

Table 2. Proposed meeting schedule for the International Union of Solar System Physics.

International	Scientific meetings	National meetings (where appropriate)
Summer 1971	Division of Solar Physics	Fall 1970
Summer 1972	Association of Atmospheric Physics of the Solar System	Winter 1971
Summer 1973	Division of Geophysics	Spring 1971
Summer 1974	Association of Interior Physics of the Solar System	Fall 1971
Summer 1975	Division of Planetary Physics	Winter 1972
Summer 1976	Association of Surface Physics of the Solar System	Spring 1972

al activity is less essential, and also into electromagnetic theory, electronics, and laboratory plasma physics, where international collaboration, although desirable, is not mandatory. Those activities of URSI where an international approach is vital are accommodated in the proposed International Union for Solar System Physics, particularly if appropriate units have commissions on wave phenomena. An exception is galactic and extragalactic radio astronomy, which is being steadily and appropriately taken over by the International Astronomical Union. On the other hand, those activities of URSI where international activity is desirable rather than mandatory probably belong in a modified International Union of Pure and Applied Physics. If URSI did not wish to be bisected in this way, it could continue with roughly its present organization, but its operations would almost certainly shift sharply toward the engineering aspects of radio science, perhaps to an extent that would permit joint operation with the International Radio Consultative Committee. However, it would seem far more desirable to merge URSI and IUGG into a single International Union of Solar System Physics, thereby simultaneously improving the organization of international science and reducing the number of unions by one.

It should be noted that Table 1 makes no adequate provision for the detailed studies of the earth connoted by the subject of geology. It seems appropriate that the International Union of Geological Sciences should retain its traditional function. The same applies to the World Meteorological Organization.

The proposed International Union of Solar System Physics would render unnecessary several existing or proposed special or inter-union committees. In particular, the functions of both the Inter-Union Committee on Solar and Terrestrial Relationships and the Inter-Union Committee on the

Ionosphere could be taken over by the Association of Atmospheric Physics of the Solar System.

The proposed union could not take over all the activities of the Committee on Space Research, in view of the biological aspects of space science and the galactic and extragalactic aspects of observations made in space vehicles. However, a large part of COSPAR's activity is, in fact, in the field of solar system physics and, in particular, in the domains of the proposed Division of Planetary Physics and Association of Atmospheric Physics of the Solar System. The International Union of Solar System Physics would handle these matters in a way that would promote integration between vehicular and nonvehicular studies of the same phenomena.

It is believed that the proposal for merging IUGG and URSI into a single International Union of Solar System Physics (i) constitutes the reform currently needed in existing international scientific organization; (ii) indicates a pattern of development that should be studied by national academies, professional societies, and scientific journals; and (iii) draws the attention of universities to the emergence of solar system physics as an identifiable advanced educational discipline.

HENRY G. BOOKER

*Center for Radio Physics and
Space Research, Cornell
University, Ithaca, New York*

Basic Research: Capabilities of Universities and Other Research Organizations

For the United States, one can certainly pick a date during the last 50 years previous to which practically all basic research in physical science was carried out in university laboratories. However, in the last decade or so, the origin of basic research has become much more diffuse. To study the prob-

lem one has to analyze a succession of individual cases, and I should like to report some data from the chemistry of inert gas compounds.

The advent of molecules containing chemically bonded noble gas atoms has produced a discontinuity in chemical thinking. This fact, together with the lack of a requirement for a large investment in specialized equipment and the rapid development of the field, makes this example an especially interesting "model case" for inquiry into the relative contributions of university, industrial, institutional, and national laboratories to basic research. The field being less than 1 year old, the necessary data on the origin of research are readily available from journals and the proceedings of a conference recently held at the Argonne National Laboratory.

The original discovery was made in a university laboratory and was closely followed by experimental advances of major significance coming from national laboratories. Universities have contributed about 45 percent of the total research effort, and national laboratories have dominated the non-university category, accounting for 50 percent. Further interesting figures can be obtained by separating the research into experimental and theoretical contributions: the university versus industrial, institutional, and national laboratory share is 30 percent versus 70 percent for experimental work. On the other hand, universities have contributed essentially 100 percent of the theoretical effort. This suggests that universities are maintaining their traditional leadership only in the theoretical aspects of basic research.

Although I have not carried out a detailed study, it seems likely that a similar analysis of the two or three most significant recent advances in solid-state physics would show a comparable division of effort. In this and other areas one will not find 100 percent of the theory coming from university laboratories because several non-university organizations (for example, Bell Telephone Laboratories) have strong theoretical groups, but the relative degrees of participation may well be maintained. A discussion of advances in solid-state physics which is closely related to my observations has been given by A. B. Pippard [*Physics Today* **14**, 381 (1961)].

LELAND C. ALLEN

*Department of Chemistry, Princeton
University, Princeton, New Jersey*