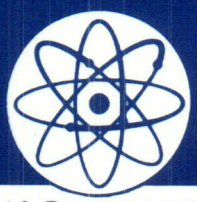
RESEARCH CONTRACTS in the PHYSICAL SCIENCES

Division of Research

July 1, 1970



UNITED STATES ATOMIC ENERGY COMMISSION

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INTRODUCTION

The Physical Research Program is chiefly concerned with basic research investigations undertaken to discover new scientific knowledge and also includes some applied research investigations relevant to certain aspects of the practical utilization of nuclear energy. Research is conducted in the fields of high, medium, and low energy physics, mathematics and computers, chemistry, metallurgy and materials, and controlled thermonuclear reactions.

Approximately three-fourths of the costs are associated with support of research conducted in AEC-owned, contractor-operated, Federally Funded Research and Development Centers (FFRDC's). A little less than one-fourth of the costs are associated with the contract support of research conducted in other laboratories ("off-site"). The major portion of the research at sites other than at FFRDC's is conducted at educational institutions, and is based almost entirely on unsolicited proposals.

Federally Funded Research and Development Centers

There is no clear line of demarcation between Federally Funded Research and Development Centers and other laboratories. The AEC investment in facilities ranges from zero for some contractors to tens of millions of dollars for others, and the annual level of AEC support ranges from a few thousand dollars for some contractors, to tens of millions of dollars for others -- the spectrum is broad with no significant peaks or breaks.

Some of the FFRDC's research and development activities other than basic physical research include programs in production,weapons, biology and medicine, reactor development, isotopes development, and peaceful nuclear explosives. The Physical Research Program at FFRDC laboratories provides, in varying degrees, the basic investigations underlying the applied and development activities of such laboratories. FFRDC's also include laboratories that are engaged in research in a single, well defined area. All FFRDC's have the following common characteristics:

1. They are treated as national facilities.
2. They represent large investments (several millions of dollars) in AEC-owned capital facilities.
3. They have large annual levels (several millions of dollars) of AEC support.
4. It is implicit that they have continuing AEC support.
5. The guidance of smaller scientific efforts within each laboratory is usually vested in the laboratory management with only major overall research guidance supplied by the AEC.

Washington-Designated Contract-Research Program

In addition to the research conducted at the FFRDC's, AEC supports, by means of the Washington-designated ("off-site") contract-research program, research investigations at educational and other non-profit institutions, and at industrial laboratories. Under this program AEC Headquarters is responsible for the approval of AEC support and for the review of the technical progress of the research projects, while AEC's field offices negotiate and administer the non-technical aspects of the contracts.

The objective of the off-site basic research program is to search for and discover new knowledge within the mission-oriented framework of AEC. It is from this expanding reservoir of knowledge that developmental accomplishments are ultimately achieved. Thus the off-site programs aids in the advancement of science in those disciplines that are fundamental to AEC's programs.

The contract-research program has a number of distinct benefits:

1. When the amount provided by AEC is added to other funds available to the contractor, the effectiveness of the contractor's program, as well as the basic research effort of AEC, is increased.

2. AEC receives the services, in basic research activities fundamental to AEC's future capabilities, of highly qualified scientists who prefer employment at outside laboratories or who prefer to teach and to do research at educational institutions.

3. The contract-research program, by providing for the conduct of research at educational institutions, contributes to the training of scientists in fields relevant to AEC's programs.

In conducting this program, AEC generally uses a special research support agreement with educational institutions. In consideration for the institution's performance of research activities described in the contract and in accordance with the provisions of the contract, the AEC will pay up to a specified amount, referred to as the "support ceiling." Adjustment of this amount will be made if total costs turn out to be less than expected. The total project cost estimate is reflected in a budget, submitted by the prospective contractor, that includes such items as salaries, materials and supplies, equipment, travel, communication, publication, and indirect expenses.

In most cases, the contractor proposes to share in the cost of the work conducted under the contract. In order to support the maximum number of important and worthwhile projects within the limits of available funds and to have tangible evidence of a university's interest in the proposed research, it is AEC policy to encourage cost-sharing by the universities. Although sharing by the institution in the cost of the project is desirable, such sharing is not a prerequisite for AEC support, which, in the final analysis, is determined by the prospective quality of the proposed research, the relative interest of AEC and the institution in the research, and availability of funds. Thus, AEC will pay up to the full cost of a research project.

When the special research support agreement is used for not-for-profit organizations other than educational institutions, AEC's commercial cost principles will be used in determining actual cost, or the contract provisions may be revised to provide for a lump-sum payment to the contractor in consideration for its commitment to perform particular research at a specified level of effort.

For larger projects, a cost-reimbursement contract generally is used. This provides for the reimbursement, to the extent prescribed in the agreement, of defined allowable costs incurred in the performance of the contract. This type of contract as a rule is used for projects with an annual AEC contribution exceeding $250,000 and/or for projects that do not lend themselves to accurate cost estimates. The total costs of the research may be shared by the contractor and AEC.

Occasionally, no-fund contracts are used in the contract-research program when AEC loans property to an outside organization as AEC's support to the research project or when the organization wishes to enter into a study contract in a certain area of research before it actually undertakes the research. Also, contracts are frequently extended without additional funds being added when the research project is being completed or terminated and additional time is required to bring the project to an orderly close.

Most research contracts are written for terms of one year, renewable for additional annual terms. Sometimes contract terms may run somewhat more or less than one year (e.g. 9 or 15 months), usually for the purpose of establishing a different renewal date. There may also be cases where the contract may be written for several (usually three) years, but with the legal commitment for funding remaining on an annual basis. Occasionally, multi-year contracts with full funding are executed, generally where procurement of a major piece of equipment is involved, or where the nature of the research project is such that a clearly defined, longer fixed term can be established.

In practice, contracts tend to run for several years, some of them for as much as ten years or more. Most research projects are not of the type that can be completed in one year, or in any specified longer time period that can be estimated in advance with reasonable accuracy. This is informally recognized by the parties concerned, whenever a new research project is approved for support and the customary one year contract written.

Proposals for research contracts are usually initiated by the scientist interested in doing the work and are submitted through administrative channels of his institution to the appropriate division at the Headquarters, U. S. Atomic Energy Commission, Washington, D. C. 20545, depending on the scientific area of the proposed research project:

Division of Research:
Physical Sciences, covering Chemistry, Metallurgy, Ceramics, Solid State Physics, Elementary Particle Physics, Nuclear Structure Physics, Atomic Physics, Plasma Physics as related to controlled thermonuclear processes, Mathematics and Computer research, and Basic Nuclear Engineering.

Division of Biology and Medicine:
Life Sciences, including Medicine, Biology, Ecology and Marine Sciences; Atmospheric Radioactivity and Fallout Studies; Radiation Instrumentation; and Radiological and Health Physics

Division of Reactor Development and Technology:
Nuclear Reactor Technology, Nuclear Power Plant Development, and Terrestrial and Marine Isotopic Power Systems Development.

Division of Isotopes Development:
Radioisotope Technology; Applications of Radioisotopes; and Industrial Process Radiation.

Those interested in receiving contracts for research under this program may obtain a copy of a "Guide for the Submission of Research Proposals" from AEC Headquarters, Washington, D. C. 20545 or from an AEC field office.

The contract-research program is not to be confused with AEC's program for Nuclear Education Assistance, including equipment grants, nuclear materials loans, fellowships, institutes, etc. Requests for information and brochures concerning educational assistance should be directed to the Division of Nuclear Education and Training at AEC Headquarters.

Reporting Results of Research

Scientific reports on basic research investigations are usually published in the open literature. Special reporting of results in detail before they are ready for publication generally is not required of the contractors. AEC recognizes open publication and wide dissemination as the normal and most desirable means for reporting the findings of fundamental research.

AEC annually publishes a special survey of selected significant developments during the previous year in the more basic areas of AEC's research and development activities. This annual report entitled "Fundamental Nuclear Energy Research--A Supplemental Report to the Annual Report to Congress of the U. S. Atomic Energy Commission," may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Contract Listing

Contract-research projects supported by the AEC Headquarters Division of Research are listed on pp. 12-42, including the name and address of the contractor, the name(s) of the principal investigator(s), a short descriptive title of the research, and the level of AEC support during the most recent funding period. The amounts listed are for one year unless otherwise indicated.

FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS

For purposes of this report, the following may be considered FFRDC's* operated for AEC (including only those supported in whole or in part under the Physical Research Program):

Name of Laboratory and Contractor and Contract Number	Level of Physical Research Program Support - FY 1970 (in thousands)	
	Operations	Equipment
Ames Laboratory, Ames, Iowa Iowa State University, W-7405-ENG-82	$ 7,076	$ 922
Argonne National Laboratory, Argonne, Illinois Argonne Universities Association and University of Chicago, W-31-109-ENG-38	36,900	5,308
Brookhaven National Laboratory, Upton, L. I., New York Associated Universities, Inc., AT(30-2)-GEN-16	34,817	6,080
Cambridge Electron Accelerator, Cambridge, Massachusetts Harvard University, AT(30-1)-2076	3,476	584
Lawrence Radiation Laboratory, Berkeley and Livermore, California University of California, W-7405-ENG-48	39,376	3,728
Los Alamos Scientific Laboratory, Los Alamos, New Mexico University of California, W-7405-ENG-36	8,885	855
Mound Laboratory, Miamisburg, Ohio Monsanto Chemical Company, AT(33-1)-GEN-53	580	139
National Accelerator Laboratory, Batavia, Illinois Universities Research Association, Inc., AT(49-8)-3000	6,597	1,699
National Reactor Testing Station, Idaho Falls, Idaho Idaho Nuclear Corporation, AT(10-1)-1230	127	41
Oak Ridge National Laboratory, Oak Ridge, Tennessee Union Carbide Nuclear Company, W-7405-ENG-26	32,728	3,578
Pacific Northwest Laboratory, Richland, Washington Battelle Memorial Institute, AT(45-1)-1830	844	226
Princeton Proton Accelerator, Princeton, New Jersey Princeton University, AT(30-1)-2137	4,129	350
Princeton Plasma Physics Laboratory, Princeton, New Jersey Princeton University, AT(30-1)-1238	7,459	171
Stanford Linear Accelerator Center, Stanford, California Stanford University, AT(04-3)-515	23,819	2,158
	$ 206,813	$ 25,839

*The listing is consistent with Federally Funded Research and Development Centers as defined by the National Science Foundation and the Office of Science and Technology.

SUMMARY OF OFF-SITE CONTRACTS

The following summarizes the number and level of Washington-designated off-site contracts in effect on July 1, 1970 and supported under the Physical Research Program:

Type of Organization	No. of Institutions	No. of Contracts	FY 1970 Funding (in 1000's)
Educational Institutions	143	547	$ 69,728*
Not-for-Profit Institutes	6	14	566
Industrial Organizations	4	5	1,098
Total	153	566	$ 71,392*

(Under "No. of Institutions," the separate campuses of the University of California, University of Miami, the City and State Universities of New York, and the University of Wisconsin are counted as separate institutions)

AEC Budget Category	No. of Contracts	FY 1970 Funding (in 1000's)
High Energy Physics	49	$ 26,363*
Medium Energy Physics	16	3,979
Low Energy Physics	72	14,461
Mathematics and Computer Research	24	3,699
Chemistry	208	10,132
Metallurgy and Materials	151	8,658
Controlled Thermonuclear Research	46	4,100
Total	566	$ 71,392*

Under AEC's annual review and renewal system, the yearly turnover rate, i.e. numbers of new projects approved and existing contracts terminated, in recent years has been in the 10-15% range, with an average of some 65 new contracts written and approximately 55 old contracts terminating each year. In FY 1970, however, only some 35 new projects were started, while 60 contracts terminated.

Note:
The above summary does not include the portion of the Physical Research Program supported through reimbursable agreements with other Federal agencies. In FY 1970 this amounted to $0.7 million.

*Includes $7,865,000 for research activities included under FFRDC's in previous editions of this report, but more appropriate for listing under educational institutions.

SUMMARY OF NEW PROPOSALS RECEIVED AND ACTIONS TAKEN

During Fiscal Year 1970 the Division of Research received 441 formal proposals for new research, representing requests for a total of $48.4 million. On hand at the beginning of FY 1970 pending completion of reviews were 246 new proposals requesting $35.7 million, for a total of 687 proposals representing requests for $84.2 million.

Approved during FY 1970 were 35 new proposals for $1.9 million, while 447 representing $70.1 million, were declined, tabled, or withdrawn.

NEW PROPOSALS - FY 1970
($ in 1000's)

	On Hand 7/1/69		Received during FY 1970		Total	
	No.	Amount	No.	Amount	No.	Amount
High Energy Physics	36	$ 26,782	45	$ 3,351	81	$ 30,133
Physics & Mathematics	79	3,829	140	34,956	219	38,785
Chemistry	54	1,772	93	3,393	147	5,165
Metallurgy & Materials	50	1,810	134	4,851	184	6,661
Controlled Thermonuclear	27	1,557	29	1,860	56	3,417
TOTAL	246	$ 35,750	441	$ 48,411	687	$ 84,161

ACTIONS TAKEN - NEW PROPOSALS - FY 1970
($ in 1000's)

	Approved		Declined, etc.		On Hand 6/30/70	
	No.	Amount	No.	Amount	No.	Amount
High Energy Physics	5	$ 305	47	$ 27,454	29	$ 2,374
Physics & Mathematics	9	636	132	32,531	78	5,618
Chemistry	6	237	94	3,203	47	1,725
Metallurgy & Materials	11	303	148	5,480	25	878
Controlled Thermonuclear	4	423	26	1,398	26	1,596
TOTAL	35	$ 1,904	447	$ 70,066	205	$ 12,191

Submissions to the Division of Research of new proposals have increased significantly in recent years, from an annual rate of some 200 in the late 1950's, and about 300 in the early 1960's to 441 in FY 1970. Approval rates have averaged about 65 annually for the past ten years. Approval dollars have decreased from about 33% of requested amounts in the early 1960's to about 6% during the 1968-69-70 period. Competition for available funds for new research projects thus has become increasingly severe in recent years and many proposals for excellent research must be turned down solely because of lack of funds.

SUMMARY OF CONTRACTS BY STATE

(not including contracts listed on p. 5 or agreements with other Federal agencies)

State and Contractor	Number of Contracts	FY 1970 Funding (in 1000's)
Alabama	3	79
Alabama, University of, University	1	24
Auburn University, Auburn	1	19
Tuskegee Institute, Tuskegee	1	36
Alaska	3	60
Alaska, University of, College	3	60
Arizona	8	323
Arizona State University, Tempe	1	72
Arizona, University of, Tucson	7	251
Arkansas	2	108
Arkansas, University of, Fayetteville	2	108
California	67	9,718
California Institute of Technology, Pasadena	9	2,451
California, University of, Berkeley	5	322
California, University of, Davis	5	870
California, University of, Irvine	5	805
California, University of, Los Angeles	12	1,640
California, University of, Riverside	2	304
California, University of, San Diego	8	1,450
California, University of, Santa Barbara	2	230
Gulf General Atomic, Inc., San Diego	2	764
Southern California, University of, Los Angeles	6	291
Stanford Research Institute, Menlo Park	2	99
Stanford University, Stanford	9	492
Colorado	4	750
Colorado State University, Ft. Collins	1	14
Colorado, University of, Boulder	3	736
Connecticut	11	3,503
The New England Institute, Inc., Ridgefield	1	45
United Aircraft, East Hartford	1	160
Yale University, New Haven	9	3,298
Delaware	1	0
Delaware, University of, Newark	1	0
District of Columbia	13	370
Catholic University of America	2	65
Georgetown University	1	39
George Washington University	1	10
Howard University	3	73
National Academy of Sciences	6	183
Florida	10	525
Florida State University, Tallahassee	4	341
Florida, University of, Gainesville	3	92
Miami, University of, Coral Gables	2	68
Miami, University of, Miami	1	24
Georgia	9	312
Georgia Institute of Technology, Atlanta	6	233
Georgia, University of, Athens	3	79

State and Contractor	Number of Contracts	FY 1970 Funding (in 1000's)
Hawaii	2	$ 410
Hawaii, University of, Honolulu	2	410
Idaho	1	8
Idaho State University, Pocatello	1	8
Illinois	27	5,668
Chicago, University of, Chicago	9	1,296
Illinois Institute of Technology, Chicago	4	149
Illinois, University of, Urbana	7	4,002
Northwestern University, Evanston	7	221
Indiana	19	3,051
Indiana University, Bloomington	3	191
Notre Dame, University of, Notre Dame	3	1,376
Purdue University, Lafayette	13	1,484
Iowa	4	79
Dordt College, Sioux Center	1	0
Iowa, University of, Iowa City	3	79
Kansas	6	609
Kansas State University, Manhattan	3	324
Kansas, University of, Lawrence	3	285
Kentucky	4	69
Kentucky, University of, Lexington	4	69
Louisiana	1	75
Louisiana State University, Baton Rouge	1	75
Maryland	25	2,659
Johns Hopkins University, Baltimore	6	413
Maryland, University of, College Park	19	2,246
Massachusetts	34	9,672
Avco-Everett Research Laboratory, Everett	1	102
Boston University, Boston	1	31
Brandeis University, Waltham	5	211
Clark University, Worcester	1	23
Harvard University, Cambridge	5	1,695
Massachusetts Institute of Technology, Cambridge	12	6,959
Massachusetts, University of, Amherst	2	207
Northeastern University, Boston	2	66
Southeastern Massachusetts University, North Dartmouth	1	0
Tufts University, Medford	3	353
Worcester Polytechnic Institute, Worcester	1	25
Michigan	26	2,973
Michigan State University, East Lansing	11	464
Michigan Technological University, Houghton	3	95
Michigan, University of, Ann Arbor	9	2,286
Wayne State University, Detroit	3	128
Minnesota	9	1,424
Minnesota, University of, Minneapolis	9	1,424
Mississippi	1	14
Mississippi, University of, University	1	14
Missouri	8	340
Midwest Research Institute, Kansas City	1	31
Missouri, University of, Rolla	1	32
Washington University, St. Louis	6	277

State and Contractor	Number of Contracts	FY 1970 Funding (in 1000's)
Montana	2	$ 22
Montana State University, Bozeman	2	22
Nebraska	1	25
Nebraska, University of, Lincoln	1	25
Nevada	1	10
Nevada, University of, Reno	1	10
New Hampshire	2	39
Dartmouth College, Hanover	1	27
New Hampshire, University of, Durham	1	12
New Jersey	12	2,927
Institute for Advanced Study, Princeton	1	60
Princeton University, Princeton	6	2,588
Rutgers University, New Brunswick	2	55
Stevens Institute of Technology, Hoboken	3	224
New Mexico	1	9
New Mexico Highlands University, Las Vegas	1	9
New York	82	10,035
Brooklyn, Polytechnic Institute of, Brooklyn	1	0
Brooklyn, Polytechnic Institute of, Farmingdale	1	37
Clarkson College of Technology, Potsdam	4	111
Columbia University, New York	11	3,764
Cornell University, Ithaca	19	1,206
Fordham University, New York	1	25
Long Island University, Greenvale	1	0
New York, City University of, Brooklyn College	1	25
New York, City University of, Hunter College	1	17
New York, City University of, Queens College	1	42
New York, State University of, Albany	1	39
New York, State University of, Buffalo	4	184
New York, State University of, Stony Brook	9	861
New York University, New York	3	1,690
Rensselaer Polytechnic Institute, Troy	9	255
Rochester, University of, Rochester	7	1,340
Rockefeller University, New York	1	130
Syracuse University, Syracuse	3	174
Yeshiva University, New York	4	135
North Carolina	15	1,174
Duke University, Durham	3	665
North Carolina State University, Raleigh	4	122
North Carolina, University of, Chapel Hill	7	351
Wake Forest University, Winston-Salem	1	36
North Dakota	1	36
North Dakota, University of, Grand Forks	1	36
Ohio	20	1,112
Case Western Reserve University, Cleveland	8	475
Cincinnati, University of, Cincinnati	2	82
Kent State University, Kent	1	40
Ohio State University, Columbus	7	495
Ohio University, Athens	1	0
Toledo, University of, Toledo	1	20
Oklahoma	3	82
Oklahoma State University, Stillwater	1	25
Oklahoma, University of, Norman	2	57

State and Contractor	Number of Contracts	FY 1970 Funding (in 1000's)
Oregon	8	$ 455
Oregon State University, Corvallis	5	151
Oregon, University of, Eugene	3	304
Pennsylvania	35	3,923
Carnegie-Mellon University, Pittsburgh	10	1,541
Franklin Institute, Philadelphia	3	149
Lehigh University, Bethlehem	3	53
Pennsylvania State University, University Park	7	259
Pennsylvania, University of, Philadelphia	5	1,551
Pittsburgh, University of, Pittsburgh	5	264
Temple University, Philadelphia	2	106
Puerto Rico	3	296
Puerto Rico, University of, Mayaguez and Rio Piedras	3	296
Rhode Island	5	558
Brown University, Providence	4	542
Rhode Island, University of, Kingston	1	16
South Carolina	3	61
Clemson University, Clemson	1	41
South Carolina, University of, Columbia	2	20
Tennessee	9	256
Tennessee State University, Nashville	1	40
Tennessee, University of, Knoxville	6	183
Vanderbilt University, Nashville	2	33
Texas	31	2,818
Baylor University, Waco	2	46
Houston, University of, Houston	4	177
Rice University, Houston	6	868
Texas A & M University, College Station	10	976
Texas Christian University, Ft. Worth	1	0
Texas Nuclear Corporation, Austin	1	73
Texas Tech University, Lubbock	1	17
Texas, University of, Austin	6	661
Utah	4	140
Brigham Young University, Provo	2	31
Utah, University of, Salt Lake City	2	109
Vermont	1	22
Vermont, University of, Burlington	1	22
Virginia	8	388
Roanoke College, Salem	1	17
Virginia Polytechnic Institute, Blacksburg	3	115
Virginia, University of, Charlottesville	4	256
Washington	9	1,301
Washington State University, Pullman	3	145
Washington, University of, Seattle	5	1,146
Western Washington State College, Bellingham	1	10
Wisconsin	11	2,863
Marquette University, Milwaukee	1	33
Wisconsin, University of, Madison	9	2,822
Wisconsin, University of, Milwaukee	1	8
Wyoming	1	41
Wyoming, University of, Laramie	1	41

HIGH ENERGY PHYSICS

Army, Department of the, (U.S. Military Academy), West Point, New York. William B. Streett, Experimental Measurements of Density in Liquid Mixtures of Neon and Hydrogen. $15,985 (2 years).

Brandeis University, Waltham, Massachusetts. Lawrence E. Kirsch and Howard J. Schnitzer, Experimental and Theoretical Elementary Particle Physics. $73,765.

Brown University, Providence, Rhode Island. David Feldman and Anatole M. Shapiro, Experimental and Theoretical High Energy Physics. $325,000.

California Institute of Technology, Pasadena, California. Robert L. Walker, Operation and Research with 1.5 BeV Electron Synchrotron; Users Group. $1,472,984.

California, University of, Davis, California. Richard L. Lander, High Energy Particle Physics Research. $55,000.

California, University of, Irvine, California. Frederick Reines, Studies of Neutrino and Cosmic Ray Interactions. $450,000.

California, University of, Irvine, California. Jonas Schultz, Study of New Heavy Bosons in Proton-Anti-Proton Interactions. $140,000.

California, University of, Los Angeles, California. Harold K. Ticho and Donald H. Stork, Research in High Energy Physics. $461,000.

California, University of, Riverside, California. Peter E. Kaus and Anne Kernan, High Energy Physics. $240,000.

California, University of, San Diego, California. Oreste Piccioni, Norman Kroll and George Masek, Experimental and Theoretical Particle Physics. $962,000.

California, University of, Santa Barbara, California. David O. Caldwell, High Energy Physics Users. $160,000.

Carnegie-Mellon University, Pittsburgh, Pennsylvania. Roger B. Sutton, High Energy Physics Users; Theoretical Research. $865,000.

Case Western Reserve University, Cleveland, Ohio. Thomas L. Jenkins, High Energy Accelerator Physics and Low Level Counting Elementary Particle Physics. $70,000.

Chicago, University of, Chicago, Illinois. Y. Nambu, Theoretical Research in Elementary Particle Physics. $310,000.

Chicago, University of, Chicago, Illinois. Roland Winston, Experimental Study of Weak Interactions. $135,000.

Cincinnati, University of, Cincinnati, Ohio. Mirko M. Nussbaum, Experimental Particle Physics Program. $45,000.

Colorado, University of, Boulder, Colorado. Jay B. Kopelman, Tai Ho Tan and Uriel Nauenberg, High Energy Physics. $295,000.

Columbia University, New York, New York. Leon Lederman and Robert Serber, High Energy Physics Users; Theoretical Research. $1,979,438.

Cornell University, Ithaca, New York. Kenneth Greisen, Detection of Large Cosmic Ray Showers By Atmospheric Fluorescence. $55,000.

Duke University, Durham, North Carolina. Earle C. Fowler, Research in High Energy Physics. $195,000.

Florida State University, Tallahassee, Florida. Joseph E. Lannutti, Elementary Particle Physics. $155,000.

Harvard University, Cambridge, Massachusetts. F. M. Pipkin, R. V. Pound, J. C. Street and R. Wilson, High Energy Physics Research. $1,518,227.

Harvard University, Cambridge, Massachusetts. Tai Tsun Wu, High Energy Collision Processes. $35,000 (2 years).

Hawaii, University of, Honolulu, Hawaii. Vincent Z. Peterson and San Fu Tuan, Research in High Energy Nuclear Physics. $385,000.

Illinois, University of, Urbana, Illinois. A. Wattenberg and R. D. Sard, High Energy Physics Users; Theoretical Research. $1,383,189.

Indiana University, Bloomington, Indiana. Richard M. Heinz and Homer A. Neal, Spark Chamber and Counter High Energy Physics Research Program. $163,000.

Johns Hopkins University, Baltimore, Maryland. Gabor Domokos, Algebraic Methods in Regge Pole Theory. $38,000.

Maryland, University of, College Park, Maryland. George A. Snow, Properties of Elementary Particles. $660,000.

Massachusetts Institute of Technology, Cambridge, Massachusetts. P. T. Demos, High Energy Physics Research. $3,377,000.

Massachusetts, University of, Amherst, Massachusetts. S. Steven Yamamoto and Janice B. Shafer, High Energy Physics. $170,000.

Michigan State University, East Lansing, Michigan. J. H. Hetherington, Few-Body and Many-Body Problems. $15,000.

Michigan, University of, Ann Arbor, Michigan. H. R. Crane, High Energy Physics Users; Theoretical Research. $1,153,000.

Minnesota, University of, Minneapolis, Minnesota. Stephen Gasiorowicz and Hans W. J. Courant, Theoretical and High Energy Physics Research. $254,000.

National Bureau of Standards, Boulder, Colorado. Heat Transfer and Associated Fluid Property Studies with Liquid Helium. $131,908.

New York, State University of, Stony Brook, New York. Juliet Lee-Franzini, C. N. Yang and Myron L. Good, Experimental and Theoretical Subnuclear Physics. $430,000.

Ohio State University, Columbus, Ohio. Thomas A. Romanowski, K. Tanaka and W. W. Wada, High Energy Physics. $275,000.

Oregon, University of, Eugene, Oregon. Michael J. Moravcsik, Theory of Elementary Particles. $82,000.

Pennsylvania, University of, Philadelphia, Pennsylvania. Sherman Frankel, High Energy Physics Research. $1,446,374.

Pittsburgh, University of, Pittsburgh, Pennsylvania. Richard H. Pratt, Studies in Quantum Electrodynamics and the Theory of Elementary Particles. $75,000.

Princeton University, Princeton, New Jersey. George T. Reynolds, High Energy Physics Research. $1,523,645.

Purdue University, Lafayette, Indiana. Frank J. Loeffler and Masao Sugawara, Fundamental Particle Physics. $593,184.

Rochester, University of, Rochester, New York. Adrian C. Melissinos and J. Bruce French, High Energy Physics Users; Theoretical Research. $894,989.

Rockefeller University, New York, New York. Abraham Pais, Theoretical High Energy Physics. $130,000 (2 years).

Southeastern Massachusetts Technological Institute, North Dartmouth, Massachusetts. Zvi Bar-Yam, Photoproduction of Single Pions from Hydrogen and Deuterium. $100,000 (2 years).

Syracuse University, Syracuse, New York. K. C. Wali, Research Program in Elementary Particle Theory. $124,996.

Tennessee, University of, Knoxville, Tennessee. William M. Bugg, Study of Elementary Particle Processes using Bubble Chamber Techniques. $48,000.

Texas, University of, Austin, Texas. E. C. G. Sudarshan, Research Program in Elementary Particle Theory. $125,000.

Tufts University, Medford, Massachusetts. Allan M. Cormack, Experimental and Theoretical High Energy Physics Research. $335,000.

Washington University, St. Louis, Missouri. John H. Scandrett, Malcolm C. Whatley, John M. Dobbs and Peter R. Phillips, Kaon Decay. $25,000.

Wisconsin, University of, Madison, Wisconsin. Marvin E. Ebel and D. Reeder, High Energy Physics Users; Theoretical Research. $1,625,773.

Yale University, New Haven, Connecticut. Robert K. Adair, High Energy Physics Users; Theoretical Research. $1,038,059.

MEDIUM ENERGY PHYSICS

California, University of, Davis, California. John A. Jungerman and William W. True, Nuclear Physics Research. $755,000.

California, University of, Los Angeles, California. Roy P. Haddock and B. M. K. Nefkens, Particle Physics. $200,000.

Carnegie-Mellon University, Pittsburgh, Pennsylvania. Peter D. Barnes, Experimental Nuclear Physics. $31,752.

Columbia University, New York, New York. W. W. Havens and C. S. Wu, Medium Energy Physics. $128,000.

Houston, University of, Houston, Texas. John C. Allred and Clark Goodman, Pion Interactions at Medium Energies. $50,000.

Maryland, University of, College Park, Maryland. Harry D. Holmgren, Variable Energy Cyclotron Facility. $3,000,000 (authorized FY 1965).

Maryland, University of, College Park, Maryland. Harry D. Holmgren, Experimental Study of the Structure of Nuclei and the Interactions of Intermediate Energy Particles. $680,000.

Maryland, University of, College Park, Maryland. William M. MacDonald and Manoj K. Banerjee, Theoretical Studies in Nuclear Reactions and Nuclear Structure. $180,000.

Massachusetts Institute of Technology, Cambridge, Massachusetts. P. T. Demos, Medium Energy Physics. $861,800.

Rice University, Houston, Texas. Gerald C. Phillips, Nuclear and Extra-Nuclear Physics. $186,545.

Temple University, Philadelphia, Pennsylvania. W. Kenneth McFarlane, Experimental Investigation of Pion Decays at the Los Alamos Meson Physics Facility. $16,180.

Texas A & M University, College Station, Texas. A. D. Suttle, Jr., Variable Energy Cyclotron Facility. $3,000,000 (authorized FY 1964).

Texas A & M University, College Station, Texas. J. A. McIntyre and A. D. Suttle, Jr., TAMVEC Research Program. $650,000.

Virginia Polytechnic Institute, Blacksburg, Virginia. W. Peter Trower, To Experimentally Determine the Charge Structure of the Proton at Large Distance. $48,000.

Virginia, University of, Charlottesville, Virginia. Ralph C. Minehart, Stanley E. Sobottka and Klaus O. H. Ziock, Experiments on the Nuclear Interactions of Pions. $43,000.

Yale University, New Haven Connecticut. Vernon W. Hughes, Medium Energy Physics. $148,672.

LOW ENERGY PHYSICS

Alaska, University of, College, Alaska. Eduard Berg, Earth Tilts in Connection with Crustal Failure: A Study in Alaska. $40,000.

Alaska, University of, College, Alaska. Syun-Ichi Akasofu, A Study of Magnetospheric Substorms in Conjunction with the Vela Satellite Data. $20,494.

Alaska, University of, College, Alaska. David B. Stone, Paleomagnetic Studies on Amchitka Island. No Funds (2 years).

Arizona, University of, Tucson, Arizona. Douglas J. Donahue, Research in Nuclear Physics. $93,000.

Arizona, University of, Tucson, Arizona. C. Y. Fan, To Measure Lamb Shift in Hydrogen-Like Atoms of Nuclear Charge $Z \geq 3$. $60,000 (27 months).

Brigham Young University, Provo, Utah. Dwight R. Dixon, Max W. Hill and Gary L. Jensen, Transfer of 4 MeV Van de Graaff Accelerator. No Funds (4 years).

Brown University, Providence, Rhode Island. Russell A. Peck, Jr., Reaction Studies with Fast Neutrons and Theory of Direct Reactions and Nuclear Excitations. $92,000.

California Institute of Technology, Pasadena, California. Felix Boehm, Nuclear Spectroscopy and X-ray Program. $300,000.

California, University of, Berkeley, California. Carson D. Jeffries, Dynamic Nuclear Polarization and Solid State Physics. $87,082.

California, University of, Berkeley, California. John H. Reynolds, Mass Spectroscopy Research. $75,000.

California, University of, Berkeley, California. Paul B. Price, Jr., Geophysical and Astrophysical Studies with Nuclear Tracks in Solids. $30,000.

California, University of, Los Angeles, California. J. Reginald Richardson and Byron T. Wright, Nuclear Structure Research. $418,000.

California, University of, Los Angeles, California. Leon Knopoff, Space-Time Correlation of Seismic Events. $40,000.

California, University of, Los Angeles, California. George C. Kennedy, Compressibility Measurements. $60,000.

California, University of, San Diego, California. Keith A. Brueckner, Problems in the Theory of Many-Body Systems. $128,120.

California, University of, Santa Barbara, California. Paul H. Barrett and Robert M. Eisberg, Nuclear Structure Research. $70,000.

Carnegie-Mellon University, Pittsburgh, Pennsylvania. Peter D. Barnes, Experimental Nuclear Physics. $35,000.

Case Western Reserve University, Cleveland, Ohio. Harvey B. Willard and R. M. Thaler, Nuclear Physics Research. $250,000.

Catholic University of America, Washington, D. C. Robert W. Deutsch, Experimental and Theoretical Investigations of Nuclear Fission Induced by Low-Energy Nuclear Particles. $43,000.

Colorado, University of, Boulder, Colorado. J. J. Kraushaar and Ernest S. Rost, Study of Fundamental Nuclear Interactions. $429,000.

Columbia University, New York, New York. W. W. Havens, Jr., C. S. Wu, L. J. Rainwater, L. J. Lidofsky, and H. N. Goldstein, Nuclear Physics Research. $1,218,302.

Columbia University/Lamont-Doherty Geological Observatory, Palisades, New York. James H. Dorman, Jack Oliver and Lynn R. Sykes, A Comprehensive Study of the Seismotectonics of the Aleutian Arc. $70,000.

Cornell University, Ithaca, New York. David D. Clark, Experimental Study of Nuclear Isomers. $37,000.

Duke University, Durham, North Carolina. Henry W. Newson, Studies of Nuclear Structure using Neutrons and Charged Particles. $470,000.

Duke University, Durham, North Carolina. Henry W. Newson, Regional Nuclear Physics Laboratory. $2,500,000 (authorized FY 1966).

Franklin Institute, Philadelphia, Pennsylvania. Franz R. Metzger, Electromagnetic Properties of Excited States of Nuclei. $70,000.

Gulf General Atomic Incorporated, San Diego, California. W. M. Lopez and M. P. Fricke, Neutron Capture Cross-Section Measurements. $50,000.

Illinois, University of, Urbana, Illinois. George H. Miley and Joseph T. Verdeyen. Advanced Methods for Nuclear Reactor-Gas Laser Coupling. $45,000.

Johns Hopkins University, Baltimore, Maryland. Henry M. Crosswhite, Jr. and Brian R. Judd, Spectra of Rare Earth and Uranium Ions. $70,000.

Johns Hopkins University, Baltimore, Maryland. George E. Owen and Leon Madansky, Nuclear Moments and Nuclear Structure. $180,000.

Kansas State University, Manhattan, Kansas. Robert B. Leachman, Atomic and Nuclear Research with Accelerators. $270,765.

Kansas State University, Manhattan, Kansas. Walter Meyer and John O. Mingle, Fast Neutron Transmission Measurements for Reactor Core and Shielding Materials. $41,000.

Kansas, University of, Lawrence, Kansas. Ralph W. Krone, Nuclear Structure Studies of the Light and Medium-Light Nuclei. $170,000.

Maryland, University of, College Park, Maryland. William F. Hornyak, The Structure of Light Nuclei. $190,000.

Massachusetts Institute of Technology, Cambridge, Massachusetts. P. T. Demos, Nuclear Physics Research. $1,076,100.

Massachusetts Institute of Technology, Cambridge, Massachusetts. Keiiti Aki, Measurement of Stress in Place. $31,000.

Michigan State University, East Lansing, Michigan. Hugh McManus, Jerzy Borysowicz and K. Kolltveit, Scattering Problems Including the Scattering of Particles by Nuclei. $81,000

Michigan State University, East Lansing, Michigan. Peter S. Signell, The Nucleon-Nucleon Interaction. $70,650.

Michigan, University of, Ann Arbor, Michigan. H. R. Crane, Low Energy Physics Research. $905,000.

Michigan, University of, Ann Arbor, Michigan. Glenn Knoll, Absolute Fission Cross Section Measurements. $40,000.

Minnesota, University of, Minneapolis, Minnesota. J. Morris Blair, George Greenlees and Norton Hintz, Experimental Nuclear Physics. $758,106.

National Academy of Sciences, Washington, D. C. Konrad Krauskopf, Committee on the Alaska Earthquake. $5,000.

National Academy of Sciences, Washington, D. C. Joseph W. Berg, Jr., Committee on Seismology. $4,425.

National Academy of Sciences, Washington, D. C. Hugh Odishaw, A Survey of Physics. $140,000 (33 months).

National Academy of Sciences, Washington, D. C. John W. Handin, U. S. National Committee on Rock Mechanics. $7,000.

National Academy of Sciences, Washington, D. C. C. K. Reed, Committee on Nuclear Science. $22,000.

New York, State University of, Buffalo, New York. Gregory Breit, The Theories of Nucleon-Nucleon Interactions, Nuclear Reactions and Atomic Hyperfine Structure. $107,811.

New York, State University of, Stony Brook, New York. G. E. Brown and Arnold M. Feingold, Research in Theoretical Nuclear Physics. $130,000.

North Carolina State University, Raleigh, North Carolina. L. W. Seagondollar, Nuclear Structure Research at the Triangle Universities Nuclear Laboratory. $70,000.

North Carolina, University of, Chapel Hill, North Carolina. Eugen Merzbacher, Studies of Nuclear Processes. $75,000.

Notre Dame, University of, Notre Dame, Indiana. Charles J. Mullin, Interactions of Photons and Particles with Nuclei. $85,000.

Notre Dame, University of, Notre Dame, Indiana. John W. Mihelich, Nuclear Spectroscopy. $100,000.

Ohio University, Athens, Ohio. Raymond O. Lane, 8 MeV Tandem Accelerator Facility. $1,000,000 (authorized FY 1967).

Oregon State University, Corvallis, Oregon. Harry T. Easterday, Low Energy Nuclear Research. $55,435.

Oregon, University of, Eugene, Oregon. Bernd Crasemann and Amit Goswami, Nuclear Physics Research. $190,500.

Pennsylvania, University of, Philadelphia, Pennsylvania. Henry Faul, Applications of Spontaneous Fission of ^{238}U in the Study of Natural Crystals and Glasses. $25,000.

Princeton University, Princeton, New Jersey. Gerald T. Garvey, Nuclear Physics Research. $702,210.

Purdue University, Lafayette, Indiana. Rolf M. Steffen, Research in Nuclear Physics. $350,000.

Rice University, Houston, Texas. G. C. Phillips and G. K. Walters, Nuclear and Extra-Nuclear Physics. $512,600.

Rochester, University of, Rochester, New York. J. B. French, Nuclear Physics Research. $129,997.

South Carolina, University of, Columbia, South Carolina. Frank T. Avignone, III, Antineutrino Absorption Cross Section Measurement. $24,915 (16½ months).

Southern California, University of, Los Angeles, California. H. H. Forster, Nuclear Physics Research. $130,000.

Texas Nuclear Corporation, Austin, Texas. William E. Tucker, Experimental and Theoretical Studies of Neutron Produced Gamma Ray Cross Sections. $72,680.

Texas, University of, Austin, Texas. Ira L. Morgan, Research in Nuclear Physics. $397,000.

Washington, University of, Seattle, Washington. John G. Cramer and Ernest M. Henley, Experimental and Theoretical Nuclear Physics. $1,028,900.

Washington, University of, Seattle, Washington. Gene L. Woodruff, The Measurement of Delayed Neutron Energy Spectra. $17,385 (6 months).

Wisconsin, University of, Madison, Wisconsin. H. H. Barschall, Nuclear Research. $526,550.

Wisconsin, University of, Madison, Wisconsin. J. R. Dillinger, Low Temperature Physics. $55,000.

Wyoming, University of, Laramie, Wyoming. William G. Simon and Hudson B. Eldridge, Nuclear Physics Studies. $41,000.

Yale University, New Haven, Connecticut. Vernon W. Hughes and Howard L. Schultz, Studies in Nuclear Physics. $580,572.

Yale University, New Haven, Connecticut. D. A. Bromley, Emperor Tandem Van de Graaff Research Program. $810,000.

Yeshiva University, New York, New York. A. G. W. Cameron, Research in Nuclear Physics and Nucleosynthesis. $35,610.

California, University of, Berkeley, California. A. H. Taub, Analytical and Numerical Studies in General Relativity. $75,000 (18 months).

California, University of, Los Angeles, California. Gerald Estrin, Research Program for the UCLA Variable Structure Computer System. $249,839.

California, University of, San Diego, California. Kenneth Bowles, Computing Facility at UCSD. No Funds.

Chicago, University of, Chicago, Illinois. Robert L. Ashenhurst, Research in Computer and Information Science. $316,453.

Harvard University, Cambridge, Massachusetts. Garrett Birkhoff, Research on Reactor Mathematics. $7,105 (12½ months).

Illinois, University of, Urbana, Illinois. Bruce H. McCormick, Experiments in Image Processing. $320,000.

Illinois, University of, Urbana, Illinois. C. W. Gear and W. J. Poppelbaum, Computer Systems Research. $656,200.

Johns Hopkins University, Baltimore, Maryland. Michael J. Flynn, Studies in the Organization of Computer Systems. $54,923 (15 months).

Kent State University, Kent, Ohio. Richard S. Varga, Use of Variational and Projectional Methods in Numerical Analysis. $39,576.

Maryland, University of, College Park, Maryland. Bertie E. Hubbard, Studies of the Numerical Solution of Elliptic and Parabolic Boundary Value Problems. $85,552 (2 years).

Maryland, University of, College Park, Maryland. Azriel Rosenfeld, Development of a Generalized Picture-Processing Programming System. $45,996.

Midwest Research Institute, Kansas City, Missouri Yudell L. Luke, Research in Finite Perturbation Methods. $30,461.

New York, City University of/Queens College, Flushing, New York. Arthur Sard, Optimal Approximation and Differentiable Maps. $42,436 (2 years).

New York, State University of, Stony Brook, New York. Martin A. Leibowitz and Daniel Dicker, Research in Applied Mathematics. $30,000.

New York University, New York, New York. Peter Lax and Robert Shevlin, Courant Institute of Mathematical Sciences. $1,450,394.

New York University, University Heights, Bronx, New York. Raphael Aronson, Investigation of Transfer Matrix Method. $30,000 (2 years).

North Carolina, University of, Chapel Hill, North Carolina. Frederick P. Brooks, Jr., An Investigation of a System for Displaying Computer Outputs to the Kinesthetic Sense. $105,923.

Oregon State University, Corvallis, Oregon. Arvid T. Lonseth, Research in Applied Analysis. $45,024.

Rice University, Houston, Texas. Edward A. Feustel, The Interchange of Essential Programs between Dissimilar Computers. $25,555.

Southern California, University of, Los Angeles, California. Richard Bellman, New Methods in the Theory of Partial Differential Equations. $58,200 (2 years).

Stanford University, Stanford, California. George B. Dantzig, Robert B. Wilson and Richard W. Cottle, Stochastic Mathematical Programs. $75,000 (15½ months).

Stanford University, Stanford, California. Stefan Bergman, The Kernel Function and the Method of Particular Solutions. $31,100.

Stanford University, Stanford, California. William F. Miller, Programming Models and the Control of Parallel Computing Systems. $44,100.

Stanford University, Stanford, California. Gene Golub, Numerical Analysis with Emphasis on Least Square Problems. $53,441 (19 months).

CHEMISTRY

Alabama, University of, University, Alabama. Lowell D. Kispert, ELDOR Investigations of Radiation Processes. $24,000.

Arizona State University, Tempe, Arizona. LeRoy Eyring, Solid State Chemistry of Rare Earth Oxides. $72,000 (11½ months).

Arizona, University of, Tucson, Arizona. Paul E. Damon, Correlation and Chronology of Ore Deposits and Volcanic Rocks. $35,000.

Arizona, University of, Tucson, Arizona. Leslie S. Forster, The Luminescence of Metal Complexes. $16,600.

Arizona, University of, Tucson, Arizona. Quintus Fernando, An Investigation of Steric and Synergic Effects in Metal Chelates. $12,000.

Arkansas, University of, Fayetteville, Arkansas. Arthur Fry, Tracer and Isotope Effect Studies in Organic Chemistry. $42,900.

Arkansas, University of, Fayetteville, Arkansas. Paul K. Kuroda, Nuclear and Cosmochemistry. $65,000.

Auburn University, Auburn, Alabama. William C. Askew and C. H. Ward, Synthesis, Identification and Purification of C_6 and C_7 Fluorocarbons from Radiolysis. $19,000.

Avco-Everett Research Laboratory, Everett, Massachusetts. Richard H. Levy, Study of a Heavy Ion Plasma Accelerator. $101,827 (16 months).

Baylor University, Waco, Texas. W. O. Milligan, Crystal Structure and Morphology of Hydrous Oxides and Hydroxides in the Lanthanide and Actinide Series. $26,000.

Baylor University, Waco, Texas. Malcolm Dole, Radiation Chemistry in High Polymers. $20,000.

Brandeis University, Waltham, Massachusetts. Henry Linschitz, Photochemical Reactions of Complex Molecules in Condensed Phase. $55,000.

Brandeis University, Waltham, Massachusetts. Saul G. Cohen, Effects of Mercaptans and Disulfides on Photochemical and High Energy Radiation Induced Reactions. $23,400.

Brown University, Providence, Rhode Island. E. F. Greene, Experimental Chemical Kinetics: A Study of Chemical Reactions by Means of Molecular Beam and Shock Wave Techniques. $55,000.

California Institute of Technology, Pasadena, California. Frederick H. Shair, Diffusion of Molecular Species at Low Concentrations in Glow Discharge. $21,000.

California Institute of Technology, Pasadena, California. Aron Kuppermann, Studies in Chemical Dynamics and Radiation Chemistry. $120,000.

California Institute of Technology, Pasadena, California. Samuel Epstein, Geochemical Studies with Stable and Radioactive Species. $160,000.

California Institute of Technology, Pasadena, California. Jesse L. Beauchamp, The Application of Ion Cyclotron Resonance to the Study of Ion-Molecule Interactions. $32,690.

California, University of, Davis, California. John W. Root, Recoil Studies in Chemical Dynamics. $43,500.

California, University of, Davis, California. Peter A. Rock, The Thermodynamic Properties of Lithium Isotopes. $11,000.

California, University of, Irvine, California. Frank S. Rowland, Radiochemistry Research. $130,000.

California, University of, Irvine, California. Max Wolfsberg, Theoretical Studies on Isotopic Mass Effects in Chemistry. $85,000 (2 years).

California, University of, Los Angeles, California. W. G. McMillan, E. R. Hardwick and M. F. Nicol, Intra- and Intermolecular Energy Transfer Studies. $105,000 (18 months).

California, University of, Los Angeles, California. M. A. El-Sayed, Electronic Spectroscopy of Polyatomic Molecules. $49,950.

California, University of, Los Angeles, California. Clifford S. Garner, Complex Ion Chemistry. $35,000.

California, University of, San Diego, California. Harold C. Urey and Kurt Marti, The Distribution and Origin of the Elements and Their Isotopes in Nature. $40,000.

California, University of, San Diego, California. Joseph E. Mayer, Interacting Atoms. $33,000.

Carnegie-Mellon University, Pittsburgh, Pennsylvania. Truman P. Kohman, Nuclear Chemistry and Geochemistry Research. $60,109.

Carnegie-Mellon University, Pittsburgh, Pennsylvania. Robert H. Schuler, Radiation Chemistry. $355,000.

Carnegie-Mellon University, Pittsburgh, Pennsylvania. Albert A. Caretto, Jr., High Energy Nuclear Reactions. $60,000.

Carnegie-Mellon University, Pittsburgh, Pennsylvania. Joe V. Michael, Reactions of Hydrogen Atoms. $26,000.

Carnegie-Mellon University, Pittsburgh, Pennsylvania. Morton Kaplan, Research in Nuclear Chemistry. $47,138 (7½ months).

Case Western Reserve University, Cleveland, Ohio. Edwin W. Abrahamson, Primary Processes in Radiation Chemistry. $20,000 (20 months).

Case Western Reserve University, Cleveland, Ohio. Robert E. Sparks, Velocity Profile Control in Large Scale Chromatographic Columns. $37,000 (4 years).

Catholic University of America, Washington, D. C. Theodore A. Litovitz, Structural Relaxation in Liquids. $21,538.

Chicago, University of, Chicago, Illinois. Clyde A. Hutchison, Jr., Paramagnetic Resonance Absorption. $150,000.

Chicago, University of, Chicago, Illinois. Edward Anders, Radiochemical and Geochemical Studies. $57,727.

Chicago, University of, Chicago, Illinois. Nathan Sugarman and Anthony Turkevich, Nuclear Chemistry Research. $190,000.

Chicago, University of, Chicago, Illinois. Ugo Fano, Basic Studies of Atomic Dynamics. $52,000.

Chicago, University of, Chicago, Illinois. Yuan Tseh Lee, The Dynamics of Chemical Reactions by Molecular Beam Techniques. $35,566.

Clark University, Worcester, Massachusetts. Daeg S. Brenner, Nuclear Chemistry and Radiochemistry. $23,000.

Clarkson College of Technology, Potsdam, New York. Milton Kerker, Studies on Colloidal Particles: Scavenging of Aerosol Particles by a Falling Macroscopic Particle. $28,000.

Clarkson College of Technology, Potsdam, New York. Richard J. Nunge and Fadel F. Erian, An Investigation of Pulsating Turbulent Flow. $32,000.

Colorado State University, Fort Collins, Colorado. John D. Vaughan, Chemical Effects of the Nuclear Reaction $N^{14}(n,p)C^{14}$ in Various Nitrogenous Compounds. $13,500.

Columbia University, New York, New York. T. I. Taylor, Separation of Isotopes. $47,864.

Columbia University, New York, New York. J. M. Miller, Nuclear Chemistry at Medium and High Energy. $65,951.

CHEMISTRY

Columbia University, New York, New York. Paul F. Kerr, Origin of Plateau Uranium Ores: With Emphasis on Mineralization and Alteration. $32,000.

Columbia University, New York, New York. Charles F. Bonilla, High Temperature Transport Properties and Processes of Gases and Alkali Metals. $52,174 (18 months).

Cornell University, Ithaca, New York. Franklin A. Long, Mechanisms of Acid-Base Catalysis and Studies in Deuterium Oxide as Solvent. $37,997.

Dordt College, Sioux Center, Iowa. Russell Maatman, Interactions of Aqueous and Nonaqueous Ions with Oxide Surfaces. $8,000 (18 months).

Florida State University, Tallahassee, Florida. Gregory R. Choppin, Research in Nuclear Chemistry. $49,933.

Florida State University, Tallahassee, Florida. Russell H. Johnsen, Radiation Induced Effects in Organic Systems. $40,500.

Florida State University, Tallahassee, Florida. Raymond K. Sheline, An Experimental Study of Nuclear Models. $95,000.

Florida, University of, Gainesville, Florida. M. Luis Muga, Ternary Fission and the Interaction of Fission Fragments with Matter. $46,000.

Florida, University of, Gainesville, Florida. Robert J. Hanrahan, Radiation Chemistry of Hydrocarbon and Alkyl Halide Systems. $54,000 (18 months).

Fordham University, New York, New York. Michael Cefola, Kinetics and Structural Studies of Chelates. $25,000.

Franklin Institute/Germantown Laboratories, Inc., Philadelphia, Pennsylvania. Aristid V. Grosse, High Temperature Inorganic Chemistry. $30,000.

George Washington University, Washington, D. C. Nicolae Filipescu, Lanthanide Ions as Sensitive Probes in Intermolecular Energy Transfer and Organic Photochemistry. $10,000.

Georgia Institute of Technology, Atlanta, Georgia. Richard W. Fink, Nuclear Spectroscopy and Fast Neutron Reactions. $71,000.

Georgia Institute of Technology, Atlanta, Georgia. James A. Knight, Jr., Radiation Chemistry of Monosubstituted Aromatic Compounds. $20,000.

Georgia, University of, Athens, Georgia. Francis J. Johnston, Studies in Colloid Kinetics and Radiation Chemistry. $12,000.

Georgia, University of, Athens, Georgia. Charles E. Melton, Radiolysis of Water in a Wide Range Radiolysis Source. $32,000.

Georgia, University of, Athens, Georgia. David M. Hercules, Photoelectron Spectroscopy. $35,000.

Harvard University, Cambridge Massachusetts. William A. Klemperer, Molecular Spectroscopy of Substances Existing at High Temperatures. $60,000.

Harvard University, Cambridge, Massachusetts. Martin Karplus, Theoretical Studies in Chemical Kinetics. $75,000.

Houston, University of, Houston, Texas. Gerhard G. Meisels, Principal Processes in the Radiolysis of Gases by High Energy Electrons and Fission Recoils. $47,000.

Houston, University of, Houston, Texas. L. C. Witte, The Vapor Explosion - Heat Transfer and Fragmentation. $60,000 (2 years).

Howard University, Washington, D. C. Peter Hambright, Kinetic, Magnetic and Mössbauer Studies on Porphyrin Systems. $28,000.

CHEMISTRY

Howard University, Washington, D. C. Lue-Yung Chow Chiu, The Fine and Hyperfine Structure of Rovibronic Linear Triatomic Molecule. $25,000.

Idaho State University, Pocatello, Idaho. Joseph L. Thompson, Consequences of Radioactive Decay: Charge and Kinetic Energy of the Daughter Atom. $8,000.

Illinois Institute of Technology, Chicago, Illinois. Phillip G. Wahlbeck, High Temperature Chemistry-Fundamentals of Effusion and Thermodynamics of Materials. $33,400.

Illinois Institute of Technology, Chicago, Illinois. Theodore J. Neubert, Color Centers and Related Phenomena in Alkali Halide Type Crystals. $32,000.

Illinois, University of, Urbana, Illinois. Robert F. Nystrom, Preparation of Carbon-14 and Tritium Labeled Compounds by Hydroboration and Tritioboration Procedures. $17,821.

Illinois, University of, Urbana, Illinois. Peter E. Yankwich, Isotope Effects and Chemical Kinetics. $29,000.

Indiana University, Bloomington, Indiana. W. B. Schaap and F. C. Schmidt, Electrochemical Research in Amine Solvents. $5,000 (6 months).

Indiana University, Bloomington, Indiana. V. J. Shiner, Jr., Deuterium Effects on the Rates of Organic Reactions. $22,538.

Iowa, University of, Iowa City, Iowa. E. David Cater, High Temperature Physical Chemistry. $20,375.

Iowa, University of, Iowa City, Iowa. Gilbert Gordon, Stable Isotope Tracer Studies. $24,000.

Johns Hopkins University, Baltimore, Maryland. Paul H. Emmett, Study of Catalytic Surfaces and the Mechanism of Catalytic Reactions. $16,118.

Johns Hopkins University, Baltimore, Maryland. Walter S. Koski and Joyce J. Kaufman, Studies in Hot Atom and Radiation Chemistry. $54,000.

Kansas State University, Manhattan, Kansas. Herbert C. Moser, Chemical Effects of Low Energy Electron Irradiation: Reactions of Tritium Atoms and Ions. $12,280.

Kansas, University of, Lawrence, Kansas. Edward J. Zeller, Study of Natural Radiation Damage in Minerals by Electron Spin Resonance and Thermoluminescence. $25,000.

Kansas, University of, Lawrence, Kansas. Paul W. Gilles, High Temperature Chemistry. $90,000.

Kentucky, University of Lexington, Kentucky. William F. Wagner and Donald E. Sands, Properties and Structure of Solvates of Metal Chelates. $25,000.

Kentucky, University of, Lexington, Kentucky. William D. Ehmann, Radiochemistry as Applied to Geochemical Problems; Neutron Activation Analysis. $20,500

Kentucky, University of, Lexington, Kentucky. Charles E. Hamrin, Jr., Separation of Boron Isotopes by Parametric Pumping. $17,000.

Lehigh University, Bethlehem, Pennsylvania. Edward K. Levy, Vapor Compressibility Effects in Heat Pipes. $20,385 (16 months).

Long Island University, Greenvale, New York. James J. Barker, Particle-to-Fluid Heat Transfer Coefficients in Fluidized Beds by Means of a Microelectronic Device. $21,565 (30 months).

Maryland, University of, College Park, Maryland. Joseph Silverman, Graft Polymerization. $32,015.

Maryland, University of, College Park, Maryland. Everett R. Johnson, The Radiation Induced Decomposition of Inorganic Salts. $24,580 (18 months).

Maryland, University of, College Park, Maryland. Victor E. Viola, Jr., Research in Nuclear Chemistry. $40,000.

Maryland, University of, College Park, Maryland. Glen E. Gordon, Nuclear Structure and Activation Analysis. $75,000 (2 years).

Massachusetts Institute of Technology, Cambridge, Massachusetts. Charles D. Coryell, et al, Nuclear Chemistry Research. $222,783.

Massachusetts Institute of Technology, Cambridge, Massachusetts. Patrick M. Hurley, Variations in Isotopic Abundances of Strontium, Calcium and Argon, and Related Topics. $70,000.

Massachusetts Institute of Technology, Cambridge, Massachusetts. F. Albert Cotton, Thermodynamic, Spectral and Structural Studies of Complex Ions. $42,000.

Miami, University of, Miami, Florida. David E. Fisher, Studies on Meteorites and Related Subjects. $24,000.

Michigan State University, East Lansing, Michigan. Harry A. Eick, An Investigation of Some Rare Earth Boron, Carbon, Nitrogen, and Related Systems at Elevated Temperatures. $35,000.

Michigan State University, East Lansing, Michigan. James L. Dye, Electrochemistry and Spectra of Metal-Ammonia and Metal-Amine Solutions and Kinetics of Electron-Attachment Reactions. $35,000.

Michigan State University, East Lansing, Michigan. Carl H. Brubaker, Jr., Effects of Polyfunctional Anions on the Electron-Transfer Between Metal Ions in Solution. $18,000.

Michigan State University, East Lansing, Michigan. Max T. Rogers, Electron Spin Resonance Studies of Radiation Effects. $25,000.

Michigan State University, East Lansing, Michigan. William G. McHarris, Nuclear Chemistry Research. $75,000.

Michigan Technological University, Houghton, Michigan. Leslie Leifer, Fundamental Studies of Concentrated Electrolyte Solutions. $19,000.

Michigan, University of, Ann Arbor, Michigan. Adon A. Gordus, Radiochemical Studies. $30,000.

Michigan, University of, Ann Arbor, Michigan. Edgar F. Westrum, Jr., Low Temperature Chemical Thermodynamics. $50,000.

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Oklahoma, University of, Norman, Oklahoma. Ronald R. Bourassa, Thermoelectric Size Effect in Noble Metals. $27,500.

Oregon State University, Corvallis, Oregon. James R. Welty, Natural Convection Heat Transfer in Liquid Metals. $16,061.

Pennsylvania State University, University Park, Pennsylvania. P. L. Walker, Jr., Research on Graphite. $109,770.

Pennsylvania State University, University Park, Pennsylvania. Arnulf Muan, Thermodynamic Properties of Solid Solutions at High Temperatures. $29,000.

Pennsylvania State University, University Park, Pennsylvania. Earle Ryba, Transformations in AB_2 Intermetallic Compounds. $11,000 (24½ months).

Pennsylvania State University, University Park, Pennsylvania. G. R. Barsch, Nonlinear Elastic and Thermoelastic Properties of Materials. $49,390.

Pennsylvania State University, University Park, Pennsylvania. Richard C. Bradt and John H. Hoke, Ceramic Research on Transformational Superplasticity and Ferroelectric Domain Boundaries. $20,405.

Pennsylvania, University of, Philadelphia, Pennsylvania. Norman Brown and David P. Pope, Dislocation Mobilities in Ordered Alloys. $24,987.

Pittsburgh, University of, Pittsburgh, Pennsylvania. Raymond S. Craig and W. E. Wallace, Thermal, Structural and Magnetic Studies of Metals and Intermetallic Compounds. $95,000.

Pittsburgh, University of, Pittsburgh, Pennsylvania. John R. Townsend, A Study of Radiation Induced Defects in Metals. $30,367.

Pittsburgh, University of, Pittsburgh, Pennsylvania. William A. Soffa, Precipitation from Supersaturated Copper-Titanium Solid Solutions: The Aging Process in Copper-Titanium Side-Band Alloys. $28,000.

Princeton University, Princeton, New Jersey. David O. Welch, Model Pseudopotentials and Atomic Properties in Simple Metals and Alloys. $28,757.

Puerto Rico, University of, Mayaguez, Puerto Rico. Mortimer I. Kay, Neutron Diffraction Studies. $200,800.

Puerto Rico, University of, Rio Piedras, Puerto Rico. Amador Cobas, Radiation Damage in Organic Crystals. $63,200.

Purdue University, Lafayette, Indiana. John W. MacKay, Basic Radiation Damage Studies. $66,920.

Purdue University, Lafayette, Indiana. Richard E. Grace, Transport and Thermodynamic Properties of Solids. $33,000.

Purdue University, Lafayette, Indiana. James G. Mullen, Mossbauer Studies of the Properties of Solids. $32,000.

Purdue University, Lafayette, Indiana. James R. Cost, Diffusion and Precipitation of Inert Gases in Metals. $42,933.

Rensselaer Polytechnic Institute, Troy, New York. H. B. Huntington, Anisotropic Diffusion and Electromigration. $55,700.

Rensselaer Polytechnic Institute, Troy, New York. Edmond Brown, Theoretical Research on Electron Behavior in Crystals. $29,000 (19½ months).

Rensselaer Polytechnic Institute, Troy, New York. Norman S. Stoloff, Precipitation and Dispersion Hardening in Hexagonal Alloys. $24,900.

Rensselaer Polytechnic Institute, Troy, New York. H. Michael Gilder, Effect of Hydrostatic Pressure on Self-Diffusion Rates in Hexagonal Metals. $35,000.

Rensselaer Polytechnic Institute, Troy, New York. Fritz V. Lenel, Research in Powder Metallurgy, $33,000.

Rhode Island, University of, Kingston, Rhode Island. J. S. Desjardins and S. S. Malik, Measurement of Frequency Spectra of Normal Modes by Means of Inelastic Neutron Scattering from Oriented Single Crystals. $15,875.

Southern California, University of, Los Angeles, California. Lawrence E. Murr, The Effects of Electric and Magnetic Fields on the Nucleation, Structure, and Residual Properties of Vapor Deposited Metal Films. $29,000.

Southern California, University of, Los Angeles, California. Young B. Kim, Materials Research on High-Field Superconductors. $93,000.

Stanford University, Stanford, California. Craig R. Barrett and William D. Nix, Structure Dependence of High Temperature Deformation of Metals. $47,504.

Stanford University, Stanford, California. Norman A. Parlee, Nitride Forming Reactions in Liquid Uranium Alloys. $38,830.

Syracuse University, Syracuse, New York. Richard W. Vook, In Situ Ultra High Vacuum High Energy Electron Diffraction Studies. $30,522.

Temple University, Philadelphia, Pennsylvania. Leonard Muldawer and Henri Amar, Study of the IB-IIB Beta Phase Alloys. $90,000.

Tennessee, University of, Knoxville, Tennessee. E. E. Stansbury and C. R. Brooks, Application of Adiabatic Calorimetry to Metal Systems. $22,434.

Tennessee, University of, Knoxville, Tennessee. J. E. Spruiell, Study of a New Method for Preparing Ultra-Fine Grained Metal Alloys. $17,806.

Texas Christian University, Fort Worth, Texas. Richard F. Raeuchle, Structural Studies of Amorphous Aluminum Oxide. $20,319 (27 months).

Texas, University of, Austin, Texas. Thomas H. Courtney, Elevated Temperature Morphological Stability of Metal Matrix Fiber Composites. $16,714.

Tuskegee Institute, Tuskegee, Alabama. Ira G. Dillon, Density Determinations Using a Gamma Radiation Attenuation Technique. $36,000.

Utah, University of, Salt Lake City, Utah. Ronald S. Gordon, Impurity Effects on the Creep of Polycrystalline Magnesium and Aluminum Oxides at Elevated Temperatures. $21,428.

Utah, University of, Salt Lake City, Utah. Abraham Sosin, The Fundamentals of Radiation Damage. $87,600.

Vanderbilt University, Nashville, Tennessee. James J. Wert, Deformation Studies of Superlattice Structures. $6,000 (6 months).

Vermont, University of, Burlington, Vermont. John S. Brown, Thermodynamic and Transport Properties of Interstitial Hydrogen Isotopes in Palladium. $21,891.

Virginia, University of, Charlottesville, Virginia. Robert V. Coleman, Electronic Properties of Metals and Alloys. $75,939.

Virginia, University of, Charlottesville, Virginia. Doris Kuhlmann-Wilsdorf, Investigations on the Behavior of Point Defects and Dislocations. $62,323.

Virginia, University of, Charlottesville, Virginia. John W. Mitchell, Dynamic Dislocation Phenomena in Single Crystals of Metals and Alloys. $75,000 (18 months).

Wake Forest University, Winston-Salem, North Carolina. Thomas J. Turner and George P. Williams, Jr., A Study of Atomic Mobilities in Crystalline Solids. $36,504 (2 years).

Washington, University of, Seattle, Washington. Robert L. Ingalls, Mössbauer Studies at High Pressure. $33,466.

Washington, University of, Seattle, Washington. Douglas H. Polonis, A Study of Phase Transformations and Superconductivity. $35,428.

Wayne State University, Detroit, Michigan. Yeong-Wook Kim, Electron Paramagnetic Resonance Studies of Radiation Effects in Solids and Chemical Compounds. $55,000.

METALLURGY AND MATERIALS

Wisconsin, University of, Madison, Wisconsin. Richard A. Dodd, Creep Mechanisms in B.C.C. Alloy Crystals. $27,100.

Yale University, New Haven, Connecticut. C. N. J. Wagner, X-ray Study of the Structure of Liquid Metals and Alloys. $28,426.

Yale University, New Haven, Connecticut. Werner P. Wolf, The Study of Ideal Magnetic Crystals. $80,000.

Brooklyn, Polytechnic Institute of, Farmingdale, New York. KunMo Chung, Experimental Study of Plasma Turbulence using a Hollow Cathode Discharge. $36,920.

Brooklyn, Polytechnic Institute of, Brooklyn, New York. Alan Oppenheim, Bremsstrahlung Radiation in High Temperature Plasmas. $17,000 (15 months).

California Institute of Technology, Pasadena, California. Robert S. Harp, Research on Plasma Waves. $29,000.

California, University of, Berkeley, California. Charles K. Birdsall and A. Bruce Langdon, Computer and Alkali Plasma Instability Experiments. $55,000.

California, University of, Davis, California. James P. Hurley, An Upper Bound on Plasma Containment. $5,335.

California, University of, Irvine, California. Nathan Rynn, Experiments on Alkali Metal and Barium Plasmas. No Funds.

California, University of, Los Angeles, California. William B. Kehl and Burton D. Fried, Interactive Display System for the IBM 360 Model 91 for Plasma Physics. $62,389.

California, University of, Los Angeles, California. Burton D. Fried, Alfredo Banos, Jr., K. R. MacKenzie, A. Y. Wong and Charles F. Kennel, Joint Experimental-Theoretical Program in Plasma Physics. $79,978.

California, University of, San Diego, California. William B. Thompson, Plasma Physics Research (Theoretical). $48,200 (11 months).

Colorado, University of, Boulder, Colorado. Richard E. Aamodt, Nonlinear Phenomena in Collisionless Plasmas. $12,325 (10 months).

Columbia University, New York, New York. Chia-Kun Chu, Research in Computational Plasma Physics. $61,689.

Cornell University, Ithaca, New York. Peter L. Auer, Properties of the High Beta Plasma State. $54,000.

Cornell University, Ithaca, New York. Charles B. Wharton, Investigation of Plasma Turbulence by Microwave Scattering. $65,000.

Cornell University, Ithaca, New York. Ravindra N. Sudan, Theoretical Studies on Astron Stability and Associated Problems. $22,000.

Environmental Science Services Administration, Boulder, Colorado. Plasma Density Correlation and Diffusion Study. $11,500.

Georgia Institute of Technology, Atlanta, Georgia. Edward W. Thomas, Formation of Excited Hydrogen Atoms by Charge Transfer and Dissociation. $27,000.

Georgia Institute of Technology, Atlanta, Georgia. John W. Hooper, The Excitation and Ionization of Ions by Electron Impact. $39,647.

Gulf General Atomic, Inc., San Diego, California. T. Ohkawa, Plasma Confinement in Toroidal Multipoles. $713,900.

Houston, University of, Houston, Texas. Gregory M. Haas and Melvin Eisner, Investigation of Ion Heating by Modulated Electron Beams. $20,000.

Institute for Advanced Study, Princeton, New Jersey. Marshall N. Rosenbluth, Theoretical Plasma Physics Research. $59,510.

Iowa, University of, Iowa City, Iowa. Georg E. Knorr, Numerical and Analytical Investigation of Non-Linear Properties of the Vlasov Equation and of Plasmas. $35,000 (15 months).

Maryland, University of, College Park, Maryland. Hans R. Griem and Hans-Joachim Kunze, Applications of Light Scattering to Plasma Diagnostics. $115,800.

Maryland, University of, College Park, Maryland. Herbert Lashinsky, Investigation of Universal Plasma Instabilities. $54,000.

Maryland, University of, College Park, Maryland. David W. Koopman and D. A. Tidman, Collisionless Shock Studies Using Laser-Produced Plasmas. $35,815.

Massachusetts Institute of Technology, Cambridge, Massachusetts. George Bekefi, Abraham Bers, Lawrence M. Lidsky and David J. Rose, Plasma Physics Research. $716,800.

Miami, University of, Coral Gables, Florida. Daniel R. Wells, Investigation of Plasma Vortex Structures. No Funds.

Miami, University of, Coral Gables, Florida. Harry S. Robertson, Containment and Heating of Lithium Plasma. $68,000.

Michigan, University of, Ann Arbor, Michigan. Terry Kamash, Microinstabilities in Inhomogeneous Plasma. $40,005.

National Bureau of Standards, Washington, D. C. High Field Magnet Research; Hydrogen Cross Section Measurements; Ultraviolet Optical and Photoelectric Properties of Solid Materials. $121,102.

New York University, New York, New York. Harold Grad, Plasma Physics and Magneto-Fluid Dynamics. $239,818.

Pennsylvania State University, University Park, Pennsylvania. Edward H. Klevans and James W. Robinson, The Experimental and Theoretical Investigation of an Inertial, Electrostatic Confinement Device. $50,000 (2 years).

Roanoke College, Salem, Virginia. Charles R. Finfgeld, Proton Sputtering. $17,000.

Rochester, University of, Rochester, New York. Albert Simon, Nonlinear Behavior of Unstable Plasma in the Threshold Regime. $35,000.

Rochester, University of, Rochester, New York. Moshe J. Lubin, An Experimental Investigation of Laser Plasma Injection in a Toroidal Multipole. $60,096.

Stanford University, Stanford, California. Frederick W. Crawford, Oscar Buneman and Donald A. Dunn, Plasma Physics Research. $176,000.

Stevens Institute of Technology, Hoboken, New Jersey. George J. Yevick and Robin Harvey, Experimental Investigations of Cusped Containment Geometries. $126,600.

Stevens Institute of Technology, Hoboken, New Jersey. Kenneth C. Rogers and Robin Motz, Investigations in Plasma Dynamics. $69,928.

Stevens Institute of Technology, Hoboken, New Jersey. George Schmidt, Investigations in Plasma Dynamics. $27,503.

Tennessee, University of, Knoxville, Tennessee. Edward G. Harris, Instabilities Due to Anisotropic Velocity Distributions. $34,731.

Texas Tech University, Lubbock, Texas. Magne Kristiansen, Theoretical and Experimental Investigations of Harmonic Ion Cyclotron Wave Propagation and Plasma Heating. $16,627.

Texas, University of, Austin, Texas. William E. Drummond, Anomalous Diffusion and Thermalization of Turbulent Plasmas. $88,000.

Texas, University of, Austin, Texas. D. Gary Swanson, Quasistatic Ion Cyclotron Wave Studies. $22,000.

United Aircraft Corporation, East Hartford, Connecticut. Alan F. Haught, Production of Plasmas for Thermonuclear Research by Laser Beam Irradiation of Single Solid Particles. $159,970.

Washington State University, Pullman, Washington. Edward E. Donaldson and M. J. Dresser, Surface Studies Concerning Plasma Environments. $55,000.

Wisconsin, University of, Madison, Wisconsin. Juda L. Shohet, Plasma Instabilities and Waves Excited by Electron Temperature Anisotropy Produced by Electron Cyclotron Resonance. $22,500.

Wisconsin, University of, Madison, Wisconsin. Donald W. Kerst, Thermonuclear Plasma Studies. $460,000.

Wisconsin, University of, Madison, Wisconsin. John E. Scharer and James B. Beyer, Cyclotron Wave Plasma Experiment. $8,000 (29 months).

Yale University, New Haven, Connecticut. Ira B. Bernstein, Theoretical Research in the Fundamentals of Plasma Physics. $32,000.