Increased Outlay for Atom Smashers Asked

Following are excerpts from a report released 16 May entitled "A Proposed Federal Program in Support of High Energy Accelerator Physics" which was prepared by a special panel appointed by the President's Science Advisory Committee and the General Advisory Committee to the Atomic Energy Commission.

There is now need to review the high energy accelerator program and needs at the Presidential level. This stems from: (a) the extraordinarily high cost of the construction and utilization of high energy accelerators; (b) the fact that all support in this scientific area comes from the Federal Government; (c) the interest of a number of Government agencies in the science and technology associated with both the construction and the experimental results; and (d) the desire to have an orderly national program taking full account of the activities abroad.

A number of groups within the Federal Government have studied this problem. The most detailed examinations have been made by the Advisory Panel on High Energy Accelerators of the National Science Foundation. Other advisory groups which have also been concerned with this general area are the President's Science Advisory Committee, the General Advisory Committee to the Atomic Energy Commission, and the Defense Science Board of the Department of Defense. There is general agreement on the recommendations contained herein among the several groups listed above.

The United States has 15 high energy accelerators in operation with energies above 200 MEV [million electron volts]; four of these have energies in excess of 1 BEV [billion electron volts] and are capable of producing "strange particles." The highest energy particles now available are 6.2 BEV protons and 1.2 BEV electrons. Four additional accelerators are under construction by the Atomic Energy Commission; a 6 BEV electron synchrotron at Cambridge, Massachusetts (Harvard–MIT); a 25–30 BEV proton synchrotron at the Brookhaven National Laboratory; a 12.5 BEV proton synchrotron at the Argonne National Laboratory; and a 3 BEV proton synchrotron at Princeton University that will greatly increase the intensity available at that energy. The Argonne and Brookhaven accelerators will be capable of producing all known types of particles.

Needs Reviewed

The Committee has carefully reviewed the present high energy accelerator program in the light of the above factors and finds that the future United States requirements fall into four major categories.

(i) It is necessary to continue and to expand the support of presently operating accelerators to assure maximum exploitation. This requires continuous updating of facilities, expansion of research space, and the support of major efforts aimed at the augmentation of existing techniques for beam analysis, particle detection and data reduction and analysis.

(ii) It is necesssary that the accelerators now under construction be finished without undue delay and that adequate funds be provided to equip and operate them. It is necessary to give particular attention to providing early support to plans for initial experimental facilities in order that these facilities be efficient, flexible, and available once an accelerator is operating.

It is clear that the Federal Government is committed to provide adequate support to those accelerators which are now in operation or under construction in order to fully exploit the capabilities of the instruments. Thus, regardless of decisions which may be made with respect to the construction of additional accelerators, high energy accelerator physics can be expected to be costing the Government about $75–$80 million annually by 1963. This figure must be considered as a base cost upon which any future forward steps must be built. The projected costs [shown in the accompanying table] have been jointly developed by the Atomic Energy Commission, Department of Defense and National Science Foundation and reflect the present degree of diversity of support.

(iii) There is a clear need for the construction and operation of additional accelerators both to increase the energy and intensity parameters and to increase the U.S. capacity for experimentation in this field.

There does not now appear to be a clear need for extension of the energy parameter for *protons* beyond the 30 BEV now in sight at the Brookhaven National Laboratory and CERN [the European center in Geneva, Switzerland]. There is an immediate need for a moderately high intensity *electron* accelerator in the energy region of 10–15 BEV. There is also a need for a high intensity *proton* accelerator at an energy of 8 BEV or above. Accelerators to meet these needs will cost approximately $15–$20 million each per year to build and operate. Thus, these two needs can be expected to increase the costs of high energy accelerator physics from $75–$80 million to about $120 million per year in the course of the next five years.

The faculties and students of the nation's universities have increased access to high energy accelerators. The additional accelerators need not necessarily be unique or extreme in their energy or intensity characteristics in order to fully justify their construction at a site where they may exploit the unique capabilities of a single university or group of institutions. It is our best judgment that by fiscal year 1963 an additional $15 million per year will be required to meet these needs, thus raising the total cost of high energy accelerator physics to between $120 and $135 million per year by 1963.

Annual high-energy physics support (in thousands of dollars) by various government agencies based on existing or authorized accelerators.

Fiscal year	Atomic energy commission		Office of Naval Research	Air Force Office of Scientific Research	National Science Foundation	Total
	Operation	Construction				
1946			3,900			3,900
1947		500	4,000			4,500
1948	3,400	600	2,400			6,400
1949	4,800	1,600	2,200			8,600
1950	3,400	7,500	1,600			12,500
1951	5,900	4,100	3,300			13,300
1952	6,300	1,700	1,600			9,600
1953	7,600	2,300	2,400			12,300
1954	7,400	1,900	1,800	270	80	11,400
1955	8,300	1,600	1,500	320	280	12,000
1956	10,200	3,200	1,600	610	220	15,800
1957	16,000	7,000	2,000	930	180	26,100
1958	19,100	12,900	3,300	1,000	210	36,500
1959*	27,700	26,300	3,300	865	400	58,600
1960*	36,600	20,500	3,600	950	700	62,400
1961*	45,900	19,000	4,000	1,150	1,000	71,100
1962*	53,700	18,800	4,400	1,250	1,500	79,700
1963*	60,500	9,000	4,800	1,550	2,000	77,900

* Estimated.

(iv) Research and exploratory development of new accelerator concepts must be strongly supported without prejudice to a later determination of need for full-scale construction. In addition, in order to make optimum use of the accelerators, strong support will be required for advancing the techniques of particle detection, data reduction, and data analysis.

Federal Responsibility Stressed

The basic importance of research in the field of high energy physics and its high cost, well beyond private resources, requires the Federal Government to continue to expand its support of this field consistent with valid scientific needs and the availability of qualified research personnel. Consequently, government planning must be based on the need for an increasing level of support from some $59 million in fiscal year 1959 to approximately $135 million in fiscal year 1963, in accordance with the needs outlined above.

It is important that the Atomic Energy Commission, the National Science Foundation and the Department of Defense each support research in high energy physics because of their separate responsibilities for the support of basic research, because of the fundamental nature and significance of high energy physics and the corresponding need for each of these agencies to keep in direct and intimate contact with the scientists in this field and their research. Accordingly, the construction and operation of future high energy accelerators should not be considered the responsibility of any single Federal agency.

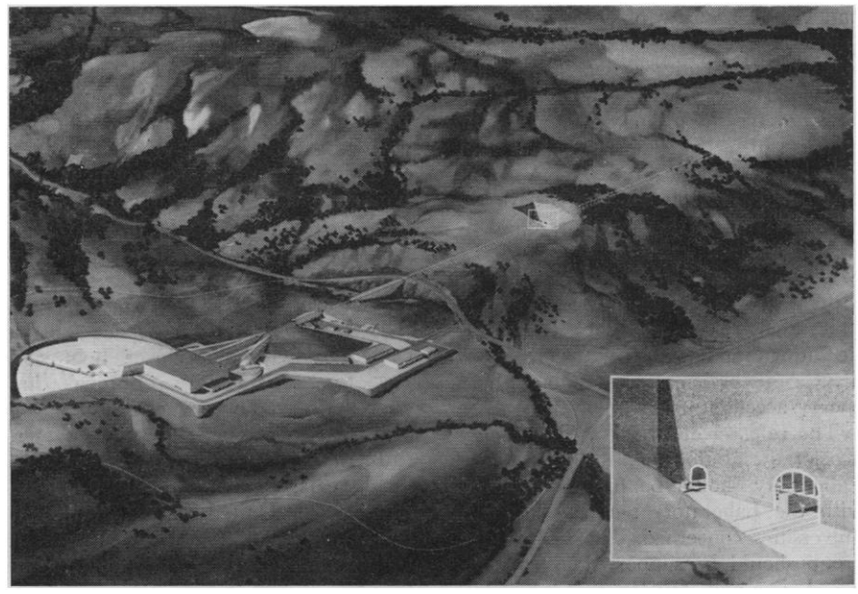
The Atomic Energy Commission, Department of Defense and National Science Foundation should each maintain strong interests and contacts in the field of high energy accelerator physics. This can be achieved only through direct financial responsibility and participation in the construction of high energy accelerators. The budgeting for the total cost of construction and operation of a particular accelerator should be the responsibility of a single Federal agency, as sole agent on behalf of all, supplemented by appropriate coordination with the other agencies active in this field.

These large particle accelerators constitute a national asset and should be made available to competent scientists elsewhere in this country and abroad to the fullest extent practicable. The support of any given accelerator project by a particular Federal agency should not be construed to prevent or limit the financial support of outside groups using the accelerator by other agencies, public or private.

The parallel interest of several Federal agencies in the support of high energy physics and the impact of this support on national budget planning and programming require a coordinating mechanism to assure effective planning and review at the national level. An interdepartmental council on high energy accelerators should be established to assure coordination of budget and technical planning. The membership of the council should consist of policy level representatives from the Atomic Energy Commission, Department of Defense and National Science Foundation. Technical assistance to the council should be provided by the scientific staff of the three agencies (AEC, DOD and NSF) directly concerned with the administration of high energy physics research programs. The council should be responsible for continuing reformulation of national policies on high energy accelerator physics and the implementation of this policy. This should include the review and coordination of agency programs and plans in the field of high energy accelerator physics and the review of agency proposals for new accelerators.

There should be a review of contracting procedures by the Atomic Energy Commission, Department of Defense and National Science Foundation to assure that such procedures properly support scientific undertakings of this magnitude and character. Present procedures should be revised where necessary so that agencies can provide funds in the contract, for a period of one to three years in advance, for the support of research operations connected with high energy accelerators.

The world-wide scientific significance of research in high energy physics, the extensive, high quality of scientific activity abroad in this field, and the limited number and costliness of high energy accelerators present a unique opportunity for a high degree of international collaboration and cooperation in the planning for and design of future accelerators and in the increased use of facilities. As a first step in the direction of international collaboration looking toward the development of new high energy accelerators, representative scientific groups from other countries, including the U.S.S.R., should be encouraged to meet with us in order to lay plans for cooperative research on new accelerator concepts. The National Academy of Sciences should be requested to advise on the best means for accomplishing this objective.



Two-mile linear accelerator at Stanford University in California would have an initial energy of at least 10 BEV.

Stanford Proposal Accepted

Consistent with the needs and guidelines outlined above, the following comments apply to the three major proposals before the Federal Government.

The Stanford proposal for an electron linear accelerator adequately meets the requirement discussed above of a research need for a new electron accelerator and its technical feasibility has been adequately demonstrated. It should be supported fully with the ultimate objective as described in the proposal and with an initial energy of at least 10 BEV. It is desirable that this accelerator project be initiated in fiscal year 1959 in order to avoid an undue delay in high energy research. Because of its dependence on advanced microwave technology, this proposal should be of particular relevance to the interests of the Department of Defense.

Although the technical feasibility

and research utility of the specific accelerator recently proposed by Midwestern Universities Research Association (MURA) have not been established, many of the important new accelerator concepts of recent years have come from the ideas and work of the MURA group. Continued progress in these developments is strongly dependent on the continuation and intensification of the MURA program. The group should be supported on a continuing basis with the funds and facilities necessary for its participating intensively in the development, construction and operation of high energy accelerators.

The research need for a high energy accelerator at the Oak Ridge National Laboratory should be further explored with the Laboratory and the southern universities concerned. The Oak Ridge group should be supported in continuing design and development activities. The technical feasibility of the accelerator proposed by Oak Ridge has not been established.

Panel Members

Jesse W. Beams, chairman, department of physics, University of Virginia

Hans A. Bethe, professor of physics, Cornell University

Leland J. Haworth, director, Brookhaven National Laboratory

Edwin M. McMillan, director, Lawrence Radiation Laboratory, University of California

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Training Center for U.N. Fellows

A new type of regional training center for United Nations fellows, with headquarters at the University of British Columbia in Vancouver, B.C., will enable trainees from underdeveloped countries to study activities in fields such as hydroelectric power, water development, geology, mining, forestry, land management, cooperatives, credit unions, social welfare, and public administration. In contrast to training centers that provide formal lectures and group field trips, the Vancouver center will draw up individual training plans designed to fill the specific needs of each fellow.

The rivers, forests, cities, and industries of western Canada and northwestern United States will serve as a laboratory. A trainee selected under the U.N. technical assistance program may enroll for classroom instruction, if appropriate, or he may carry out guided studies under faculty supervision. In addition, he will be given opportunity for first-hand observation in his specialty in a field agency or governmental laboratory. Western Canada and the northwestern United States were chosen because in the past 50 years these areas have experienced unusual expansion in population and unusually rapid economic development.

Under a three-way agreement, the United Nations will supply fellowships for the trainees and will provide a director and an administrative officer. The University of British Columbia will provide instruction and guidance for the fellows, as well as office space for the center. The Canadian Government, subject to parliamentary approval, has offered a special annual grant of $10,000 to the U.N. for operation of the center, to be made in each of three consecutive fiscal years, beginning in 1959–60. In addition, the United States Government has made the facilities of its agencies in the northwestern states available to the trainees.

The director of the center will be Albert Lepawsky of the department of political science, University of California, Berkeley, who was a member of the U.N. technical assistance survey mission to Bolivia in 1950. Fellowships for the center will be provided under the present technical assistance program of the United Nations and related agencies.

Federal Court Asked to Halt Atomic Tests

The Federal Court of Appeals, Washington, D.C., was asked in an action filed last month to order the United States to halt nuclear tests. The appeal was made by a group of 39 people, including scientists, churchmen, Japanese fishermen, and residents of the Marshall Islands. Among the plaintiffs were Linus Pauling, Nobel Prize winner in chemistry and professor at California Institute of Technology, and Bertrand Russell, British mathematician and philosopher.

The group asked the Court of Appeals to reverse a ruling that was handed down by District Judge Richmond B. Keech last July. At that time he dismissed two similar suits, saying the complaints had failed to show a controversy within the court's jurisdiction. He also held that none of the 39 plaintiffs had standing to sue. The appeal will probably be heard by the court next fall.

Edison Awards

The Thomas Alva Edison Foundation awarded special citations to the following at a luncheon in New York on 20 May as a part of the foundation's continuing program to improve the presentation of science to youth.

The Scientific American, Girard Piel, publisher, in recognition of distinguished educational service to the nation by advancing the understanding of science through accurate, informative, and vivid reporting of the latest scientific developments.

Union County Regional High School District No. 1, Springfield, N.Y., in recognition of distinguished educational service to the nation for special excellence in developing more effective teaching of science.

A Parent's Guide to Children's Reading, by Nancy Larrick (Doubleday and Pocket Books), in recognition of distinguished educational service . . . in the development of wholesome reading by young people.

Gilberton Company, Inc., for publishing *The Illustrated Story of Space*, one of the series "The World Around Us," as "the best science comic book."

AEC Power Program Approved by Joint Congressional Committee

The legislative subcommittee of the Joint Atomic Energy Committee of the Congress has approved, almost without change, the atomic power program put forth early this year by John A. McCone, chairman of the Atomic Energy Commission. This action confirms the growing belief that a new harmony has developed between the committee and the commission. In past years, when Lewis L. Strauss was chairman, this relationship had been very stormy.

The commission had requested $49.5 million for the construction of five prototype atomic power plants, either by the Government or by industry with government aid. Only three new projects were added to the total program, which, when it was first submitted, was characterized as "wholly inadequate." These new projects are a reactor of advanced design, to be built in Puerto Rico; a prototype plant of 30,000- to 75,000-kilowatt capacity; and another plant to be built for a rural cooperative or public power company by the commission.

Inter-American Nuclear Energy Commission to Hold First Meeting

The Organization of American States, Pan American Union, Washington, D.C., is establishing an Inter-American Nuclear Energy Commission to plan for the peaceful application of nuclear energy in the Western Hemisphere. The statutes for the commission were approved by the council of the OAS on 22 April. The new organization will hold its first meeting at the Pan American Union, probably in October.