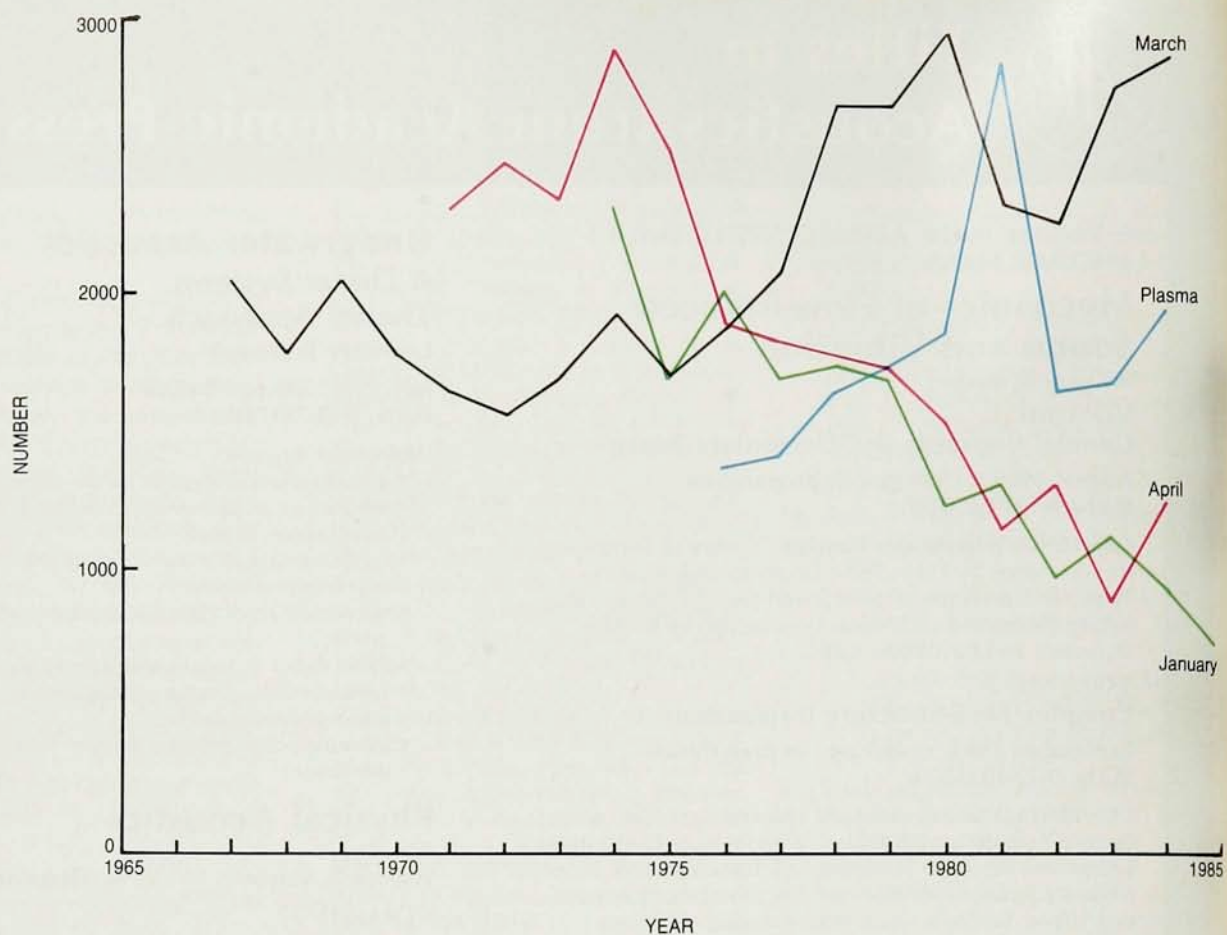
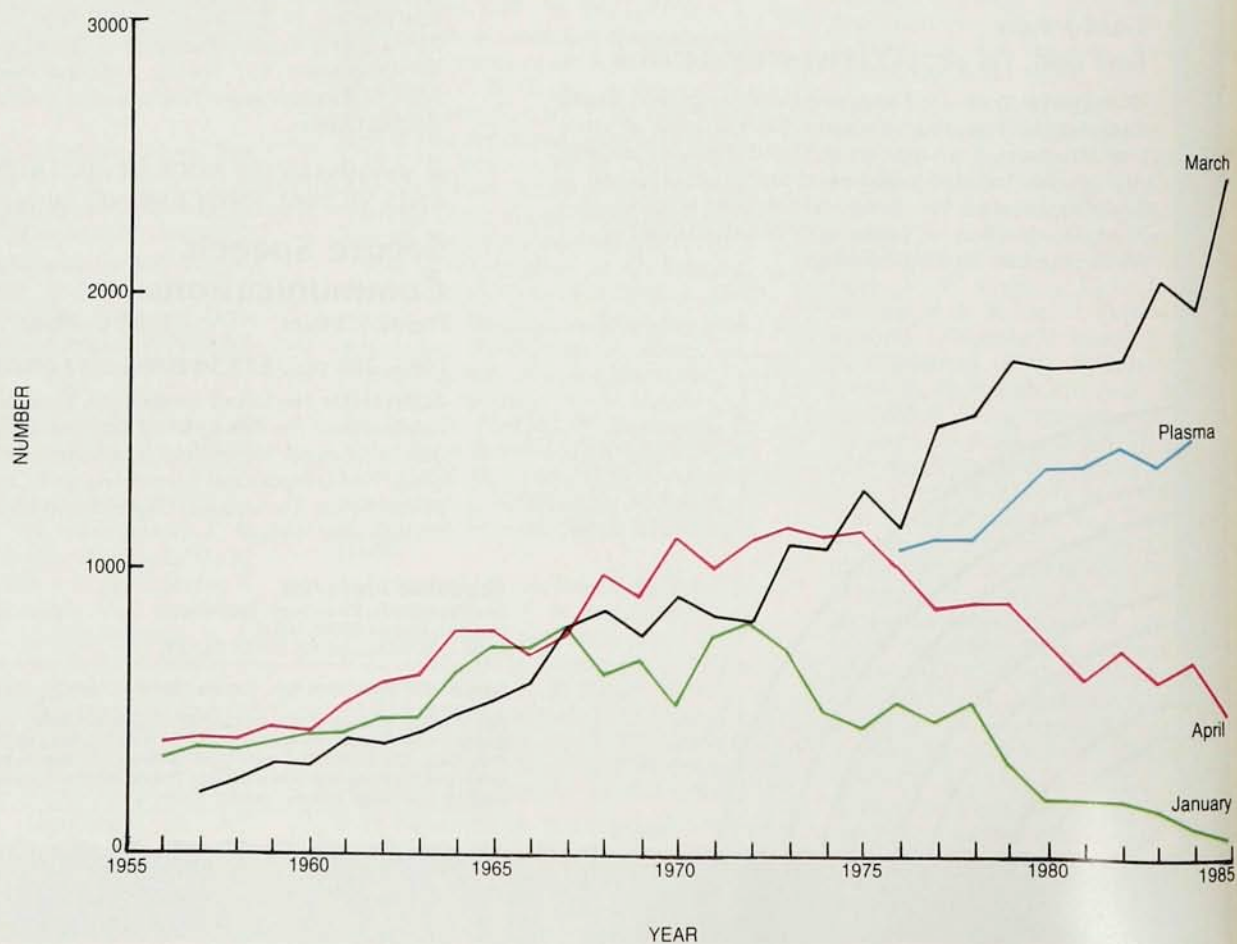




Registration at American Physical Society meetings. The above statistics on registration, together with those on contributed papers (given in the figure below), document the decline of the January and April meetings.

Papers contributed at American Physical Society meetings. An APS task force is addressing the problems that these long-term trends imply.



Perspectives on the presidency of The American Physical Society

Leading the 35 000-member organization in new directions, representing the physics community and continuing to make a personal contribution to the advance of knowledge, makes for an exciting but busy year.

Mildred S. Dresselhaus

It may seem surprising that the most frequent question I was asked during the year I served as president of The American Physical Society was "how it felt" to be president of this distinguished and venerable society. This question is perhaps not so surprising when you consider that the probability for a physicist to experience personally this challenge is only on the order of one chance in a thousand. In this article I will attempt to give one operational answer to this complex question.

I must admit that I was caught completely by surprise when the chairman of the APS nominating committee called to ask if I would run for vice-president of APS. I could hardly believe that I was a serious candidate. After consulting my family, my boss, my colleagues and a few close friends, I concluded that while I didn't have much of a chance to win the election, this would be a fine opportunity to voice some of my priorities for APS, for

physics and for physicists. My boss at MIT assured me that the most valuable contribution that MIT could make to women in science was for me to take this proposition seriously. He did not, however, take my nomination seriously enough to factor the possibility of my election into my work assignments for the coming years.

With these words of encouragement, I accepted the nomination and proceeded to prepare an upbeat, liberal platform aimed at young physicists and industrial physicists. I called for increased participation of the younger, more active physicists in the leadership of APS; I supported increased APS sponsorship of studies on technical issues of national concern; and I said APS should work to increase the scientific literacy of the general public, so that citizens can better make decisions on issues that involve the interface between science and society. My husband and close friends liked my platform, but thought it was too radical for winning the election. This assessment turned out to be wrong. I honestly believe that I won the election because of my activist platform. My opponent was a truly distinguished physicist with an excellent record of leadership in physics. I am certain that he

would have been an outstanding APS president.

Luckily, the forefathers of APS, in their wisdom, framed the organization's constitution to give the president a two-year apprenticeship prior to inauguration. For me, those two years as vice-president and president-elect were absolutely essential, because there was so much to learn about ongoing APS programs, committee activities and people who carry out the work of the society. Thus, upon election, I plunged into the work of APS with much enthusiasm and dedication. My life has not been the same since my election to the APS presidential line.

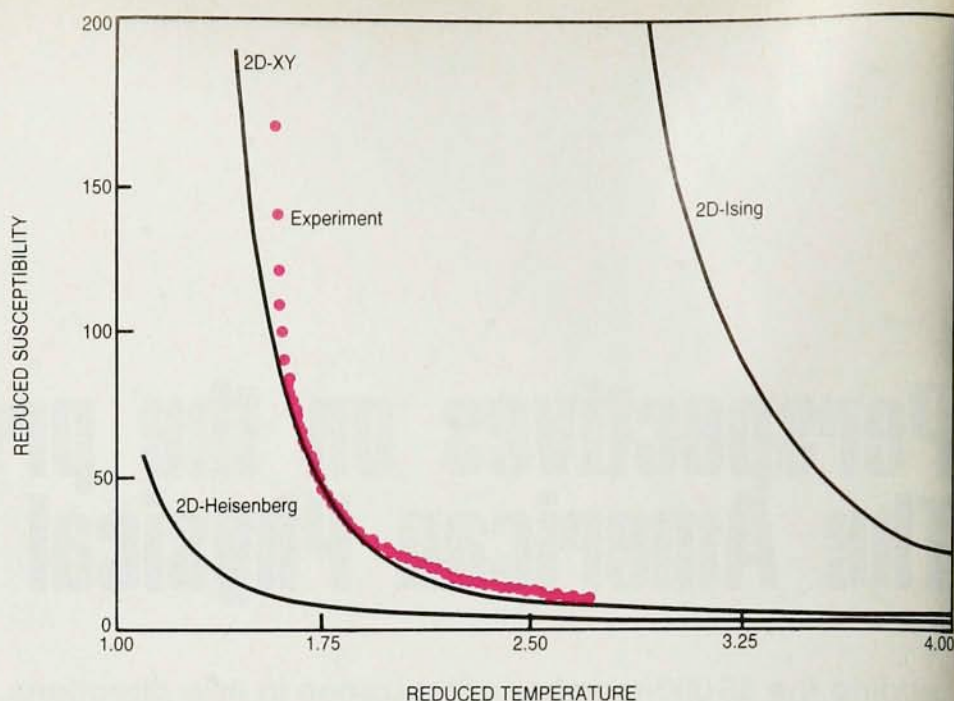
To be sure, serving the society has involved a lot of hard work, but the personal rewards have also been tremendous. First, it has been a marvelous experience to work with so many distinguished physicists and thoughtful people. But more than that, being exposed to such a wide variety of physics has been truly enriching, something like going back to graduate school.

Physics survey and briefing

I was especially fortunate to have been president during the year that the National Academy of Sciences Physics

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Magnetic susceptibility as a function of temperature, for a stage-3 CoCl_2 graphite intercalation compound. Plotted here is the in-plane susceptibility immediately above the magnetic ordering temperature. The colored curve represents experimental results, while the black curves represent high-temperature series expansions from the two-dimensional models indicated. (From reference 1.)



Survey Committee was in full operation. It has become the custom that in every decade (at least for the past two decades) there is a review to note progress in physics for the preceding decade and to identify exciting research opportunities for the coming decade. Because of my APS position, I was invited to serve as a member of the NAS Physics Survey Committee. This experience has broadened my knowledge of physics and of science policy, and has given me a deeper understanding of the relation of my own research work to the broader framework of physics.

As the survey was nearing completion, members of the survey committee felt that the year of my presidency would be an especially opportune time to conduct a physics briefing for George Keyworth, President Reagan's science adviser. Hans Frauenfelder, representing the NAS Board on Physics, and I, representing The American Physical Society, were designated co-chairmen of the Physics Briefing Committee. This undertaking, like the physics survey, was a truly rewarding scientific experience. The ground rule for the physics briefing was that we were to identify a few, select research opportunities where a small amount of additional funding could have a major scientific impact. We prepared a short briefing paper and made oral presentations to funding-agency leaders as well as to Keyworth.

I well remember from my graduate student days discussions among parti-

cle theorists, and later the advice of my PhD thesis adviser, that the most interesting and tractable problems in physics had already been solved. What remained of high intellectual content was very difficult—too difficult for people like me. Many influential people at the time, around 1956, thought that this was a good time to leave physics. History has of course shown otherwise. What we learned from the physics survey and from the physics briefing is that we are now in a very exciting era in physics, the "Golden Age of Physics." Allow me to quote directly from the 1984 physics briefing, which the National Academy of Sciences has published in full:

Recent fundamental advances in physics demonstrate that physics is still in a golden age and has never been more vigorous or more productively interactive with other fields. Progress in physics over the last decade has been remarkable. Puzzles that seemed to present insuperable challenges at the beginning of the 1970s have yielded to powerful and elegant theoretical and experimental techniques. The new insights and accomplishments have not only brought greater unity to the various branches of physics but have also strengthened the ties of physics to other areas of science and opened a vast array of new opportunities. Every part of physics has participated in the advance.

Perusing the program of the March

1985 APS meeting, actually listening to the invited and contributed papers and talking to people in the hallways, all strongly confirmed the essence of this quotation.

Overview is invaluable. After I completed my graduate studies, I worked for two years as a postdoc at Cornell and then took a permanent position in the solid-state physics division of the MIT Lincoln Laboratory. While those were very productive years, I became more and more of an expert in an increasingly narrow field. Becoming a professor at MIT and teaching solid-state physics courses, being a laboratory director at the MIT Center for Materials Science and Engineering and serving on numerous national committees, all helped broaden my appreciation of physics. However, working on the NAS Physics Survey Committee and on the physics briefing was the most broadening experience I have yet had. It has expanded my horizons in physics and increased my appreciation of the unity of physics. I am truly grateful to APS for making this possible.

My own research has been almost exclusively concerned with small science. In such fields of research, there are only a few scattered discoveries that change the course of research or unify the work of previous decades. Progress occurs in many areas in small steps that often seem disconnected. The long-term impact of a given contribution is often difficult to evaluate at the time of discovery. My experiences as APS president helped me see more



Education committee. Last year was particularly busy for the APS Committee on Education, as it focused on upgrading precollege math and science education. APS is emphasizing the goal of preparing each citizen to deal with the technological issues that confront the nation.

connections between the work of our research group at MIT and some of the major thrusts of this decade in "small science." The small patchwork pieces discovered in a multitude of small groups somehow fit together to form a large, beautiful, patchwork quilt.

Research continues

It is a tradition that APS presidents serve as volunteers and therefore continue their research work to the extent compatible with APS demands. I tried to follow this practice, and would like to give a glimpse of some of the research work of my group at MIT during 1984.

Scientific and technological breakthroughs over the last decade have stimulated increasing interest in two-dimensional phenomena. The development of MOSFET technology, for example, opened up new opportunities for quantitative studies of the physics of the two-dimensional electron gas. Advances in high-vacuum technology and computer control have made possible the fabrication of a wide variety of materials. The new technologies allow one to design structures by:

- ▶ defining atomically sharp interfaces
- ▶ constructing geometrically patterned structures at the submicron level
- ▶ depositing superlattices of semiconducting and metallic constituents as both crystalline and disordered layers
- ▶ controlling the compositional and doping profiles within superlattice structures.

The new materials technology has

opened up vast areas of new physics, such as the quantum Hall effect, the fractional quantum Hall effect and localization phenomena. At the same time, the technology has given materials scientists an abundance of "exotic" materials to use to study the relationship between structure and properties and to use to design new devices based on tailoring materials properties to achieve specific desired functions.

At the heart of two-dimensional physics are anisotropic, layered materials. Physicists were quick to recognize that intercalation—the insertion of one atomic or molecular species into the lattice of another—provides a controlled method for enhancing the anisotropy of materials and making them more two-dimensional. The study of two-dimensional physics in graphite intercalation compounds is now an active field of research, as evidenced by the four sessions devoted to these compounds at the March 1985 APS meeting. Coincidentally, during the fall of 1984, the presidents of both The American Physical Society and the Japanese Physical Society were actively working on graphite intercalation compounds.

Graphite intercalation compounds are formed by inserting layers of guest species—the intercalant—into layers of graphite—the host material. (For a more detailed discussion, see my PHYSICS TODAY article on intercalation compounds, March 1984, page 60.) Graphite intercalation compounds are metallic superlattices in the limit of very

small layer thicknesses—monolayers—and therefore studies of two-dimensional phenomena in graphite intercalation compounds strongly complement current work on metallic superlattices, though the methods for synthesizing graphite intercalation compounds are very different from those for metallic superlattices. The phenomena studied in graphite intercalation compounds fall into many fields of condensed-matter physics. Among these fields are magnetism, superconductivity, glasses and structural phase transitions.

The intercalant layers are arranged periodically between layers of the host material. This phenomenon is known as staging, and the number of graphite layers between sequential intercalant layers is known as the stage index n . In high-stage compounds the intercalant layers may be separated by large distances, and one can observe two-dimensional behavior. For a stage index of ten, for example, the separation between sequential intercalant layers can be as large as 40 Å.

Graphite intercalation compounds provide new ways to study novel two-dimensional magnetic behavior. The intercalation of magnetic species into a host material results in a magnetically ordered compound below a magnetic ordering temperature. By using the staging mechanism to vary the separation between sequential magnetic layers, one can reduce the coupling between those layers to very small values in a controlled manner, thereby achieving two-dimensional magnetic

behavior. In addition, by proper choice of intercalant, one can vary the spin dimensionality, as illustrated by the Hamiltonian for the exchange coupling (the Hamiltonian reflecting the energy of the magnetic interaction) between spins S_i and S_j on the same magnetic layer, and spins S_i and S_k on other magnetic layers.

$$H = -J \sum_{\langle i,j \rangle} \mathbf{S}_i \cdot \mathbf{S}_j + J_A \sum_{\langle i,j \rangle} S_{iz} S_{jz} + J' \sum_{\langle i,k \rangle} \mathbf{S}_i \cdot \mathbf{S}_k - J'_A \sum_{\langle i,k \rangle} S_{iz} S_{kz}$$

As the stage index n increases, the interplanar exchange coupling and the interplanar anisotropy coupling (energy due to the anisotropy of the crystal fields in the layered system) J' and J'_A become very small, so that the magnetic interactions are largely confined to a single plane and two-dimensional magnetic behavior is observed. When the anisotropy term J_A is small, the exchange coupling is essentially isotropic in spin space and a Heisenberg, or three-dimensional, spin system results. However, if the anisotropy term J_A is of comparable magnitude and of opposite sign to the exchange interaction J , then only the x and y spin components contribute to the equation, and the system is described by what is called a two-dimensional xy model, in which the spins lie in the magnetic planes. Finally, if the anisotropy term J_A is large and of the same sign as the exchange interaction J , then the z components of the spin are dominant in the equation, and the spin system is one-dimensional, being described by an Ising model in which the spins are perpendicular to the magnetic planes. Both ferromagnetic and antiferromagnetic two-dimensional Ising systems are possible. As one varies the temperature and magnetic field, one observes unusual magnetic phase transitions between the various types of spin alignments that arise in these low-dimensional systems.

Yu. S. Karimov and his coworkers in the Soviet Union did pioneering work in the field of magnetic intercala-

tion compounds in the 1970s. With the advent of improved synthesis and characterization of magnetic graphite intercalation compounds, and significant advances in the theory of 2D- xy systems, there has been renewed attention to studies of two-dimensional magnetic graphite intercalation compounds, mainly by the Suzuki group at Ochanomizu University, the Suematsu group at the University of Tsukuba, and my group at MIT. Our own most recent work^{1,2} at MIT has focused on showing that specific magnetic graphite intercalation compounds provide physical examples of 2D- xy behavior. The figure on page 38 illustrates one aspect of this work, showing that the measured magnetic susceptibility for a high-stage CoCl_2 graphite intercalation compound fits well to the 2D- xy model. The use of weak magnetic fields to establish long-range order in this system has also been of particular interest. These magnetic 2D- xy studies also have broader relevance to condensed-matter physics insofar as two-dimensional xy phenomena are also found in liquid helium, structural phase transitions and superconductivity.

Graphite intercalation compounds also exhibit unusual anisotropic superconducting properties. For example, C_8K , the stage-1 graphite intercalation compound with potassium, becomes superconducting below about 150 mK, even though neither carbon nor potassium are superconducting by themselves. Recent research has focused on ternary compounds such as KHg , KTI and KBI graphite intercalation compounds, which exhibit much higher superconducting transition temperatures and much higher anisotropies in their critical magnetic fields.

One currently controversial area in the study of superconducting graphite intercalation compounds is explaining the wide range of superconducting transition temperatures—0.8 K to 1.6 K—reported for the stage-1 KHg graphite intercalation compound, as well as explaining the anomalous pressure dependence of the superconduct-

ing transition temperature and the remarkable increase in the transition temperature upon addition of hydrogen. We have shown³ that all of these anomalous phenomena can be explained by a single model based on an increase in the density of states at the Fermi level and a simultaneous lowering of the Fermi level as mercury and hydrogen grab electrons from the other constituents of the intercalation compound. Such phenomena frequently occur in a band that is more than half filled, where a maximum in the density of states lies below the Fermi level.

Charge transfer is now an important research topic in many areas of chemistry and condensed-matter physics. For graphite intercalation compounds, a transfer of charge is required for the insertion of the intercalant between the graphite layers, but fundamental questions remain about the nature of the charge transfer, especially for intercalant materials that accept electrons. The study of ternary donor graphite intercalation compounds has made it possible to obtain new insights into the intercalation of donor and acceptor species. When donors such as alkali metals intercalate into graphite, they release electrons into the graphite layers, causing the Fermi level to rise; acceptor intercalants such as bromine grab electrons from the graphite layers, leaving holes behind and causing the Fermi level to fall. Starting with a binary donor compound such as the stage-1 potassium graphite intercalation compound, one can add hydrogen to form a ternary compound. Because of hydrogen's high electron affinity, the hydrogen atoms will grab electrons, lowering the Fermi level and decreasing the volume contained within the Fermi surface. Experimental studies⁴ have tested these concepts directly.

Graphite intercalation compounds are providing unique opportunities for the observation of unusual phases and unusual structural phase transitions. At MIT we recently focused attention on a novel phase change seen in SbCl_5 graphite intercalation compounds,



which are transformed from a commensurate crystalline phase to a glass phase at low temperatures. Such crystalline-to-glass phase transitions are normally seen at high temperatures, with the glassy phase being stable above the glass transition temperature. What is unusual about the SbCl_5 graphite intercalation compounds is that the glassy phase is present at low temperatures and is seen with transmission electron microscopy, but not with x-ray diffraction. Evidently the phase change from a commensurate crystalline phase to a glassy state is brought about by a low dose of electron irradiation in the transmission electron microscope through a radiolysis process, in which atoms are displaced from their commensurate equilibrium sites.⁵ The glassy phase is stable for long times at low temperatures. It is significant that this glassy state is achieved in an intercalation system exhibiting disproportionation, whereby the intercalate layers contain chemical species distinct from the species in the pristine intercalant material.

APS international work

While I tried to remain active in research and teaching during my year as APS president, I devoted a significant fraction of my creative energy to

providing leadership to The American Physical Society. This meant working closely with the APS Council, which is the governing body of APS, as well as with the executive secretary and the treasurer, who, as the society's long-term officers, implement the policies legislated by the Council and provide skillful, efficient and devoted administrative support for society operations. My interactions with executive secretary William Havens and treasurer Joseph Burton were frequent and intense. An electronic mail system, acquired during my administration, made communication much easier. (See *PHYSICS TODAY*, June 1984, page 81.) Because the APS president must address many issues that deal with science and public policy, I leaned heavily on L. Charles Hebel, chairman of the APS Panel on Public Affairs, and on Robert Park, director of the APS Office of Public Affairs in Washington. With publications such a vital APS activity, there were many occasions where I sought the expert guidance of editor-in-chief David Lazarus.

It was through my predecessor Robert Marshak that I got off to a running start on new programs for APS. Past-president Marshak is a great innovator whose interests as APS president focused strongly on international pro-

grams, arms control and merit evaluation of the funding of research. (See *PHYSICS TODAY*, June 1984, page 44.) Marshak has a deep understanding of the international aspects of physics research and a humanitarian instinct for collaborative research programs. One was a program that each year brings approximately ten senior Chinese scholars to the US to spend two years in leading research groups, where they are trained to assume leadership positions in China. During my administration I worked to provide a proper framework for the operation of the program under steady-state conditions.

Marshak's interest in physics in developing countries led to APS participation in the October 1984 Trieste conference of the International Union of Pure and Applied Physics. In this context I asked the APS Panel on Public Affairs Subcommittee on International Scientific Activities to consider appropriate long-term APS programs in developing countries.

During Marshak's administration, APS initiated a Latin American assistance program in which the National Science Foundation provided funds to support physics programs in five Latin American countries—Mexico, Brazil, Argentina, Chile and Venezuela. The

support is in four general areas:

- Latin American library purchases of American physics journals
- Travel and per-diem allowances for Latin American researchers visiting the United States to collaborate in American research projects
- Page-charge payments for articles by Latin American physicists in American journals
- Purchase of spare parts for laboratory equipment.

Because the Latin American assistance program was funded during my administration, I was involved with its implementation. Each of the five Latin American countries provided prioritized proposals in the four areas listed above, and an APS committee made recommendations for funding. Conceptually, this is a relatively cost-effective assistance program for physicists in developing countries. The Subcommittee on International Scientific Activities and APS's new International Physics Group are now considering further application of this form of funding.

During the previous administration, the International Physics Group was formed and grew rapidly to a membership of 4000. It was my responsibility to work out a mechanism for addressing the needs of APS in international physics and for addressing the needs of the constituency of the International Physics Group, whose members are broadly distributed around the world. During this past year, the complementary roles of the International Physics Group and the Subcommittee on International Scientific Activities have been defined operationally, and both groups have been operating effectively. Leo Falicov, chairman of the International Physics Group, and Bernd Crasemann and Venkatesh Narayanamurti, past and current chairmen of the Subcommittee on International Scientific Activities, played leading roles in pulling this activity together.

Physics is today an international enterprise, and it is becoming more so with each passing day as the speed and efficiency of information transfer accelerates and as the cost of research in some subfields reaches a scale where

international collaboration becomes essential. To develop long-range programs of international collaboration, a meeting of representatives of physical societies from around the world is planned for April 1986. This meeting will be held in conjunction with the APS meeting in Washington, and will be cosponsored by the European Physical Society, the Japanese Physical Society and the Canadian Association of Physicists. Detailed planning is now underway, with major involvement from the Subcommittee on International Scientific Activities and the International Physics Group. Topics to be discussed at the meeting include:

- Research at the frontiers of physics
- International collaboration in facilities and research
- Reciprocity of privileges for members of the various national physical societies
- The nuts and bolts of running physical societies, publications and meetings.

Last May the National Science Board asked me to offer written comments on the role of the National Science Foundation in international science. (Excerpts from these comments appear in *PHYSICS TODAY*, November 1984, page 125.) This and other requests led to a number of valuable ideas, which the Subcommittee on International Scientific Activities is now discussing and extending. A briefing paper on the subject is nearing completion.

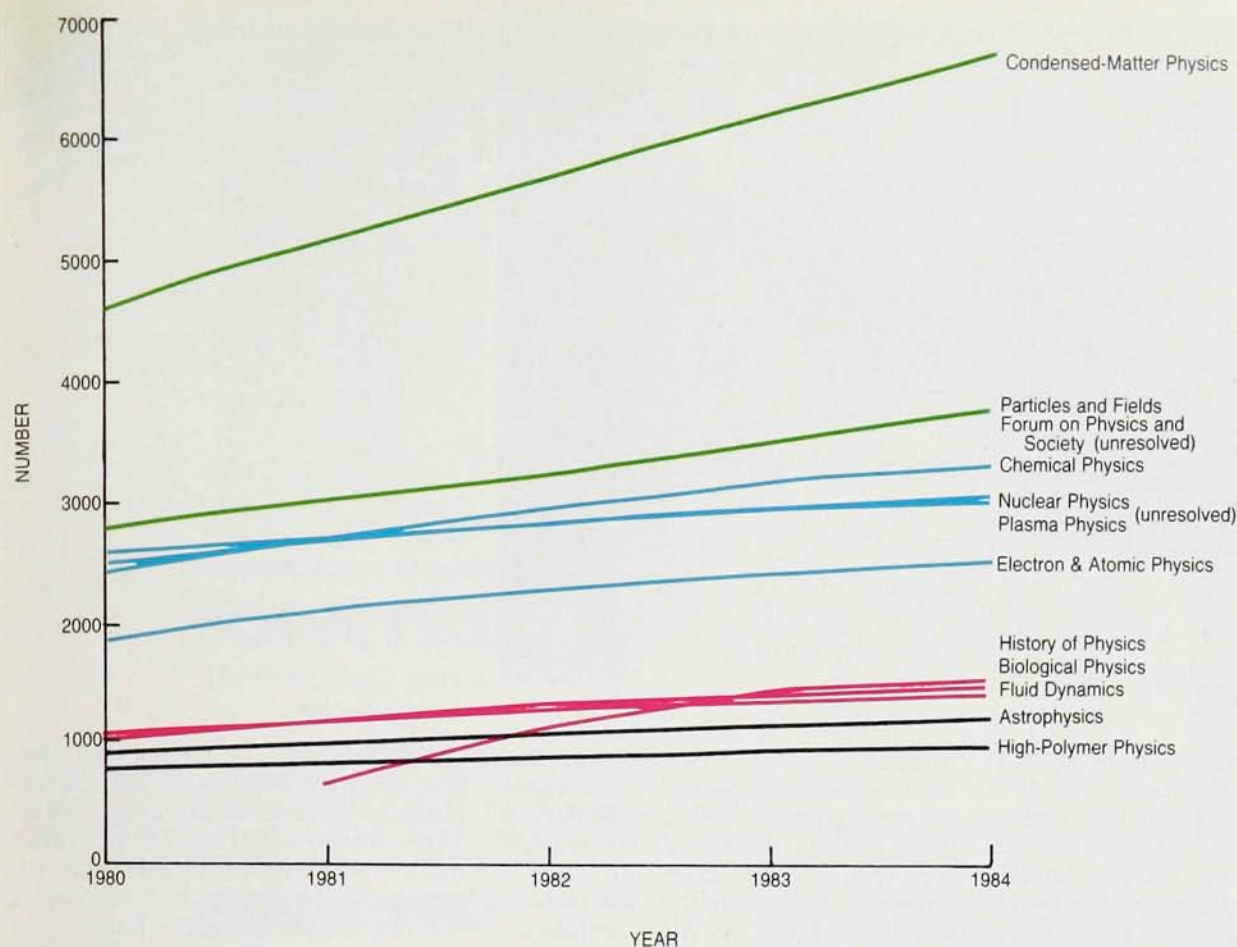
APS and nuclear issues

Marshak's interest in arms control led to the launching of an APS study on directed-energy weapons. (See *PHYSICS TODAY*, June 1984, page 53.) The decision to proceed with this study was made at the November 1983 council meeting, after months of discussion. The Council felt that the need of the physics community and the population at large for more understanding of the technical issues surrounding the Strategic Defense Initiative outweighed the sensitivities and difficulties of carrying out such a study. There is ample evidence that APS members are very interested in this topic, independent of

their political preferences. The study, under the leadership of co-chairmen Nicolaas Bloembergen and Kumar Patel, is off to a good start, and it is expected that the results will be published in *Reviews of Modern Physics*, with a popular version available for the media.

During my administration, APS was also heavily involved with a major study commissioned by the Nuclear Regulatory Commission to assess what we know about the release of radionuclides during severe nuclear accidents. The "Nuclear Source Term" study panel, under the able leadership of Richard Wilson of Harvard University, examined the issue in detail. The panel's report is now finished and will appear in a supplement to the July issue of *Reviews of Modern Physics*. (For a summary, see *PHYSICS TODAY*, May, page 67.) The main findings were presented at the April 1985 APS meeting in Washington. The APS study concludes that for many accident scenarios, the quantity of radionuclides—especially radioactive cesium and iodine—released to the atmosphere would be much lower than predicted in the 1975 Rasmussen study of reactor safety. However, the study panel concluded that for some accident sequences the release of radioactive lanthanides could be larger than predicted in the 1975 study, due to interactions between the molten reactor core and the concrete containment vessel. Because of this, the APS study panel refused to support an American Nuclear Society study panel conclusion that the maximum radioactive release would always be much less than predicted in the 1975 report. The report of the APS study panel received substantial press coverage and attracted significant public attention. Rather than emphasizing the general agreement between the APS and American Nuclear Society reports, the press has focused on the small areas of disagreement.

Merit review. During 1983 and 1984, approximately 15 institutions bypassed the normal merit-review process of proposal evaluation and obtained



Congressional authorization for academic programs valued at over \$100 million. In many cases, universities hired professional lobbyists to steer the projects away from the normal pitfalls of merit review. With the encouragement of the APS Council, both Marshak and I were aggressive in attacking end-runs on the merit-review process. We wrote strong letters to Congressmen and Senators and we alerted other groups to what was happening.

The flood of direct Congressional action emphasizes the severity of current difficulties with the funding of new facilities at universities. However, the Congressional activity has created major problems for government funding agencies, because Congress has not usually accompanied its authorizations of these new facilities with additional appropriations. The funding agencies have thus been compelled to curtail important ongoing physics research programs and to essentially eliminate new programs approved for funding by the normal merit-review process.

Scientific communication. We gave a great deal of attention during the past year to keeping open the channels of scientific communication between physicists. Under Park's dynamic leadership of the APS Office of Public Affairs in Washington, The American Physical Society has acquired a reputation for leadership in scientific communication

and national security. During 1984 we paid particular attention to enlisting the support of leaders of multinational corporations, exploiting the parallel needs of the research community and the industrial community in keeping the channels of communication open.

Communication would also be an important part of any APS contribution to the planning of large facilities for physics research. During my administration, we considered the APS role in such planning, motivated largely by the need of high-energy physicists, nuclear physicists, plasma physicists and condensed-matter physicists to remain at the cutting edge of their subfields (see *PHYSICS TODAY*'s March 1985 special issue on major facilities). Three roles for APS emerged from these discussions:

► APS could be especially helpful to the physics research community by disseminating information on specific needs for large, costly facilities, and by making known the exciting research that these facilities will make possible. APS could make this information available at meetings and through publications such as *PHYSICS TODAY* and the *Bulletin* of The American Physical Society.

► APS could facilitate discussion among researchers within the physics community as well as discussion between researchers and key members

of the funding agencies.

► APS could express concern about the future of university physics research and the training of graduate students, much of which involves research by small groups. Because most research physicists today work in small groups that do not use large, expensive facilities, and because these small groups are doing much of today's forefront research, adequate support of "small science" is of great importance to the nation.

Meetings

The organization of APS meetings continues to present problems. The incessant growth of the March meeting presents the Society with one kind of problem, while the decline of the January and April meetings presents problems of a different sort. (See the figures on page 36.) We made several changes last year to improve the quality of the meetings, and I hope that some of these will have a good long-term effect. I will discuss four of the steps that we have taken:

► To emphasize the unity of physics, meetings now feature general-interest sessions in the evenings to acquaint physicists with major advances in the various subfields of physics and to provide a forum for the discussion of current issues in science and society and in science and public policy. These



International cooperation. A luncheon for Chinese scholars in the American-Chinese program sponsored by APS and the Chinese Academy of Sciences and Ministry of Education. The Chinese scholars spend two years with research groups in the US.

general-interest sessions have already made a positive contribution to APS meetings. We look forward to further successes with this approach as we learn more about organizing and publicizing special-interest sessions to better match the interests of APS members.

► To improve the organization of the general meetings, we introduced program committees consisting of one representative from each participating division. The representatives are responsible for protecting the interests of their own divisions in the scheduling of contributed and invited papers. The growth of the March general meeting is closely linked to the increasing number of contributed papers and the growth of the various participating divisions (see the figures on pages 36 and 43). With the increasing size and complexity of this meeting, some organizational action seemed necessary. We hope that the program committee system will reduce the number of scheduling conflicts at the general meetings.

► To make it convenient for physicists with common interests to organize sessions at APS meetings and initiate other activities that stimulate interaction among physicists with common interests, in 1983 the APS Council approved the concept of topical groups. Members with a common interest can now organize themselves and apply to the APS Council for official recognition as a topical group, which can then organize sessions at meetings. Five of these groups are now in operation. I believe that the formation of topical groups was necessary to meet the needs of members who are in large divisions, interdisciplinary areas and newly emerging fields.

► To take a longer-range view of its meetings, APS set up a task force on meetings. While it is clear that APS

meetings make an important contribution to the advancement of physics—there were over 12 000 meeting participants in 1984—problems such as those highlighted by the figures on page 36 indicate that we must now address the long-range goals for APS meetings.

Physical Review and *Physical Review Letters* continue to flourish, and in many subfields have become the journals of choice for publication by physicists worldwide. In fact, major growth in these journals during the past two years is due to contributions from authors abroad. To give priority to publication of the best physics, the APS Council has reduced page charges and has taken steps to minimize the publication time delay for nonpayment of page charges. This policy is working well and therefore will be continued.

During my administration we made an effort to examine the changing demography of physicists over the past decade and the implications that the demographic changes hold for the future. As more physicists find employment in industry and in applied areas of physics, there are likely to be shifts in the interests of physicists. To address the resulting issues, APS appointed an industrial task force under the leadership of Ted McIrvine of the Xerox Corporation. The report of the task force emphasizes the underrepresentation of industrial physicists in the governance of the Society and makes a number of specific recommendations for making APS more hospitable to industrial physicists. A meeting with leaders of physics in industry is planned for 1985 to make further recommendations.

Last year was especially busy for the APS Committee on Education, as it focused on actions to be taken to upgrade precollege math and science

education. APS is giving this topic high priority because of the current national concerns in this area, because of the special importance of precollege math and science education for the training of physicists, and because of the importance of such education for preparing each citizen to deal with the increasingly complex technological issues confronting our civilization. The APS Committee on Education has for the past two years worked very effectively with other professional societies to achieve common goals in precollege education.

Now that my year as APS president has ended, it is refreshing to look back at the progress that was made. It is, however, difficult to assess at this early time the impact of the initiatives that are taking APS in new directions. Future presidents will support the best programs, and the weaker programs will die. The presidency of APS truly presents a window of opportunity. However, future generations must assess the significance of each president's accomplishments.

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