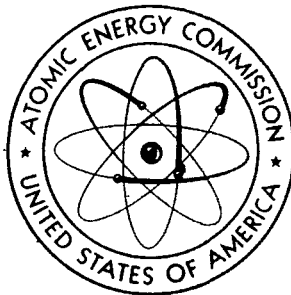


UNITED STATES
ATOMIC ENERGY COMMISSION

RESEARCH CONTRACTS
in the
PHYSICAL SCIENCES



JULY 1, 1967

DIVISION OF RESEARCH

INDEX

	<u>Page</u>
Introduction	2
List of Major Research Centers	5
Summary of Off-site Contracts	6
Summary of New Proposals Received and Actions Taken	7
Summary of Contracts by State	8
Contract Listing:	
High Energy Physics	13
Medium Energy Physics	15
Low Energy Physics	16
Mathematics and Computer Research	19
Chemistry	20
Metallurgy and Materials	33
Controlled Thermonuclear Research	43

I N T R O D U C T I O N

The Physical Research Program, though including some applied investigations initiated to develop certain aspects of the practical utilization of nuclear energy, consists mainly of basic research undertaken to discover new scientific knowledge in the fields of high, medium, and low energy physics, mathematics, chemistry, metallurgy, materials, and controlled thermonuclear reactions.

Approximately three-fourths of the costs of operations and related capital equipment acquisition of the Physical Research program are associated with the support of research conducted in AEC national and other multiprogram laboratories and special research centers. Most of the research conducted at sites other than such major research centers ("off-site") is carried out at universities and other institutions of higher education, and is based almost entirely on unsolicited proposals.

Major Research Centers

There is no clear line of demarcation between "major research centers" and "other sites". The AEC investment in facilities ranges from zero for some contractors to tens of millions for others, and likewise, the annual level of AEC support ranges from a few thousand dollars for some contractors to tens of millions for others - the spectrum is broad with no significant peaks or breaks.

Many of the major research centers are also engaged in research and development activities other than under the Physical Research Program; namely activities for the Production, Weapons, Reactor Development and Technology, Biology and Medicine, Isotopes Development and Civilian Applications of Nuclear Explosives programs. The Physical Research Program at multiprogram laboratories provides, in varying degrees, the basic investigations underlying the applied and developmental activities of the individual laboratory. Some of the other major research centers tend to be more specialized and are engaged in research in a single, defined area, such as high energy physics. They all have the following 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 vested in the laboratory management with only major overall research guidance supplied by AEC.

Washington-Designated Contract-Research Program

In addition to the research conducted at the major research centers, 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, although in many instances, practical applications are not immediately discernable from the basic research effort. Thus the off-site program aids in the advancement of science in those disciplines that are fundamental to AEC's programs.

As a supplement to AEC's programs at the major research centers the contract-research program has a number of distinct benefits:

1. When the amount provided by AEC is added to the 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 supply 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, and Mathematics & Computer research.

Division of Biology and Medicine:

Life Sciences, including Medicine, Biology, Ecology and Marine Sciences; Atmospheric Radioactivity and Fallout Studies; Radiation Instrumentation; and Radiological Physics.

Division of Reactor Development and Technology:

Nuclear Reactor Technology.

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 Educational 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. 13-44, including the name and address of the contractor, the names(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.

MAJOR RESEARCH CENTERS

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

<u>Name of Laboratory and Contractor and Contract Number</u>	<u>Level of Physical Research Program Support - FY 1967</u> (in thousands)	
	<u>Operations</u>	<u>Equipment</u>
<u>Ames Laboratory</u> , Ames, Iowa Iowa State University, W-7405-ENG-82	\$ 6,754	\$ 1,076
<u>Argonne National Laboratory</u> , Argonne, Illinois Argonne Universities Association and University of Chicago, W-31-109-ENG-38	36,350	10,122
<u>Brookhaven National Laboratory</u> , Upton, L. I., New York Associated Universities, Inc., AT(30-2)-GEN-16	33,584	8,076
<u>Cambridge Electron Accelerator</u> , Cambridge, Massachusetts Harvard University, AT(30-1)-2076, AT(30-1)-2752 Massachusetts Institute of Technology, AT(30-1)-2098	8,446	1,397
<u>Knolls Atomic Power Laboratory</u> , Schenectady, New York General Electric Company, W-31-109-ENG-52	554	61
<u>Lawrence Radiation Laboratory</u> , Berkeley and Livermore, California University of California, W-7405-ENG-48	39,693	4,338
<u>Los Alamos Scientific Laboratory</u> , Los Alamos, New Mexico University of California, W-7405-ENG-36	5,272	373
<u>Mound Laboratory</u> , Miamisburg, Ohio Monsanto Chemical Company, AT(33-1)-GEN-53	479	146
<u>National Accelerator Laboratory</u> , Chicago, Illinois Universities Research Association, Inc., AT(49-8)-3000	195	-
<u>National Reactor Testing Station</u> , Idaho Falls, Idaho Idaho Nuclear Corporation, AT(10-1)-205	139	7
<u>Oak Ridge K-25 Plant</u> , Oak Ridge, Tennessee Union Carbide Nuclear Company, W-7405-ENG-26	49	-
<u>Oak Ridge National Laboratory</u> , Oak Ridge, Tennessee Union Carbide Nuclear Company, W-7405-ENG-26	31,602	2,597
<u>Pacific Northwest Laboratory</u> , Richland, Washington Battelle Memorial Institute, AT(45-1)1830	2,027	301
<u>Princeton-Pennsylvania Proton Accelerator</u> , Princeton, New Jersey Princeton University, AT(30-1)-2137 University of Pennsylvania, AT(30-1)-2171	7,904	793
<u>Princeton Plasma Physics Laboratory</u> , Princeton, New Jersey Princeton University, AT(30-1)-1238	6,320	395
<u>Stanford Linear Accelerator Center</u> , Stanford, California Stanford University, AT(04-3)-400, AT(04-3)-515	15,266	7,237
	<u>\$ 194,634</u>	<u>\$ 36,919</u>

*FY 1967 Costs for Operations and Capital Equipment

SUMMARY OF OFF-SITE CONTRACTS

The following summarizes the number and level of Washington-designated off-site contracts in effect on July 1, 1967 and supported under the Physical Research Program:

<u>Type of Organization</u>	<u>No. of Institutions</u>	<u>No. of Contracts</u>	<u>FY 1967 Funding (in 1000's)</u>
Educational Institutions	135	530	\$ 65,516
Not-for-Profit Institutes	9	12	473
Industrial Organizations	<u>7</u>	<u>10</u>	<u>1,297</u>
Total	151	552	\$ 67,286

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

<u>AEC Budget Category</u>	<u>No. of Contracts</u>	<u>FY 1967 Funding (in 1000's)</u>
High Energy Physics	37	\$ 18,524
Medium Energy Physics	12	3,985
Low Energy Physics	56	16,325
Mathematics and Computer Research	18	6,856
Chemistry	227	10,290
Metallurgy and Materials	170	9,166
Controlled Thermonuclear Research	<u>32</u>	<u>2,140</u>
Total	<u>552</u>	\$ <u>67,286</u>

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 60 new contracts written and a corresponding number of old contracts terminating each year. In FY 1967, 61 new projects were started, while 46 contracts terminated. While the total number of contracts has tended to remain rather constant, the total dollar level increased from \$50.5 million in 1962 to \$67.3 million in 1967.

The above summary does not include the portion of the Physical Research Program supported through reimbursable agreements with other Federal agencies. In FY 1967 there were four such agreements in effect between AEC and the following Government agencies with a total FY 1967 obligation of \$840,698, as follows:

1. Environmental Science Services Administration	\$ 39,600
2. National Bureau of Standards (2)	684,401
3. Navy - Bureau of Ships	116,697

SUMMARY OF NEW PROPOSALS RECEIVED AND ACTIONS TAKEN

During Fiscal Year 1967 the Division of Research received 431 formal proposals for new research, representing requests for a total of \$45.5 million. On hand at the beginning of FY 1967 pending completion of reviews were 174 new proposals requesting \$12.7 million, for a total of 605 proposals representing requests for \$58.2 million.

Approved during FY 1967 were 61 new proposals for \$3.4 million, while 311 representing \$19.5 million, were declined, tabled, or withdrawn.

NEW PROPOSALS - FY 1967
(\$ in 1000's)

	<u>On Hand 7/1/66</u>		<u>Received During FY 1967</u>		<u>Total</u>	
	<u>No.</u>	<u>Amount</u>	<u>No.</u>	<u>Amount</u>	<u>No.</u>	<u>Amount</u>
High Energy Physics	17	\$ 1,561	53	\$ 5,422	70	\$ 6,983
Physics & Mathematics	37	4,793	100	27,293	137	32,086
Chemistry	61	2,255	126	5,522	187	7,777
Metallurgy & Materials	46	1,734	112	3,913	158	5,647
Controlled Thermonuclear	13	2,399	40	3,352	53	5,751
TOTAL	174	\$ 12,742	431	\$ 45,502	605	\$ 58,244

ACTIONS TAKEN - NEW PROPOSALS - FY 1967
(\$ in 1000's)

	<u>Approved</u>		<u>Declined, etc.</u>		<u>On Hand 6/30/67</u>	
	<u>No.</u>	<u>Amount</u>	<u>No.</u>	<u>Amount</u>	<u>No.</u>	<u>Amount</u>
High Energy Physics	7	\$ 489	22	\$ 2,166	41	\$ 4,328
Physics & Mathematics	10	1,492	76	6,788	51	23,806
Chemistry	18	530	105	3,996	64	3,251
Metallurgy & Materials	21	739	89	3,201	48	1,707
Controlled Thermonuclear	5	124	19	3,387	29	2,240
TOTAL	61	\$ 3,374	311	\$ 19,538	233	\$ 35,332

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 431 in FY 1967. Approval rates have tended to decrease somewhat, averaging 60 annually during the 1963 - 1967 period, compared to 90 annually for the 1958 - 1962 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)

<u>State and Contractor</u>	<u>Number of Contracts</u>	<u>FY 1967 Funding (in 1000's)</u>
<u>Alabama</u>	<u>1</u>	<u>\$ 50</u>
Tuskegee Institute, Tuskegee	1	50
<u>Arizona</u>	<u>9</u>	<u>\$ 334</u>
Arizona State University, Tempe	1	80
Arizona, University of, Tucson	8	254
<u>Arkansas</u>	<u>3</u>	<u>\$ 177</u>
Arkansas, University of, Fayetteville	3	177
<u>California</u>	<u>63</u>	<u>\$ 9,142</u>
Atomics International, Canoga Park	4	784
California Institute of Technology, Pasadena	8	2,572
California, University of, Berkeley	8	318
California, University of, Davis	1	839
California, University of, Irvine	3	212
California, University of, Los Angeles	10	1,103
California, University of, Riverside	3	323
California, University of, San Diego	7	1,461
California, University of, Santa Barbara	2	235
General Dynamics, San Diego	1	136
Harvey Mudd College, Claremont	1	17
Navy, Bureau of Ships, San Francisco	1	117
Southern California, University of, Los Angeles	3	450
Stanford Research Institute, Menlo Park	1	84
Stanford University, Stanford	10	491
<u>Colorado</u>	<u>7</u>	<u>\$ 807</u>
Colorado State University, Ft. Collins	1	10
Colorado, University of, Boulder	4	757
Denver, University of, Denver	1	0
Environmental Science Services Administration, Boulder	1	40
<u>Connecticut</u>	<u>16</u>	<u>\$ 4,540</u>
Connecticut, University of, Storrs	3	54
New England Institute for Medical Research, Ridgefield	1	50
United Aircraft, East Hartford	1	100
Yale University, New Haven	11	4,336
<u>Delaware</u>	<u>2</u>	<u>\$ 54</u>
Delaware, University of, Newark	2	54
<u>District of Columbia</u>	<u>7</u>	<u>\$ 755</u>
Catholic University of America	1	24
Georgetown University	3	42
National Academy of Sciences	1	5
National Bureau of Standards	2	684

<u>State and Contractor</u>	<u>Number of Contracts</u>	<u>FY 1967 Funding (in 1000's)</u>
<u>Florida</u>	<u>18</u>	<u>\$ 610</u>
Florida State University, Tallahassee	7	346
Florida, University of, Gainesville	8	191
Miami, University of, Coral Gables and Miami	3	73
<u>Georgia</u>	<u>8</u>	<u>\$ 309</u>
Georgia Institute of Technology, Atlanta	6	283
Georgia, University of, Athens	2	26
<u>Hawaii</u>	<u>1</u>	<u>\$ 351</u>
Hawaii, University of, Honolulu	1	351
<u>Idaho</u>	<u>1</u>	<u>\$ 13</u>
Idaho State University, Pocatello	1	13
<u>Illinois</u>	<u>31</u>	<u>\$ 5,947</u>
Associated Midwest Universities, Argonne	1	35
Chicago, University of, Chicago	10	1,367
IIT Research Institute, Chicago	1	33
Illinois Institute of Technology	5	72
Illinois, University of, Urbana	7	4,173
Northwestern University, Evanston	7	267
<u>Indiana</u>	<u>18</u>	<u>\$ 2,895</u>
Indiana University, Bloomington	3	68
Notre Dame, University of, Notre Dame	4	1,300
Purdue University, Lafayette	11	1,527
<u>Iowa</u>	<u>2</u>	<u>\$ 46</u>
Dordt College, Sioux Center	1	13
Iowa, State University of, Iowa City	1	33
<u>Kansas</u>	<u>10</u>	<u>\$ 580</u>
Kansas State University, Manhattan	3	51
Kansas, University of, Lawrence	7	529
<u>Kentucky</u>	<u>7</u>	<u>\$ 156</u>
Kentucky, University of, Lexington	6	117
Murray State University, Murray	1	39
<u>Louisiana</u>	<u>3</u>	<u>\$ 85</u>
Louisiana State University, Baton Rouge	1	75
Louisiana State University, New Orleans	2	10
<u>Maine</u>	<u>1</u>	<u>\$ 23</u>
Maine, University of, Orono	1	23
<u>Maryland</u>	<u>19</u>	<u>\$ 2,564</u>
Johns Hopkins University, Baltimore	5	399
Maryland, University of, College Park	13	2,116
Westinghouse Electric, Baltimore	1	49

<u>State and Contractor</u>	<u>Number of Contracts</u>	<u>FY 1967 Funding (in 1000's)</u>
<u>Massachusetts</u>	<u>29</u>	<u>\$ 4,117</u>
Avco-Everett Research Laboratory, Everett	1	80
Brandeis University, Waltham	4	256
Clark University, Worcester	1	22
Harvard University, Cambridge	3	191
Little, Arthur D., Cambridge	1	21
Massachusetts Institute of Technology, Cambridge	16	2,957
Massachusetts, University of, Amherst	1	155
Tufts University, Medford	2	435
<u>Michigan</u>	<u>26</u>	<u>\$ 2,548</u>
Andrews University, Berrien Springs	1	5
Michigan State University, East Lansing	9	350
Michigan Technological University, Houghton	3	89
Michigan, University of, Ann Arbor	9	2,015
Wayne State University, Detroit	4	89
<u>Minnesota</u>	<u>9</u>	<u>\$ 1,693</u>
Minnesota, University of, Minneapolis	8	1,666
St. Mary's College, Winona	1	27
<u>Mississippi</u>	<u>1</u>	<u>\$ 35</u>
Mississippi, University of, University	1	35
<u>Missouri</u>	<u>8</u>	<u>\$ 387</u>
Midwest Research Institute, Kansas City	1	29
Missouri, University of, Rolla	2	94
Washington University, St. Louis	5	264
<u>Montana</u>	<u>1</u>	<u>\$ 22</u>
Montana State University, Bozeman	1	22
<u>Nebraska</u>	<u>3</u>	<u>\$ 91</u>
Nebraska, University of, Lincoln	3	91
<u>Nevada</u>	<u>1</u>	<u>\$ 12</u>
Nevada, University of, Reno	1	12
<u>New Hampshire</u>	<u>1</u>	<u>\$ 15</u>
New Hampshire, University of, Durham	1	15
<u>New Jersey</u>	<u>12</u>	<u>\$ 1,910</u>
Princeton University, Princeton	5	1,600
Rutgers University, New Brunswick	3	88
Stevens Institute of Technology, Hoboken	4	222
<u>New Mexico</u>	<u>2</u>	<u>\$ 16</u>
New Mexico Highlands University, Las Vegas	1	0
New Mexico, University of, Albuquerque	1	16

<u>State and Contractor</u>	<u>Number of Contracts</u>	<u>FY 1967 Funding (in 1000's)</u>
<u>New York</u>	<u>72</u>	<u>\$ 12,260</u>
Brooklyn, Polytechnic Institute of, Brooklyn	2	47
Clarkson College of Technology, Potsdam	4	44
Columbia University, New York	11	3,410
Cornell University, Ithaca	18	1,117
Fordham University, New York	2	50
Institute of Electrical and Electronics Engineers, New York	1	4
New York, City University of, Brooklyn College	1	33
New York, City University of, Hunter College	1	30
New York, City University of, Queens College	1	27
New York, State University of, Buffalo	3	57
New York, State University of, Stony Brook	4	382
New York University, New York	3	4,784 ^{1/}
Rensselaer Polytechnic Institute, Troy	10	261
Rochester, University of, Rochester	5	1,660
Syracuse University, Syracuse	3	273
Yeshiva University, New York	3	81
<u>North Carolina</u>	<u>12</u>	<u>\$ 986</u>
Duke University, Durham	5	730
North Carolina, State University, Raleigh	3	101
North Carolina, University of, Chapel Hill	3	139
Wake Forest University, Winston-Salem	1	16
<u>North Dakota</u>	<u>2</u>	<u>\$ 37</u>
North Dakota, University of, Grand Forks	2	37
<u>Ohio</u>	<u>20</u>	<u>\$ 2,666</u>
Battelle Memorial Institute, Columbus	2	78
Case Western Reserve University, Cleveland	9	1,155
Kent State University, Kent	1	16
Ohio State University, Columbus	5	388
Ohio University, Athens	2	1,006 ^{2/}
Toledo, University of, Toledo	1	23
<u>Oklahoma</u>	<u>7</u>	<u>\$ 135</u>
Oklahoma State University, Stillwater	3	45
Oklahoma, University of, Norman	4	90
<u>Oregon</u>	<u>8</u>	<u>\$ 486</u>
Oregon State University, Corvallis	4	164
Oregon, University of, Eugene	3	317
Reed College, Portland	1	5
<u>Pennsylvania</u>	<u>33</u>	<u>\$ 3,204</u>
Carnegie-Mellon University, Pittsburgh	11	2,243
Duquesne University, Pittsburgh	1	0
Franklin Institute, Philadelphia	3	155
Lehigh University, Bethlehem	1	0
Pennsylvania State University, University Park	7	286
Pennsylvania, University of, Philadelphia	3	123
Pittsburgh, University of, Pittsburgh	5	262
Temple University, Philadelphia	2	135

^{1/} Includes \$3.15 million for purchase of CDC 6600 computer.

^{2/} Includes \$1 million for 8 MeV Tandem Accelerator Facility

<u>State and Contractor</u>	<u>Number of Contracts</u>	<u>FY 1967 Funding (in 1000's)</u>
<u>Puerto Rico</u>	<u>3</u>	<u>\$ 312</u>
University of Puerto Rico, Mayaguez and Rio Piedras	3	312
<u>Rhode Island</u>	<u>7</u>	<u>\$ 663</u>
Brown University, Providence	6	629
Rhode Island, University of, Kingston	1	34
<u>South Carolina</u>	<u>4</u>	<u>\$ 94</u>
Clemson University, Clemson	1	35
South Carolina, University of, Columbia	3	59
<u>Tennessee</u>	<u>8</u>	<u>\$ 168</u>
Tennessee, University of, Knoxville	5	85
Vanderbilt University, Nashville	3	83
<u>Texas</u>	<u>17</u>	<u>\$ 1,973</u>
Houston, University of, Houston	1	47
Rice University, Houston	3	763
Texas A & M University, College Station	5	462
Texas Christian University, Ft. Worth	1	37
Texas Nuclear Corporation, Austin	1	127
Texas, University of, Austin	6	537
<u>Utah</u>	<u>9</u>	<u>\$ 217</u>
Brigham Young University, Provo	2	46
Utah, University of, Salt Lake City	7	171
<u>Vermont</u>	<u>1</u>	<u>\$ 21</u>
Vermont, University of, Burlington	1	21
<u>Virginia</u>	<u>8</u>	<u>\$ 319</u>
Roanoke College, Salem	1	8
Virginia Polytechnic Institute, Blacksburg	2	50
Virginia, University of, Charlottesville	5	261
<u>Washington</u>	<u>9</u>	<u>\$ 1,349</u>
Washington State University, Pullman	4	194
Washington, University of, Seattle	4	1,148
Western Washington State College, Bellingham	1	7
<u>West Virginia</u>	<u>1</u>	<u>\$ 8</u>
West Virginia University, Morgantown	1	8
<u>Wisconsin</u>	<u>14</u>	<u>\$ 2,911</u>
Marquette University, Milwaukee	1	28
Wisconsin, University of, Madison	13	2,883
<u>Wyoming</u>	<u>1</u>	<u>\$ 40</u>
Wyoming, University of, Laramie	1	40

High Energy Physics

- Associated Midwest Universities, Inc., Argonne, Illinois. J. H. Roberson, Users Group and Related Activities. \$35,000.
- Brandeis University, Waltham, Massachusetts. Sanford E. Wolf, Research in Elementary Particle Physics. \$118,430.
- Brown University, Providence, Rhode Island. David Feldman and Anatole M. Shapiro, Experimental and Theoretical High Energy Physics. \$352,500.
- California Institute of Technology, Pasadena, California. R. F. Bacher, Operation and Research with 1.5 BeV Electron Synchrotron; Users Group. \$1,603,100.
- California, University of, Irvine, California. Jonas Schultz, High Energy User Group. \$92,000.
- California, University of, Los Angeles, California. H. K. Ticho and D. H. Stork, Research in High Energy Physics. \$268,250.
- California, University of, Riverside, California. Peter E. Kaus and Walter H. Barkas, High Energy Physics. \$225,000.
- California, University of, San Diego, California. Oreste Piccioni, Norman Kroll, and George Masek, Experimental and Theoretical Particle Physics. \$948,000.
- California, University of, Santa Barbara, California. David O. Caldwell, High Energy Physics Users. \$135,000.
- Carnegie-Mellon University, Pittsburgh, Pennsylvania. R. B. Sutton, High Energy Physics Users; Theoretical Research. \$909,620.
- Case Western Reserve University, Cleveland, Ohio. Frederick Reines, Research in Neutrino Physics, Cosmic Rays, and Elementary Particles. \$605,000.
- Chicago, University of, Chicago, Illinois. Y. Nambu, Theoretical Research in Elementary Particle Physics. \$295,000.
- Chicago, University of, Chicago, Illinois. Roland Winston, Experimental Research in Elementary Particle Physics. \$102,000.
- Colorado, University of, Boulder, Colorado. Leona Marshall Libby, High Energy Physics. \$325,000.
- Columbia University, New York, New York. Leon Lederman and Robert Serber, High Energy Physics Users; Theoretical Research. \$1,858,911.
- Cornell University, Ithaca, New York. Kenneth Greisen, Detection of Super Showers by Atmospheric Scintillation. \$114,000.
- Duke University, Durham, North Carolina. Earle C. Fowler, Research in High Energy Physics. \$205,000.
- Florida State University, Tallahassee, Florida. Joseph E. Lannutti, Elementary Particle Physics. \$130,000.
- Hawaii, University of, Honolulu, Hawaii. Vincent Z. Peterson and San Fu Tuan, Research in High Energy Nuclear Physics. \$351,000.

High Energy Physics

- Illinois, University of, Urbana, Illinois. E. L. Goldwasser and A. Wattenberg, High Energy Physics Users; Theoretical Research. \$1,449,220.
- Institute of Electrical & Electronics Engineers (IEEE), New York, New York. Particle Accelerator Conference. \$4,300.
- Maryland, University of, College Park, Maryland. George A. Snow, Properties of K-Mesons and Hyperons and Related Topics. \$1,010,000.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. Benjamin Lax, Search for Ferromagnetically Trapped Dirac Monopoles of Cosmic Ray Origin. \$35,000.
- Massachusetts, University of, Amherst, Massachusetts. S. Steven Yamamoto and Janice B. Shafer, High Energy Physics. \$155,000.
- Michigan State University, East Lansing, Michigan. J. H. Hetherington, Theoretical Investigations of Scattering Problems and Nucleon-Nucleon Interactions. \$17,000.
- Michigan, University of, Ann Arbor, Michigan. A. R. Crane, High Energy Physics Users; Theoretical Research. \$884,000.
- Minnesota, University of, Minneapolis, Minnesota. Stephen Gasiorowicz and Hans W. J. Courant, Theoretical Physics and Experimental Study of Elementary Particle Interactions. \$240,000.
- New York, State University of, Stony Brook, New York. C. N. Yang and J. Lee-Franzini, Theoretical and Experimental Studies in Elementary Particle Physics. \$218,818.
- Ohio State University, Columbus, Ohio. Thomas A. Romanowski, High Energy Physics. \$275,000.
- Oregon, University of, Eugene, Oregon. Michael J. Moravcsik, Theory of Elementary Particles. \$102,500.
- Pittsburgh, University of, Pittsburgh, Pennsylvania. Richard H. Pratt, Studies in Quantum Electrodynamics and Theory of Elementary Particles. \$45,000.
- Purdue University, Lafayette, Indiana. George W. Tautfest and Masao Sugawara, Fundamental Particle Physics. \$1,005,589.
- Rochester, University of, Rochester, New York. Morton F. Kaplan, High Energy Physics Users; Theoretical Research. \$887,800.
- Syracuse University, Syracuse, New York. E. C. George Sudarshan, Research Program in Elementary Particle Theory. \$201,000.
- Tufts University, Medford, Massachusetts. Julian K. Knipp and Allan M. Cormack, Experimental and Theoretical High Energy Physics Research. \$396,040.
- Wisconsin, University of, Madison, Wisconsin. A. R. Erwin and M. Ebel, High Energy Physics Users; Theoretical Research. \$1,599,605.
- Yale University, New Haven, Connecticut. Vernon W. Hughes, High Energy Physics Users; Theoretical Research. \$1,329,000.

Medium Energy Physics

- California, University of, Davis, California. John A. Jungerman, Nuclear Physics Research. \$829,000.
- California, University of, Los Angeles, California. Roy P. Haddock, Meson Physics. \$170,000.
- Carnegie-Mellon University, Pittsburgh, Pennsylvania. R. B. Sutton, 440 MeV Synchrocyclotron and Associated Research. \$679,170.
- Columbia University, New York, New York. W. W. Havens, Medium Energy Physics. \$103,000.
- Maryland, University of, College Park, Maryland. Harry D. Holmgren, Variable Energy Research Facility. \$3,000,000 (authorized FY 1965).
- Maryland, University of, College Park, Maryland. Harry D. Holmgren and W. M. MacDonald, Experimental and Theoretical Study of the Structure of Nuclei and the Interaction of Intermediate Energy Particles. \$564,000.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. P. T. Demos, Medium Energy Physics. \$105,000.
- Minnesota, University of, Minneapolis, Minnesota. J. Morris Blair, George Greenless and Norton Hintz, Experimental Nuclear Physics. \$565,000.
- National Bureau of Standards, Washington, D. C. Accelerator Research. \$17,000 (5 months).
- Rochester, University of, Rochester, New York. Morton F. Kaplan, Synchrocyclotron Operation and Associated Research. \$521,181.
- 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, Research and Operation of the Texas A & M Variable Energy Cyclotron. \$400,000.
- Yale University, New Haven, Connecticut. Vernon W. Hughes, Medium Energy Physics. \$38,935.

Low Energy Physics

- Arizona, University of, Tucson, Arizona. Douglas J. Donahue, Research in Nuclear Physics. \$90,000.
- Brown University, Providence, Rhode Island. Russell A. Peck, Jr., Reaction Studies with Fast Neutrons. \$77,400.
- California Institute of Technology, Pasadena, California. Felix Boehm, Nuclear Spectroscopy and X-ray Studies. \$335,000.
- California, University of, Berkeley, California. C. D. Jeffries, Dynamic Nuclear Polarization and Solid State Physics. \$52,800.
- California, University of, Berkeley, California. John H. Reynolds, Mass Spectroscopy Research. \$52,570.
- California, University of, Berkeley, California. Luis W. Alvarez, A System for Detecting Voids in Large Masses. \$230,280. (18 months)
- California, University of, Los Angeles, California. J. R. Richardson and B. T. Wright, Nuclear Structure Research. \$130,000.
- California, University of, Los Angeles, California. Leon Knopoff, Space-Time Correlation of Seismic Events. \$41,064.
- California, University of, San Diego, California. K. A. Brueckner, Problems in Theoretical Nuclear Physics: Many Body Systems. \$154,523.
- California, University of, Santa Barbara, California. P. H. Barrett and R. M. Eisberg, Nuclear Structure Research. \$100,000.
- Case Western Reserve University, Cleveland, Ohio. E. F. Shrader, L. L. Foldy, and R. M. Thaler, Low Energy Nuclear Physics. \$291,850.
- Chicago, University of, Chicago, Illinois. J. L. Honsaker, Researches on Low Energy Nuclear Physics. \$53,000 (18 months).
- Colorado, University of, Boulder, Colorado. D. A. Lind, J. J. Kraushaar, and P. D. Kunz, Study of Fundamental Nuclear Interactions. \$415,000.
- 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. \$1,140,000.
- Cornell University, Ithaca, New York. David D. Clark, Experimental Study of Nuclear Isomers. \$39,544.
- Duke University, Durham, North Carolina. Henry W. Newson, Fast Neutron Cross-Sections and Shell Structure. \$412,965.
- Duke University, Durham, North Carolina. Regional Nuclear Physics Laboratory. \$2,500,000 (authorized FY 1966).
- Franklin Institute, Philadelphia, Pennsylvania. Franz R. Metzger, Electromagnetic Properties of Excited States of Nuclei. \$95,000.
- General Dynamics Corporation (General Atomic Division), San Diego, California. W. M. Lopez and F. H. Froehner, Neutron Capture Cross-Section Measurements. \$136,484.

Low Energy Physics

Georgetown University, Washington, D. C. James A. Lambert and Paul A. Treado, Nuclear Structure and Interaction Studies with a Low Energy Positive Ion Accelerator. No Funds.

Johns Hopkins University, Baltimore, Maryland. Leon Madansky and Henry M. Crosswhite, Jr., Absorption and Fluorescence Spectra of Uranium Salts and Other Solids - Spectra of Molecules Containing Tritium. \$75,000.

Johns Hopkins University, Baltimore, Maryland. George E. Owen and Leon Madansky, Studies of Neutron and Charged Particle Reactions. \$215,000.

Kansas State University, Manhattan, Kansas. Robert B. Leachman, Nuclear Physics Accelerator Facility. \$440,461 (authorized FY 1966).

Kansas State University, Manhattan, Kansas. Determination of Parameters of Nuclear States. \$30,000.

Kansas, University of, Lawrence, Kansas. R. W. Krone, Nuclear Structure Studies of the Light and Medium-Light Nuclei. \$185,000 (12½ months).

Kansas, University of, Lawrence, Kansas. R. W. Krone, On-Line Computer System for Use with the Univ. of Kansas 3 MeV Van de Graaff. \$155,000.

Maryland, University of, College Park, Maryland. William F. Hornyak, The Structure of Light Nuclei. \$223,600.

Massachusetts Institute of Technology, Cambridge, Massachusetts. P. T. Demos, Nuclear Physics Research. \$1,204,000.

Michigan State University, East Lansing, Michigan. Hugh McManus and Peter S. Signell, Theoretical Investigations of Scattering Problems and Nucleon-Nucleon Interactions. \$145,000.

Michigan, University of, Ann Arbor, Michigan. H. R. Crane, Low Energy Physics Research. \$953,000.

Minnesota, University of, Minneapolis, Minnesota. J. M. Blair, George Greenless, and Norton Hintz, Emperor Tandem Van de Graaff Research Program. \$511,412.

National Academy of Sciences, Washington, D. C. Walter H. Bailey, Committee on Rock Mechanics. \$5,000.

Nebraska, University of, Lincoln, Nebraska. Theodore Jorgensen, Jr., Energy Transfer of Slow Ions. \$17,500 (15 months).

North Carolina State University, Raleigh, North Carolina. L. W. Seagondollar, Nuclear Structure Research. \$55,000.

North Carolina, University of, Chapel Hill, North Carolina. Eugen Merzbacher and Paul E. Shearin, Studies of Nuclear Processes. \$75,000.

Notre Dame, University of, Notre Dame, Indiana. Charles J. Mullin, Interactions of Photons and Particles with Nuclei. \$80,000.

Notre Dame, University of, Notre Dame, Indiana. John W. Mihelich, Nuclear Spectroscopy. \$85,000.

Ohio University, Athens, Ohio. Raymond O. Lane, 8 MeV Tandem Accelerator Facility. \$1,000,000 (5 years).

Low Energy Physics

- Oregon State University, Corvallis, Oregon. Larry Schecter and McAllister Hull, Jr., Experimental and Theoretical Nuclear Physics. \$115,000.
- Oregon, University of, Eugene, Oregon. Bernd Crasemann, Nuclear Physics Research. \$170,000.
- Princeton University, Princeton, New Jersey. Ruby Sherr, 18 MeV Cyclotron and Associated Nuclear Physics Research. \$735,000.
- Purdue University, Lafayette, Indiana. R. M. Steffen, Research in Nuclear Physics. \$215,000.
- Rice University, Houston, Texas. G. C. Phillips and G. K. Walters, Nuclear and Extra-Nuclear Research. \$527,000.
- Rochester, University of, Rochester, New York. J. B. French, Nuclear Physics Research. \$150,000.
- South Carolina, University of, Columbia, South Carolina. F. T. Avignone, III, Antineutrino Absorption Cross Section Measurement. \$25,000.
- Southern California, University of, Los Angeles, California. M. H. L. Pryce, Nuclear Physics with a 32 MeV Proton Linear Accelerator and 50 MeV Cyclotron. \$395,000.
- Texas Nuclear Corporation, Austin, Texas. Ira L. Morgan, Gamma Rays Produced by the Interaction of Monoenergetic Neutrons in Several Nuclei. \$126,931.
- Texas, University of, Austin, Texas. B. B. Kinsey, Nuclear Structure Physics. \$400,000.
- Virginia, University of, Charlottesville, Virginia. Morris E. Rose, Theoretical Nuclear Physics. \$73,000.
- Washington, University of, Seattle, Washington. James B. Gerhart and Ernest M. Henley, Experimental and Theoretical Nuclear Physics. \$1,039,990.
- Wisconsin, University of, Madison, Wisconsin. C. H. Blanchard and H. H. Barschall, Nuclear Research. \$527,000.
- Wisconsin, University of, Madison, Wisconsin. J. R. Dillinger, Low Temperature Physics. \$60,000.
- Wyoming, University of, Laramie, Wyoming. William G. Simon, Neutron Emission From Charged Particle Reactions. \$39,700.
- Yale University, New Haven, Connecticut. Gregory Breit, Theory of Nuclear Reactions. \$117,673.
- Yale University, New Haven, Connecticut. Vernon W. Hughes, Studies in Nuclear Physics. \$814,000.
- Yale University, New Haven, Connecticut. D. A. Bromley, Emperor Tandem Van de Graaff Research Program. \$1,433,000.

Mathematics and Computer Research

- California, University of, Berkeley, California. A. H. Taub, Analytical and Numerical Studies in General Relativity. \$48,065.
- California, University of, Los Angeles, California. Gerald Estrin, Research Program for the UCLA Variable Structure Computer System. \$250,000.
- California, University of, San Diego, California. Kenneth Bowles, Computing Facility at UCSD
No Funds.
- Chicago, University of, Chicago, Illinois. Victor H. Yngve, Computer Research and Development.
\$432,400.
- Case Western Reserve University, Cleveland, Ohio. Richard S. Varga, Use of Variational and Projectional Methods in Numerical Analysis. \$52,950 (15 months).
- Duke University, Durham, North Carolina. J. L. Artley and H. Hacker, Jr., Superconducting Circuitry. \$111,655.
- Illinois, University of, Urbana, Illinois. Bruce H. McCormick, Pattern Recognition Computer.
\$415,000.
- Illinois, University of, Urbana, Illinois. C. W. Gear and W. J. Poppelbaum, Computer Systems Research. \$549,280.
- Maryland, University of, College Park, Maryland. Bertie E. Hubbard, Studies of the Numerical Solution of Elliptic and Parabolic Boundary Value Problems. \$36,000.
- Maryland, University of, College Park, Maryland. Azriel Rosenfeld, Development of a Generalized Picture-Processing Programming System. \$45,605.
- Midwest Research Institute, Kansas City, Missouri. Yudell L. Luke, Research in Finite Perturbation Methods. \$29,348.
- New York, State University of, Stony Brook, New York. M. A. Leibowitz and D. Dicker, Research in Applied Mathematics. \$27,328.
- New York University, New York, New York. Peter Lax, Courant Institute of Mathematical Sciences. \$4,524,000 (Including \$3.15 million for purchase of a CDC 6600 computer).
- Oregon State University, Corvallis, Oregon. Arvid T. Lonseth, Research in Applied Analysis.
\$52,799 (13 months).
- Rice University, Houston Texas. Walter Orvedahl and John A. Robinson, Computer Research.
\$139,250.
- Stanford University, Stanford, California. George B. Dantzig and Robert B. Wilson, Stochastic Mathematical Programs. \$102,200 (2 years).
- Stevens Institute of Technology, Hoboken, New Jersey. Ivan Flores, Effective Use of Mass Memory in Computer Systems. \$27,000. (15½ months).
- Washington University, St. Louis, Missouri. Leon Cooper, Research in Methods of Non-Linear and Combinatorial Programming. \$93,187 (2 years).

Chemistry

- Arizona State University, Tempe, Arizona. LeRoy Eyring, Solid State Chemistry of Rare Earth Oxides. \$80,000.
- Arizona, University of, Tucson, Arizona. Henry Freiser, Development and Testing of Organic Reagents for Use in Inorganic Analysis. \$40,000.
- Arizona, University of, Tucson, Arizona. Paul E. Damon, Correlation and Chronology of Ore Deposits and Volcanic Rocks. \$38,000.
- Arizona, University of, Tucson, Arizona. Leslie S. Forster, The Luminescence of Metal Complexes. \$36,382 (16½ months).
- Arizona, University of, Tucson, Arizona. David M. Bodily, Kinetics of Secondary Reactions in Irradiated Polyethylene. \$12,000.
- Arizona, University of, Tucson, Arizona. Quintus Fernando, An Investigation of Steric and Synergic Effects in Metal Chelates. \$15,000.
- Arkansas, University of, Fayetteville, Arkansas. Lester C. Howick, Precipitation from Homogeneous Solutions of Mixed Solvents. \$8,256.
- Arkansas, University of, Fayetteville, Arkansas. Arthur Fry, Isotope Effect and Tracer Studies in Organic Chemistry. \$38,900.
- Arkansas, University of, Fayetteville, Arkansas. Paul K. Kuroda, Nuclear and Cosmochemistry. \$130,000 (18 months).
- Atomics International, Canoga Park, California. S. J. Yosim, High Temperature Chemistry. \$163,572.
- Atomics International, Canoga Park, California. R. B. Ingalls, Radiation Chemistry. \$84,279.
- Avco-Everett Research Laboratory, Everett, Massachusetts. Richard H. Levy, Study of a Heavy Ion Plasma Accelerator. \$80,000.
- Brandeis University, Waltham, Massachusetts. Henry Linschitz, Photochemical Reaction of Complex Molecules in Condensed Phase. \$55,894.
- Brandeis University, Waltham, Massachusetts. Saul G. Cohen, Effects of Mercaptans and Disulfides on Photochemical and High Energy Radiation Induced Reactions. \$48,402.
- Brigham Young University, Provo, Utah. R. M. Izatt and J. J. Christensen, Jr., Thermodynamics of Metal-Ligand Interaction in Aqueous Solution. \$19,000.
- Brooklyn, Polytechnic Institute of, Brooklyn, New York. Joseph Steigman, Investigation of Binding of Ions to Polyelectrolytes in Dilute Aqueous Solution. \$25,000.
- Brown University, Providence, Rhode Island. John O. Edwards, Oxyanions and Peroxides--Their Constitutions and Reaction Mechanisms. \$19,100.
- 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. \$40,000.

Chemistry

- California Institute of Technology, Pasadena, California. G. S. Hammond, Metallic Compounds in Oxidation. \$40,000.
- California Institute of Technology, Pasadena, California. G. W. Robinson, Molecular Ionization in Dense Media. \$33,288 (3 years).
- California Institute of Technology, Pasadena, California. Robert P. Sharp P. Sharp, Geochemical Studies with Stable and Radioactive Isotopes. \$170,800.
- California Institute of Technology, Pasadena, California. Aron Kuppermann, Studies in Chemical Dynamics and Radiation Chemistry. \$136,781.
- California, University of, Berkeley, California. J. O. Rasmussen, Theoretical Studies on Nuclear Structure and Transitions. \$44,602.
- California, University of, Irvine, California. Frank S. Rowland, Radiochemistry Research. \$120,000.
- California, University of, Los Angeles, California. C. S. Garner, Complex Ion Chemistry. \$49,881.
- California, University of, Los Angeles, California. W. G. McMillan, E. R. Hardwick, and M. F. Nicol, Intra- and Inter-molecular Energy Transfer Studies. \$57,608.
- California, University of, Los Angeles, California. M. A. El-Sayed, The Vacuum Ultraviolet Spectra and Photochemistry of Ordinary and Tritium Labelled Polyatomic Molecules. \$50,000.
- California, University of, Riverside, California. Donald T. Sawyer, Study of Metal Chelates. \$33,000.
- California, University of, San Diego, California. Harold C. Urey, The Distribution and Origin of the Elements and Their Isotopes in Nature. \$100,000.
- California, University of, San Diego, California. Joseph E. Mayer, Interacting Atoms. \$50,000.
- Carnegie-Mellon University, Pittsburgh, Pennsylvania. Truman P. Kohman, Nuclear Chemistry and Geochemistry Research. \$84,942.
- Carnegie-Mellon University, Pittsburgh, Pennsylvania. Robert H. Schuler, Radiation Research. \$310,000.
- Carnegie-Mellon University, Pittsburgh, Pennsylvania. A. A. Caretto, Jr., High-Energy Nuclear Reactions. \$65,000.
- Carnegie-Mellon University, Pittsburgh, Pennsylvania. Joe V. Michael, Determination of Elementary Reaction Rate Constants for the Reactions of Hydrogen Atoms with Various Substrate Molecules in the Gas Phase. \$26,120.
- Case Western Reserve University, Cleveland, Ohio. Alan G. Walton, Nucleation and Coprecipitation from Homogeneous Solution. \$16,525 (11½ months).
- Case Western Reserve University, Cleveland, Ohio. E. W. Abrahamson, Primary Processes in Radiation Chemistry. \$18,890.
- Case Western Reserve University, Cleveland, Ohio. Robert E. Sparks, Velocity Profile Control in Large Scale Chromatographic Columns. \$37,000 (2 years).

Chemistry

- Catholic University of America, Washington, D. C. T. A. Litovitz, Ultrasonic Spectroscopy in Liquids at High Temperatures. \$24,295.
- Chicago, University of, Chicago, Illinois. C. A. Hutchinson, Jr., Paramagnetic Resonance Absorption. \$145,000.
- Chicago, University of, Chicago, Illinois. Edward Anders, Radiochemical and Geochemical Studies. \$52,274.
- Chicago, University of, Chicago, Illinois. N. C. Yang, Radiation Chemistry of Organic Compounds. \$26,600.
- Chicago, University of, Chicago, Illinois. Nathan Sugarman and Anthony Turkevich. Nuclear Chemistry Research. \$225,000.
- Chicago, University of, Chicago, Illinois. Ugo Fano, Basic Studies of Atomic Dynamics. \$34,685.
- Clark University, Worcester, Massachusetts. Thomas T. Sugihara and Daeg S. Brenner, Nuclear Chemistry and Geochemistry. \$21,664.
- Clarkson College of Technology, Potsdam, New York. Herman L. Shulman, Performance of Packed Columns. \$13,060 (2 years).
- Clarkson College of Technology, Potsdam, New York. Milton Kerker, Studies on Colloidal Particles: Scavenging of Aerosol Particles by a Falling Microscopic Particle. \$26,702.
- Clarkson College of Technology, Potsdam, New York. Joseph Estrin, Heat and Mass Transfer in the Condensation of Multicomponent Systems. \$8,040 (9 months).
- Colorado State University, Fort Collins, Colorado. John D. Vaughn, Chemical Effects of Nuclear Reactions in Nitrogen Compounds. \$10,433.
- Colorado, University of, Boulder, Colorado. H. F. Walton, Specific Attractions in Ion Exchange. \$6,866.
- Colorado, University of, Boulder, Colorado. Edward L. King, Oxidation-Reduction Reaction Mechanisms. \$9,517.
- Columbia University, New York, New York. T. I. Taylor, Separation of Isotopes by Chemical Exchange. \$46,786.
- Columbia University, New York, New York. J. M. Miller, Nuclear Chemistry at Medium and High Energy. \$70,000.
- Columbia University, New York, New York. Paul F. Kerr, Alteration and Mineralization of Primary Uranium Deposits. \$34,981.
- Columbia University, New York, New York. Charles F. Bonilla, High Temperature Transport Properties and Processes of Gases and Alkali Metals. \$31,200.
- Columbia University, College of Pharmaceutical Sciences, New York, New York. Alfred V. Willi, Isotope Effects in Nucleophilic Substitution Reactions of Alkyl Halides. \$17,100.
- Connecticut, University of, Storrs, Connecticut. John T. Stock, Analytical Chemistry at Low Concentrations. \$9,000 (20 months).

Chemistry

- Cornell University, Ithaca, New York. Franklin A. Long, Mechanism of Acid-Base Catalysis and Studies in Deuterium Oxide as Solvent. \$24,732.
- Cornell University, Ithaca, New York. S. H. Bauer, Homogeneous (Gas Phase) Isotope Exchange Reactions in Shock Tubes. \$15,000.
- Delaware, University of, Newark Delaware. Conrad N. Trumbore, Primary Chemical Processes in Radiolysis of Liquids. \$26,800.
- Dordt College, Sioux Center, Iowa. Russell Maatman, Interactions of Aqueous and Nonaqueous Ions with Oxide Surfaces. \$13,022.
- Duke University, Durham, North Carolina. Howard A. Strobel, Ion Exchange in Polar Non-Aqueous Solvents. \$10,000 (32 months).
- Duquesne University, Pittsburgh, Pennsylvania. Norman C. Li, Complexes in Chemistry. \$20,000 (15 months).
- Florida State University, Tallahassee, Florida. Gregory R. Choppin, Chemistry of the Actinide and Lanthanide Elements and Nuclear Chemistry. \$49,157.
- Florida State University, Tallahassee, Florida. R. H. Johnsen, Radiation Induced Effects in Organic Systems. \$41,000.
- Florida State University, Tallahassee, Florida. R. K. Sheliné, An Experimental Study of Nuclear Models. \$96,500.
- Florida State University, Tallahassee, Florida. James V. Quagliano, Structural Studies of Metal Coordination Compounds. \$8,459.
- Florida State University, Tallahassee, Florida. Bruno Linder, Radiochemical Study of Nuclear Reactions. \$15,000 (2 years).
- Florida State University, Tallahassee, Florida. Ronald J. Clark, Physical - Inorganic Studies on Phosphorus Trifluoride - Metal Complexes. \$20,281.
- Florida, University of, Gainesville, Florida. Wallace S. Brey, Jr., Physical Characteristics and Catalytic Activity of Thorium Oxide. \$14,730.
- Florida, University of, Gainesville, Florida. M. Luis Muga, Ternary Fission and the Interaction of Fission Fragments with Matter. \$59,000.
- Florida, University of, Gainesville, Florida. Robert J. Hanrahan, Radiation Chemistry of Hydrocarbon and Alkyl Halide Systems. \$30,000.
- Florida, University of, Gainesville, Florida. William H. Ellis, Chemical Structural Studies by Nuclear Techniques. \$35,000.
- Florida, University of, Gainesville, Florida. T. M. Reed, Radiolytically - Induced Heterogeneous Reactions with Perfluorocompounds. \$11,500.
- Fordham University, New York, New York. Michael Cefola, Kinetics and Structural Studies of Chelates. \$26,429.
- Fordham University, New York, New York. Philip S. Gentile, The Synthesis of Complexes and Related Kinetics, Thermodynamics and Spectral Studies. \$23,520.

Chemistry

- Franklin Institute, Philadelphia, Pennsylvania. W. E. Danforth, Chemisorption Studies by Low Energy Electron Diffraction. \$25,000.
- Georgetown University, Washington, D. C. Joseph E. Earley, Substitution in Oxyions. \$17,912.
- Georgia Institute of Technology, Atlanta, Georgia. Richard W. Fink, Nuclear Spectroscopy and Reaction Studies. \$63,000.
- Georgia Institute of Technology, Atlanta, Georgia. James A. Knight, Jr., Radiation Chemistry of Monosubstituted Aromatic Compounds. \$25,000.
- Georgia, University of, Athens, Georgia. William C. Sears, Infrared Spectra of Plastics and Elastomers after Nuclear Irradiation. \$15,000.
- Georgia, University of, Athens, Georgia. F. J. Johnston, Isotope Exchange in Non-Equilibrium Systems. \$11,475.
- Harvard University, Cambridge, Massachusetts. Clifford Frondel, Geochemistry and Crystal Chemistry of Rare Elements. \$22,392 (2 years).
- Harvard University, Cambridge, Massachusetts. William A. Klemperer, Molecular Spectroscopy of Substances Existing at High Temperatures. \$73,500.
- Harvard University, Cambridge, Massachusetts. Martin Karplus, Theoretical Studies in Chemical Kinetics. \$95,000.
- Harvey Mudd College, Claremont, California. Arthur J. Campbell, Energy Levels of Polyatomic Inorganic Ions. \$17,260.
- Houston, University of, Houston, Texas. Gerhard G. Meisels, Radiolysis of Gases with High Energy Electrons and Fission Fragments. \$47,358.
- Idaho State University, Pocatello, Idaho. J. L. Thompson, Consequences of Radioactive Decay: Charge and Kinetic Energy of the Daughter Atom. \$13,052.
- IIT Research Institute, Chicago, Illinois. Daniel Sperber, Angular Momentum Effects on Gamma Emission. \$33,000.
- Illinois Institute of Technology, Chicago, Illinois. P. G. Wahlbeck, High Temperature Chemistry - Fundamentals of Effusion and Thermodynamics of Materials. \$32,000 (15 months).
- Illinois Institute of Technology, Chicago, Illinois. Theodore J. Neubert, Color Centers and Related Phenomena in Alkali Halide Type Crystals. \$46,000 (15 months).
- Illinois Institute of Technology, Chicago, Illinois. Theodore J. Neubert, Radiation Chemistry. \$22,000 (2 years).
- Illinois, University of, Urbana, Illinois. Russell S. Drago, Non-aqueous Solvents. \$20,000.
- Illinois, University of, Urbana, Illinois. R. F. Nystrom, Preparation of Carbon-14 and Tritium Labeled Compounds by Hydroboration and Tritoboration Procedures. \$16,000.
- Illinois, University of, Urbana, Illinois. Peter E. Yankwich, Studies in Radiochemistry. \$28,000.

Chemistry

- Indiana University, Bloomington, Indiana. W. B. Schaap and F. C. Schmidt, Electro-chemical Research in Amine Solvents. \$41,084.
- Indiana University, Bloomington, Indiana, Ralph L. Seifert, Chemical Equilibria at High Temperatures. \$4,860.
- Indiana University, Bloomington, Indiana. V. J. Shiner, Jr., Deuterium and Tritium Effects on the Rates of Organic Reactions. \$22,000.
- Iowa, State University of, Iowa City, Iowa. E. David Cater, Research in High Temperature Physical Chemistry, Particularly the Vaporization of Refractory Sulfides. \$33,140.
- Johns Hopkins University, Baltimore, Maryland. Walter S. Koski, Studies in Hot Atom and Radiation Chemistry. \$40,357.
- Johns Hopkins University, Baltimore, Maryland. Paul H. Emmett, Study of Catalytic Surfaces and the Mechanism of Catalytic Reactions. \$32,500.
- Kansas State University, Manhattan, Kansas. Herbert C. Moser, Reactions of Tritium Atoms and Ions with Solids, Radon, and Low Energy Electron Irradiation Chemistry. \$20,700.
- 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. \$97,000.
- Kansas, University of, Lawrence, Kansas. Larry Kevan, Radiolysis Studies on Fluorocarbons and on Reactive Intermediates. \$26,000.
- Kentucky, University of, Lexington, Kentucky. William F. Wagner and Donald E. Sands, Properties and Structure of Solvates of Metal Chelates. \$29,000.
- Kentucky, University of, Lexington, Kentucky. Lyle R. Dawson, Properties of Solvents Having High Dielectric Constants. \$15,000.
- Kentucky, University of, Lexington, Kentucky. William D. Ehmann, Radiochemistry as Applied to Geochemical Problems; Neutron Activation Analysis. \$23,100.
- Kentucky, University of, Lexington, Kentucky. Eugene Bradley, Rotation and Debye Relaxation Spectra of Dipolar Compounds in the Microwave Region. \$8,350 (18 months).
- Kentucky, University of, Lexington, Kentucky. H. C. Eckstrom, Infrared Studies of Chemisorbed Molecules. \$22,254.
- Lehigh University, Bethlehem, Pennsylvania. James E. Sturm, Studies of Photochemical Processes. \$20,000 (2 years).
- Louisiana State University, New Orleans, Louisiana. Mary L. Good, Extraction of Inorganic Complexes from Aqueous Media by Certain Alkyl Ammonium Compounds. \$18,182 (15 months).
- Louisiana State University, New Orleans, Louisiana. Jack H. Stocker, A Quantitative Study of Stereoselective Reactions. \$9,950.

Chemistry

- Maryland, University of, College Park, Maryland. Joseph Silverman, Study of Graft Polymerization. \$15,000 (7 months).
- Maryland, University of, College Park, Maryland. Gilbert Gordon, Stable Isotope Tracer Studies. \$6,444 (3½ months).
- Maryland, University of, College Park, Maryland. Everett R. Johnson, The Radiation Induced Decomposition of Inorganic Salts. \$33,064 (2 years).
- Massachusetts Institute of Technology, Cambridge, Massachusetts. Jack Irvine, et al, Nuclear Chemistry Research. \$542,000.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. P. M. Hurley, Variations in Isotopic Abundances of Strontium, Calcium and Argon, and Related Topics. \$85,000.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. F. Albert Cotton, Thermodynamic, Spectral and Structural Studies of Complex Ions. \$34,979.
- Miami, University of, Miami, Florida. David E. Fisher, Neutron Activation Analysis Studies of Iron Meteorites. \$25,000.
- Michigan State University, East Lansing, Michigan. Harry A. Eick, An Investigation of Some Rare-Earth Boron, Carbon, Nitrogen, and Related Systems at Elevated Temperatures. \$40,608.
- 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. \$38,920.
- Michigan State University, East Lansing, Michigan. Carl H. Brubaker, Jr., Effects of Polyfunctional Anions on Electron-Transfer Between Metal Ions in Solutions. \$25,000 (15 months).
- Michigan State University, East Lansing, Michigan. Max T. Rogers, Electron Spin Resonance Studies of Radiation Effects. \$20,351.
- Michigan Technological University, Houghton, Michigan. Leslie Leifer, Fundamental Studies of Concentrated Electrolyte Solutions. \$21,500.
- Michigan, University of, Ann Arbor, Michigan. Adon A. Gordus, Energetic Recoil Atom Reaction Mechanisms. \$44,000.
- Michigan, University of, Ann Arbor, Michigan. Philip J. Elving, Polarographic Behavior of Organic Compounds. \$30,000 (18 months).
- Michigan, University of, Ann Arbor, Michigan. E. F. Westrum, Jr., Low Temperature Chemical Thermodynamics. \$57,000.
- Michigan, University of, Ann Arbor, Michigan. Charles L. Rulfs, Chemistry of Technetium. \$5,070.
- Minnesota, University of, Minneapolis, Minnesota. Sanford Lipsky, The Contribution of Electronically Excited States to the Radiation Chemistry of Organic Liquids. \$45,488.
- National Bureau of Standards, Washington, D. C. Nuclear, Structural, and Inorganic Chemistry; Radiation, Isotope, and Physical Chemistry. \$376,893.
- Navy, Bureau of Ships, Naval Radiological Defense Laboratory, San Francisco, California. Nathan B. Ballou and E. C. Freiling, High Temperature Chemistry and Nuclear Chemistry. \$116,697.

Chemistry

- Nebraska, University of, Lincoln, Nebraska. Edward P. Rack, Hot Atom Chemistry of Neutron Capture Reactions and Isomeric Transitions. \$31,000.
- Nevada, University of, Reno, Nevada. Richard D. Burkhart, A Measurement of Diffusion Coefficients of Alkyl Radicals in Solution by Photochemical Space Intermittency. \$12,000 (3 years).
- New England Institute for Medical Research, Ridgefield, Connecticut. John Lee and S. J. Tao, Positronium Chemistry. \$50,000.
- New Hampshire, University of, Durham, New Hampshire. Helmut M. Haendler, Reactions in Non-aqueous Solvents. \$14,700.
- New Mexico Highlands University, Las Vegas, New Mexico. Vincent C. Anselmo, Chemical Effects Following Neutron Capture in Phosphates. \$12,000 (18 months).
- New Mexico, University of, Albuquerque, New Mexico. Milton Kahn, Behavior of Elements of Very Low Concentrations. \$15,958.
- New York, City University of/Brooklyn College, Brooklyn, New York. Harmon L. Finston, Applications of Nuclear and Radiochemical Techniques in Chemical Analysis. \$33,000.
- New York, City University of/Hunter College, New York, New York. Richard H. Wiley, Ion Exchange Resins. \$29,915.
- New York, State University of, Buffalo, New York. G. M. Harris, Applications of Isotopes in Chemical Kinetics. \$4,203.
- New York, State University of, Buffalo, New York. Jacob A. Marinsky and George A. Clarke, Studies in Solution and Nuclear Chemistry. \$35,430.
- New York, State University of, Buffalo, New York. D. A. Cadenhead, Chemisorption Studies of Benzene at Metal Alloy-Gaseous Interfaces. \$17,817.
- New York, State University of, Stony Brook, New York. John M. Alexander, Nuclear Reaction Studies. \$70,000.
- New York, State University of, Stony Brook, New York. Oliver A. Schaeffer, High Energy Nuclear Interactions with Matter. \$66,084.
- Northwestern University, Evanston, Illinois. Fred Basolo and R. G. Pearson, Mechanism of Substitution Reactions of Metal Complexes. \$43,000.
- Northwestern University, Evanston, Illinois. Malcolm Dole, Mechanism of High Energy Radiation Effects in High Polymers. \$32,000.
- Northwestern University, Evanston, Illinois. Herman L. Pines, The Use of C-14 and Tritium in the Study of Catalyzed Reactions of Hydrocarbons and Alcohols. \$40,639.
- Northwestern University, Evanston, Illinois. F. E. Stafford, Physical Chemistry of Highly Energetic Systems: Cross Sections for Electron Impact Ionization. \$26,672.
- Notre Dame, University of, Notre Dame, Indiana. Milton Burton, Radiation Chemistry. \$1,122,000.

Chemistry

- Ohio State University, Columbus, Ohio. H. H. Nielsen and K. N. Rao, High-Resolution Infrared Spectra of Tritium and Deuterium Substituted Molecules. \$28,708.
- Ohio State University, Columbus, Ohio. R. F. Firestone, Kinetics of Ionizing-Radiation Induced Reactions in Organic Compounds. \$41,850.
- Ohio State University, Columbus, Ohio. C. J. Geankoplis, Knudsen and Molecular Diffusion of Gases in Capillaries and Porous Solids over Large Pressure Ranges. \$16,336.
- Ohio University, Athens, Ohio. James Y. Tong, An Investigation of Chromate Complexes. \$6,140.
- Oklahoma State University, Stillwater, Oklahoma. John B. West, Mass Transfer Kinetics of Uranium Complexes. \$22,000.
- Oklahoma State University, Stillwater, Oklahoma. T. E. Moore, A Study of the Liquid-Liquid Extraction and Separation of Salts. \$14,000.
- Oklahoma State University, Stillwater, Oklahoma. J. Paul Devlin, A Vibrational Study of Molten Salt Systems by Attenuated Total Reflection Infrared Spectroscopy. \$9,000.
- Oregon State University, Corvallis, Oregon. T. H. Norris, A Study of Generalized Acid-Base Phenomena in Non-aqueous Ionizing Solvents with Radioactive Tracers. \$25,000.
- Oregon, University of, Eugene, Oregon. Richard M. Noyes, Diffusion Controlled Reactions and Exchange Reactions in Solutions. \$27,293.
- Pennsylvania State University, University Park, Pennsylvania. Joseph Jordon, Electrochemistry, Thermochemistry, and Fused Salts. \$31,000.
- Pennsylvania State University, University Park, Pennsylvania. F. W. Lampe, Radiation Chemistry and Mass Spectrometric Studies of Silanes and Simple Organosilanes. \$18,998 (15 months).
- Pennsylvania, University of, Philadelphia, Pennsylvania. John O'M. Bockris, Investigation of the Structure and Properties of Molten Salts. \$54,945.
- Pennsylvania, University of, Philadelphia, Pennsylvania. David White, Rotational Ordering in the Solid Molecular Hydrogens. \$35,000.
- Pennsylvania, University of, Philadelphia, Pennsylvania. Wayne L. Worrell, High-Temperature Galvanic-Cell Investigations Using Solid Electrolytes. \$32,675.
- Pittsburgh, University of, Pittsburgh, Pennsylvania. Robert L. Wolke, Recoil Studies of Nuclear Reactions. \$44,239.
- Princeton University, Princeton, New Jersey. John Turkevich, Heterogeneous Catalysts: Synthesis, Characterization and Investigation of Reaction Kinetics. \$88,000.
- Princeton University, Princeton, New Jersey. Robert A. Naumann, Nuclear Interactions. \$201,000.
- Princeton University, Princeton, New Jersey. R. C. Axtmann, Heavy Particle Energy Transfer to Chemical Systems and Mossbauer Studies of Inorganic Salts. \$46,000.
- Princeton University, Princeton, New Jersey. Leland C. Allen, High Accuracy, Many-Electron Wavefunctions for Noble Gas Molecules. \$30,000.

Chemistry

- Puerto Rico, University of, Mayaguez, Puerto Rico. Owen H. Wheeler, Hot-Atom Chemistry of Organic Phosphorus and Sulphur Compounds. \$37,273.
- Purdue University, Lafayette, Indiana. Robert T. Grimley, Thermodynamics, Mechanism and Kinetics of Vaporization Processes. \$32,700.
- Purdue University, Lafayette, Indiana. L. B. Rogers, Gas Chromatography, Foam Fractionation and Other Separations Methods. \$44,714.
- Purdue University, Lafayette, Indiana. Grant W. Urry, Covalently Bonded Compounds of the Light Elements. \$40,000.
- Purdue University, Lafayette, Indiana. Norbert T. Porile, De-excitation Processes in High-Energy Nuclear Reactions. \$81,000 (15 months).
- Purdue University, Lafayette, Indiana. Patrick J. Daly, Radiative Capture Reactions and Nuclear Spectroscopy. \$30,615.
- Purdue University, Lafayette, Indiana. James W. Cobble, Thermodynamics of Heavy Elements and Studies in Nuclear Chemistry. \$58,500.
- Reed College, Portland, Oregon. Arthur F. Scott, Studies in Physical and Inorganic Chemistry. \$5,000.
- Rensselaer Polytechnic Institute, Troy, New York. George J. Janz, Non-aqueous Ionic Solutions. \$25,000 (19 months).
- Rensselaer Polytechnic Institute, Troy, New York. Howard Littman, Gas-Particle Heat Transfer Coefficients in Packed Beds by Frequency Response Techniques. \$26,000.
- Rensselaer Polytechnic Institute, Troy, New York. Paul Harteck and Seymour Dondes, A Study of the Pulse Radiolysis of Gases. \$26,077.
- Rice University, Houston, Texas. Kenneth S. Pitzer and John L. Margrave, Physical Chemistry of High Temperature Systems. \$96,625.
- Rochester, University of, Rochester, New York. H. Marshall Blann, Nuclear Reaction Mechanisms. \$55,000.
- Rutgers University, New Brunswick, New Jersey. Rolfe H. Herber, Studies in Nuclear and Radiochemistry. \$19,656.
- Rutgers University, New Brunswick, New Jersey. Richard W. Laity, Ion Mobility in Molten Salts. \$36,453.
- South Carolina, University of, Columbia, South Carolina. O. D. Bonner, Fundamental Studies of Ion Exchange Equilibria. \$11,000.
- South Carolina, University of, Columbia, South Carolina. Edward E. Mercer, Chemistry of Ruthenium. \$22,725.
- Southern California, University of, Los Angeles, California. Wayne K. Wilmarth, Aqueous Chemistry of Free Radicals and Other Inorganic Reactive Intermediates. \$38,423.
- Southern California, University of, Los Angeles, California. Arthur W. Adamson, The Photochemistry of Complex Ions. \$16,874.

Chemistry

- Stanford Research Institute, Menlo Park, California. Daniel Cubicciotti, A Fundamental Study of Fused Salts and Metal-Salt Systems. \$83,400.
- Stanford University, Stanford, California. George A. Parks, Inorganic Oxides in Aqueous Systems: The Zero Point of Charge. \$15,000.
- Stanford University, Stanford, California. Henry Taube, Reactions of Solvated Ions. \$42,461.
- Stanford University, Stanford, California. Thomas J. Connolly, Radiation-Induced Nucleation of Bubbles in Superheated Water. \$15,273.
- Temple University, Philadelphia, Pennsylvania. A. V. Grosse, High Temperature Inorganic Chemistry. \$39,792.
- Tennessee, University of, Knoxville, Tennessee. Hilton A. Smith, Studies Dealing with the Isotopes of Hydrogen. \$15,866 (2 years).
- Tennessee, University of, Knoxville, Tennessee. T. Ffrancon Williams, Research Concerning Ionic and Free Radical Reactions in Radiation Chemistry. \$30,000.
- Tennessee, University of, Knoxville, Tennessee. Gleb Mamantov, Electrochemical Studies in Molten Fluorides and Other Halides. \$15,413.
- Texas A & M University, College Station, Texas. Ralph A. Zingaro and Kurt J. Irgolic, Chemistry of the Metalloids of Group VA and Group VIA. \$30,596.
- Texas A & M University, College Station, Texas. Arthur E. Martell, Chelation and Oleation Reactions of Metal Ions in Aqueous Solution. \$19,392.
- Texas, University of, Austin, Texas. George W. Watt, Unusual Oxidation States of Transitional Elements. \$35,368 (15 months).
- Texas, University of, Austin, Texas. David M. Himmelblau, Initiation of Bubbles in Super-saturated Solutions by Ionizing Radiation. \$10,488 (2 years).
- Toledo, University of, Toledo, Ohio. Jack G. Kay, Chemical Effects of Nuclear Transformations, Flash Heating or Flash Photolysis. \$23,000.
- Tufts University, Medford, Massachusetts. T. R. P. Gibb and Charles E. Messer, Fundamental Properties of Metallic Hydrides. \$41,146.
- Utah, University of, Salt Lake City, Utah. Henry Eyring and C. J. Christensen, Surface Chemistry Phenomena. \$24,281.
- Utah, University of, Salt Lake City, Utah. Mead LeRoy Jensen, Carbon, Oxygen, and Sulfur Isotopes and the Origin and Sources of Uranium Mineralization. \$38,980.
- Vanderbilt University, Nashville, Tennessee. Mark M. Jones. Some Aspects of the Stabilities of Complex Compounds. \$19,500.
- Vanderbilt University, Nashville, Tennessee. Thomas W. Martin, Studies in Radiation Chemistry and Flash Spectroscopy. \$35,241.

Chemistry

- Virginia Polytechnic Institute, Blacksburg, Virginia. Hans J. Ache, Reactions of Charged and Neutral Recoil Particles Following Nuclear Transformations. \$25,400.
- Virginia Polytechnic Institute, Blacksburg, Virginia. Alan F. Clifford, Studies in Hydrogen Fluoride Solvent Systems and Mössbauer Spectroscopy of Rare Earth Compounds. \$25,000.
- Washington State University, Pullman, Washington. John B. Gruber, Spectroscopic Studies of Actinide Ions in Crystalline Solids. \$52,000.
- Washington State University, Pullman, Washington. John P. Hunt, Inorganic Reaction Mechanisms in Aqueous and Non-Aqueous Solvents. \$46,026.
- Washington State University, Pullman, Washington. Selmer W. Peterson, Neutron Diffraction Determination of Proton Positions. \$39,957.
- Washington University, St. Louis, Missouri. Arthur C. Wahl, Radiochemical Studies of the Fission Processes. \$39,100.
- Washington University, St. Louis, Missouri. Demetrios G. Sarantites, Low Energy Nuclear Reactions and Spectroscopy. \$40,000.
- Washington University, St. Louis, Missouri. Paul L. Reeder, Delayed-Particle Spectroscopy. \$38,753.
- Washington University, St. Louis, Missouri. Peter P. Gaspar, Reaction Studies of Hot Silicon Radicals. \$52,500.
- Washington, University of, Seattle, Washington. A. L. Babb, Separation Efficiency of Solvent Extraction Systems. \$28,340.
- Wayne State University, Detroit, Michigan. Karl H. Gayer, A Kinetic and Reaction Mechanism Study of the Formation and Decomposition of Uranium Oxide U_3O_8 in Organic Media. \$9,600 (15 months).
- Wayne State University, Detroit, Michigan. H. K. Livingston, Controlled Polymerization of Adsorbed Monolayers. \$18,500.
- Western Washington State College, Bellingham, Washington. Edward F. Neuzil, Fission Studies on Elements Below Polonium. \$6,750.
- Wisconsin, University of, Madison, Wisconsin. J. E. Willard, Studies in Hot Atom and Radiation Chemistry. \$97,839.
- Wisconsin, University of, Madison, Wisconsin. W. J. Blaedel, Use of Radiotracers in Continuous Analysis. \$16,700.
- Wisconsin, University of, Madison, Wisconsin. Irving Shain, Kinetic and Mass Transfer Processes in Electrochemistry: Application to Analytical Methods. \$20,106.
- Wisconsin, University of, Madison, Wisconsin. R. B. Bernstein, Atomic and Molecular Beam Studies. \$50,000.
- Wisconsin, University of, Madison, Wisconsin. Werner W. Brandt, Diffusion in Zeolites and Glasses. \$12,516.

Chemistry

- Yale University, New Haven, Connecticut. P. A. Lyons, Diffusion Coefficients of Electrolytes and Molecules. \$15,140 (16 months).
- Yale University, New Haven, Connecticut. Richard Wolfgang, Research on High Energy Chemical Reactions. \$95,000.
- Yale University, New Haven, Connecticut. Robert Beringer, Nuclear Chemistry and Physics at the Yale Heavy Ion Linear Accelerator. \$376,270.
- Yale University, New Haven, Connecticut. Morton Kaplan, Research in Nuclear Chemistry. \$70,000 (15 months).
- Yeshiva University, New York, New York. William Spindel, Isotope Effects in Chemical Exchange Processes and Factors Influencing Them. \$40,000.
- Yeshiva University, New York, New York. Marvin J. Stern, Isotope Effects on Rate and Equilibrium Processes. \$23,000.

Metallurgy and Materials

- Andrews University, Berrien Springs, Michigan. Donald D. Snyder, Physical Properties of Separated Metallic Isotopes. \$5,358
- Arizona, University of, Tucson, Arizona. Carl T. Tomizuka, Impurity Diffusion in Solids. \$102,800 (18 months).
- Arizona, University of, Tucson, Arizona. Roy M. Emrick, High Temperature Anneals of Defects Quenched in Metals. \$22,330.
- Atomics International, Canoga Park, California. R. G. Breckenridge, Electronic Structure of Metals and Alloys. \$222,444.
- Atomics International, Canoga Park, California. A. Sosin, Radiation Damage and Lattice Defects in Crystalline Solids. \$313,500.
- Battelle Memorial Institute, Columbus, Ohio. A. H. Clauer and B. A. Wilcox, Correlation of Dislocation Structure with Creep Properties in Refractory Metals. \$44,032.
- Battelle Memorial Institute, Columbus, Ohio. M. S. Seltzer, Investigation of Steady-State Creep in Non-Stoichiometric Compounds. \$33,570.
- Brandeis University, Waltham, Massachusetts. Christoph Hohenemser, Critical Point Behavior in Magnetically Ordered Solids. \$33,240.
- Brigham Young University, Provo, Utah. J. Bevan Ott and J. Rex Goates, Thermodynamic Investigation of Alkali Metal Mixtures. \$27,072.
- Brooklyn, Polytechnic Institute of, Brooklyn, New York. L. S. Castleman, Binary Multiphase Diffusion in Metallic Systems. \$21,121.
- Brown University, Providence, Rhode Island. P. J. Bray, Radiation Damage Studies in Solids Using Magnetic Resonance Techniques. \$69,699.
- Brown University, Providence, Rhode Island. Joseph Gurland and D. C. Drucker, A Combined Macroscopic and Microscopic Approach to the Mechanical Properties of Metals. \$70,000.
- California Institute of Technology, Pasadena, California. Pol Duwez, Fundamental Studies of Materials. \$222,500.
- California Institute of Technology, Pasadena, California. D. S. Wood and T. Vreeland, Jr., Dislocation Mobility and Density in Metallic Crystals. \$64,007.
- California, University of, Berkeley, California. C. D. Jeffries, Dynamic Nuclear Polarization and Solid State Physics. \$35,200.
- California, University of, Berkeley, California. Alan M. Portis, Microwave Faraday Rotation and Other Studies. \$45,000 (17 months).
- California, University of, Los Angeles, California. W. Gilbert Clark, Experimental Research in Solid State Physics by Magnetic Resonance Methods. \$44,987.
- California, University of, Los Angeles, California. Marvin Chester, Second Sound in Solids; Electroabsorption Studies in Semiconductors. \$41,000.
- California, University of, Riverside, California. A. W. Lawson, Electric and Magnetic Properties of Transition Metals and Their Compounds. \$65,136.
- California, University of, San Diego, California. J. C. Wheatley, Research on the Properties of Materials at Very Low Temperatures. \$145,670.

Metallurgy and Materials

- Carnegie-Mellon University, Pittsburgh, Pennsylvania. H. W. Paxton, Surface Diffusion on Metals. \$16,213.
- Carnegie-Mellon University, Pittsburgh, Pennsylvania. J. R. Low, A Study of the Interaction Between Point Defects and Dislocations Through Dislocation Damping Experiments. \$27,700 (2 years).
- Carnegie-Mellon University, Pittsburgh, Pennsylvania. D. A. Wiegand, Radiation Effects in Solids. \$44,400.
- Carnegie-Mellon University, Pittsburgh, Pennsylvania. Paul A. Flinn, Application of the Mössbauer Effect to the Study of Metallic Solid Solutions. \$41,821.
- Carnegie-Mellon University, Pittsburgh, Pennsylvania. T. B. Massalski, Stability of Alloy Phases. \$40,577.
- Case Western Reserve University, Cleveland, Ohio. R. F. Hehemann, Kinetics of Phase Transformation in Zirconium-Niobium Alloys. \$15,030.
- Case Western Reserve University, Cleveland, Ohio. Charles S. Smith, Solid State Physics. \$78,850.
- Case Western Reserve University, Cleveland, Ohio. Ronald Gibala, Dislocation-Solute Atom Interactions in Alloys. \$35,525.
- Chicago, University of, Chicago, Illinois. Robert Gomer, Interactions on Metallic Surfaces. \$42,000.
- Clarkson College of Technology, Potsdam, New York. A. W. Czanderna, The Oxidation of Copper Films. \$8,866.
- Clemson University, Clemson, South Carolina. Robert L. Chaplin, Radiation Effects in Crystalline Materials. \$34,758.
- Columbia University, New York, New York. Stephen P. Denker, Electronic Properties of Refractory Monoxides Having Intrinsic Lattice Vacancy Concentrations. \$31,075.
- Columbia University, New York, New York. Arthur S. Nowick, Defects in Crystals. \$37,113.
- Columbia University, New York, New York. Eugene S. Machlin, A Study of the Feasibility of Obtaining Field Ion Microscope Images of Interstitial Solutes. \$39,347.
- Connecticut, University of, Storrs, Connecticut. O. R. Gilliam, Investigations of Radiation Effects in Solids by Electron Spin Resonance. \$36,950.
- Connecticut, University of, Storrs, Connecticut. Ralph H. Bartram, Theoretical Investigations of Radiation Effects in Ionic Crystals. \$17,374.

Metallurgy and Materials

- Cornell University, Ithaca, New York. R. H. Silsbee and Raymond Bowers, Solid State Physics: Magnetic Phenomena. \$119,689.
- Cornell University, Ithaca, New York. J. A. Krumhansl, A. J. Sievers and R. O. Pohl, Experimental Phonon Physics and Dynamitron Utilization. \$142,273.
- Cornell University, Ithaca, New York. Henri S. Sack, A Study of Imperfections in Crystals. \$63,810.
- Cornell University, Ithaca, New York. Arthur L. Ruoff, Elastic and Plastic Deformation of Solids. \$105,000.
- Cornell University, Ithaca, New York. John Silcox and W. W. Webb, Hard Superconducting Materials. \$138,652 (18 months).
- Cornell University, Ithaca, New York. John Silcox, Correlation of Physical Properties of Crystals with Microstructure. \$44,658 (15 months).
- Cornell University, Ithaca, New York. Che-Yu Li, Solid Liquid Interface. \$25,986 (19 months).
- Cornell University, Ithaca, New York. Mark S. Nelkin, The Theory of Slow Neutron Inelastic Scattering by Liquids. \$34,509.
- Cornell University, Ithaca, New York. Douglas B. Fitchen, Electronic Properties of Defects in Ionic Crystals. \$34,504.
- Cornell University, Ithaca, New York. Robert W. Balluffi and David N. Seidman, Defects in Metal Crystals. \$150,557.
- Cornell University, Ithaca, New York. James A. Krumhansl and P. A. Carruthers, Theoretical Phonon Physics. \$76,240.
- Cornell University, Ithaca, New York. B. W. Batterman, Low Temperature Phase Transformations in High Field Superconductors. \$36,144.
- Cornell University, Ithaca, New York. A. Taylor, Radiation Damage Studies Using the Cornell 3 MeV Dynamitron. \$52,387.
- Delaware, University of, Newark, Delaware. Richard B. Murray, Radiation-Induced Defects in Alkali Halides, and Their Role in Recombination Processes. \$26,883.
- Denver, University of, Denver, Colorado. C. E. Lundin, Alloying Behavior of the Rare Earths. \$29,652 (14 months).
- Florida, University of, Gainesville, Florida. F. N. Rhines, John Kronsbein and R. T. DeHoff, Topological Study of the Sintering Process. \$40,115.
- Florida, University of, Gainesville, Florida. Robert E. Reed-Hill, Deformation Processes in Zirconium. \$14,851.
- Florida, University of, Gainesville, Florida. R. E. Hummel and J. J. Hren, Neutron-Irradiation of Copper-Based Alloys with Martensitic Transformations. \$25,000.
- Franklin Institute, Philadelphia, Pennsylvania. John D. Meakin, A Study of Non-Stoichiometry in Metallic Carbides Using Field Ion Microscopy. \$36,822.

Metallurgy and Materials

- Georgetown University, Washington, D. C. William D. Gregory, The Study of Very Pure Metals at Low Temperatures. \$23,655.
- Georgia Institute of Technology, Atlanta, Georgia. E. J. Scheibner, Surface Properties of Magnetic Materials. \$52,264.
- Georgia Institute of Technology, Atlanta, Georgia. Stephen Spooner, Magnetic Phenomena at Metal Surfaces. \$35,000 (10 months).
- Illinois Institute of Technology, Chicago, Illinois. L. I. Grossweiner, Investigation of Energy Transfer Processes by Flash Photolysis. \$34,776.
- Illinois Institute of Technology, Chicago, Illinois. Harold Weinstock, Thermal Measurements on Solids Below 1 K. \$37,000.
- Illinois, University of, Urbana, Illinois. Robert J. Maurer, The Science of Materials. \$1,695,658.
- Johns Hopkins University, Baltimore, Maryland. Peter E. Wagner, Phonon Imprisonment Studies. \$35,811.
- Kansas, University of, Lawrence, Kansas. Robert J. Friauf, Point Defects in Ionic Crystals. \$41,000.
- Kansas, University of, Lawrence, Kansas. Peter M. Richards, Experimental and Theoretical Studies of Magnetic Resonance and Relaxation. \$41,500 (18 months).
- Kent State University, Kent, Ohio. Stanley H. Christensen, A Study of Local Symmetry and Bonding by Electron Paramagnetic Resonance. \$15,555.
- Kentucky, University of, Lexington, Kentucky. Ben R. Gossick, Radiation Effects on Germanium. \$27,292.
- Little, Inc., Arthur D., Cambridge, Massachusetts. D. W. Lee, Investigation of Deformation of Transition Metal Carbides and Borides at High Temperatures. \$21,200.
- Louisiana State University, Baton Rouge, Louisiana. J. M. Reynolds, Conductivity Tensors in Metals and Semiconductors. \$75,001.
- Maine, University of, Orono, Maine. Douglas W. Wylie, Effects of Radiation on Alkali Azides Using Electron Spin Resonance Techniques. \$22,540.
- Marquette University, Milwaukee, Wisconsin. Robert N. Blumenthal, Defect Structures in Non-stoichiometric Oxides. \$27,658.
- Maryland, University of, College Park, Maryland. Robert M. Asimow, An Investigation of Solid Solution Hardening in Metallic Solid Solution Alloys. \$32,000.
- Maryland, University of, College Park, Maryland. R. J. Arsenault, An Investigation of Irradiation Strengthening of B.C.C. Metals and Solid Solutions. \$30,000.

Metallurgy and Materials

- Massachusetts Institute of Technology, Cambridge, Massachusetts. M. B. Bever, Thermodynamic and Other Aspects of Metallic Systems. \$48,250.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. B. L. Averbach and Morris Cohen, Atomic Arrangements, Imperfections and Diffusion. \$97,978.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. B. E. Warren, X-ray Study of Structure and Defects. \$6,800 (31 months).
- Massachusetts Institute of Technology, Cambridge, Massachusetts. C. G. Shull, Low Temperature Neutron Physics Studies. \$171,039 (18 months).
- Massachusetts Institute of Technology, Cambridge, Massachusetts. W. A. Backofen, Mechanical Properties of Metals at Low Temperatures. \$18,480.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. Benjamin Lax and John E. C. Williams, Research on Instability in Superconducting Magnets. \$61,370.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. W. D. Kingery and R. L. Coble, Basic Research in Ceramics and Noncrystalline Systems. \$286,623.
- Michigan State University, East Lansing, Michigan. F. J. Blatt and J. Bass, Studies of Electrical and Defect Properties of Thin Metallic Wires. \$41,479.
- Michigan State University, East Lansing, Michigan. Edward H. Carlson, Study of Interactions Between f-Shell Transition Ions in Non-metallic Crystals. \$28,385.
- Michigan State University, East Lansing, Michigan. Gerald L. Pollack, Properties of Rare-Gas Solids. \$18,264.
- Michigan Technological University, Houghton, Michigan. A. A. Hendrickson, Structure and Properties of Solid Solutions. \$34,490.
- Michigan Technological University, Houghton, Michigan. Donald E. Mikkola, Effect of Annealing on the Substructure of Cold Worked fcc Metals and Alloys. \$32,694.
- Michigan, University of, Ann Arbor, Michigan. Lawrence O. Brockway, The Oxidation of Thin Single Crystals of Copper. \$20,737.
- Michigan, University of, Ann Arbor, Michigan. R. E. Balzhiser and R. D. Pehlke, Thermodynamic and Transport Properties of Liquid Metal Systems. \$19,635.
- Minnesota, University of, Minneapolis, Minnesota. Richard A. Swalin, Diffusion Studies in Liquid Metals. \$45,212.
- Minnesota, University of, Minneapolis, Minnesota. Morris E. Nicholson, A Study of the Influence of Short-Range Order on the Mechanical Properties and Plastic Behavior of Alloys. \$20,911.
- Minnesota, University of, Minneapolis, Minnesota. W. Zimmerman, Jr., L. H. Nosanow, W. V. Weyhman, and A. M. Goldman, Experimental and Theoretical Studies in Solid State and Low Temperature Physics. \$152,728.
- Minnesota, University of, Minneapolis, Minnesota. Y. P. Gupta, Transport Processes in Non-Crystalline Oxides. \$19,812.
- Mississippi, University of, University, Mississippi. Arthur B. Lewis, The Effects of Neutron Irradiation on the Electronic Properties of Binary Alloys. \$34,696.

Metallurgy and Materials

- Missouri, University of, Rolla, Missouri. Robert Gerson, Ferroelectric Properties of Bismuth Ferrate and Related Materials. \$45,116.
- Missouri, University of, Rolla, Missouri. Charles A. Gobin, Nuclear Radiation Effects on Silicon P-N Junctions. \$48,819.
- Montana State University, Bozeman, Montana. Harry W. Townes, An Investigation of Turbulent Flow in a Rough Pipe \$21,559.
- Murray State University, Murray, Kentucky. L. Bridwell, Interaction of Fission Fragments with Thin Films of UO_2 . \$38,830.
- National Bureau of Standards, Washington, D. C. Solid State Physics. \$86,608.
- National Bureau of Standards, Washington, D. C. Constitution of Binary Alloys. \$28,000.
- Nebraska, University of, Lincoln, Nebraska. Edgar A. Pearlstein, Studies of Imperfections in Solids. \$60,020.
- New York, City University of/Queens College, Flushing, New York. Robert D. Hatcher, Theoretical Research on Radiation Induced Defects in LiH. \$27,000.
- New York University, New York, New York. Edward Miller, Thermodynamic Properties of Intermetallic Compounds. \$28,576.
- North Carolina State University, Raleigh, North Carolina. Hayne Palmour, III, Grain Boundary Sliding in Alumina Bicrystals. \$25,440.
- North Carolina State University, Raleigh, North Carolina. Thomas S. Elleman, The Effects of Radiation and Gas Concentration on Rare Gas Diffusion in Solids. \$21,000.
- North Carolina, University of, Chapel Hill, North Carolina. Lawrence Slifkin, Atomic Diffusion in Crystals. \$34,649.
- North Carolina, University of, Chapel Hill, North Carolina. J. H. Crawford, Jr., Investigation of Defect Structures by Electric Polarization and Relaxation Methods. \$29,250.
- North Dakota, University of, Grand Forks, North Dakota. Harold D. Bale, Radiation Damage to Silica Structures. \$10,992.
- North Dakota, University of, Grand Forks, North Dakota. H. H. Soonpaa, Physical Phenomena in Crystals Consisting of a Finite and Countable Number of Atoms in One Direction. \$26,330.
- Northwestern University, Evanston, Illinois. R. L. Hines, Radiation Effects of Ion Bombardment. \$39,746.
- Northwestern University, Evanston, Illinois. John W. Kauffman, Studies of Radiation Damage Resulting from Electron Bombardment. \$48,000.
- Northwestern University, Evanston, Illinois. M. Meshii, Effect of Point Defects on Mechanical Properties of Metals. \$36,503.
- Notre Dame, University of, Notre Dame, Indiana. B. D. Cullity, Magnetoelastic Phenomena in Metals. \$13,500.

Metallurgy and Materials

- Ohio State University, Columbus, Ohio. Robert A. Rapp, An Investigation of Mixed Conduction in Solid Electrolytes. \$26,685.
- Oklahoma, University of, Norman, Oklahoma. Raymond D. Daniels and C. R. Haden, Influence of Imperfections and Interstitial Contaminants on the Superconducting Behavior of Metals. \$28,000.
- Oklahoma, University of, Norman, Oklahoma. C. A. Plint, Formation Energies of Individual Vacancies in Alkali Halides. \$13,135.
- Oklahoma, University of, Norman, Oklahoma. Frank B. Canfield, Diffusion in Binary Liquid Metal Systems. \$23,380.
- Oklahoma, University of, Norman, Oklahoma. Robert J. Block, The Effects of Surface Coatings on the Plastic Deformation of Metal Single Crystals. \$25,577.
- Oregon State University, Corvallis, Oregon. Melvin Cutler, The Electronic Properties of Liquid Semiconductors. \$24,000.
- Pennsylvania State University, University Park, Pennsylvania. P. L. Walker, Jr., Research on Graphite. \$102,195.
- Pennsylvania State University, University Park, Pennsylvania. L. E. Cross, Fundamental Studies in High Temperature Materials Phenomena. \$83,148.
- Pennsylvania State University, University Park, Pennsylvania. Arnulf Muan, Thermodynamic Properties of Solid Solutions at High Temperatures. \$30,288.
- Pennsylvania State University, University Park, Pennsylvania. Della M. Roy, Gases in Solids: High Volatile Content Glasses. \$8,404.
- Pennsylvania State University, University Park, Pennsylvania. Earle Ryba, Transformations in AB₂ Intermetallic Compounds. \$31,450.
- Pittsburgh, University of, Pittsburgh, Pennsylvania. Richard A. Butera, Magneto-thermodynamics of Para- and Antiferromagnets. \$47,437.
- Pittsburgh, University of, Pittsburgh, Pennsylvania. R. S. Craig and W. E. Wallace, Thermal, Structural and Magnetic Studies of Metals and Intermetallic Compounds. \$96,201.
- Pittsburgh, University of, Pittsburgh, Pennsylvania. John R. Townsend, A Study of Radiation Induced Defects in Metals. \$28,653.
- Puerto Rico, University of, Mayaguez, Puerto Rico. Mortimer I. Kay, Neutron Diffraction Program. \$215,205.
- Puerto Rico, University of, Rio Piedras, Puerto Rico. Amador Cobas, Radiation Damage in Organic Crystals. \$59,524.
- Purdue University, Lafayette, Indiana. John W. MacKay, Basic Radiation Damage Studies. \$61,747.
- Purdue University, Lafayette, Indiana. Richard E. Grace, Transport and Thermodynamic Properties of Solids. \$10,769.
- Purdue University, Lafayette, Indiana. James G. Mullen, Mössbauer Studies of the Properties of Solids. \$23,371.

Metallurgy and Materials

- Rensselaer Polytechnic Institute, Troy, New York. H. B. Huntington, Anisotropic Diffusion and Electromigration. \$58,000.
- Rensselaer Polytechnic Institute, Troy, New York. Edmond Brown, Theoretical Research on Electron Behavior in Crystals. \$31,300.
- Rensselaer Polytechnic Institute, Troy, New York. Fritz V. Lenel, Studies of Sintering. \$31,000.
- Rensselaer Polytechnic Institute, Troy, New York. Philip A. Casabella, Nuclear Quadrupole Coupling Studies in Solids. \$24,475.
- Rensselaer Polytechnic Institute, Troy, New York. John D. Mackenzie, Diffusion and Electrical Conductivity in Crystalline and Glassy Calcium Silicates. \$18,000.
- Rensselaer Polytechnic Institute, Troy, New York. Norman S. Stoloff, Precipitation and Dispersion Hardening in Magnesium-Base Alloys. \$18,400.
- Rensselaer Polytechnic Institute, Troy, New York. H. Michael Gilder, Effect of Hydrostatic Pressure on Self-Diffusion Rates in Hexagonal Metals. \$30,000.
- 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. \$33,994.
- Rochester, University of, Rochester, New York. Theodore G. Castner, Electron Spin Resonance in Solids. \$46,000.
- Rutgers University, New Brunswick, New Jersey. John A. Sauer, Relaxation Behavior, Molecular Motion and Structure in Polymers and Related Materials. \$31,778.
- St. Mary's College, Winona, Minnesota. Donald R. Morgan and William E. Blass, Experimental Study of the Surface Structure and Electronic Properties of Single Crystal Molybdenum and Tungsten Ribbons. \$27,000.
- Stanford University, Stanford, California. David A. Stevenson, Thermodynamic Properties and Defect Structure of Intermetallic Compounds. \$25,000.
- Stanford University, Stanford, California. Oleg D. Sherby and O. Cutler Shepard, Effect of Point Defects on Mechanical Behavior of Crystalline Solids. \$21,500.
- Stanford University, Stanford, California. Craig R. Barrett and William D. Nix, Structure Dependence of Viscous Deformation of Metals. \$24,000.
- Syracuse University, Syracuse, New York. F. A. Kanda, Physical Properties and Alloying Behavior of Alkali and Alkaline Earth Metals. \$46,686.
- Syracuse University, Syracuse, New York. Richard W. Vook, In Situ Ultra High Vacuum High Energy Electron Diffraction Studies. \$26,300.
- Temple University, Philadelphia, Pennsylvania. Leonard Muldawer and Henri Amar, Study of the IB-IIB Beta Phase Alloys. \$95,000.
- Tennessee, University of, Knoxville, Tennessee. E. E. Stansbury and C. R. Brooks, Application of Adiabatic Calorimetry to Metal Systems. \$22,513.
- Texas Christian University, Fort Worth, Texas. Richard F. Raeuchle, Structural Studies of Amorphous Aluminum Oxide. \$36,465.

Metallurgy and Materials

- Tuskegee Institute, Tuskegee, Alabama. Ira C. Dillon, Density Determinations Using a Gamma Radiation Attenuation Technique. \$49,600.
- Utah, University of, Salt Lake City, Utah. Ivan B. Cutler, Recrystallization and Sintering of Oxides. \$13,330.
- Utah, University of, Salt Lake City, Utah. William D. Ohlsen, A Magnetic Resonance Study of Defects in Solids. \$28,599.
- Utah, University of, Salt Lake City, Utah. Owen W. Johnson, Interstitial Diffusion in Non-Metallic Crystals. \$21,000.
- Utah, University of, Salt Lake City, Utah. John W. DeFord, Radiation Damage in Nb and Ta. \$20,083.
- Utah, University of, Salt Lake City, Utah. Ronald S. Gordon, Impurity Effects on the Creep of Polycrystalline Magnesium and Aluminum Oxides at Elevated Temperatures. \$15,716.
- Vanderbilt University, Nashville, Tennessee. James J. Wert and S. G. Cuschalk, Deformation Studies of Superlattice Structure. \$28,000.
- Vermont, University of, Burlington, Vermont. Ted B. Flanagan, Absorption of Hydrogen and Deuterium by Palladium-Rich Alloys. \$21,220.
- Virginia, University of, Charlottesville, Virginia. J. W. Mitchell, The Properties of Crystalline Solids. \$41,969.
- Virginia, University of, Charlottesville, Virginia. Robert V. Coleman, Electronic Properties of Metals and Alloys. \$65,000 (11½ months).
- Virginia, University of, Charlottesville, Virginia. Doris Kuhlmann-Wilsdorf, Investigations on the Behavior of Point Defects and Dislocations. \$62,000.
- Virginia, University of, Charlottesville, Virginia. Kenneth R. Lawless, Electron Diffraction Studies of Single Crystal Metal Surfaces. \$18,748.
- Wake Forest University, Winston-Salem, North Carolina. Thomas J. Turner and G. P. Williams, Jr., A Study of Atomic Mobility in Crystalline Materials. \$15,509.
- Washington, University of, Seattle, Washington. Douglas H. Polonis, Phase Transformation in a Eutectoid Binary Alloy System. \$35,900.
- Washington, University of, Seattle, Washington. Robert L. Ingalls, Mössbauer Studies at High Pressures. \$43,550.
- Wayne State University, Detroit, Michigan. Yeong-Wook Kim, Electron Paramagnetic Resonance Studies of Radiation Effects in Solids and Chemical Compounds. \$48,000.
- Wayne State University, Detroit, Michigan. Henry O. Hooper, Atomic Structure and Nature of the Magnetism in Several Magnetic Glasses. \$22,038.
- West Virginia University, Morgantown, West Virginia. Arthur S. Pavlovic, Volume Magnetostriction in Ferromagnetic Materials. \$8,338.

Metallurgy and Materials

Wisconsin, University of, Madison, Wisconsin. C. W. Maynard and W. F. Vogelsang, Radiation Interactions in Solids; Surface and High Pressure Effects. \$48,435.

Wisconsin, University of, Madison, Wisconsin. Richard A. Dodd and P. R. Strutt, Creep Mechanisms in Alloy Crystals. \$25,847.

Wisconsin, University of, Madison, Wisconsin. J. S. Hirschhorn, The Effect of Surface Tension on the Sintering Rate of Metal Alloys. \$8,913.

Yale University, New Haven, Connecticut. C. N. J. Wagner, X-ray Study of the Structure of Liquid Metals and Alloys. \$22,000.

Yale University, New Haven, Connecticut. Werner P. Wolf, The Study of Ideal Magnetic Crystals. \$108,302.

Yeshiva University, New York, New York. Martin Goldstein, Phase Convectivity in Diffusion Limited Separations. \$18,265.

Controlled Thermonuclear Research

- California, University of, Berkeley, California. Charles K. Birdsall, Computer and Alkali Plasma Instability Experiments. \$43,910 (17½ months).
- California, University of, Irvine, California. Nathan Rynn, Experiments on Alkali and Barium Plasmas. No Funds.
- California, University of, San Diego, California. William B. Thompson, Plasma Physics Research (Theoretical). \$63,000 (9½ months).
- Cornell University, Ithaca, New York. Peter Auer, Properties of the High Beta Plasma State. \$38,000.
- Environmental Science Services Administration, Boulder, Colorado. Relationship of Density Correlation Measurements of Plasma Diffusion. \$39,600.
- Georgia Institute of Technology, Atlanta, Georgia. D. W. Martin and E. W. Thomas, Ionization and Charge Transfer Cross Sections for Hydrogen and Helium Ions in Gases in the Energy Range 0.15-1.0 MeV. \$65,557.
- Georgia Institute of Technology, Atlanta, Georgia. John W. Hooper, The Excitation and Ionization of Ions by Electron Impact. \$42,000 (15 months).
- Maryland, University of, College Park, Maryland. Hans R. Griem, Applications of Light Scattering to Plasma Diagnostics. \$54,000.
- Maryland, University of, College Park, Maryland. Herbert Lashinsky, Investigation of Universal Plasma Instabilities. \$66,000 (15 months).
- Massachusetts Institute of Technology, Cambridge, Massachusetts. George Bekefi, Plasma Physics, Plasma Production, and Plasma Diagnostics Studies. \$289,000.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. D. J. Rose and L. M. Lidsky, Non-Adiabatic Trapping of Particles in Magnetic Field and the Interaction of Optical Radiation with Plasmas. \$100,545.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. Abraham Bers, Study of Radio Frequency Emissions from Hot Electron Plasmas. \$28,000 (11½ months).
- Miami, University of, Coral Gables, Florida. Harry S. Robertson, Instabilities and Turbulence in Alkali Vapor Plasmas. \$48,000.
- Miami, University of, Coral Gables, Florida. Daniel R. Wells, Investigation of Plasma Vortex Structures. No Funds.
- Michigan, University of, Ann Arbor, Michigan. Terry Kammash, Microinstabilities in Inhomogeneous Plasma. \$23,000.
- National Bureau of Standards, Washington, D. C. High Field Magnet Research; Hydrogen Cross Section Measurements; Ultraviolet Optical and Photoelectric Properties of Solid Materials. \$175,900.
- New York University, New York, New York. Harold Grad, Plasma Physics and Magneto Fluid Dynamics. \$231,664.
- Roanoke College, Salem, Virginia. Charles R. Finfgeld, Proton Sputtering. \$7,619 (3 months).

Controlled Thermonuclear Research

- Stanford University, Stanford, California. F. W. Crawford, Research on Plasma Oscillations and Instabilities. \$145,775.
- Stanford University, Stanford, California. Oscar Buneman and K. I. Thomassen, Study of Anomalous Cross-Field Diffusion. \$53,300.
- Stanford University, Stanford, California. Oscar Buneman and Roger Hockney, Use of Computer Models of Plasma in Controlled Thermonuclear Research. \$46,500.
- Stevens Institute of Technology, Hoboken, New Jersey. George Yevick, Experimental Investigation of Cusped Containment Geometries. \$120,000.
- Stevens Institute of Technology, Hoboken, New Jersey. Kenneth C. Rogers, Investigations in Plasma Dynamics. \$79,040.
- Stevens Institute of Technology, Hoboken, New Jersey. George Schmidt, Investigations in Plasma Dynamics. \$23,164 (9 months).
- Tennessee, University of, Knoxville, Tennessee. Edward G. Harris, Instabilities Due to Anisotropic Velocity Distributions. \$17,512.
- Texas A & M University, College Station, Texas. Melvin Eisner and G. M. Haas, Investigation of Ion Heating by Modulated Beams. \$12,388.
- Texas, University of, Austin, Texas. Hans Schluter, Investigations of the Hybrid Ion-Electron Cyclotron Resonance. \$7,000 (3 months).
- Texas, University of, Austin, Texas. William E. Drummond, Anomalous Diffusion and Thermalization of Turbulent Plasmas. \$80,000.
- Texas, University of, Austin, Texas. R. J. Bickerton, Oblique Collisionless Shocks. \$50,000.
- United Aircraft Corporation, East Hartford, Connecticut. Alan F. Haught, Production of Plasmas for Thermonuclear Research by Laser Beam Irradiation of Solid Particles. \$100,000.
- Washington State University, Pullman, Washington. Edward E. Donaldson, Chemical Sputtering of Solids. \$56,282.
- Westinghouse Electric Corporation, Baltimore, Maryland. A. G. Englehardt, Plasma Production by a High-Power Q-Switched Laser. \$49,059.
- Wisconsin, University of, Madison, Wisconsin. Donald W. Kerst, Thermonuclear Plasma Studies. \$490,000.
- Wisconsin, University of, Madison, Wisconsin. Juda L. Shohet, Plasma Instabilities and Excited by Electron Temperature Anisotropy Produced by Electron Cyclotron Resonance. \$21,438.