

THE PHYSICS COMMUNITY AND THE WIDER WORLD

The APS centennial celebration being held in Atlanta this month celebrates both a century of the American Physical Society and a century of remarkable advances in physics. The *Physical Review*, in which many of these advances were first reported, celebrated its centenary in 1993. As part of that 1993 anniversary, APS and the American Institute of Physics published a 1266-page book, *The Physical Review: The First Hundred Years*, and an accompanying CD-ROM, which together contain over 1000 seminal papers. This collection, which provides a compendium of some of the great physics achievements of the century, could properly serve as a prelude to the APS centennial celebration because the society has been publishing the *Physical Review* since 1913, when it took the publication over from Cornell University.

One of the most important developments that has occurred during APS's century has been that the physics community has progressed from its initial focus on physics research to encompass such issues as national security, public policy, human rights, increasing diversity, and K-12 science education. This special issue of PHYSICS TODAY covers some key aspects of the physics community's widening focus. It points out how events have pushed the physics community into confronting political and social questions, and how this development was ultimately built into the structure of APS. At present, APS plays a large role in the involvement of physicists in public policy and educational issues.

On 10 May 1899, when a group of 36 physicists met at Columbia University to found the American Physical Society, its main purpose was to establish an organization that would meet in a forum to discuss groundbreaking research being done in Europe and in the US. It was an inward-looking group, dedicated to the interchange of ideas among American physicists. Even educational issues were initially outside of its domain. As Harry Lustig points out in his article, "APS and the Wider World" (which begins on page 27), the APS council adopted a policy in 1907 that "all pedagogical matters lie outside of the Physical Society," although a complete avoidance of such issues did not last long. The purpose of the society was clearly stated in the APS constitution: "The objective of the Society shall be the advancement and diffusion of the knowledge of physics." This statement has a sense of purity that appears to exclude overlap with societal issues.

The early APS involvement in political matters was rare and limited to specific issues not closely related to social issues. In 1901 the APS council recommended to Congress that a National Bureau of Standards be established, but it was unsuccessful in its 1906 effort urging the passage of a bill to require the use of the metric system in all Federal government departments. The society would barely intervene in political issues again until 1945.

Physicists, like any other group, are affected by the

events in society, and such purity could not be maintained. Lustig's article describes the evolution of APS, which reflected the changes in the outlook of the American physics community. The events of the 1930s and 1940s dramatically accelerated those changes. The scourge of fascism drove many outstanding physicists to our shores during that period, which greatly enhanced American physics and gave it a greater international flavor. With the onset of World War II, many physicists suspended their research and began contributing to the war effort. The work of those physicists contributed significantly to winning the war, and a grateful nation rewarded the physics community with unprecedented levels of support for basic research.

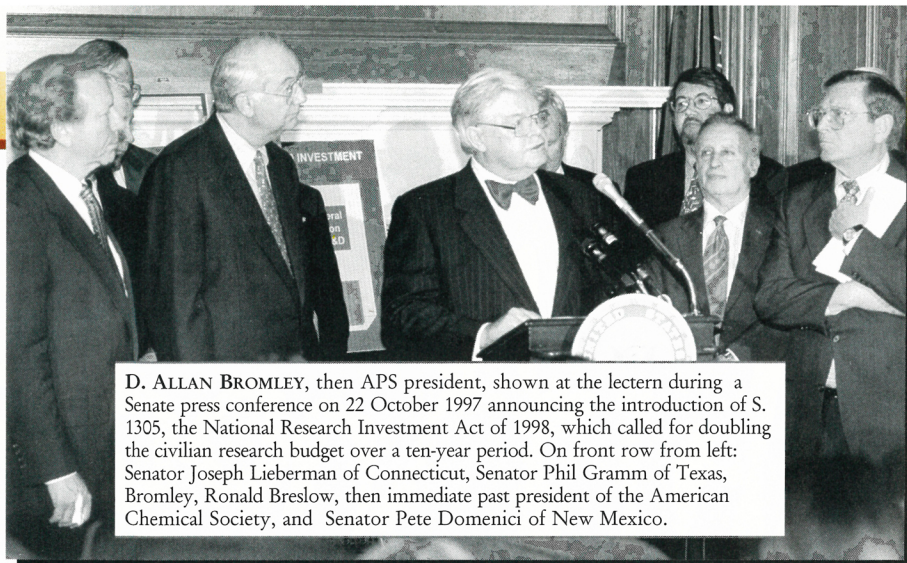
APS had always been a strong proponent of the freedom of science and of the dissemination of basic scientific research, irrespective of national boundaries. That, of course, had not been possible during the war. About a year after the end of the war, despite the reluctance of the APS council to involve itself with political or social issues, it approved a statement declaring that "the restoration of freedom of scientific research and publication as it existed before the war is an urgent national necessity." That was a beginning.

After the war many physicists became heavily involved in arms control, and some continued working on military technologies. Government leaders and the public alike viewed physicists as a group that could provide expert advice on matters of national security and on other technical issues. Prominent members of the physics community had an entrée into Washington and could get the attention of government leaders. High-level scientific advisory committees were established, and after Sputnik, President Eisenhower established the post of science adviser to the President. These developments are described in Wolfgang Panofsky's article, "Physics and Government" (which begins on page 35).

However, many in the physics community believed that another route to change public policy was to work outside of government, especially when there was a perception that government policy was wrong. The turbulence and controversy that the Vietnam War created in American society spurred the development of social activism in the American physics community. This activism intensified the trend of working outside the government to affect political change, and ultimately changed APS.

As described in Kurt Gottfried's article, "Physicists in Politics" (which begins on page 42), activists in the physics community established a number of organizations in the period after the end of World War II to influence political policy, including the *Bulletin of the Atomic Scientists*, the Federation of American Scientists and, subsequently, the Union of Concerned Scientists. While not all APS members approved of the society becoming involved in political issues, in the 1970s APS did start to provide advice to the government and the public (sometimes with government funding) through a number of studies of contentious scientific and technical issues in the public arena. Today,

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D. ALLAN BROMLEY, then APS president, shown at the lectern during a Senate press conference on 22 October 1997 announcing the introduction of S. 1305, the National Research Investment Act of 1998, which called for doubling the civilian research budget over a ten-year period. On front row from left: Senator Joseph Lieberman of Connecticut, Senator Phil Gramm of Texas, Bromley, Ronald Breslow, then immediate past president of the American Chemical Society, and Senator Pete Domenici of New Mexico.

the vast majority of APS members recognize and accept the society's responsibility to inform the public and the government about such issues.

Physicists no longer hold the unique status in Washington that they enjoyed for decades after World War II—a status that in large measure resulted from the key roles that they had played both in the MIT Radiation Laboratory and in the Manhattan Project. Their change in status reflects primarily two developments: first, other sciences have matured and become more interested and involved in science policy matters, and second, almost without exception, Federal agencies and congressional offices and committees have assembled competent scientific and technical expertise.

APS was among the first of the professional societies to recognize the critical need for a coherent, comprehensive presentation to both Congress and the administration of the case for enhanced Federal investment in fundamental science and technology. In the fall of 1994, APS expanded the operations of its Washington office, and subsequently it helped establish an unprecedented coalition of some 110 societies with more than 3.5 million members that has supported a common message concerning the importance of Federal investment in science and technology.

This message primarily emphasizes the rapidly growing interdependence of the sciences; the recently published economic studies supporting public rates of return on Federal investment in science and technology in the 40–80% range; and the substantial fraction of the growth of the US gross domestic product that can be traced directly to the implementation of new technologies. The message has had a positive impact on both Congress and the administration, as demonstrated by actions on both the fiscal 1998 and fiscal 1999 budgets.

APS and many of the other societies have begun to exploit e-mail and other modern information technologies not only to make this message available to their members but also to alert their members to pending actions in Congress and the administration relevant to Federal investment in science and technology. By such means, APS and its sister societies have stimulated substantially increased direct communication with the administration and members of Congress.

These activities are a far cry from the original purpose and objectives of the APS founders. In cognizance of the new vision of physics' relationship to society, the APS council recently revised the society's statement of purpose

to read: "In the firm belief that an understanding of the nature of the physical universe will be of benefit to all humanity, the Society's objective shall be the advancement and diffusion of the knowledge of physics."

While APS to a large degree initially avoided educational matters, individuals and groups of physicists have developed physics curricula and textbooks

throughout the 20th century. Charles Holbrow's article, "Archeology of a Bookstack: Some Major Introductory Physics Texts of the Last 150 Years" (which begins on page 50), describes some of these developments. Physicists interested in physics teaching founded the American Association of Physics Teachers in 1930 for the "advancement of the teaching of physics and the furtherance of appreciation of the role of physics in our culture." In the early 1980s, APS began expanding its educational activities and by 1987 APS had hired its first education officer. Then, in the early 1990s, APS joined with AAPT to raise \$5 million for the Campaign for Physics to support efforts to improve K–12 science education at the local level. By increasing its involvement with science teachers at the local level, the physics community, with support from AAPT, APS and other societies, is helping them train the scientifically literate citizens of the future. APS, reflecting the views of the physics community, has concluded that it also must expand its role in providing the public with the scientific information needed to participate effectively in political decisions that have scientific and technological elements.

As we stand poised on the brink of a new millennium, what can we envision for physics in the future? We have had 100 years of remarkable physics achievements and we can envision the continuation of such advances. There is no question that the intellectual questions to be answered are deep and manifold, and technology is developing so rapidly that many measurements that are almost inconceivable today will be commonplace tomorrow. There will be totally unanticipated discoveries that will expand and reshape many of our current theoretical interpretations. There will be greater international collaboration and much more interdisciplinary work, with, for example, physics making deep contributions to biology. But to flourish, the physics of the 21st century will need a hospitable environment. To foster such an environment, the physics community must continue to reach out to the public and the government with the message about the intellectual and practical benefits of science.

As we enter the next century, APS is well positioned to play an important role in transmitting this message, as well as enhancing the ability of physicists to do their work and contribute to society. APS will continue to help the physics community look outward as well as inward.

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