fice of Science and Technology and the National Clearinghouse on Scientific and Technical Information."

Nixon, in his campaign speeches, has emphasized the need for the country to keep pace with the Russians in the eyes of the uncommitted nations and has pointed out the scientific expertise of the US as one of the means for insuring national prestige. He has also spoken of the need for the federal government to channel funds to the states and cities to promote research aimed at curing serious national ills, such as crime, social problems, pollution. The Republican emphasis is on practical results and a hardheaded approach to expenditures. However there is no movement directed at taking the government out of the science business or even sharply reducing its role in research. (For statements by leading Republican House science committee members, see PHYSICS TODAY, December, page 69.)

Humphrey in his public speeches has often talked of the importance of scientific research to the nation and the people. "Any nation that can mobilize its scientific and managerial resources to put a man on the moon ought to be able to put a man on his feet on this good earth." "Basic research makes the deposits in our bank of knowledge from which applied research may later draw. No deposits, no withdrawals." "There is no reason why we can't prepare ourselves to meet technological changes and temper them to essentially human objectives." An administration headed by Humphrey can be expected to remain heavily involved in science.

AIP Offers New Translation, Takes On AAPT Publication

Two new publishing ventures have been taken on by the American Institute of Physics: a cover-to-cover translation of the *Ukrainian Physics Journal* and publication of *The Physics Teacher*.

The Ukrainian journal offers original papers and brief communications in experimental and theoretical physics, especially in solid state. It also covers nuclear physics, plasmas, lasers and other topics. The first issue is scheduled for mailing in October.

Hugh C. Wolfe, AIP publications director, told PHYSICS TODAY that the Ukrainian journal is so well thought of that all the 1967 issues were translated for the Atomic Energy Commission and the National Science Foundation. Copies are available from the Clearinghouse for Federal Scientific and Technical Information.

AIP publication will begin with volume 13 (1968). In its 12 Russian issues, the volume will contain about 2100 pages. Subscriptions, priced at $80 domestic and $84 foreign, are available from AIP.

At the same time, AIP will take over publication of *The Physics Teacher* for the American Association of Physics Teachers. While the association's editorial policies will remain unchanged and Clifford E. Swartz will remain editor and Lester G. Paldy assistant editor, AIP will take on copy editing, production and all arrangements with the printer.

Space Panel Urges Series Of Cheap Planetary Probes

A panel of US scientists has urged that the US send relatively small and inexpensive spacecraft to orbit Venus and Mars each time the planets are favorably placed between now and 1975. The report also recommended an instrument landing on Mars in 1973 and called attention to rare opportunities to send probes to Mercury and the major planets beyond Mars by playing gravitational billiards.

The report, released 15 Aug. by the Space Sciences Board of the National Academy of Sciences and the National Research Council, was prepared under the chairmanship of Gordon J. F. MacDonald as a sequel to a report published in 1965 after a conference at Woods Hole, Mass.

The panel noted that in the current fiscal year, planetary exploration will receive only about 2% of the nation's space budget, an amount the report calls "totally inadequate." At the same time, the total amount of money available for space is declining. The panel outlined the useful work that can be done with small, spinning spacecraft of the Pioneer and IMP classes and urges that they be sent on orbiting missions to Mars and Venus at each opportunity.

Further savings can be made, the panel said, by ending the practice of duplicate missions. Technological advances have made the chances of failure much less and space shots have become so commonplace that national prestige no longer rides on any individual mission. The panel recommended, however, that the twin Mariner missions to Mars next year go ahead as planned.

More duplication can be eliminated, the report noted, by closer coöperation with the Soviet Union. Joint planning and coördination of scientific flights would not entail the problems of meshing hardware on joint launches or raise possible security problems. The panel suggested that informal contacts between scientists could produce liaison proposals to be presented to the respective governments. Such an arrangement could reduce duplication and reduce the chance of missing a flight opportunity.

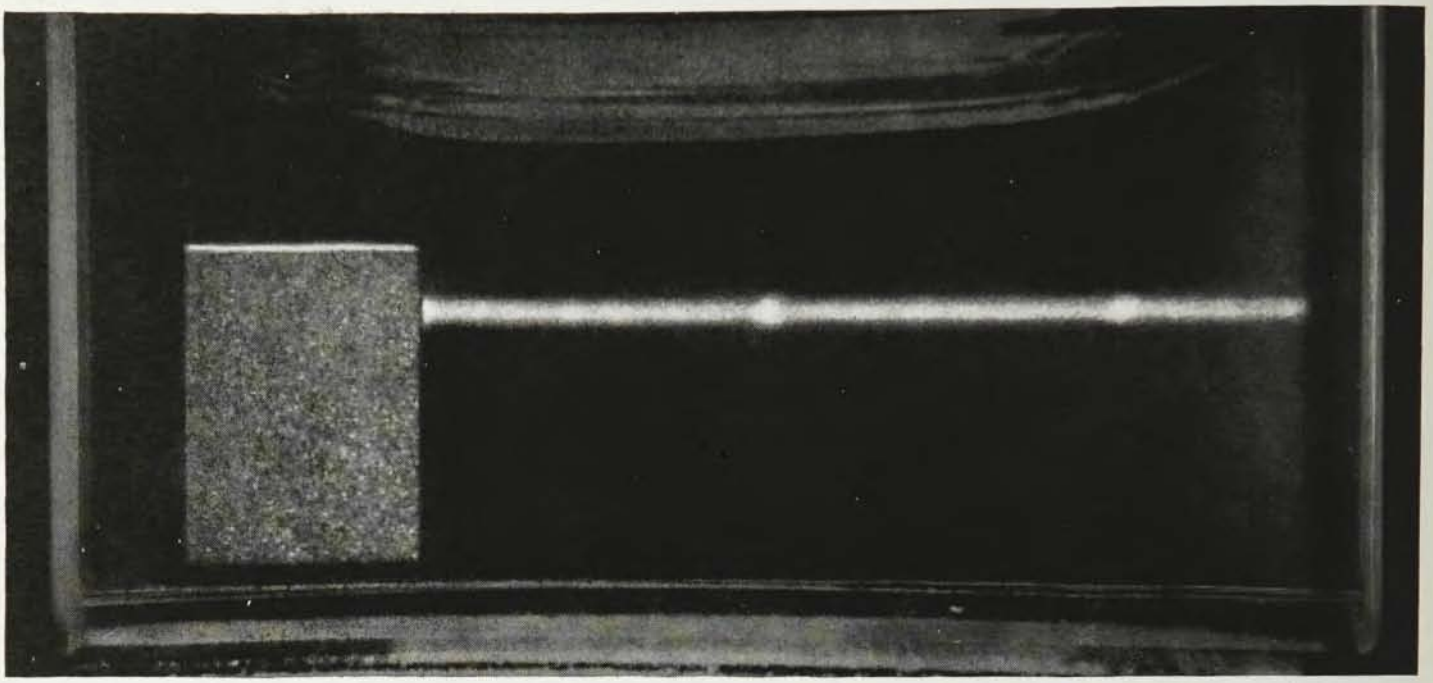
Unusual configurations of planets provide opportunities to send spacecraft much further with a booster of given size by using the gravitational force of one planet to accelerate the probe toward the next planet. In 1970, 1973 and 1975, the report noted, it will be possible to use the gravitational field of Venus to assist a spacecraft in a flight to Mercury. The Jet Propulsion Laboratory is already working to seize a once-in-a-century opportunity in 1977–78 to send a probe to Jupiter, Saturn, Uranus and Neptune without using extraordinarily powerful boosters.

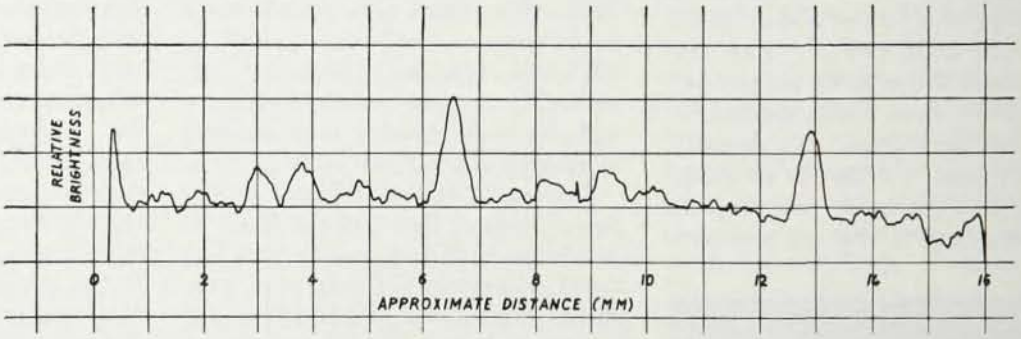
The panel also recommended that a $30-million radar-astronomy observatory be built, that another intermediate-size optical telescope be placed in the southern hemisphere and that a

Report from

BELL LABORATORIES

"Self-portrait" of a Laser Signal





The photograph above, like the first of its kind, was taken by scientists at Bell Telephone Laboratories. The three bright spots along the horizontal line are images produced by a train of laser pulses, each about 2 picoseconds (2×10^{-12} sec.) long, caught in transit through a fluorescent liquid. This technique allowed us to display and measure these light pulses, the briefest optical phenomena ever observed. In this liquid, light travels 0.4 mm in 2 picoseconds.

The curve, a densitometer tracing of the photograph, is the pulse-brightness profile. From it, we have been able to study the pulse width, the approximate number of pulses in the train, and the peak pulse power, none of which could previously be examined from measurements on a single train. The laser used here, for instance, has an instantaneous peak power of about 1×10^8 watts.

This is not high-speed photography. Rather, a stationary image is formed in the cell holding the fluorescent liquid. This fluorescent image can be easily seen by an observer. In the photograph above, the pulse train enters from the right and strikes the mirror (left) submerged in the liquid. Each pulse, returning after reflection, collides with every following pulse in turn.

This interaction of pulses produces bright spots because the liquid's fluorescence is excited by the combined energy of the colliding photons. So, because more energy is concentrated at the collision points, bright spots appear . . . with a weaker background track marking the remainder of the pulses' path. The laser pulse, in effect, takes its own portrait. The camera shutter is held open throughout.

This research was performed at Bell Laboratories by J. A. Giordmaine, P. M. Rentzepis, S. L. Shapiro, and K. W. Wecht. In a group of related experiments by Rentzepis and M. A. Duguay, using a second train of pulses moving at slightly different speed, a display of the pulses expanded by a factor of 50 has been produced. Or, by controlling the energies and wavelengths of two successive pulses—so that neither alone can excite the medium—they have been able to eliminate the background track in the photo. This makes the spots stand out more brightly.

These new techniques for the direct measurement of ultra-short light pulses will allow us to observe laser light on a picosecond time scale and obtain a better understanding of the mechanism of laser action. Ultimately, this knowledge may contribute to improved communications technology for use by the Bell System.

Bell Telephone Laboratories
Research and Development Unit of the Bell System

large infrared telescope be built, all for planetary work. The report is available from the NAS.

AAS Establishes New Divisions, Strengthens Executive Officer

The American Astronomical Society has amended its constitution and bylaws to strengthen the position of executive officer, provide for establishment of subject-oriented divisions and create a liaison officer between the divisions and the society. Paul M. Routly, executive officer of AAS for the past six years, left the post as of 1 Sept. to join the US Naval Observatory.

To deal effectively with the growing demands of the society, the executive officer is now a full voting member of the council, as is the liaison officer. Both officers are to be appointed by the council. Limited coverage of special fields at AAS meetings has prompted separate meetings by new divisions. Specifically groups of solar astronomers, researchers in the physics of the planetary system (excluding the sun) and high-energy astrophysicists voiced the need for specialized meetings. An appointed committee will govern each division and establish its bylaws, subject to review by the council and society, that will provide for a chairman, secretary and treasurer.

IPPS Revises Journals, AIP To Be North American Agent

The Institute of Physics and the Physical Society announced in August changes in the format and publishing schedule of three of its journals, to take effect early next year. The IPPS also named the American Institute of Physics as its sole North American agent for 1969.

Starting in January *Physics Education* will have more editorial pages and will include invited articles on such topics as books for schools (March), careers (May), physics teaching in schools (July), equipment and apparatus (September) and teaching aids (November).

The now annual volume *Reports of Progress in Physics* will be changed to a bimonthly journal as of February. To accommodate the growing demand for review articles, each issue will contain one or more major reviews. Subscribers will choose either six issues of the bimonthly journal immediately on publication together with binding cases twice a year or, as presently, the case-bound parts twice a year.

The *Journal of Physics B* (Atomic and Molecular) and the *Journal of Physics C* (Solid State) will be published monthly, although the *Journal of Physics A* (General) will continue as as bimonthly publication. The change stems from the increased number of papers published since the *Journal of Physics* was created in January 1968 by dividing the *Proceedings of the Physical Society*. Also in 1969 a combined subscription rate for all five parts of the *Journal of Physics* will be initiated, although the existing combined rate to the *Journal of Physics A–C* will continue.

Subscription to the IPPS house journal, the *Physics Bulletin*, will be available for the first time to nonmembers at an annual rate of £3 10s ($8.40).

AIP Fulfillment Division Installs a UNIVAC 9300

Dues and subscription-fulfillment operations at the American Institute of Physics have been improved by a UNIVAC 9300. Installed in the basement of AIP headquarters, the magnetic tape system keeps track of some 230 000 member and nonmember subscriptions in addition to memberships and dues of nine AIP member societies and affiliates.

AIP ordered the new computer and started planning the necessary software when it became apparent that the former UNIVAC 1004 card system was no longer able to keep up with the burgeoning membership and the steadily rising number of journals published by AIP. The 16 000-core memory of the UNIVAC 9300 replaced the card system's limited 1000-core memory.

The computer's efficiency stems from a shorter processing time, quick information retrieval, and updating of records that now include additional information. Preparation of the PHYSICS TODAY mailing list has been shortened from 50–60 hours to 5.5 hour. Member renewal billing has improved from 4–6 weeks to three days. A flexible coding system makes the inclusion of new journals and societies no problem although one existed with the card system's fully used code. All input is fed directly onto a Mo-