PHYSICS PHYSICISTS and SECURITY

By ***John B. Phelps*** *and* ***Ernest C. Pollard***

FOR the last fifteen years, a great part of physical research in the United States and a high proportion of the working hours of US physicists have been related, in one way or another, to national security. During World War II the objectives of physicists and their research programs were more or less clearly defined. The overriding task then was to produce the better weapons and countermeasures which could, and did, speed the day of victory. The impressive wartime successes in applied research helped to establish physics and the other sciences as indispensable to progress in the "hardware" of war. In a broader sense, the military man, the statesman, the average citizen—and the scientist—all came, quite understandably, to associate scientific progress with greater security for our country. And in this broad association of science with security physics has probably occupied the most prominent position, whether this prominence be measured by respect, money, publicity, or security restrictions.

It is clear that physics still contributes to our security. But just how it contributes—or how it can and should contribute most effectively—has not been quite so clear for the last ten years. Many physicists have, of course, continued to work on weapons. In this area the objectives are still fairly well defined, although the sense of urgency and the team spirit which transcends administrative barriers and professional viewpoints do not always seem to be present.

Most physicists also feel strongly that progress in nonweapons research, in all the branches of pure and applied physics, also contributes fundamentally to our security. But this contribution is a hard thing to sum up in a few words. Security is a word sometimes overworked almost to the point of meaninglessness, and very hard to define in the present context of world affairs. But essentially all US physicists will go along with the view that a Soviet-Communist-dominated world would be a very unattractive place for people, including scientists, to live and work, and that such a world one or two generations hence is to be avoided, even at great cost. Any insurance against such a world is, as far as we are concerned, a useful measure of security (and perhaps even a passably good operational definition of that word).

Our purpose here is not to discuss national security nor to tell how physics can best contribute to it; yet we do need to establish some perspective. Perhaps we should add also that we are not oblivious to the inherent and unique beauty of physics and the deep, personal satisfaction that physicists may derive from it. But we are, with some regret, excluding these things from this brief article, in order to focus on the practical involvement of physics in some realities of the present. Our aim is to call attention to a few recent developments which affect the relationship of physics and physicists to our national security and to pick out some trends which we believe are of interest to most physicists, and to US scientists in general. These developments have occurred both at home and abroad, and there may be more to come. Now, a little more than a decade after the war, the prevailing concept of security through science is undergoing some perceptible, and hopefully significant, modifications. This seems to be a good time to try to sum up the essential issues and trends.

Soviet Advances

MOST of the security policies which have had so great an influence on physics and physicists originated in the years 1945 through 1947. Then, the wartime harmony with the Soviet Union was coming to a fairly abrupt end and the concept of the cold war was emerg-

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ing. Atomic energy in this country was transferred from military to civilian control and the US had a complete monopoly on nuclear weapons. Security policies were evolved—or just grew, as some prefer to put it—with the dominant aim of preventing "leaks" to the Russians that might speed up their own weapons progress. These policies restricted the flow of information by means of a classification system (information security), and sought to screen out scientists and others who might, for one reason or another, compromise secret information (personnel security).

Few can disagree with the principle of restricting weapons information. But the line between weapons and their associated technology on the one hand, and basic scientific information on the other hand, is sometimes very hard to draw. Some large areas of basic research, especially in nuclear physics, have been classified. Many physicists have argued from time to time that classification policies have retarded basic research and—sometimes a more effective point—have helped to deprive all of us of some of the practical benefits of nuclear research. Just now, the issue probably is most sharply focused on the development of thermonuclear power.

But what may have still more basic implications for our security policies is the drastically changed technological situation relative to Russia. There is abundant evidence that the Russians are "even with us" or "ahead of us" in many areas of pure and applied research, perhaps particularly in some branches of physics. The Geneva atoms-for-peace conference a year ago disclosed solid, if occasionally unspectacular, Soviet progress. Conversations with some of the US physicists who visited the USSR to attend a high-energy conference last spring are revealing and most enlightening. The Russian 10-Bev proton synchrotron is expected to be in operation in 1957. Very recently, correspondents visited the impressive Joint Nuclear Research Institute northeast of Moscow, established by the Soviet Union and the "people's democracies". In nuclear weapons, the scanty published information indicates that Soviet developments have more or less paralleled our own and the only substantial edge we probably hold now is in sheer numbers of weapons on hand. In other areas of weapons technology, jet aircraft for instance, the famous "US lead" no longer seems to exist.

Soviet scientific and technological progress is particularly impressive when one considers the relative technological positions of the US and the USSR at the end of World War II. US military planners could then look upon the Soviet Union as a technologically backward country and take comfort in a vision of US superiority extending into the foreseeable future. The early Soviet nuclear test in 1949 first jolted this complacency. We now know that successful espionage may have speeded up this test by as much as a year. But the conclusion is almost inescapable that Russian scientists have progressed faster than their colleagues in the West, in weapons research and in pure research as well. Russia is now producing great numbers of competent scientists and engineers each year, and research of all kinds is heavily subsidized by the government. One of the "advantages" of a totalitarian state is that enormous outlays for research do not have to be explained or justified to the taxpayers. The clear prospect is that, in the next few years, leadership in many fields of pure and applied research, and in many branches of physics, will pass from the US and the Western nations to the USSR.

The point is simple. Presumably, the degree of protection toward which a security system aims is in some proportion to what there is to protect. The basic premise upon which our security policies were, and essentially still are, based—that we can maintain a relative advantage by concealing progress from the Russians—is no longer sound. And security policies based on this obsolete premise will be less realistic and more and more meaningless in the years just ahead.

Another important factor which must, we believe, influence US security policies as they affect science, and perhaps physics in particular, is the occasional easing of tension across the Iron Curtain and the changing character of the cold war. We do not here speculate on whether there has been any change in the long-range aims of Communist expansion which we associate with Marx and with Stalin. But the new friendliness and the new communication between scientists on both sides of the Iron Curtain are facts for which we must make allowance.

In a very recent issue of the *Reviews of Modern Physics,* Richard F. Post reviews the challenge of controlled nuclear fusion and puts in clear perspective the multitudinous problems which must be solved. His article is stimulating and, in a way, inspiring reading for physicists; yet he is evidently obliged to omit almost all discussion of actual current research and the progress which has been achieved. Many American physicists were embarrassed by the seemingly offhand remarks on Russian approaches to controlled fusion made by I. V. Kurchatov in England last Spring. Kurchatov was fairly specific in regard to some experimental work and some preliminary results already obtained. Similar incidents may happen in the future and they will probably be to our disadvantage. If it chooses to exploit the advantage, the Soviet government is in a position to make very effective propaganda by ostentatiously publishing even limited information on scientific topics that might be classified in this country. Along the same line, Russia may be able to depict itself more and more as the true friend of the technologically underdeveloped nations in contrast to the weapon- and security-conscious United States.

Whatever we may think of the Soviet government. Russian scientists and Western scientists have a real community of interests, and a rapport which is difficult to describe but is definitely not found among professional diplomats. Communications and personal contacts between scientists of East and West can only work to our advantage, by removing misunderstanding and ignorance, and by winning friends among Russian scien-

tists who, it would appear, are fairly influential people in the Soviet hierarchy. Our security policies work against us when they impede this flow of information, ideas, and people.

We have emphasized Soviet technical progress and the changing character of the cold war because we believe that these factors must, from now on, have a decisive influence on US security policies as they affect science. We believe also that this changed situation and its significance are only now coming into really sharp focus among US scientists. And it is probably in the field of physics that the picture is clearest.

A Calmer View at Home

HERE in the United States, several developments in recent months have, we think, been evidence of some progress toward more realistic security policies. Over-all, the situation is best described as a limited but definite calming of the prevailing public attitude in this area. A change in atmosphere is quite noticeable although most of the formal policies and regulations remain unchanged. The exaggerated concern over security which probably reached a peak of publicity in 1953 and 1954—with, on the scientific side, the Oppenheimer and Condon affairs and the Fort Monmouth investigations —has declined markedly. The relative unimportance of "security" in this year's political campaign has been a very welcome contrast with former years.

This calmer outlook is manifested in a number of fairly tangible developments. A recent Supreme Court decision, in the Cole case, restricts the application of the federal employees' security program to persons holding sensitive positions, in sharp contrast to earlier policies. The Court ruling was promptly implemented by the Justice Department and bills designed to circumvent it failed to pass in the closing days of the last Congress. A long-awaited study by the Association of the Bar of the City of New York, a highly respected group, was published in book form in July. The Association recommends, among other things, a 75 percent reduction in the number of persons covered by security programs, taking the view that this would better safeguard the truly sensitive areas. A report released by a Senate subcommittee which had been studying the federal employees' security program summed up a mass of testimony spread over many months and discussed a number of suggestions for improvement. Unfortunately, the work of this subcommittee was to some extent marred by partisan political controversy.

The 12-member Commission on Government Security, equipped with a large staff and a substantial budget, is now at work on what is no doubt the most exhaustive analysis of the over-all security problem yet undertaken. It will report and make recommendations to the next session of Congress. Unofficial reports indicate that the Commission is at least considering some very fundamental revisions of our security policies. Its findings are awaited with keen interest.

Some other developments may be of particular interest to scientists. Last spring, a congressional subcommittee under the chairmanship of Representative Moss heard testimony from a large number of scientists on problems of information security. Many striking examples were presented which generally emphasized the disadvantages of tight information controls. In May, the Atomic Energy Commission instituted new personnel security regulations which formalized some procedures the AEC had previously used unofficially (such as informal interviews to resolve bits of derogatory information), reworded the clearance criteria, and took more realistic cognizance of "the confrontation problem". Most important, perhaps, the new AEC regulations give assurance that, once clearance is granted, a case cannot be reopened unless substantial new derogatory information appears or the level of sensitivity of the individual's work is significantly increased.

Last spring, a committee of the National Academy of Sciences under the chairmanship of J. A. Stratton prepared, at the Administration's request, a report on loyalty in relation to government support of unclassified research. This report recommended that research grants be awarded to competent investigators entirely on the basis of scientific merit, except when evidence of disloyalty warranted some definite action before "legally constituted authority". In August, Presidential Assistant Sherman Adams informed the Academy that government agencies will "follow practices consistent with the recommendations" of the Stratton committee. The scanty evidence which has come to our attention so far indicates that the recommendations are at least partially implemented, but it will be some months before the changes can be thoroughly assessed. Many scientists, perhaps more in biology and medicine than in physics, are watching developments closely.

The Usefulness of Physicists

WE have tried to pick out the factors which seem to us most significant in their influence on US security policies at the present time, at least as far as science and physics are concerned. Communist technical progress is making some of our long-standing axioms of security obsolete very fast. In the United States the trend is toward a calmer and more rational approach to security and there have been several concrete developments to support this view.

We believe that a great deal must be done before our security policies will be truly realistic, and as fair as possible to individuals. In this short article we cannot discuss points or policies in detail or make very specific recommendations. We have tried instead to call attention to the pertinent facts and trends. To borrow some concepts from physics, we can say that the external constraints affecting our security system are changing, or have changed, and we must realize this. Here at home, the outlook is improving and the first and sec-

ond derivatives with respect to the time seem to be positive.

Our own interest in these questions is closely tied to the work of the Scientists' Committee on Security, of which the present authors are members. The SCS is an independent volunteer group * which seeks to act as a clearinghouse for information and responsible scientific opinion on matters of personnel and information security. Our Committee answers enquiries and, upon request, sometimes offers informal suggestions to help insure that scientists with clearance problems receive the full protection of existing regulations, but it does not judge the merits of individual cases. It operates on an infinitesimal—and occasionally negative—budget, almost all of which comes from the voluntary contributions of working scientists. We regret our limitations of time and manpower but we try to use our resources as effectively as possible.

Perhaps most important at present, our Committee aims to cooperate with and to assist government agencies in establishing and maintaining realistic security programs which safeguard both the long-range security of the United States and the traditional rights of its citizens. Members have conferred informally with many government officials and have also presented formal testimony upon request. The Committee has submitted documentary material, with examples and illustrative cases, on other occasions. We make every effort to stay in touch with responsible scientific thinking on security matters. Our Committee will be grateful for the comments and suggestions of physicists who read this article (although we should make it clear that responsibility for the views expressed herein rests with the authors alone). The address is: Scientists' Committee on Security, Inc., 2153 Yale Station, New Haven, Connecticut.

As a final point, we should like to make it clear that our contacts with government officials have been, on the whole, satisfactory and our views have generally been received with appreciation. There is a marked change from the time when many physicists hesitated to express firm convictions on security questions lest their own clearances be, in some possible degree, jeopardized. We believe that scientists, as intelligent and responsible citizens, have an obligation to exert a constructive influence toward better security policies. This is especially true in those areas where their experience and perspective can be most helpful, in the technical questions of information security for instance. Perhaps also, it is especially true for physicists, because of the particular importance of their work to national security. And we believe it is especially true at the present time, when several factors seem to be making both necessary and possible a thorough, fundamental review of our security policies.

* Besides Pollard and Phelps, present SCS members are: Ralph S. Brown, Jr., Earle C. Fowler, Arthur W. Galston, Robert L. Gluckstern, Samuel A. Goudsmit, William A. Higinbotham, Franklin Hutchinson, G. Evelyn Hutchinson, William J. Knox, Henry L. Kraybill, Julian M. Sturtevant, Hugh C. Wolfe.