

Role of physicists in the 1980's

Throughout the country, there is worry about the future and expectation of change in coming years, born of dissatisfaction with economic troubles, decreasing respect for the United States abroad and anxiety as to whether or not peace can be maintained. All of this cannot leave physicists unaffected.

The new administration encourages both freedom of action and the responsibility which is inseparable from freedom. A splendid example of this from the past is The American Physical Society's unanimous report on nuclear waste disposal. It makes a great contribution to improving the chances of a vital energy source.

A different kind of example—more diffuse, more pervasive and incredibly effective—is the use of the laser. From precise measurement of the distance to the Moon, to calculation of wind velocities, to medical and industrial applications, there is hardly anything lasers cannot do. What will follow is even more.

Sound waves are hardly less useful than light, particularly when combined with the best computer techniques. Three-dimensional geologic exploration has led to increased effectiveness in finding oil. Sound waves are used to explore the functioning of a diseased heart. And sonar, coupled with newly developing computers, can pinpoint submarines in almost every part of the ocean.

Indeed, wherever ingenious applications emerge, the potential advantage to the country will be remarkable. What next? Will long-range weather prediction and climate modification begin to become realities? If so, we may lose our last safe topic of conversation.

The most important developments may come about in national defense. This probably will not mean bigger explosives. Defense against incoming missiles is more challenging, more important and more in accordance with what we wish to do. But, as in other areas, the most significant discoveries are those that cannot be predicted. Therefore, what anyone of us may suggest can merely serve as an example. Good science cannot be directed.

Those of us who remember the mid-1930s know that Britain was saved by the development of radar and even more by Turing's application of computing machinery to code breaking. This work was started in the Chamberlain era and was sparked by individual initiative, guided by the

needs of the times. Today, the problem is similar yet different. In both cases, the danger came from an ambitious tyranny. But Hitler was an adventurer while the men of the Kremlin are cool, practical and conservative. This time, success in developing defense could prevent war.

While working on one important phase of survival, missile defense, we shall of necessity be interested in space technology. Here is a striking example of the fact that there is no sharp line of division between application in peace and in war. If scientists approach their task from a technical point of view, they may use the same tools to work on preventing war as they do to explore the great adventure of understanding how the universe began.

We find more and more surprises in the center of our galaxy, in supernovae, black holes and quasars located at billions of light years. To me, these puzzles are irresistible. Astronomy is also the part of science that has the oldest and most pervasive attraction to the non-specialist. In the space age, it may be the natural gateway through which young people will enter into our wonderful and peculiar pursuits whose ultimate aim is understanding and simplicity, but whose short-range result may well be to preserve peace and save freedom.

What will be the relationship between our new government and physics? I believe that the initiative will lie with the physicists. To physicists, their profession means beauty and spontaneous dedication. Much of this dedication has been and will be directed toward the unified understanding of the big but isolated regions which have been explained or which are being explored. In addition, physicists may be more important for our nation and the world than they have ever been. If scientists had not played their remarkable role in the past, National Socialists could well be ruling the world today. If we should be unable to help in the future by exercising technical ingenuity, it may be impossible to prevent increasing poverty and despair in great portions of the world and to deter growing aggression by an old imperialism that has recently created the most terrifying military force ever known to Man.

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