

Niels Bohr Library at AIP Shows Faraday Memorabilia

A Michael Faraday exhibit is now on display in the Niels Bohr Library at the American Institute of Physics. The exhibit includes books read by Faraday that influenced his career; photographic copies of letters exchanged with George S. Ohm, James P. Joule, Joseph Henry, William Thomson and James C. Maxwell discussing research developments on electricity and magnetism; engravings showing his laboratory and apparatus; photocopies of pages from his scientific diary and from his lecture notes. It is open to the public and is expected to run through the end of June.

Charles Weiner, director of the Center for History and Philosophy of Physics at the AIP, compiled the exhibit at the request of the American Association for the Advancement of Science. It was arranged in cooperation with The Rockefeller University and the Royal Institution of London as part of a AAAS program commemorating the 100th anniversary of Faraday's death. During the 1967 AAAS annual meeting in New York, the display was housed at the university.

RESONANCES

The American Physical Society will send its membership a mail ballot on the proposed amendment to its constitution, the so-called "Schwartz Amendment" by 10 May. This is the first time in the history of APS that the membership will vote on an amendment proposed by the membership itself. The deadline date for return of the ballots will be marked on the ballot form and will be no later than five weeks from the date of mailing.

Although the amendment was discussed at the APS annual meeting in Chicago in January, the distribution of the ballot was scheduled for May to allow enough time for publishing letters discussing the pros and cons of the amendment in *PHYSICS TODAY*. Another delay on the mailing of the ballots was the decision by the APS council to give advance notice of the balloting dates in the first possible issue of the APS Bulletin, which was the April issue.

Only 30% of the normal number of first-year male physics graduate students will be entering graduate schools this fall, according to a survey conducted by the Scientific Manpower Commission. This drastic drop will occur if the changes in the draft rules concerning graduate deferments (*PHYSICS TODAY*, April, page 89) are implemented by all draft boards. The second-year class will have only 61% of normal male enrollment. Physics, with its high proportion of male students will be harder hit than other fields. Total first-year enrollment in all graduate disciplines will be only half of normal.

The Physicist with a Cause—An Interview with Jay Orear

As a panelist assessing the role of the American Physical Society in public issues, Jay Orear of Cornell suggested to the Chicago meeting delegates that the real question was, "Is APS doing an adequate job discussing public issues?" (*PHYSICS TODAY*, March, page 81). Orear is one of a vocal group of APS members who say no, who feel that APS stands on physics-related public issues would benefit the advancement of physics, a stated APS aim. Physicists must face a host of issues related to their work, from whether the State Department should deny invited scientists entry into the US to whether the University of California should administer weapons laboratories. The APS should face these issues, too, says Orear. He supports the so-called "Schwartz amendment," which would push the society

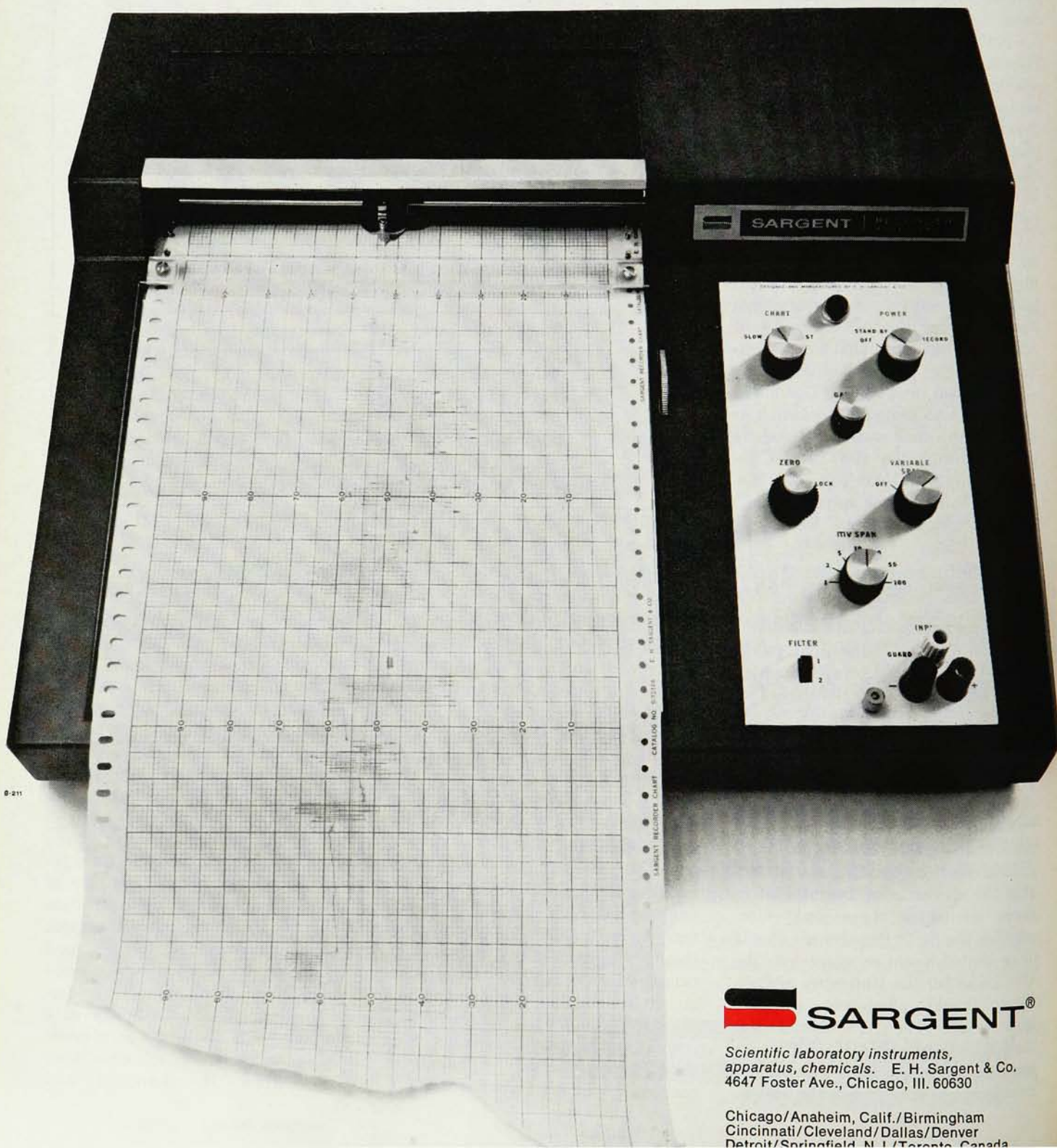
toward taking positions on "any matter of concern to the society." *PHYSICS TODAY* went to Orear and asked him about what today concerns a physicist with a cause.

As a physicist Orear is concerned with keeping physics as free as possible from outside interference and finds that more and more of his time is spent dealing with such outside influences. His concern for the undesirable effects on his university of classified research at the Cornell Aeronautical Laboratory in Buffalo, caused him to work for a policy revision through Cornell faculty initiative. The campaign succeeded and Orear went on to become the current chairman of the Federation of American Scientists, which was formed right after the first atomic-bomb explosion by concerned physicists at Los Alamos.

In this post Orear is giving new life to the federation's long-term project of ending university involvement in classified research and has helped the federation extend this crusade to the ending of university involvement in "improper" research.

Orear, still boyish-looking at 42, was trained at the University of Chicago. He earned a PhD in 1943 and after time out for Navy service gained his master's degree in 1950 and his PhD in physics in 1953 under Enrico Fermi. He stayed on a year as a research associate in the Institute of Nuclear Studies and then went to Columbia University where he spent the next four years. In 1958 he joined the faculty at Cornell as associate professor and was named full professor in 1964. He is the author of a comprehensive textbook, *Fundamental Physics*, now in its second edition. With Arthur H. Rosenfeld and

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Robert A. Schluter, he prepared a course book titled *Nuclear Physics*. This book, published in 1949 and still in print, was based on the notes the three students compiled while taking Fermi's course.

PHYSICS TODAY asked Orear:

• *What is the history of resistance to classified research projects at universities?*

"For many years, especially during the McCarthy years, this was one of the key issues of the Federation of American Scientists. We were proposing to the universities that they not sign any contracts that would restrict the open publication of research findings. It was quite common then for some of the contracts to be worded that research findings had to be submitted to some agency for approval before they could be published or even sent out as pre-prints. We were advising universities to resist signing such contracts and to request a rewording of them. I know some universities did just that. The University of California at Berkeley has a firm policy of not accepting such a wording and requesting a change in wording. This usually works. An agency will reword a contract accordingly.

"In the McCarthy days reactor physics, nuclear engineering and plasma physics were highly classified for no good reason. During the years when Lewis Strauss was chairman of the Atomic Energy Commission, basic research in the field of plasma physics remained highly classified. Strauss was very adamant about this and very reluctant to declassify fields of fairly basic physics."

• *What is being done now to keep basic research open?*

"A few years ago there was an increase in these classified projects in university laboratories, especially in the areas of chemical and biological weapons research. So the Federation of American Scientists tried to set up guidelines opposing secrecy in university research. These guidelines were mailed last August directly to the presidents of all the private universities in the country. We received replies from about 100 university presidents telling of their policy concerning classified research and of their current practices.

"It was clear from the immediate response that there is considerable



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concern on many of the campuses. We found that some universities were adopting policies opposing classified research that never had such policies before. We could be sure that there was a clear trend toward reducing the amount of classified research in the universities."

• *What about defense-related research at the universities?*

"At a recent meeting the council of the Federation of American Scientists elaborated on the previous guidelines. The statement issued goes further than classified research and discusses objectionable or improper university research whether classified or not. It speaks out against research directly involved in the design of weapons and speaks out against university involvement with government weapons laboratories. It points out the University of California as the most notable example since the University of California administers Los Alamos and Livermore weapons laboratories. So there is a specific recommendation there that the University of California dissolve that association.

"Let me cite the council's statement. 'Except in times of national emergency, the university should not be a part of the military establishment and should not directly or indirectly take part in military operations or participate in the collection of military intelligence. The university should not enter into any contract supporting research the specific purpose of



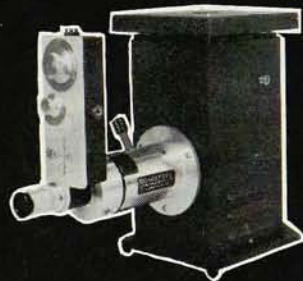
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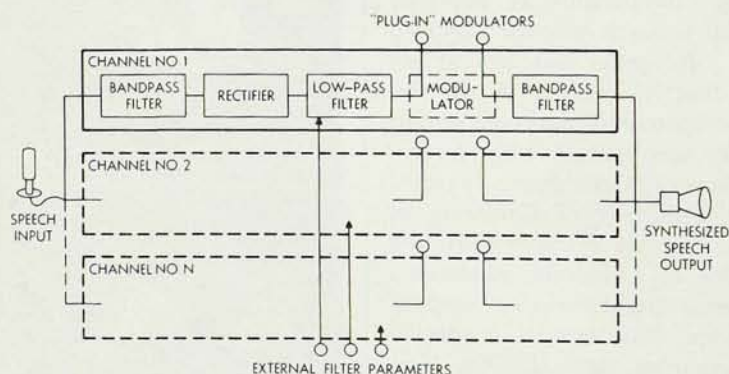
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Scientist Barry J. Karafin of Bell Laboratories checks chart recorder waveforms from a BLODIB simulation. Karafin uses the computer console at his right to interact with the simulation program. This feature was developed for the BLODIB program to give users the flexibility of making changes in such things as component values without having to re-program an entire system.



A hypothetical voice-analyzing/synthesizing system (resembling Bell Laboratories' "vocoder")... and how it might be simulated with BLODIB. The system would have a number of band-limited channels, each consisting of such blocks as BANDPASS FILTER, RECTIFIER, and LOW-PASS FILTER. Once the experimenter specifies one channel, he can call upon it, complete, as many times as necessary. Such a system analyzes a voice input into "channels" (narrow frequency bands). It then synthesizes (recombines the channels) so that the speech output can be heard on earphones or over a loudspeaker. It might be used to test relationships between channel width and intelligibility. To experiment with various MODULATORS, the user can leave "open terminals" (blank sections) in the program and "plug in" (supply sub-programs for) simulated modulators. The LOW-PASS FILTERS have externally variable parameters, such as cutoff frequencies; these parameters may be supplied by a user during simulation or by another computer program.

More and more, engineers use digital computers to simulate new electronic systems. It's often faster and cheaper than breadboarding... building an experimental system.

But simulation is most useful if the experimenter can "talk" to the computer in his own language... a block diagram symbolizing an electronic process. To translate such a diagram into a computer simulation program, scientists at Bell Telephone Laboratories designed an intermediate program or "compiler." The latest version is called BLODIB for BLOCK Diagram compiler B (pronounced "Bloody Bee"). BLODIB's output is a simulation program—in machine language.

The BLODIB user needs little programming experience. He writes a description of a block diagram and its connections in terms from the BLODIB dictionary... which contains abbreviated names for most blocks, such as AMP for amplifier. The description need not follow signal flow; BLODIB arranges it properly.

The BLODIB dictionary cannot contain a block for every possible electronic function. But many new blocks can be built up from those available. And, if one combination will be used many times in a design, it can be named and used as often as necessary.

To test prototype systems, the experimenter can leave parameters variable, or he can even arrange for their values to be supplied by another computer program for automatic simulation throughout a range of settings. Also, if he is doubtful about, say, a filter, he can simulate his system without the filter and "plug in" simulation programs for various experimental filter designs. In this way, several designs can be tested before investing in a laboratory model.

The BLODIB program has been used to simulate acoustical and visual systems and was recently used to study automatic equalization techniques for Bell System data sets.

The first block-diagram compiler, BLODI, was conceived and developed at Bell Laboratories by V. A. Vyssotsky, John Kelly, and Carol Lochbaum. B. J. Karafin recently formulated the BLODIB program which extends the original BLODI program so it can interact with non-BLODI programs and provide the flexibility described above. This makes it an even more powerful tool for probing potential systems over a broad range of operating conditions.



Bell Telephone Laboratories
Research and Development Unit of the Bell System

which is the development of weapons or devices designed to destroy human life or to incapacitate human beings, nor should it provide administrative services for government weapons laboratories. . . . Not only does secrecy in research run counter to the values and basic function of a university, but so does secrecy or misrepresentation in the support of research even if the research itself be nonsecret."

• *There is dissatisfaction with AEC restrictions on who can visit and use the high-energy physics facilities it supports. What is being done about that?*

"For over ten years the Federation of American Scientists has been fighting this. It has become a more relevant issue now because of the new national accelerator laboratory and the 200-GeV machine. At its last meeting the council also issued a policy statement on this subject. It said, 'Basic research in high-energy physics has no direct military value and thus for many years has been nonsecret and freely published in the open literature. Although our high-energy physicists who use accelerators funded by the AEC can report their results freely, they are not free to invite some of their foreign colleagues to their laboratories without prior approval from the AEC. . . . Such approval normally takes several weeks and in some cases is never granted.' The last Brookhaven users' meeting unanimously passed a motion asking for a change in policy.

"I wrote the president of the APS division of particles and fields, Wolfgang Panofsky, about the division proposing such a policy statement. I think the executive committee of the division of particles and fields drafted a statement, but I do not know whether they have decided to support such a statement or to present it formally to the APS council.

"There is a new State Department restriction on giving visas to Soviet bloc scientists. It specifically applies to any Soviet bloc scientist who would have been covered by exchange agreements between the Soviet atomic energy commission and ours. This is because the Russians have refused to renew that agreement, and the State Department is doing this as a lever to try to get them to renew the agreement. It looks like the Russians are not going to renew it. They

have indicated that they now want to work along direct person-to-person lines, the same way West Europeans come to the United States. This is what we scientists have been wanting to happen for the past 20 years. Now that the Russians indicate that they would like to operate like West Europeans we should be encouraging them, rather than refusing to give them visas."

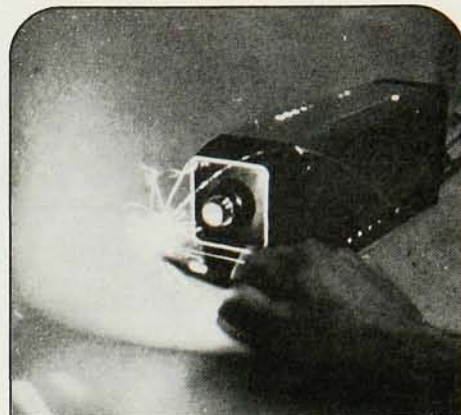
• *Do you know of any case where this restriction has caused a problem?*

"A Soviet exchange scientist was to come to Cornell last fall. His trip was approved by the National Academy of Sciences and the Soviet academy of sciences. At the last minute the State Department would not give a visa. We did a number of things. Some of our people went to Washington to plead with the AEC. Finally we convinced the AEC and the State Department that this had nothing to do with the Russian or American atomic energy commissions. He was a theoretician. He was not going to use the Brookhaven or Stanford accelerators, or even the Cornell accelerator, which has none of these restrictions; the National Science Foundation is more enlightened than the AEC. He arrived the day before Christmas, over three months late. For once it was not his own government's fault. It was completely our government's fault.

"I think the American Physical Society should advise the government that this sort of thing is detrimental to physics and to the advancement of physics. The purpose of the APS is to support the advancement of physics. Here is a repressive government policy that is detrimental to the advancement of physics. It is just one of many public issues that the APS legitimately could take a stand on."

• *So you think the APS should take public stands. Is the Schwartz amendment, then, a step in the right direction?*

"I think of this, in analogy to another part of the APS constitution, as a democratic safeguard. There is the democratic safeguard in the constitution that 1% of the membership can directly nominate a candidate. This protects against the officers becoming a self-perpetuating clique. The Schwartz amendment is a quite similar safeguard, not concerning candidates but concerning policy decisions, concerning the positions the APS can take or has taken. Some of



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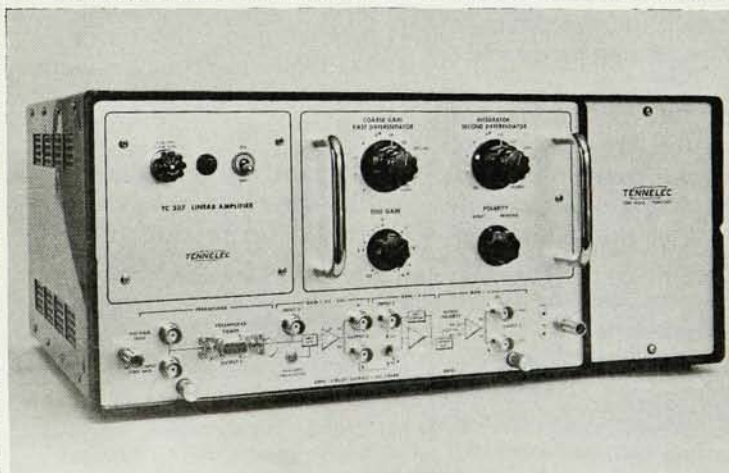
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us know that the APS has taken policy positions and has the right to do so, but it usually is the council of the APS in its own name which has taken these policy positions. Conceivably, the majority of the membership could object to an action of the council. The Schwartz amendment gives a mechanism for at least finding the opinion of the entire membership on a policy matter. If the membership feels the council is somewhat negligent in taking a position on a very important or crucial public issue that they could be taking a position on, the Schwartz amendment is a mechanism to bring such a thing to a vote.

"Now one would worry and feel that there should be some limiting safeguard because you don't want everything under the sun being brought to a vote. Such a safeguard is the wording that it must be a 'matter of concern to the society.' The legal adviser of the APS interprets that wording as requiring that the resolution to be voted on must be consistent with the purpose and the constitution of the society. If 1% of the membership proposed a resolution outright condemning the Vietnam war, the APS council would have to rule that out of order as inconsistent with the purpose of the society. I consider that a quite adequate safeguard; so I think the Schwartz amendment is a useful one that would make the APS more democratic." —JJ

Gordon Conferences to Offer 72 Sessions at Seven Places

The annual Gordon Research Conferences, established to stimulate research in universities, foundations and industrial laboratories, will be held in New Hampshire and Washington this year. The 72 sessions in many scientific disciplines are split up between six New Hampshire schools and the Crystal Inn, Crystal Mountain, Wash. The eastern sessions run from 10 June to 30 Aug., and the western conferences run from 24 June to 23 Aug.

The conferences, which are highly informal in nature, mix scheduled speakers with discussion groups and try to foster a free and meaningful exchange of ideas. The content of the talks and discussions stresses the latest developments and suggestions for progress, rather than reviews of

known information. To promote free exchanges of thoughts, the conferences are not the source of any published proceedings, and the participants agree to use no information gathered there without the specific authorization of the person making the contribution.

Admission to the conferences is by application, available from the office of the director, W. George Parks, University of Rhode Island, Kingston, R. I. Applications should be received two months in advance of the conference date.

Some of the more interesting physics-related conferences are "Particle-Solid Interactions" (15–19 July), "Solid-State Studies in Ceramics" (29 July–2 Aug.), "Chemistry and Physics of Solids" (12–16 Aug.), "Nonlinear Optical Effects" (26–30 Aug.), all at Kimball Union Academy, Meriden, N. H.; "Plasma Physics" (1–5 July), "Nuclear Structure Physics" (29 July–2 Aug.), "Thin Films" (19–23 Aug.), at Tilton School, Tilton, N. H.; "Dynamics of Molecular Collisions" (17–21 June), Proctor Academy, Andover, N. H.; "Chemistry and Physics of Isotopes" (24–28 June), Holderness School, Holderness, N. H.; and "Quantum Solids and Fluids" (22–26 July), Crystal Inn.

CCP Panel Seeks to Improve Teaching at Two-Year Colleges

A special panel on physics in two-year colleges has been set up by the Commission of College Physics. The improvement of physics teaching at the junior college is the task of the panel. In fulfilling this aim, the panel plans to help develop physics courses for the student in vocational and technical studies.

The chairman of the newly-formed group is Peggy Dixon of Montgomery Junior College, Takoma Park, Md. The panel consists of a number of other junior-college physics teachers, as well as a representative of the commission, Philip DiLavore, and a representative of the American Institute of Physics, Arnold A. Strassenburg.

The first project of the panel is gathering together a list of the physics teachers at such institutions and identifying the problems peculiar to the two-year college. Interested physics teachers are invited to contact the commission, 4321 Hartwick Road, College Park, Md. □

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