriate and cost effective blast and fallout shelters, crisis relocation, fallout monitoring and instrumentation, "nuclear winter" implications on longer-term stays in shelters, Soviet Civil Defense, adaptation of available computer codes to a micro for educational purposes, etc.

3) We would like to have a work session (briefing with FEMA people - on a official/unofficial status - or both, if possible. This would involve some of the CD people coming to Washington for a one or two day work session.

Verification Study Group. Report by Dietrich Schroeer, Dept. of Physics and Astronomy, Univ. of North Carolina, Chapel Hill, NC 27514

The following is a preliminary report on the activities of the Forum Verification Study Group. Three things happened that might have been anticipated, and perhaps been partially avoided. (i) Technical aspects of verification are a neglected area of study. There are few "public" experts, and they have written little in the open literature. The Forum Study Group, therefore, included few technical experts; astronomers seem to have come closest to expertise by their knowledge of optical photographic and electronic recording methods. (ii) Motivation is another

problem. Many study-group members are inspired by the desire to achieve some arms control. They, therefore, are interested in considering specific treaties, and how these might be verified. Hence, some group members did not contribute directly; they might have been more active if the question had been posed in the form of "How can a specific treaty be verified?" (iii) The third problem was no surprise. No one, including the chairman, could devote as much time to the study as they had hoped. This is particularly the case since the project was not well specified; since the objective was not studying something specific with well-defined literature, but rather defining what should be studied and what questions should be asked.

Basically two products have come out of the work. One is a sketch of a review of photoreconnaissance based on the contribution of a few of the group. This review indicates the state of readily accessible knowledge in one area, and what the verification possibilities are using one verification technique. The people who made technical contributions to this work are:

1. Ruth H. Howes, Dept. of Physics and Astronomy, Ball State University, Muncie, IN 47306; who wrote a paper on "Infrared Radiation and Verification of Arms Control Agreements."
2. David Hafemeister, Dept. of Physics, Cal. Polytechnic State University; presently with the Program in Science and Technology for International Security, Dept. of Physics, MIT, Cambridge, MA 02139; who produced a lot of material and verification technology, and is now involved in a verification study at MIT with Kosta Tsipis.
3. Adolph Baker, Dept. of Physics, Univ. of Lowell, home: 7 Gage Rd., Wayland, MA 01778; who sent an article he has published on analysis of optical information.

The **Forum** could try to organize studies of this sort in more depth for this verification technique and others. Such an effort may not lend itself readily to "free" work. Since there is little expertise openly available, a large amount of time would have to be committed to literature searches and writing. Study groups may not be the way to go. For the case of verification there is the additional factor that the MIT Program on Science and Technology for International Security under Kosta Tsipis and David Hafemeister is undertaking a major verification study right now. Since that project has funding, it may be difficult to get a competing study going through the **Forum**. The next paragraph will indicate how the **Forum** might nonetheless pursue the topic of verification to some extent.

The second part of this report is a suggestion based on the comments of the group members who want to verify specific treaties, and inspired by the MIT verification activity and the planned APS study of directed-energy technologies. Specifically I recommend that the **Forum** through the verification study group or through some other mechanism, consider acting as an intermediary between the APS and the MIT studies to consider the monitoring/verifying of space-related ASAT and Directed-Energy Weaponry. The APS study would specify what those weapons technologies might look like in the future. The MIT study would review the relevant detection technologies. A piggy-back study on either might with reasonable effort produce a worthwhile result for one specific technology to be monitored or verified.

Vulnerability Study Group

Does the Land-Based ICBM Have A Future? by P.D. Zimmerman, Dept. of Physics and Astronomy, Louisiana State University, Baton Rouge, LA 70803

It seems to be clear that existing force levels on both the Soviet and U.S. sides permit the Soviet Union to construct an attack scenario which, in principle, would result in the destruction of the overwhelming majority of fixed, silo-based ICBMs on the North American continent. Several schemes have been advanced to alter this situation. The most notable of these are:

- The MX missile deployed in a multiple aim-point, multiple protective shelter (racetrack) system.
- A "Densepack" system in which a large number of missiles are located close enough together that the effects of warheads attacking some degrade the performance of warheads aimed at others, thus permitting a reasonable number of missiles to survive.
- A fully mobile system of small ICBMs (SICM) obtaining its invulnerability by presenting the USSR with a constantly changing target set.

The first two of these ideas have already been discarded as impractical; the third was the principal recommendation of the Scowcroft Report issued earlier this year.

Achievable missile accuracies are sufficiently high that worst-case military planners will always be able to argue that fixed-point systems are vulnerable to attack. The technical questions arise in the evaluation of

the fluctuations about the most probable number of missiles which would survive such an onslaught. Indeed it is alleged that (depending upon the point of view of the speaker) the fluctuations will be so small that the defense cannot expect many survivors, or that the uncertainties are so great that the attacker cannot reckon with much chance of disarming his victim.

Evaluating the merits of these arguments requires a subtle analysis of (a) inherent missile accuracy and reliability; (b) the effects of fratricide including the usual dust-and-dirt mechanisms, neutron production and absorption and EMP; and (c) a consideration of different attack scenarios by which an aggressor would hope to maximize his advantage. In particular the APS/FORUM could study the question of fratricide in detail; the principal open-literature reference to the problem is that of Steinbrunner and (T.) Garwin in an old issue of *International Security* (Vol. 1, No. 1, 1976, p. 138).

Nevertheless, it seems probable that (a) at the present time the probability of an attack destroying all but a few US land-based missiles is low, (b) it is arguable whether this situation will extend indefinitely into the future and (c) worst-case planners will insist that a reasonable fraction of the force must survive any attack on US land-based missiles.

If a C³ could be constructed to service a SICM force, it is technically feasible to replace many of the present ICBMs with a mobile deterrent. Whether or not it is wise is a different question.

Land-based missiles can, at least in principle, be rendered vulnerable to pre-emptive attack so long as their possible launch and storage sites are fixed and well known. The picture changes radically when mobile missiles which can range widely are employed. It changes radically again if maneuvering re-entry bodies are used and if the intelligence cycle time is as short as thirty minutes. Finally, it seems indisputable that some form of point or terminal defense which will extract a price of one or two warheads per aim point can be constructed. Each of these points involves a large number of physical and technical questions which could be studied appropriately in the context of an APS/Forum/POPA study. Some of the points for study include:

- Hardness, vulnerability and cost of mobile missile systems; C³ systems needed to link them to the NCA.
- Performance of maneuvering warheads on ICBMs as opposed to MRBMs; yield/accuracy tradeoff; potential countermeasures to MARVs. Note that MARVs do not have to be MIRVs.

- What might the intelligence cycle time logically be; how short can it be made? Constraints imposed by computer evaluation of imaging data; problem of surveillance and tracking when surveillance is intermittent. Crossing trajectories. Consequences for both mobile ICBMs and submarines.

- Potential effectiveness of point defenses. Requirements on radars: range, hardness, appropriate frequency bands for operation in a nuclear environment.

I have not yet had a chance to examine the TTAPS paper on nuclear winter. It might be appropriate for the APS/FORUM to attempt to provide a technical review of that paper and the other similar predictions. Should our colleagues' conclusions be correct, many of the current concepts of nuclear deterrence will have to be changed, since attacks on cities, or massive attacks of any kind, may result in unacceptable damage to the attacker as well as the victim, even if a totally effective first strike were achieved.

Also representing the Vulnerability Study Group were T.P. Eubanks of JPL and Herb Nelson of NRL. Eubanks spoke on the problems associated with CEP. He discussed bias errors and the fact that what is known about the atmosphere ultimately limits what can be said about CEP. Nelson addressed the problems associated with the survivability of the Midgetman. He examined the dispersal mechanisms available for such a system and the transporter hardness for different schemes.

LETTERS TO THE EDITOR

It seems to me that the "speckle diagram" which attempts to compare World War II to the amount of nuclear explosive available is misleading. Granting for a moment that all 18,000 MT of nuclear explosive would be available, and used and not withheld or destroyed by other attacks and the like, comparing one dot for each nuclear megaton to one dot for each conventional megaton is wrong.

One ought to compare equivalent megatons, and not megatons, in order to make a direct comparison of the areas devastated. In World War II a typical high explosive shell or bomb might have contained 100 pounds of explosive, and certainly no more on average. Many more artillery shells were fired than heavy bombs dropped. To get 3 MT of explosives would then have required about 6×10^7 rounds. But each 100 pound shell has an equivalent megatonnage

of $(.05 \times 10^{-6})^{2/3} = 1.4 \times 10^{-5}$ EMT. Multiplying the two together reveals that World War II was around 800 equivalent megatons. Since the average shell/bullet/bomb used in World War II might have had even less than 100 pounds of explosive, the total equivalent megatonnage probably exceeded 1,000 EMT. Most of the potential nuclear yield is in fact contained in weapons in the general yield range of a megaton, so one probably need not attempt to calculate the nuclear fractionation. The prompt effects from a nuclear war would be worse than World War II, much worse, but the two fit on the same graph without using a semi-log plot.

Analysis should be honest rather than dramatic. A 20:1 ratio between the nuclear arsenal and World War II is impressive enough, and has the advantage of being correct. Perhaps it is a more horrifying figure, since one can visualize the number 20, and can try to imagine the scenes of Europe and Japan replicated that many times. Even if, by the way, one assumes a 500 pound average charge (certainly too large since a 500 pound bomb contained only 250 pounds of high explosive, and 500 pound bombs were the most dropped bombs in the European theater) as the average, World War II was still 480 EMT.

P.D.Z.
5 Dec 1983

Open Letter to Leo Sartori and the Forum Executive Committee concerning the Forum's Short Course on the Arms Race at the APS Meeting in April 1983.

Repeated communications with various members of your Committee have established that the Forum, without discussion in its Newsletter or at any public meeting, has adopted a firm policy of ignoring that most elementary precept of all conflict studies: "Know thine adversary".

The values of that precept are self-evident. It enables one to have a clear understanding of the adversaries' strengths and weaknesses, and thereby to counter the strengths and exploit the weaknesses.

What the Forum has chosen to do instead is to focus entirely on those aspects of the Soviet Union in which it enjoys the greatest strengths - namely, its nuclear weaponry and conventional armaments. Completely ignored, therefore, are the critical weaknesses: its economic, social, and political backwardness and instability, including periodic crises of leadership, recurring food shortages, chronic aggressiveness at

its borders and beyond, declining health standards and life expectancy, etc. What should be of particular concern to the scientific community are the following: (1) SU is now launched on a systematic campaign of abuse and misuse of psychiatry which is being vigorously opposed by the international psychiatric and medical communities. Notable among the victims are peace advocates within the SU. (2) While making no contribution at all to the epic transformations of health care and agriculture by use of new chemical agents, there is mounting evidence of use of chemical agents by the SU in warfare in Asia. (3) Social science has been openly declared to be an instrument of state policy in the SU. It has thereby effectively aborted the development of meaningful social science within its borders.

The policy of focusing on SU strengths and ignoring weaknesses has the inevitable consequence of vastly exaggerating the threat which the SU poses to us; it undercuts our self-confidence, bypasses all educational and political initiatives which might exploit Soviet weaknesses, and clearly plays into the hands of our adversaries.

The one-sidedness of the Forum's concerns is inimical to its claim that it is applying science to the problems of society. And unless that one-sidedness is soon remedied, the legitimacy of the Forum as an agency of the American Physical Society will inevitably come into question.

Lawrence Cranberg
1205 Constant Springs Dr.
Austin, TX 78746
12 Jan 1983

A Reply to Cranberg's letter by Leo Sartori, Chairperson of The Forum.

The Forum does not have a policy of "focussing on Soviet Union strengths and ignoring weaknesses." In fact, we have no policy whatever regarding the Soviet Union. We are however, deeply concerned with the nuclear arms race and with the danger of nuclear war, which threatens to destroy civilization. We, therefore, consider it important to do whatever we can, utilizing our training as physicists, to lessen that danger.

Dr. Cranberg cites three areas which he thinks should be of particular concern to the scientific community. Two of these, dealing with alleged Soviet abuses of psychiatry and of social science, seems to me inappropriate for The Forum on Physics and Society to address. The possible use of chemical/biological agents in warfare, on the other hand, is closer to our

professional competence and would make an interesting **Forum** symposium. We shall consider organizing such a symposium in the near future. We also hold contributed paper sessions from time to time, to which Dr. Cranberg, and indeed, all **Forum** members, are free to submit papers on whatever subject is deemed appropriate.

The Scientist's Obligation to Help Prevent Nuclear War, by Lawrence Cranberg, 1205 Constant Springs Dr., Austin, TX 78746

The editorial and the articles by Panofsky and Sakharov in the June 1981 issue of **Physics Today** assert a thesis which few scientists anywhere in the world would contradict: the scientific community has a responsibility to do what it can, within its competence, to stave off the terrifying threat of global nuclear war arising from the stockpiling of nuclear weapons by the Soviet Union and the U.S.

Less clear, however, is the role which scientists can play - particularly in their role as scientists, and not as mere busybodies presuming to competence on matters in which they have no more expertise than that of the non-scientist citizen.

The purpose of this letter is to propose a role which arises directly and specifically from a professional commitment to science and the scientific enterprise. The proposal which is herewith made to each and every member of the global scientific community is to carry out a careful assessment of the scientific claims of what the **Great Soviet Encyclopedia** refers to as "Scientific Communism". It is what Friedrich Engels, the center figure of the three men shown on the cover of the June number, called "Scientific Socialism", and which he vigorously propagated just a century ago.

Those who accept this invitation will find themselves launched on an intellectual adventure. Few other fields of inquiry promise comparable short-term rewards. Khrushchev, in his memoirs, reiterated with unalloyed certainty that the eventual triumph of communism had been proven "scientifically" long ago. Similar remarks have been made by every Soviet leader in a key decision-making post. Kissinger, in recent remarks, has asserted that the Soviet's principal asset is the "myth of.....inevitability" of the triumph of Communism.

Is the inevitability of the triumph of communism the "myth" which Kissinger asserts it to be, or is it the scientific truth which Engels enunciated in his twenties, and which he later asserted Marx had proven "scientifically"?

When those claims were first propounded, they were almost completely ignored by the scholarly community. Marx went to his grave in 1883 attended by a tiny handful of friends, and seemed consigned to oblivion. But a few years before his death, Engels wrote a powerful rebuttal of Marx's critics in the form of a polemic pamphlet, "Socialism: Utopian and Scientific," which seems to have marked a turning point in the fortunes of revolutionary socialism. It is no accident that Engels is the central figure on the June cover of **Physics Today** showing a parade in Red Square. The claims of communism-socialism to scientific respectability have had mounting influence and now provide the alleged justification for a number of specific claims, including the claim of "inevitable" eventual triumph over capitalism.

In view of the specifically scientific character of those claims, our obligation to examine those claims is a professional obligation which it is a dereliction of duty to shirk. If we, as scientists, are to play a distinctive professional role in the present situation, it seems obvious that there is no more important scientific task than to assess the claims to scientific standing that the triumph of socialism-communism is inevitable, by conscientious application of the tools of our trade.

And if the triumph of Communism is indeed as "inevitable" as science can show and as Engels/Marx and their successors have claimed, then let us by all means take Prof. Panofsky's advice in its strongest form and disarm unilaterally at once.

On the other hand, suppose that examination of the scientific theories and data applicable to the problem show that Kissinger was perfectly correct, that the inevitability claim is pure myth, without a scintilla of credible evidence to support it. What, one may ask, would be the effect if an open, global consensus such as scientists customarily arrive at on a host of issues, were to be reached not just on the key question of the inevitability of communism, but on the entire allegedly scientific structure of which inevitability is the capstone? And what if the consensus opinion was similar to that which we have reached on astrology or Hitler's race theories, for example? It may be too much to hope that the emperor with no clothes will be laughed off his throne, but certainly the world will have taken a giant step toward sanity, and the scientific community will have taken a giant step toward meeting professional responsibilities which have been too long overlooked.

It will probably be assumed by many that the truth will lie somewhere between the alternative we have postulated: between acceptance of the scientific claims of socialism and their utter rejection. After all, McGraw-Hill, one of the most prestigious publishers in the West of scientific and technological books, puts

out the Karl Marx Library (seven of the projected thirteen volumes have been published). And the American Association of University Professors has recently taken extraordinary measures to assure an avowed Marxist a place as Department Chairman of the political science department of a leading university. Surely, with such credentials, scientific socialism cannot be dismissed as mere myth, and Marx and Engels as mere humbugs.

Perhaps. But reliance on such authorities is no substitute for individual inquiry. At least I personally have not found such authorities acceptable. The result of my personal quest for answers is now in manuscript form: "Road to Gulag - A Century of Pseudo-Scientific Socialism". The title indicates clearly enough the character of the conclusions reached in what is perhaps the first effort to deal comprehensively from a contemporary viewpoint with the claims of Engels/Marx to scientific standing. In addition to providing a critique of scientific socialism, the book examines important biographical and historical evidence on Marx and Engels, some of it newly available. Engels is seen to be a figure whose role is carefully camouflaged by Engels himself, and continues to be hidden by his political heirs, as evidenced by the omission of an Engels biography from the **Great Soviet Encyclopedia**.

While Engels is usually represented as a learned, successful businessman disillusioned with capitalism as seen from within, he emerges rather as a high-school drop-out, then as a misfit-clerk in the family business, first deeply at odds with his successful father, then with Gottfried Ermen, his boss in the business and the redoubtable "King of the Cotton Trade". Engels was known in his mature years among his revolutionary colleagues as "General," as befits a youthful admirer of the warrior-hero Siegfried, and as a lifelong advocate of military solutions to social, economic, and political problems. Other scions of middle-class wealth who aspire to power via military leadership of proletarian armies are following closely in the steps of Friedrich Engels. The June cover of **Physics Today**, with Engels viewing a military parade on Red Square, is an eminently just representation of Engels the "Scientific" Socialist.

A thousand-word summary of "Road to Gulag - A Century of Pseudo-Scientific Socialism" will be sent to anyone who sends a stamped, self-addressed envelope to the author. A Russian translation is available on request.

UPCOMING FORUM SESSIONS

Forum Session at San Antonio

Science Education: The Federal Role. Cosponsored by the APS Committee on Education and the **Forum on Physics and Society**.

SESSION CA: MONDAY, 7:30 PM, 30 JANUARY 1984; REGENCY BALLROOM EAST, HYATT REGENCY HOTEL; J. FRANZ, PRESIDING

- | | |
|----------|--|
| 7:30 CA1 | Science Education from the Perspective of a U.S. Congressperson (Speaker to be announced.) |
| 8:06 CA2 | The Federal Role in Science Education. Laura P. Bautz, National Science Foundation, Assistant Director for Science and Engineering Education |
| 8:42 CA3 | Science and Mathematics Education: Policies of the Department. Emerson Elliott, Department of Education |
| 9:18 CA4 | From One State's Perspective: The Need for a Federal Role. Victoria Bergin, Deputy Commissioner for School Support for the State of Texas |

Forum Sessions at the March, 1984 Detroit APS Meeting

Forum Invited Session on Civil Defense. Chaired by John Dowling, Physics Department, Mansfield University, Mansfield, PA 16933.

The Forum Study on Civil Defense, Evans M. Harrell II, School of Mathematics, Georgia Tech., Atlanta, GA 30332-0160.

The U.S. Needs Civil Defense. Roger J. Sullivan, System Planning Corp., 1500 Wilson Blvd., Arlington, VA 22209.

Should We Protect Ourselves from Nuclear Weapons Effects?, Carsten M. Haaland, Oak Ridge National Lab., P.O. Box X, Oak Ridge, TN 37830.

Under the Mushroom Cloud, Mike Casper, Physics Dept., Carleton College, Northfield, MN 55057.

Scientific Communication and National Security Monday, 26 March 1984.

Bob Park of the Washington APS Office, Federal Controls Over Scientific Communication.

James R. Ferguson, U.S. Attorney's Office in Chicago (representing his own views). Scientific Freedom, National Security and the First Amendment.

The Forum is still trying to get a government speaker to address this issue.

Washington Meeting of the APS, April, 1984. The **Forum** would like to have a contributed paper session at the Washington Meeting this April. The deadline for abstracts is 3 Feb. 1984. Abstracts are to be submitted to W. W. Havens, Jr., 335 E. 45th St., New York, NY 10017. Please designate them for the Forum Contributed Paper Session.

ANNOUNCEMENTS

COMMITTEE ON THE INTERNATIONAL FREEDOM OF SCIENTISTS

The Committee on International Freedom of Scientists (CIFS) attempts to help oppressed scientists around the world. One of its activities is to form Small Committees to correspond with individual oppressed scientists to help them on a personal level.

At the present time CIFS has about 100 Small Committee members helping about 70 oppressed scientists. Except for one scientist in Poland and one in Turkey, the rest of those currently being helped are in the Soviet Union.

The Soviet situation is particularly bleak today. Almost no one gets out. Correspondence with oppressed scientists in the Soviet Union still is important for several reasons: 1) It provides a moral lift to the oppressed scientist to know that someone cares. 2) It is a means of receiving scientific and other information. 3) Soviet officials are less likely to harass some one with western contacts.

If you would be interested in participating in this work, please contact Dr. Julian Hecklen, Department of Chemistry, 152 Davey Laboratory, The Pennsylvania State University, University Park, PA 16802.

To save one soul is to create a universe.

APS Committee on Opportunities in Physics. A Report of the 7 Dec. 1983 COPS Meeting by Earl Callen, Physics Department, American University, Washington, DC 20016.

There will be an invited speaker session on Opportunities for Funding under the Small Business Innovative Research (SBIR) Programs at the March Meeting in Detroit. The session is jointly sponsored by the COPS and the Forum and is designed to help those physicists at small companies who would like to learn more about this \$400 million program. The idea for the session came from a detailed suggestion to the Committee by Michael Butler of Sandia.

Early Retirement Incentive Programs; Peter Kahn's subcommittee is compiling a bibliography which should be useful to universities interested in such programs. The subcommittee is gathering case studies and will organize a workshop to be held early in 1984.

High School Physics Teaching: In the abstract, the idea that retired physicists might want to fill their time and use their skills by aiding high school physics teachers seems a good one. The problem is that very few retired physicists have responded to our appeal. Either we haven't reached them or they are not attracted. Perhaps a more responsive group might be those in the 55-65 age category looking toward retirement, but with some free time. The need is there and it is not so much quantitative as qualitative. Physics enrollments have dropped off in the high schools even beyond the general enrollment decline. The quality of physics teaching is often poor. Aiding teachers, e.g., by doing problems with them or teaching them about new technology and exciting new science would help as much as taking classes.

As usual, COPS has a couple of personnel cases - employment complaints. These are difficult; and delicate and the committee is sensitive to the limited role it can play. But a neutral letter of inquiry from the APS can be helpful, and has been.

This will be my last report (Editor's note: we hope Earl is referring to his last COPS report). I go off the COPS committee now, after many years and at least one reincarnation. Thanks to less rancorous times and a series of fine chairmen, COPS is now secure in its mission and in its relations to the APS Council. I think the Committee performs an important service for the Society. Its role will grow. (The outgoing chairman for '82-83 is Israel Jacobs; the incoming chairman for '84 is Joseph Budnick.)

PHYSICISTS IN NEW ZEALAND ACT AGAINST NUCLEAR WAR By R.E. White, Physics Department, Univ. of Auckland, Auckland, New Zealand

The professional body representing physics in New Zealand is the N.Z. Institute of Physics (Inc.) (NZIP). Although relatively small, having only 160 members, NZIP has been active in nuclear arms and nuclear war issues recently.

At our national conference in May this year a petition calling on the New Zealand Government to urge all governments to halt the testing, production and deployment of nuclear weapons and nuclear weapons delivery systems was signed by 117 of the 212 physicists attending, including one Nobel Laureate. The NZIP sent a similar petition, signed by 90% of those who responded, to our Government last July.

A submission showing the gravity and extent of the concern in the international scientific community regarding the arms race and nuclear war was made to a special Government committee considering disarmament and arms control. This submission took the form of copies of petitions, resolutions (like the APS resolution) declarations and statements of concern and planned action from many groups.

Again in May this year three physicists at Auckland University founded a N.Z. branch of Scientists Against Nuclear Arms (SANA). We now have about 160 members with more joining every day. There are local SANA groups in most large cities and we are actively involved in many aspects of education; interaction with government; media activities; collaboration with peace groups and with other professional groups. There is a New Zealand branch of International Physicians for the Prevention of Nuclear War (IPPNW) with groups in several centres, and a recently formed Engineers for Social Responsibility (ESR) both active in Auckland. We are about to set up a joint secretariat, and pool the efforts of SANA, IPPNW and ESR here.

Groups like ours in New Zealand are rather isolated and welcome contact with similar groups in other countries. If you would like to contact us please write to: Dr. R.E. White or Dr. P.R. Wills, Physics Department, University of Auckland, Private Bag, Auckland, New Zealand.

NOTABLE QUOTES AND A SPECTATOR'S NOTES

The Department of Energy is trying to build a \$10 billion uranium enrichment plant amid a worldwide surplus of reactor fuel. For a survey of this upcoming financial and political crunch see "Uranium Enrichment: Heading for the Abyss" in *Science* **221**, (4612), 730-733 (1983).

From the May *Arms Control Today*, pg 4:

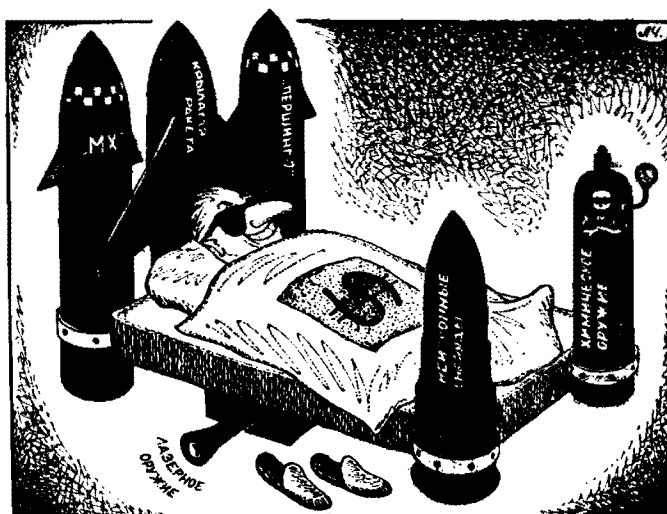
"The emergence of Soviet cruise missiles as a significant military threat illustrates the need for a comprehensive approach to arms control. In the past, U.S. strategic arms control negotiators have resisted Soviet demands for restrictions on cruise missiles because Soviet cruise technology seemed hopelessly behind the U.S. Discussions of cruise missiles in SALT were one-sided or disingenuous.

"The Soviet cruise missile program, thus, has gone forward without any significant negotiated restrictions. The most widely deployed Soviet system is now the SLCM, which poses the most vexing verification problems, and is considered a strategic system by the U.S. The result is that both sides now have something worth restricting. SLCMs will have to be taken seriously in the arms control negotiations. But it may be too late.

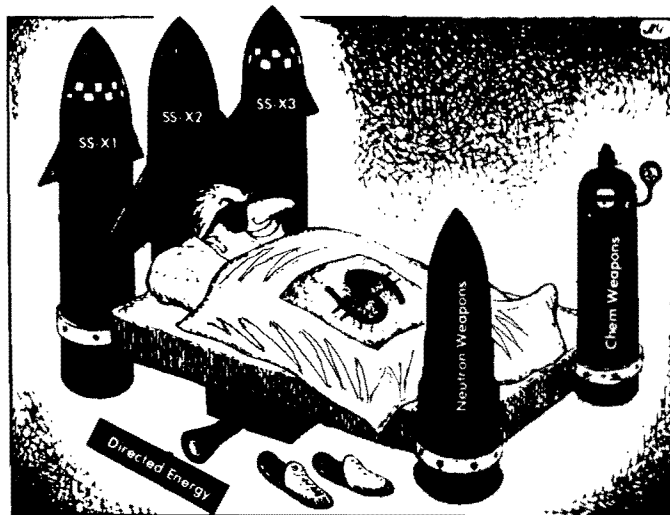
"If each superpower tries only to restrict weapons the other side has and protect its own technological leads, ignoring areas where the other side is behind, there will be no slow down in the growth of nuclear arsenals. The U.S. and the Soviet Union should stop using arms control as an area to play out the next leg of the arms race."

SPECIAL THANKS: The Forum wishes to express its thanks to Dietrich Schroer for his four years of service to the Forum as Secretary-Treasurer. Dietrich worked long and hard and well. The progress of the Forum over the last four years has been greatly aided by his dedication, skills, and generous efforts. He did an excellent job and we wish to acknowledge his contributions.

The Russian language cartoon shown below is reprinted from a *Pravda* of 11 Oct. 1983 which John Dowling picked up in Leningrad on an AAPT tour of the Soviet Union and the People's Republic of China. The missiles (proceeding clockwise from the far left) symbolize the MX, Cruise, Pershing 2, chemical weapons, and the neutron bomb. The flashlight represents directed energy weapons. The caption (forgive the poor Russian translation) goes something like this: "Only under such a cover can one sleep." We have taken the liberty of producing a U.S. version of the cartoon. Together they present a realistic picture of the status quo in the arms race.



— Только в такой кровати и можно спокойно заснуть.
Рис. Л. Чепрунова.



"Only under such a cover can one sleep."