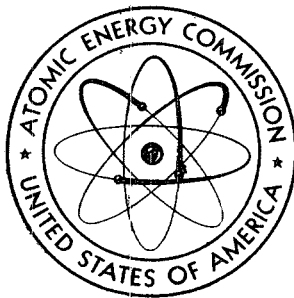


UNITED STATES
ATOMIC ENERGY COMMISSION

RESEARCH CONTRACTS
in the
PHYSICAL SCIENCES



JULY 1, 1966

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	32
Controlled Thermonuclear Research	41

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 the program, AEC generally uses a special level-of-effort contract arrangement. It is nearly always used when the annual cost to AEC is on the order of \$250,000 or less and when the cost can be estimated in advance with reasonable accuracy. In consideration for the outside organization carrying out certain investigations, the AEC will pay up to a ceiling amount based upon an agreed level of effort to be carried out. 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.

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 an appropriate administrative official of his institution. Proposals may be submitted on either a solicited or unsolicited basis, and are reviewed by 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 Physics, Mathematics, Chemistry, Metallurgy, Materials, and Controlled Thermonuclear Research.

Division of Biology and Medicine:

Life Sciences, including Medicine, Biology, Ecology and Marine Sciences; 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 such areas as equipment grants, nuclear materials loan, 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. 13-42, including the name and address of the contractor, the name(s) of the principal investigator(s), a short descriptive title of the research, and the level of AEC support during the most recent funding period. The amounts listed are for one year unless otherwise indicated.

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 1966 (in thousands)</u>
<u>Ames Laboratory, Ames, Iowa</u> Iowa State University, W-7405-ENG-82	\$ 7,672
<u>Argonne National Laboratory, Argonne, Illinois</u> University of Chicago, W-31-109-ENG-38	41,103
<u>Brookhaven National Laboratory, Upton, L. I., New York</u> Associated Universities, Inc., AT(30-2)-GEN-16	40,683
<u>Cambridge Electron Accelerator, Cambridge, Massachusetts</u> Harvard University, AT(30-1)-2076, AT(30-1)-2752 Massachusetts Institute of Technology, AT(30-1)-2098	9,630
<u>Knolls Atomic Power Laboratory, Schenectady, New York</u> General Electric Company, W-31-109-ENG-52	512
<u>Lawrence Radiation Laboratory, Berkeley and Livermore, California</u> University of California, W-7405-ENG-48	42,692
<u>Los Alamos Scientific Laboratory, Los Alamos, New Mexico</u> University of California, W-7405-ENG-36	4,628
<u>Mound Laboratory, Miamisburg, Ohio</u> Monsanto Chemical Company, AT(33-1)-GEN-53	507
<u>National Reactor Testing Station, Idaho Falls, Idaho</u> Phillips Petroleum Company, AT(10-1)-205	102
<u>Oak Ridge National Laboratory, Oak Ridge, Tennessee</u> Union Carbide Nuclear Company, W-7405-ENG-26	33,015
<u>Pacific Northwest Laboratory, Richland, Washington</u> Battelle Memorial Institute, AT(45-1)-1830	2,236
<u>Princeton-Pennsylvania Proton Accelerator, Princeton, New Jersey</u> Princeton University, AT(30-1)-2137 University of Pennsylvania, AT(30-1)-2171	8,331
<u>Princeton Plasma Physics Laboratory, Princeton, New Jersey</u> Princeton University, AT(30-1)-1238	6,489
<u>Stanford Linear Accelerator Center, Stanford, California</u> Stanford University, AT(04-3)-400, AT(04-3)-515	13,004
TOTAL	\$ 210,604

SUMMARY OF OFF-SITE CONTRACTS

The following summarizes the number and level of Washington-designated off-site contracts in effect as of July 1, 1966 and supported under the Physical Research program:

<u>Type of Organization</u>	<u>No. of Institutions</u>	<u>No. of Contracts</u>	<u>Amount (in 1000's)</u>
Educational Institutions	134	509	\$ 65,164
Not-for-Profit Institutes	10	16	887
Industrial Organizations	7	12	1,250
Other Federal Agencies	<u>2</u>	<u>5</u>	<u>755</u>
Total	<u>153</u>	<u>542</u>	\$ <u>68,056</u>

<u>Budget Category</u>	<u>No. of Contracts</u>	<u>Amount (in 1000's)</u>
High Energy Physics	33	\$ 16,378
Medium Energy Physics	11	9,161
Low Energy Physics	50	16,996
Mathematics and Computer Research	15	3,399
Chemistry	238	10,468
Metallurgy and Materials	164	9,435
Controlled Thermonuclear Research	<u>31</u>	<u>2,219</u>
Total	<u>542</u>	\$ <u>68,056</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 65 new contracts written and a corresponding number of old contracts terminating each year. In FY 1966, 60 new projects were started, while 62 contracts terminated. While the total number of contracts has tended to remain rather constant, the dollar level increased from \$47.5 million in 1961 to \$67.3 million in 1966, not including work conducted by other Federal agencies on behalf of the AEC.

Note: Actual number of contracts is slightly less (520) since research in more than one budget category sometimes is conducted as tasks under the same contract. In such cases, however, the tasks are separately budgeted for, administered, and controlled, and may therefore, as a practical matter, be viewed as separate contracts.

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.

Amounts shown represent the level of AEC support for the most recent funding period, usually one year, but include total obligations for contracts for more than 12 months (e.g. multi-year contracts for procurement of cyclotrons and other major equipment) and, therefore, do not necessarily in all cases correspond to either obligations or costs for FY 1966.

SUMMARY OF NEW PROPOSALS RECEIVED AND ACTIONS TAKEN

During Fiscal Year 1966 the Division of Research received 391 formal proposals for new research, representing requests for a total of \$36.6 million. On hand at the beginning of FY 1966 pending completion of reviews were 186 new proposals requesting \$21.6 million, for a total of 577 proposals representing requests for \$58.2 million.

Approved during FY 1966 were 60 new proposals for \$5.1 million, while 343 representing \$40.3 million, were declined, tabled, or withdrawn.

NEW PROPOSALS - FY 1966
(\$ in 1000's)

	<u>On Hand 7/1/65</u>		<u>Rec'd. During FY 1966</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	31	\$ 4,707	41	\$ 3,312	72	\$ 8,019
Physics & Mathematics	58	13,330	84	21,428	142	34,758
Chemistry	68	2,315	105	3,951	173	6,266
Metallurgy & Materials	27	1,171	133	4,972	160	6,143
Controlled Thermonuclear	2	110	25	2,777	27	2,887
Other	0	0	3	116	3	116
TOTAL	186	\$ 21,633	391	\$ 36,556	577	\$ 58,189

Actions Taken - FY 1966
(\$ in 1000's)

	<u>Approved</u>		<u>Declined</u>		<u>On Hand 6/30/66</u>	
	<u>No.</u>	<u>Amount</u>	<u>No.</u>	<u>Amount</u>	<u>No.</u>	<u>Amount</u>
High Energy Physics	6	\$ 481	49	\$ 5,977	17	\$ 1,561
Physics & Mathematics	10	3,329	95	26,636	37	4,793
Chemistry	20	448	92	3,563	61	2,255
Metallurgy & Materials	22	815	92	3,594	46	1,734
Controlled Thermonuclear	2	53	12	435	13	2,399
Other	0	0	3	116	0	0
TOTAL	60	\$ 5,126	343	\$ 40,321	174	\$ 12,742

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 391 in FY 1966. Approval rates have tended to decrease somewhat, averaging 65 annually during the 1962-1966 period, compared to 90 annually for the 1957-1961 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>Amount (in 1000's)</u>
<u>Alabama</u>	<u>1</u>	<u>\$ 25</u>
Southern Research Institute, Birmingham	1	25
<u>Arizona</u>	<u>8</u>	<u>\$ 399</u>
Arizona State University, Tempe	1	70
Arizona, University of, Tucson	7	329
<u>Arkansas</u>	<u>4</u>	<u>\$ 141</u>
Arkansas, University of, Fayetteville	4	141
<u>California</u>	<u>61</u>	<u>\$ 8,259</u>
Atomics International, Canoga Park	4	742
California Institute of Technology, Pasadena	8	2,342
California, University of, Berkeley	7	492
California, University of, Davis	1	637
California, University of, Irvine	1	90
California, University of, Los Angeles	10	997
California, University of, Riverside	3	282
California, University of, San Diego	6	1,221
California, University of, Santa Barbara	1	93
General Dynamics, San Diego	1	137
Harvey Mudd College, Claremont	1	12
Navy, Bureau of Ships, San Francisco	1	119
San Diego State College, San Diego	1	25
Southern California, University of, Los Angeles	4	516
Stanford Research Institute, Menlo Park	2	133
Stanford University, Stanford	10	421
<u>Colorado</u>	<u>7</u>	<u>\$ 840</u>
Colorado State University, Ft. Collins	1	7
Colorado, University of, Boulder	4	773
Denver, University of, Denver	1	30
National Bureau of Standards, Boulder	1	30
<u>Connecticut</u>	<u>18</u>	<u>\$ 3,821</u>
Connecticut, University of, Storrs	3	62
New England Institute for Medical Research, Ridgefield	1	20
United Aircraft, East Hartford	1	33
Yale University, New Haven	13	3,706
<u>Delaware</u>	<u>1</u>	<u>\$ 32</u>
Delaware, University of, Newark	1	32
<u>District of Columbia</u>	<u>8</u>	<u>\$ 673</u>
Catholic University of America	2	44
Georgetown University	2	18
National Academy of Sciences	1	5
National Bureau of Standards	3	606

*See "Note" bottom of p. 6

<u>State and Contractor</u>	<u>Number of Contracts</u>	<u>Amount (in 1000's)</u>
<u>Florida</u>	<u>17</u>	<u>\$ 605</u>
Florida State University, Tallahassee	7	335
Florida, University of, Gainesville	7	230
Miami, University of, Coral Gables	3	40
<u>Georgia</u>	<u>7</u>	<u>\$ 236</u>
Georgia Institute of Technology, Atlanta	5	210
Georgia, University of, Athens	2	26
<u>Hawaii</u>	<u>1</u>	<u>\$ 312</u>
Hawaii, University of, Honolulu	1	312
<u>Illinois</u>	<u>33</u>	<u>\$ 6,013</u>
Associated Midwest Universities, Argonne	1	35
Chicago, University of, Chicago	8	1,295
IIT Research Institute, Chicago	1	33
Illinois Institute of Technology, Chicago	7	217
Illinois, University of, Urbana	9	4,204
Northwestern University, Evanston	7	229
<u>Indiana</u>	<u>21</u>	<u>\$ 2,601</u>
Indiana University, Bloomington	6	113
Notre Dame, University of, Notre Dame	4	1,221
Purdue University, Lafayette	11	1,267
<u>Iowa</u>	<u>2</u>	<u>\$ 35</u>
Dordt College, Sioux Center	1	11
Iowa, State University of, Iowa City	1	24
<u>Kansas</u>	<u>9</u>	<u>\$ 871</u>
Kansas State University, Manhattan	2	460
Kansas, University of, Lawrence	7	411
<u>Kentucky</u>	<u>5</u>	<u>\$ 95</u>
Kentucky, University of, Lexington	5	95
<u>Louisiana</u>	<u>4</u>	<u>\$ 119</u>
Louisiana State University, Baton Rouge	1	75
Louisiana State University, New Orleans	2	28
Loyola University, New Orleans	1	16
<u>Maine</u>	<u>2</u>	<u>\$ 60</u>
Maine, University of, Orono	2	60
<u>Maryland</u>	<u>18</u>	<u>\$ 4,765</u>
Johns Hopkins University, Baltimore	6	393
Maryland, University of, College Park	12	4,372

<u>State and Contractor</u>	<u>Number of Contracts</u>	<u>Amount (in 1000's)</u>
<u>Massachusetts</u>	<u>29</u>	<u>\$ 3,885</u>
Boston University, Boston	1	11
Brandeis University, Waltham	3	178
Clark University, Worcester	1	53
Harvard University, Cambridge	2	80
Little, Arthur D., Cambridge	1	23
Massachusetts Institute of Technology, Cambridge	18	3,065
Massachusetts, University of, Amherst	1	98
Tufts University, Medford	2	377
<u>Michigan</u>	<u>24</u>	<u>\$ 2,416</u>
Andrews University, Berrien Springs	1	13
Michigan State University, East Lansing	9	367
Michigan Technological University, Houghton	2	62
Michigan, University of, Ann Arbor	9	1,903
Wayne State University, Detroit	3	71
<u>Minnesota</u>	<u>10</u>	<u>\$ 1,621</u>
Litton Systems, St. Paul	1	29
Minnesota, University of, Minneapolis	8	1,565
St. Mary's College, Winona	1	27
<u>Mississippi</u>	<u>1</u>	<u>\$ 32</u>
Mississippi, University of, University	1	32
<u>Missouri</u>	<u>8</u>	<u>\$ 305</u>
Midwest Research Institute, Kansas City	1	25
Missouri, University of, Rolla	2	111
Washington University, St. Louis	5	169
<u>Montana</u>	<u>1</u>	<u>\$ 31</u>
Montana State University, Bozeman	1	31
<u>Nebraska</u>	<u>3</u>	<u>\$ 124</u>
Nebraska, University of, Lincoln	3	124
<u>New Hampshire</u>	<u>1</u>	<u>\$ 14</u>
New Hampshire, University of, Durham	1	14
<u>New Jersey</u>	<u>11</u>	<u>\$ 1,244</u>
Princeton University, Princeton	5	938
Rutgers University, New Brunswick	3	81
Stevens Institute of Technology, Hoboken	3	225
<u>New Mexico</u>	<u>2</u>	<u>\$ 28</u>
New Mexico, University of, Albuquerque	1	16
New Mexico Highlands University, Las Vegas	1	12

<u>State and Contractor</u>	<u>Number of Contracts</u>	<u>Amount (in 1000's)</u>
<u>New York</u>	<u>70</u>	<u>\$ 9,055</u>
Brooklyn, Polytechnic Institute of, Brooklyn	2	28
Clarkson College of Technology, Potsdam	3	45
Columbia University, New York	14	3,781
Cornell University, Ithaca	16	1,104
Fordham University, New York	2	42
New York, City University of, Brooklyn College	1	24
New York, City University of, Hunter College	1	19
New York, City University of, Queens College	1	18
New York, State University of, Buffalo	3	84
New York, State University of, Stony Brook	3	218
New York University, New York	4	1,489
Rensselaer Polytechnic Institute, Troy	9	250
Rochester, University of, Rochester	5	1,664
Syracuse University, Syracuse	3	222
Yeshiva University, New York	3	67
<u>North Carolina</u>	<u>10</u>	<u>\$ 3,318</u>
Duke University, Durham	5	3,176
North Carolina State University, Raleigh	2	44
North Carolina, University of, Chapel Hill	2	83
Wake Forest College, Winston-Salem	1	15
<u>North Dakota</u>	<u>1</u>	<u>\$ 13</u>
North Dakota, University of, Grand Forks	1	13
<u>Ohio</u>	<u>20</u>	<u>\$ 1,739</u>
Battelle Memorial Institute, Columbus	3	103
Case Institute of Technology, Cleveland	7	1,035
Kent State University, Kent	1	17
Ohio State University, Columbus	7	564
Ohio University, Athens	1	8
Western Reserve University, Cleveland	1	12
<u>Oklahoma</u>	<u>7</u>	<u>\$ 130</u>
Oklahoma State University, Stillwater	3	46
Oklahoma, University of, Norman	4	84
<u>Oregon</u>	<u>8</u>	<u>\$ 658</u>
Oregon State University, Corvallis	4	174
Oregon, University of, Eugene	3	479
Reed College, Portland	1	5
<u>Pennsylvania</u>	<u>35</u>	<u>\$ 3,310</u>
Carnegie Institute of Technology, Pittsburgh	8	1,896
Duquesne University, Pittsburgh	1	20
Franklin Institute, Philadelphia	3	162
Lehigh University, Bethlehem	1	20
Mellon Institute, Pittsburgh	2	347
Pennsylvania State University, University Park	7	314
Pennsylvania, University of, Philadelphia	3	73
Pittsburgh, University of, Pittsburgh	4	184
Swarthmore College, Swarthmore	1	14
Temple University, Philadelphia	2	115
Westinghouse Electric, Pittsburgh	3	165

<u>State and Contractor</u>	<u>Number of Contracts</u>	<u>Amount (in 1000's)</u>
<u>Puerto Rico</u>	<u>3</u>	<u>\$ 213</u>
University of Puerto Rico, Nuclear Center	3	213
<u>Rhode Island</u>	<u>7</u>	<u>\$ 656</u>
Brown University, Providence	6	627
Rhode Island, University of, Kingston	1	29
<u>South Carolina</u>	<u>3</u>	<u>\$ 68</u>
Clemson University, Clemson	1	34
South Carolina, University of, Columbia	2	34
<u>Tennessee</u>	<u>11</u>	<u>\$ 180</u>
Fisk University, Nashville	1	12
Tennessee, University of, Knoxville	6	99
Vanderbilt University, Nashville	4	69
<u>Texas</u>	<u>13</u>	<u>\$ 4,788</u>
Rice University, Houston	3	945
Texas A & M University, College Station	3	3,150
Texas Christian University, Ft. Worth	1	43
Texas Nuclear, Austin	1	120
Texas, University of, Austin	5	530
<u>Utah</u>	<u>8</u>	<u>\$ 181</u>
Brigham Young University, Provo	1	18
Utah, University of, Salt Lake City	7	163
<u>Vermont</u>	<u>1</u>	<u>\$ 30</u>
Vermont, University of, Burlington	1	30
<u>Virginia</u>	<u>6</u>	<u>\$ 260</u>
Roanoke College, Salem	1	3
Virginia, University of, Charlottesville	5	257
<u>Washington</u>	<u>7</u>	<u>\$ 1,156</u>
Washington State University, Pullman	3	123
Washington, University of, Seattle	3	1,027
Western Washington State College, Bellingham	1	6
<u>West Virginia</u>	<u>1</u>	<u>\$ 21</u>
West Virginia University, Morgantown	1	21
<u>Wisconsin</u>	<u>13</u>	<u>\$ 2,658</u>
Marquette University, Milwaukee	1	26
Wisconsin, University of, Madison	12	2,632
<u>Wyoming</u>	<u>1</u>	<u>\$ 20</u>
Wyoming, University of, Laramie	1	20

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. \$105,000
- Brown University, Providence, Rhode Island. David Feldman and Anatole M. Shapiro, Experimental and Theoretical High Energy Physics. \$347,500.
- California Institute of Technology, Pasadena, California. R. F. Bacher, Operation and Research with 1.5 BeV Electron Synchrotron; Users Group. \$1,476,000.
- California, University of, Los Angeles, California. H. K. Ticho and D. H. Stork, Research in High Energy Physics. \$257,600.
- California, University of, Riverside, California. Peter E. Kaus and Walter Barkas, High Energy Physics. \$192,000.
- California, University of, San Diego, California. Oreste Piccioni, Norman Kroll, and George Masek, Experimental and Theoretical Particle Physics. \$822,356.
- California, University of, Santa Barbara, California. David O. Caldwell, High Energy Physics Users. \$93,000.
- Carnegie Institute of Technology, Pittsburgh, Pennsylvania. R. B. Sutton, High Energy Physics Users; Theoretical Research. \$877,000.
- Case Institute of Technology, Cleveland, Ohio. Frederick Reines, Research in Neutrino Physics, Cosmic Rays, and Elementary Particles. \$610,000.
- Chicago, University of, Chicago, Illinois. R. H. Dalitz and Y. Nambu, Theoretical Research in Elementary Particle Physics. \$315,000.
- Colorado, University of, Boulder, Colorado. Leona Marshall and Frank Oppenheimer, High Energy Physics. \$349,140.
- Columbia University, New York, New York. Leon Lederman and Robert Serber, High Energy Physics Users; Theoretical Research. \$2,118,000.
- Cornell University, Ithaca, New York. Kenneth Greisen, Detection of Super Showers by Atmospheric Scintillation. \$54,000.
- Duke University, Durham, North Carolina. Earle C. Fowler, Research in High Energy Physics. \$185,000.
- Florida State University, Tallahassee, Florida. Joseph E. Lannutti, Elementary Particle Physics. \$98,500.
- Hawaii, University of, Honolulu, Hawaii. Vincent Z. Peterson, Research in High Energy Nuclear Physics. \$312,000.
- Illinois, University of, Urbana, Illinois. E. L. Goldwasser and A. Wattenberg, High Energy Physics Users; Theoretical Research. \$1,400,000.
- Maryland, University of, College Park, Maryland. George A. Snow, Properties of K-Mesons and Hyperons and Related Topics. \$660,000.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. P. T. Demos, High Energy Physics (other than at the Cambridge Electron Accelerator). \$170,000

High Energy Physics

Massachusetts, University of, Amherst, Massachusetts. S. Steven Yamamoto and Janice B. Shafer, High Energy Physics - Bubble Chamber Research. \$98,000.

Miami, University of, Coral Gables, Florida. Behram Kursunoglu, Conference on Symmetry Principles at High Energy. \$4,280.

Michigan State University, East Lansing, Michigan. J. H. Hetherington, Theoretical Investigations of Scattering Problems and Nucleon-Nucleon Interactions. \$23,724 (19 months).

Michigan, University of, Ann Arbor, Michigan. A. R. Crane, High Energy Physics Users; Theoretical Research. \$734,000.

Minnesota, University of, Minneapolis, Minnesota. Stephen Gasiorowicz and Hans W. J. Courant, Theoretical Physics and Experimental Study of Elementary Particle Interactions. \$210,000.

New York, State University of, Stony Brook, New York. Juliet Lee-Franzini, Experimental Studies in Elementary Particle Physics. \$103,000.

Ohio State University, Columbus, Ohio. Thomas A. Romanowski, High Energy Physics. \$255,000.

Purdue University, Lafayette, Indiana. George W. Tautfest, Fundamental Particle Physics. \$646,000.

Rochester, University of, Rochester, New York. Morton F. Kaplan, High Energy Physics Users; Theoretical Research. \$775,000.

Syracuse University, Syracuse, New York. E. C. George Sudarshan, Research Program in Elementary Particle Theory. \$149,208.

Tufts University, Medford, Massachusetts. Julian K. Knipp and Allan M. Cormack, Experimental and Theoretical High Energy Physics Research. \$333,000.

Wisconsin, University of, Madison, Wisconsin. A. R. Erwin and M. Ebel, High Energy Physics Users; Theoretical Research. \$1,615,000.

Yale University, New Haven, Connecticut. Vernon W. Hughes, High Energy Physics Users; Theoretical Research. \$955,000.

Medium Energy Physics

California, University of, Davis, California. John A. Jungerman, Medium Energy Nuclear Physics Research. \$637,186.

California, University of, Los Angeles, California. Roy P. Haddock, Meson Physics. \$200,000 (15 months).

Carnegie Institute of Technology, Pittsburgh, Pennsylvania. R. B. Sutton, 440 MeV Synchrocyclotron and Associated Research. \$723,000.

Columbia University, New York, New York. W. W. Havens, Medium Energy Physics. \$69,000.

Maryland, University of, College Park, Maryland. Harry D. Holmgren, Variable Energy Research Facility. \$3,000,000 (4 years).

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. \$215,000.

Minnesota, University of, Minneapolis, Minnesota. J. Morris Blair, Experimental Nuclear Physics. \$622,000.

Rochester, University of, Rochester, New York. Morton F. Kaplan, Synchrocyclotron Operation and Associated Research. \$540,000.

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

Texas A & M University, College Station, Texas. J. A. McIntyre, Cyclotron Pre-Operational Experimental Research. \$125,000.

Yale University, New Haven, Connecticut. Vernon W. Hughes, Medium Energy Physics. \$30,724.

Low Energy Physics

- Arizona, University of, Tucson, Arizona. Douglas J. Donahue, Research in Nuclear Physics. \$72,500.
- Brown University, Providence, Rhode Island. Russell A. Peck, Jr., Reaction Studies with Fast Neutrons. \$69,800.
- California Institute of Technology, Pasadena, California. Felix Boehm, Nuclear Spectroscopy and X-ray Studies. \$362,876.
- California, University of, Berkeley, California. C. D. Jeffries, Dynamic Nuclear Polarization and Solid State Physics. \$54,377.
- California, University of, Berkeley, California. John H. Reynolds, Mass Spectroscopy Research. \$47,000.
- California, University of, Berkeley, California. Luis W. Alvarez, A System for Detecting Voids in Large Masses. \$190,280 (18 months).
- California, University of, San Diego, California. K. A. Brueckner, Problems in Theoretical Nuclear Physics: Many Body Systems. \$151,000.
- Case Institute of Technology, Cleveland, Ohio. Erwin F. Shrader and L. L. Foldy, Low Energy Nuclear Physics. \$277,645.
- Chicago, University of, Chicago, Illinois. J. L. Honsaker, Researches on Low Energy Nuclear Physics. \$53,000.
- Colorado, University of, Boulder, Colorado. David A. Lind and Jack J. Kraushaar, Study of Fundamental Nuclear Interactions. \$400,000.
- 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. \$1,203,000.
- Cornell University, Ithaca, New York. David D. Clark, Experimental Study of Nuclear Isomers. \$55,297.
- Duke University, Durham, North Carolina. Henry W. Newson, Fast Neutron Cross-Sections and Shell Structure. \$377,800.
- Duke University, Durham, North Carolina. Henry W. Newson, Regional Nuclear Physics Laboratory. \$2,500,000 (3 years).
- Franklin Institute, Philadelphia, Pennsylvania. Franz R. Metzger, Electromagnetic Properties of Excited States of Nuclei. \$90,000.
- General Dynamics Corporation (General Atomic Division), San Diego, California. W. M. Lopez and F. Froehner, Neutron Capture Cross-Section Measurements. \$136,860.
- 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. \$58,740.
- Johns Hopkins University, Baltimore, Maryland. George E. Owen and Leon Madansky, Studies of Neutron and Charged Particle Reactions. \$230,000.

Low Energy Physics

- Kansas State University, Manhattan, Kansas. Charles E. Mandeville, Nuclear Physics Accelerator Facility. \$440,461 (2 years).
- Kansas, University of, Lawrence, Kansas. R. W. Krone, Nuclear Structure Studies of the Light and Medium-Light Nuclei. \$180,000.
- Maryland, University of, College Park, Maryland. J. B. Marion, The Structure of Light Nuclei. \$255,000.
- Massachusetts Institute of Technology, Cambridge, Massachusetts, P. T. Demos, Nuclear Physics Research. \$1,051,000.
- Michigan State University, East Lansing, Michigan. Hugh McManus and Peter S. Signell, Theoretical Investigations of Scattering Problems and Nucleon-Nucleon Interactions. \$127,000.
- Michigan, University of, Ann Arbor, Michigan. H. R. Crane, Low Energy Physics Research. \$879,000.
- Minnesota, University of, Minneapolis, Minnesota. J. Morris Blair, Emperor Tandem Van de Graaff Research Program. \$458,000.
- 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.
- North Carolina, University of, Chapel Hill, North Carolina. Eugen Merzbacher and Paul E. Shearin, Studies of Nuclear Energy Processes. \$53,472 (13½ months).
- Notre Dame, University of, Notre Dame, Indiana. Charles J. Mullin, Interactions of Photons and Particles with Nuclei. \$50,934.
- Notre Dame, University of, Notre Dame, Indiana. John W. Mihelich, Nuclear Spectroscopy. \$110,000.
- Oregon State University, Corvallis, Oregon. Larry Schechter, Low Energy Nuclear Research. \$70,000.
- Oregon, University of, Eugene, Oregon. Bernd Crasemann, 4 MeV Van de Graaff Accelerator Facility. \$300,000 (3 years).
- Oregon, University of, Eugene, Oregon. Bernd Crasemann, H. W. Lefevre, D. K. McDaniels and D. O. Wells, Nuclear Physics Research. \$160,100.
- Princeton University, Princeton, New Jersey. Robert Pollock, 18 MeV Cyclotron and Associated Nuclear Physics Research. \$600,000.
- Purdue University, Lafayette, Indiana. R. M. Steffen, Research in Nuclear Physics. \$205,000.
- Rice University, Houston, Texas. J. R. Risser and G. K. Walters, Nuclear and Extra-Nuclear Research. \$750,000.
- Rochester, University of, Rochester, New York. J. B. French, Nuclear Physics Research. \$250,000.
- Southern California, University of, Los Angeles, California. M. H. L. Pryce, Nuclear Physics with a 32 MeV Proton Linear Accelerator. \$385,000.

Low Energy Physics

Texas Nuclear Corporation, Austin, Texas. Ira L. Morgan, Gamma Rays Produced by the Interaction of Monoenergetic Neutrons in Several Nuclei. \$120,000.

Texas, University of, Austin, Texas. B. B. Kinsey, Nuclear Structure Physics. \$410,000.

Virginia, University of, Charlottesville, Virginia. Morris E. Rose, Theoretical Nuclear Physics. \$69,679.

Washington, University of, Seattle, Washington. James B. Gerhart and Ernest M. Henley, Experimental and Theoretical Nuclear Physics. \$975,000.

Wisconsin, University of, Madison, Wisconsin. R. G. Herb and H. H. Barschall, Nuclear Research. \$501,574.

Wisconsin, University of, Madison, Wisconsin. J. R. Dillinger, Low Temperature Physics. \$72,000.

Wyoming, University of, Laramie, Wyoming. William G. Simon, Nuclear Physics Studies using Nuclear Emulsions. \$20,000.

Yale University, New Haven, Connecticut. Gregory Breit, Theory of Nuclear Reactions. \$117,896.

Yale University, New Haven, Connecticut. Vernon W. Hughes, Studies in Nuclear Physics. \$738,000.

Yale University, New Haven, Connecticut. D. A. Bromley, Emperor Tandem Van de Graaff Research Program. \$963,000.

Yale University, New Haven, Connecticut. D. A. Bromley, Emperor Tandem Van de Graaff Facility. \$331,000 (3 years).

Mathematics and Computer Research

California, University of, Berkeley, California. A. H. Taub, Analytical and Numerical Studies in General Relativity. \$43,850.

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. Clay L. Perry, Computing Facility at UCSD
No Funds.

Chicago, University of, Chicago, Illinois. Richard H. Miller, Computer Research and Development. \$465,741.

Duke University, Durham, North Carolina. Charles R. Vail, Superconducting Circuitry. \$103,679.

Illinois, University of, Urbana, Illinois. Bruce H. McCormick, Pattern Recognition Computer. \$459,700.

Illinois, University of, Urbana, Illinois. C. W. Gear and W. J. Poppelbaum, Computer Systems Research. \$540,747.

Maryland, University of, College Park, Maryland. Bertie E. Hubbard, Studies of the Numerical Solution of Elliptic and Parabolic Boundary Value Problems. \$26,395.

Midwest Research Institute, Kansas City, Missouri. Yudell L. Luke, Research in Finite Perturbation Methods. \$24,778.

New York University, New York, New York. Peter Lax, Courant Institute of Mathematical Sciences. \$1,199,000.

Oregon State University, Corvallis, Oregon. Arvid T. Lonseth, Research in Applied Analysis. \$56,500 (14 months).

Rice University, Houston Texas. Walter Orvedahl and John A. Robinson, Computer Research. \$121,007.

Stanford University, Stanford, California. George B. Dantzig and Robert B. Wilson, Stochastic Mathematical Programs. \$40,000.

Stevens Institute of Technology, Hoboken, New Jersey. Ivan Flores, Effective Use of Mass Memory in Computer Systems. \$27,000.

Washington University, St. Louis, Missouri. Leon Cooper, Research in Methods of Non-Linear and Combinatorial Programming. \$41,089.

Chemistry

- Arizona State University, Tempe, Arizona. LeRoy Eyring, Solid State Chemistry of Rare Earth Oxides. \$70,000.
- Arizona, University of, Tucson, Arizona. Henry Freiser and Quintus Fernando, Development and Testing of Organic Reagents for Use in Inorganic Analysis. \$60,000.
- Arizona, University of, Tucson, Arizona. Paul E. Damon, Correlation and Chronology of Ore Deposits and Volcanic Rocks. \$38,240.
- Arizona, University of, Tucson, Arizona. Leslie S. Forster, The Luminescence of Metal Complexes. \$25,102.
- Arizona, University of, Tucson, Arizona. David M. Bodily, Kinetics of Secondary Reactions in Irradiated Polyethylene. \$10,000.
- Arkansas, University of, Fayetteville, Arkansas. Edward S. Amis, Oxidation-Reduction Reactions of Neptunium, Uranium, and Other Ions, and Other Phenomena in Pure and Mixed Solvents. \$25,000.
- Arkansas, University of, Fayetteville, Arkansas. Lester C. Howick, Precipitation from Homogeneous Solutions of Mixed Solvents. \$4,967.
- Arkansas, University of, Fayetteville, Arkansas. Arthur Fry, Isotope Effect and Tracer Studies in Organic Chemistry. \$36,900.
- Arkansas, University of, Fayetteville, Arkansas. Paul K. Kuroda, Nuclear and Cosmochemistry. \$74,350.
- Atomics International, Canoga Park, California. S. J. Yosim, High Temperature Chemistry. \$151,000.
- Atomics International, Canoga Park, California. R. B. Ingalls, Radiation Chemistry. \$84,000.
- Boston University, Boston, Massachusetts. Norman N. Lichtin, Radiation Chemistry of Organic Compounds. \$11,000 (19 months).
- Brandeis University, Waltham, Massachusetts. Henry Linschitz, Photochemical Reaction of Complex Molecules in Condensed Phase. \$51,120.
- Brandeis University, Waltham, Massachusetts. Saul G. Cohen, Photochemistry and Radiation Chemistry of Mercaptans and Disulfides. \$21,982.
- Brigham Young University, Provo, Utah. R. M. Izatt and J. J. Christensen, Jr., Thermodynamics of Metal-Ligand Interaction in Aqueous Solution. \$18,000.
- Brooklyn, Polytechnic Institute of, Brooklyn, New York. Herbert Morawetz, Solid State Polymerization Initiated By Gamma Radiation. \$9,000 (7½ months).
- Brooklyn, Polytechnic Institute of, Brooklyn, New York. Joseph Steigman, Investigation of Binding of Ions to Polyelectrolytes in Dilute Aqueous Solution. \$19,000.
- Brown University, Providence, Rhode Island. John O. Edwards, Oxyanions and Peroxides--Their Constitutions and Reaction Mechanisms. \$16,355.
- Brown University, Providence, Rhode Island. E. F. Greene and John Ross, Experimental Chemical Kinetics - A Study of Chemical Reactions by Means of Molecular Beam and Shock Wave Techniques. \$50,000.
- California Institute of Technology, Pasadena, California. G. S. Hammond, Metallic Compounds in Oxidation. \$12,810 (7 months).

Chemistry

- California Institute of Technology, Pasadena, California. G. W. Robinson, Molecular Ionization in Dense Media. \$33,288 (18 months).
- California Institute of Technology, Pasadena, California. Robert P. Sharp, Geochemical Studies with Stable and Radioactive Isotopes. \$155,057.
- California Institute of Technology, Pasadena, California. Aron Kuppermann, Studies in Chemical Dynamics and Radiation Chemistry. \$114,930.
- California, University of, Irvine, California. Frank S. Rowland, Radiochemistry Research. \$90,000 (6 months).
- California, University of, Los Angeles, California. C. S. Garner, Complex Ion Chemistry. \$49,155.
- California, University of, Los Angeles, California. R. L. Scott, Fluorocarbon Solutions. \$19,000.
- California, University of, Los Angeles, California. W. G. McMillan, E. R. Hardwick and M. F. Nicol, Intra- and Inter-molecular Energy Transfer Studies. \$55,000 (11 months).
- California, University of, Los Angeles, California. M. A. El-Sayed, The Vacuum Ultraviolet Spectra and Photochemistry of Ordinary and Tritium Labelled Polyatomic Molecules. \$46,649.
- California, University of, Los Angeles, California. John B. Gruber, Spectroscopic Studies of Actinide Ions in Crystalline Solids. \$39,628.
- California, University of, Riverside, California. Donald T. Sawyer, Study of Metal Chelates. \$24,884.
- 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. \$47,232.
- Carnegie Institute of Technology, Pittsburgh, Pennsylvania. Truman P. Kohman, Nuclear Chemistry and Geochemistry Research. \$85,000.
- Carnegie Institute of Technology, Pittsburgh, Pennsylvania. A. A. Caretto, Jr., High-Energy Nuclear Reactions. \$65,000.
- Case Institute of Technology, Cleveland, Ohio. Louis Gordon, Nucleation and Coprecipitation from Homogeneous Solution. \$20,000.
- Case Institute of Technology, Cleveland, Ohio. E. W. Abrahamson, Primary Processes in Radiation Chemistry. \$13,687 (11½ months).
- Case Institute of Technology, Cleveland, Ohio. Robert E. Sparks, Velocity Profile Control in Large Scale Chromatographic Columns. \$17,000.
- 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. \$109,619.
- Chicago, University of, Chicago, Illinois. Edward Anders, Radiochemical and Geochemical Studies. \$50,000.

Chemistry

- Chicago, University of, Chicago, Illinois. N. C. Yang, Radiation Chemistry of Organic Compounds. \$29,511.
- Chicago, University of, Chicago, Illinois. Nathan Sugarman and Anthony Turkevich, Nuclear Chemistry Research. \$225,000.
- Clark University, Worcester, Massachusetts. Thomas T. Sugihara, Nuclear Chemistry and Geochemistry. \$52,500 (10 months).
- Clarkson College of Technology, Potsdam, New York. Herman L. Shulman, Performance of Packed Columns. \$13,060.
- Clarkson College of Technology, Potsdam, New York. Milton Kerker, A Study of Colloidal Particles by Light Scattering and Electron Microscopy. \$25,500 (11 months).
- Clarkson College of Technology, Potsdam, New York. Joseph Estrin, Heat and Mass Transfer in the Condensation of Multicomponent Systems. \$6,850 (23 months).
- Colorado State University, Fort Collins, Colorado. John D. Vaughn, Chemical Effects of Nuclear Reactions in Nitrogen Compounds. \$7,373.
- Colorado, University of, Boulder, Colorado. H. F. Walton, Specific Attractions in Ion Exchange. \$14,452.
- Colorado, University of, Boulder, Colorado. Edward L. King, Oxidation-Reduction Reaction Mechanisms. \$9,166.
- Columbia University, New York, New York. T. I. Taylor, Separation of Isotopes by Chemical Exchange. \$49,685.
- Columbia University, New York, New York. J. M. Miller, Nuclear Chemistry at Medium and High Energy. \$56,215.
- Columbia University, New York, New York. P. W. Gast, Isotopic Geochemistry. \$21,035.
- Columbia University, New York, New York. Paul F. Kerr, Alteration and Mineralization of Primary Uranium Deposits. \$34,425.
- Columbia University, New York, New York. Richard Bersohn, Theoretical Chemistry. \$24,000.
- Columbia University, New York, New York. Charles F. Bonilla, High Temperature Transport Properties and Processes of Gases and Alkali Metals. \$25,000 (10 months).
- Columbia University, New York, New York. Martin Karplus, Theoretical Studies in Chemical Kinetics. \$45,798.
- Connecticut, University of, Storrs, Connecticut. John T. Stock, Analytical Chemistry at Low Concentrations. \$9,000.
- Cornell University, Ithaca, New York. Franklin A. Long, Mechanism of Acid-Base Catalysis and Studies in Deuterium Oxide as Solvent. \$28,875.
- Cornell University, Ithaca, New York. David E. Fisher, Neutron Activation Analysis Studies of Iron Meteorites. \$20,412.
- Cornell University, Ithaca, New York. S. H. Bauer, Homogeneous (Gas Phase) Isotope Exchange Reactions in Shock Tubes. \$17,875.

Chemistry

- Delaware, University of, Newark, Delaware. Conrad N. Trumbore, Primary Chemical Processes in Radiolysis of Liquids. \$32,000.
- Dordt College, Sioux Center, Iowa. Russell Maatman, Interactions of Aqueous and Nonaqueous Ions with Oxide Surfaces. \$10,915.
- 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).
- Fisk University, Nashville, Tennessee. James R. Lawson and Nelson Fuson, Infrared Spectroscopic Studies of Polyatomic Inorganic Ions in Solid Solutions. \$12,250.
- Florida State University, Tallahassee, Florida. Gregory R. Choppin, Chemistry of the Actinide and Lanthanide Elements and Nuclear Chemistry. \$46,462.
- Florida State University, Tallahassee, Florida. R. H. Johnsen, Radiation Induced Effects in Organic Systems. \$38,500.
- Florida State University, Tallahassee, Florida. R. K. Sheline, An Experimental Study of Nuclear Models. \$104,641.
- Florida State University, Tallahassee, Florida. James V. Quagliano, Structural Studies of Metal Coordination Compounds. \$16,920.
- Florida State University, Tallahassee, Florida. Bruno Linder, Radiochemical Study of Nuclear Reactions. \$15,000.
- Florida State University, Tallahassee, Florida. Ronald J. Clark, Physical - Inorganic Studies on Phosphorus Trifluoride - Metal Complexes. \$14,555.
- 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. \$27,500 (11½ months).
- Florida, University of, Gainesville, Florida. William H. Ellis, Chemical Structural Studies by Nuclear Techniques. \$35,000.
- Fordham University, New York, New York. Michael Cefola, The Thermodynamics and Kinetics of Coordination Compounds. \$21,480 (10 months).
- Fordham University, New York, New York. Philip S. Gentile, The Synthesis of Complexes and Related Kinetics, Thermodynamics and Spectral Studies. \$21,000.
- Georgetown University, Washington, D. C. Joseph E. Earley, Substitution in Oxyions. \$17,821.
- Georgia Institute of Technology, Atlanta, Georgia. Richard W. Fink, Nuclear Spectroscopy and Reaction Studies. \$55,800.
- Georgia Institute of Technology, Atlanta, Georgia. James A. Knight, Radiation Chemistry of Monosubstituted Aromatic Compounds. \$20,200.

Chemistry

- Georgia, University of, Athens, Georgia. William C. Sears, Infrared Spectra of Plastics and Elastomers after Nuclear Irradiation. \$14,000.
- Georgia, University of, Athens, Georgia. F. J. Johnston, Isotope Exchange in Non-Equilibrium Systems. \$12,404.
- Harvard University, Cambridge, Massachusetts. Clifford Frondel, Geochemistry and Crystal Chemistry of Rare Elements. \$10,000.
- Harvard University, Cambridge, Massachusetts. William A. Klemperer, Molecular Spectroscopy of Substances Existing at High Temperatures. \$70,000.
- Harvey Mudd College, Claremont, California. Arthur J. Campbell, Energy Levels of Polyatomic Inorganic Ions. \$11,933.
- IIT Research Institute, Chicago, Illinois. Daniel Sperber, Angular Momentum Effects on Gamma Emission. \$32,959.
- Illinois Institute of Technology, Chicago, Illinois. A. E. Martell, Chelation and Olation Reactions of Metal Ions in Aqueous Solution. \$24,000.
- Illinois Institute of Technology, Chicago, Illinois. A. J. Kresge, Aromatic Hydrogen Exchange. \$25,000.
- 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.
- Illinois, University of, Urbana, Illinois. Russell S. Drago, Non-aqueous Solvents. \$10,000.
- 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. Jack G. Kay, Chemical Reactions of Energetic Atoms Produced by Nuclear Recoil or by Heterogeneous Flash Photolysis. \$8,939 (5½ months).
- Illinois, University of, Urbana, Illinois. Peter E. Yankwich, Studies in Radiochemistry. \$44,000.
- Indiana University, Bloomington, Indiana. L. L. Merritt, Jr., Studies of Chelate Complexes and Instrumentation in Analytical Chemistry. \$21,000 (17 months).
- Indiana University, Bloomington, Indiana. W. B. Schaap and F. C. Schmidt, Electro-chemical Research in Amine Solvents. \$39,787.
- Indiana University, Bloomington, Indiana. Frank T. Gucker, Thermodynamic Properties of Solutions. \$7,000.
- Indiana University, Bloomington, Indiana. Ralph L. Seifert, Chemical Equilibria at High Temperatures. \$11,408.

Chemistry

- Indiana University, Bloomington, Indiana. R. A. Bonham, Determination of the Structures of Molecules at High Temperatures by Electron Diffraction. \$12,000 (19 months).
- 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. \$24,000.
- Johns Hopkins University, Baltimore, Maryland. Walter S. Koski, Studies in Nuclear and Hot Atom Chemistry. \$36,648.
- Johns Hopkins University, Baltimore, Maryland. Paul H. Emmett, Study of Catalytic Surfaces and the Mechanism of Catalytic Reactions. \$17,899.
- Johns Hopkins University, Baltimore, Maryland. J. W. Gryder, Interaction Between and Identification of Ionic Species in Solution. \$15,500.
- Kansas State University, Manhattan, Kansas. Herbert C. Moser, Reactions of Hydrogen Atoms with Solid Hydrocarbons. \$19,500.
- Kansas, University of, Lawrence, Kansas. Edward J. Zeller, Study of Natural Radiation Damage in Minerals by Electron Spin Resonance and Thermoluminescence. \$26,500.
- Kansas, University of, Lawrence, Kansas. Ernest Griswold and Jacob Kleinberg, Some Problems in the Chemistry of Transition Metals. \$14,442.
- Kansas, University of, Lawrence, Kansas. Paul W. Gilles, High Temperature Chemistry. \$90,000.
- Kansas, University of, Lawrence, Kansas. Larry Kevan, Radiolysis Studies on Fluorocarbons and on Reactive Intermediates. \$23,000.
- Kentucky, University of, Lexington, Kentucky. William F. Wagner and Donald E. Sands, Properties and Structure of Solvates of Metal Chelates. \$25,776.
- Kentucky, University of, Lexington, Kentucky. Lyle R. Dawson, Properties of Solvents Having High Dielectric Constants. \$13,175.
- Kentucky, University of, Lexington, Kentucky. William D. Ehmann, Radiochemistry as Applied to Geochemical Problems; Neutron Activation Analysis. \$26,500.
- Kentucky, University of, Lexington, Kentucky. Eugene Bradley, Rotation and Debye Relaxation Spectra of Dipolar Compounds in the Microwave Region. \$8,350.
- Kentucky, University of, Lexington, Kentucky. H. C. Eckstrom, Infrared Studies of Chemisorbed Molecules. \$21,000.
- Lehigh University, Bethlehem, Pennsylvania. James E. Sturm, Studies of Photochemical Processes. \$20,000.
- Louisiana State University, New Orleans, Louisiana. Mary L. Good, Extraction of Inorganic Complexes from Aqueous Media by Certain Alkyl Ammonium Compounds. \$18,182.
- Louisiana State University, New Orleans, Louisiana. Jack H. Stocker, A Quantitative Study of Stereoselective Reactions. \$10,000.
- Maine, University of, Orono, Maine. Jerry Braunstein, Electrolytic Solutions. \$19,449.

Chemistry

- Maryland, University of, College Park, Maryland. Ellis R. Lippincott, Structural Studies and Advanced Instrumentation in Raman Spectroscopy. \$9,500.
- Maryland, University of, College Park, Maryland. Joseph Silverman, Study of Graft Polymerization. \$23,823.
- Maryland, University of, College Park, Maryland. Gilbert Gordon, Stable Isotope Tracer Studies. \$25,000.
- Maryland, University of, College Park, Maryland. Gordon Atkinson, Ion Association in Polyvalent Symmetrical Electrolytes. \$22,000.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. Jack Irvine, et al, Nuclear Chemistry Research. \$489,800.
- 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. \$44,904.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. James W. Dubrin, Chemical Kinetics of Certain High Energy Species. \$29,043.
- Mellon Institute, Pittsburgh, Pennsylvania. Robert H. Schuler, Radiation Research. \$310,000.
- Michigan State University, East Lansing, Michigan. Harry A. Eick, An Investigation of Some Rare-Earth Boron, Carbon, Nitrogen, and Related Systems at Elevated Temperatures. \$40,000.
- Michigan State University, East Lansing, Michigan. James L. Dye, Electrochemistry and Spectra of Metal Ammonia and Metal Amine Solutions and Kinetics of Electron-Attachment Reactions. \$37,483.
- 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. \$17,000.
- Michigan, University of, Ann Arbor, Michigan. Adon A. Gordus, Energetic Recoil Atom Reaction Mechanisms. \$45,000.
- Michigan, University of, Ann Arbor, Michigan. Philip J. Elving, Polarographic Behavior of Organic Compounds. \$30,000.
- Michigan, University of, Ann Arbor, Michigan. E. F. Westrum, Jr., Low Temperature Chemical Thermodynamics. \$42,200.
- Michigan, University of, Ann Arbor, Michigan. Charles L. Rulfs, Chemistry of Technetium. \$8,125.
- Minnesota, University of, Minneapolis, Minnesota. Warren L. Reynolds, Mechanisms of Inorganic Oxidation-Reduction Reactions in Non-aqueous Media. \$15,418.
- Minnesota, University of, Minneapolis, Minnesota. Sanford Lipsky, The Contribution of Electronically Excited States to the Radiation Chemistry of Organic Liquids. \$39,929.
- National Bureau of Standards, Washington, D. C. Various Research Projects. \$333,508.

Chemistry

- Navy, Bureau of Ships, Naval Radiological Defense Laboratory, San Francisco, California. Nathan B. Ballou, High Temperature Chemistry and Nuclear Chemistry. \$118,000.
- Nebraska, University of, Lincoln, Nebraska. Edward P. Rack, Hot Atom Chemistry of Neutron Capture Reactions and Isomeric Transitions. \$22,730.
- New England Institute for Medical Research, Ridgefield, Connecticut. John Lee and S. J. Tao, Positronium Chemistry. \$20,000
- New Hampshire, University of, Durham, New Hampshire. Helmut M. Haendler, Reactions in Non-aqueous Solvents. \$13,600.
- 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 at Very Low Concentrations. \$15,550.
- New York, City University of/Brooklyn College, Brooklyn, New York. Harmon L. Finston, Applications of Nuclear and Radiochemical Techniques in Chemical Analysis. \$24,300.
- New York, City University of/Hunter College, New York, New York. Richard H. Wiley, Ion Exchange Resins. \$19,034.
- New York, State University of, Buffalo, New York. G. M. Harris, Applications of Isotopes in Chemical Kinetics. \$34,700.
- New York, State University of, Buffalo, New York. Jacob A. Marinsky and George A. Clarke, Studies in Solution and Nuclear Chemistry. \$34,030.
- New York, State University of, Buffalo, New York. D. A. Cadenhead, Chemisorption Studies of Benzene at Metal Alloy-Gaseous Interfaces. \$15,000 (11 months).
- New York, State University of, Stony Brook, New York. John M. Alexander, Nuclear Reaction Studies. \$55,000.
- New York, State University of, Stony Brook, New York. Oliver A. Schaeffer, High Energy Nuclear Interactions with Matter. \$60,000.
- New York University, New York, New York. Benson R. Sundheim, Studies in Fused Salts. \$28,000 (18 months).
- Northwestern University, Evanston, Illinois. Fred Basolo and R. G. Pearson, Mechanism of Substitution Reactions of Metal Complexes. \$40,000.
- Northwestern University, Evanston, Illinois. Malcolm Dole, Mechanism of High Energy Radiation Effects in High Polymers. \$27,650.
- Northwestern University, Evanston, Illinois. Herman L. Pines, The Use of Carbon-14 in the Study of Catalyzed Reactions of Hydrocarbons and Alcohols. \$32,364.
- Northwestern University, Evanston, Illinois. F. E. Stafford, Physical Chemistry of Highly Energetic Systems: Cross Sections for Electron Impact Ionization. \$22,000.
- Notre Dame, University of, Notre Dame, Indiana. Milton Burton, Radiation Chemistry. \$1,047,000.
- Ohio State University, Columbus, Ohio. David White, The Structures and Thermodynamic Properties of Solid and Liquid Ortho-Para Mixtures of Hydrogen and Deuterium. \$35,500 (17 months).
- Ohio State University, Columbus, Ohio. H. H. Nielsen and K. N. Rao, High-Resolution Infrared Spectra of Tritium and Deuterium Substituted Molecules. \$28,500.

Chemistry

- Ohio State University, Columbus, Ohio. R. F. Firestone, Kinetics of Ionizing-Radiation Induced Reactions in Organic Compounds. \$35,000.
- Ohio State University, Columbus, Ohio. Leon M. Dorfman, Pulse Radiolysis of Organic and Aquo-Organic Systems (Equipment). \$149,200.
- Ohio State University, Columbus, Ohio. Leon M. Dorfman, Pulse Radiolysis of Organic and Aquo-Organic Systems. \$36,000.
- Ohio University, Athens, Ohio. James Y. Tong, An Investigation of Chromate Complexes. \$8,000.
- Oklahoma State University, Stillwater, Oklahoma. John B. West, Mass Transfer Kinetics of Uranium Complexes. \$21,172.
- Oklahoma State University, Stillwater, Oklahoma. T. E. Moore, A Study of the Liquid-Liquid Extraction and Separation of Salts. \$15,806.
- 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. \$19,179.
- Pennsylvania State University, University Park, Pennsylvania. Joseph Jordon, Electrochemistry, Thermochemistry and Fused Salts. \$32,000.
- 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. \$54,935.
- Pennsylvania, University of, Philadelphia, Pennsylvania. E. Charles Evers, A Study of Ion Association: The Conductance and Viscosity of Electrolyte Solutions from Fused Electrolyte to Infinite Dilution. \$15,676 (15 months).
- Pittsburgh, University of, Pittsburgh, Pennsylvania. Robert L. Wolke, Recoil Studies of Nuclear Reactions. \$36,752.
- Princeton University, Princeton, New Jersey. John Turkevich, Heterogeneous Catalysts: Synthesis, Characterization and Investigation of Reaction Kinetics. \$71,148 (11 months).
- Princeton University, Princeton, New Jersey. Robert A. Naumann, Nuclear Interactions. \$206,329.
- Princeton University, Princeton, New Jersey. R. C. Axtmann, Fission Fragment and Fast Neutron Energy Transfer to Chemical Systems. \$31,269.
- Princeton University, Princeton, New Jersey. Leland C. Allen, High Accuracy, Many-Electron Wavefunctions for Noble Gas Molecules. \$28,976 (10 months).
- Puerto Rico, University of, Mayaguez, Puerto Rico. Owen H. Wheeler, Hot-Atom Chemistry of Organic Phosphorus and Sulphur Compounds. \$8,137 (3 months).
- Purdue University, Lafayette, Indiana. Walter F. Edgell, Studies in Molecular Spectroscopy. \$30,000 (20 months).

Chemistry

- Purdue University, Lafayette, Indiana. James W. Cobble, Chemistry and Nuclear Chemistry of the Heavy Elements. \$70,000.
- Purdue University, Lafayette, Indiana. Robert T. Grimley, Thermodynamics, Mechanism and Kinetics of Vaporization Processes. \$32,000.
- Purdue University, Lafayette, Indiana. L. B. Rogers, Gas Chromatography, Foam Fractionation and Other Separations Methods. \$50,364.
- 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).
- 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.
- Rensselaer Polytechnic Institute, Troy, New York. Howard Littman, Gas-Particle Heat Transfer Coefficients in Packed Beds by Frequency Response Techniques. \$23,500.
- Rice University, Houston, Texas. Kenneth S. Pitzer and John L. Margrave, Physical Chemistry of High Temperature Systems. \$74,000.
- 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. \$15,000.
- Rutgers University, New Brunswick, New Jersey. Richard W. Laity, Ion Mobility in Molten Salts. \$32,754.
- San Diego State College, San Diego, California. Vincent Landis, Photofission of Radium, Bismuth, and Lead. \$25,000 (18 months).
- South Carolina, University of, Columbia, South Carolina. O. D. Bonner, Fundamental Studies of Ion Exchange Equilibria. \$10,040.
- South Carolina, University of, Columbia, South Carolina. Edward E. Mercer, Chemistry of Ruthenium. \$24,379.
- Southern California, University of, Los Angeles, California. Wayne K. Wilmarth, Aqueous Chemistry of Free Radicals and Other Inorganic Reactive Intermediates. \$48,000.
- Southern California, University of, Los Angeles, California. Arthur W. Adamson, Photochemistry of Complex Ions. \$18,000.
- Southern Research Institute, Birmingham, Alabama. Richard B. Ellis, Surface Tension and Viscosity and Raman Spectra of Fused Salts. \$25,000 (6 months).
- Stanford Research Institute, Menlo Park, California. Daniel Cubicciotti, Fundamental Study of Fused Salts and Metal-Salt Systems. \$85,051.
- Stanford University, Stanford, California. George A. Parks, Inorganic Oxides in Aqueous Systems: The Zero Point of Charge. \$15,844.

Chemistry

- Stanford University, Stanford, California. Henry Taube, Reactions of Solvated Ions. \$22,338.
- Stanford University, Stanford, California. Thomas J. Connolly, Radiation-Induced Nucleation of Bubbles in Superheated Water. \$10,122.
- Temple University, Philadelphia, Pennsylvania. A. V. Grosse, High Temperature Inorganic Chemistry. \$35,000.
- Tennessee, University of, Knoxville, Tennessee. Hilton A. Smith, Studies Dealing with the Isotopes of Hydrogen. \$15,866.
- Tennessee, University of, Knoxville, Tennessee. J. F. Eastham and C. W. Keenan, Isotope Studies of Hydrogen Transfer Reaction Kinetics and Mechanisms. \$4,000 (6 months).
- Tennessee, University of, Knoxville, Tennessee. T. Ffrancon Williams, Radiation Chemistry Reaction Mechanisms of Alkyl Halides and Olefins in the Condensed State. \$39,725.
- Tennessee, University of, Knoxville, Tennessee. Gleb Mamantov, Electrochemical Studies in Molten Fluorides and Other Halides. \$15,360.
- Texas A & M University, College Station, Texas. Ralph A. Zingaro and A. F. Isbell, Complex Formation and Solution Chemistry of Molecules Containing Group VA Elements. \$25,000 (10 months).
- 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.
- Tufts University, Medford, Massachusetts. T. R. P. Gibb and Charles E. Messer, Fundamental Properties of Metallic Hydrides. \$44,474.
- Utah, University of, Salt Lake City, Utah. Henry Eyring and C. J. Christensen, Surface Chemistry Phenomena. \$23,753.
- Utah, University of, Salt Lake City, Utah. Mead LeRoy Jensen, Carbon, Oxygen, and Sulfur Isotopes and the Origin and Sources of Uranium Mineralization. \$40,000.
- Vanderbilt University, Nashville, Tennessee. E. A. Jones, The Vibrational Spectra, Force Constants, and Thermodynamic Properties of Fluorine Compounds. \$13,000.
- Vanderbilt University, Nashville, Tennessee. Mark M. Jones. Some Aspects of the Stabilities of Complex Compounds. \$13,000.
- Vanderbilt University, Nashville, Tennessee. Thomas W. Martin, Studies in Radiation Chemistry by Mass Spectrometry. \$17,000.
- Washington State University, Pullman, Washington. John P. Hunt, Use of the N-15 Isotope to Study Certain Problems in Inorganic Chemistry. \$31,586.
- Washington State University, Pullman, Washington. Selmer W. Peterson, Neutron Diffraction Investigation of Proton Positions. \$40,296.
- Washington University, St. Louis, Missouri. H. A. Potratz, Geologic Dating of Corals and Other Calcareous Materials. \$10,000.
- Washington University, St. Louis, Missouri. Arthur C. Wahl, Radiochemical Studies of the Fission Processes. \$50,000.

Chemistry

- Washington University, St. Louis, Missouri. Demetrios G. Sarantites, Low Energy Nuclear Reactions and Spectroscopy. \$35,000.
- Washington University, St. Louis, Missouri. Paul L. Reeder, Delayed-Particle Spectroscopy. \$33,000.
- Washington, University of, Seattle, Washington. A. L. Babb, Separation Efficiencies of Solvent Extraction Systems. \$32,000.
- 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 Monomers. \$16,000.
- Western Reserve University, Cleveland, Ohio. Hugh A. Gillis, Radiation Chemistry of Liquid Hydrocarbons of Low Molecular Weight. \$12,000.
- Western Washington State College, Bellingham, Washington. Edward F. Neuzil, Fission Studies on Elements Below Polonium. \$6,120.
- Wisconsin, University of, Madison, Wisconsin. J. E. Willard, Applications of Radioisotopes to Chemical Problems. \$91,433.
- Wisconsin, University of, Madison, Wisconsin. W. J. Blaedel, Use of Radiotracers in Continuous Analysis. \$16,000.
- Wisconsin, University of, Madison, Wisconsin. Irving Shain, Kinetic and Mass Transfer Processes in Electrochemistry: Application to Analytical Methods. \$19,285.
- Wisconsin, University of, Madison, Wisconsin. R. B. Bernstein, Atomic and Molecular Beam Studies. \$45,000.
- Wisconsin, University of, Madison, Wisconsin. Werner W. Brandt, Diffusion in Zeolites and Glasses. \$2,707 (7 months).
- Yale University, New Haven, Connecticut. P. A. Lyons, Diffusion Coefficients of Electrolytes and Molecules. \$15,140.
- Yale University, New Haven, Connecticut. Richard Wolfgang, Research on High Energy Chemical Reactions. \$97,692.
- Yale University, New Haven, Connecticut. Robert Beringer, Nuclear Chemistry and Physics at the Yale Heavy Ion Accelerator. \$244,000.
- 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. \$37,000.
- Yeshiva University, New York, New York. Marvin J. Stern, Isotope Effects on Rate and Equilibrium Processes. \$14,500.

Metallurgy and Materials

- Andrews University, Berrien Springs, Michigan. Donald D. Snyder, Physical Properties of Separated Metallic Isotopes. \$12,800.
- 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. \$20,298.
- Atomics International, Canoga Park, California. A. Sosin, Radiation Damage and Lattice Defects in Crystalline Solids. \$301,000.
- Atomics International, Canoga Park, California. R. G. Breckenridge, Electronic Structure of Metals and Alloys. \$206,000.
- Battelle Memorial Institute, Columbus, Ohio. P. S. Rudman, The Charge on Interstitial Ions in Groups IV-A and V-A Transition Metals. \$27,929.
- Battelle Memorial Institute, Columbus, Ohio. A. H. Clauer and B. A. Wilcox, Correlation of Dislocation Structure with Creep Properties in Refractory Metals. \$42,400.
- Battelle Memorial Institute, Columbus, Ohio. M. S. Seltzer, Investigation of Steady-State Creep in Non-Stoichiometric Compounds. \$32,312.
- Brown University, Providence, Rhode Island. P. J. Bray, Radiation Damage Studies in Solids Using Magnetic Resonance Techniques. \$78,492.
- Brown University, Providence, Rhode Island. Joseph Gurland and D. C. Drucker, A Combined Macroscopic and Microscopic Approach to the Mechanical Properties of Metals. \$65,158.
- California Institute of Technology, Pasadena, California. Pol Duwez and R. H. Willens, Fundamental Studies of Materials. \$116,880 (9 months).
- California Institute of Technology, Pasadena, California. D. S. Wood and T. Vreeland, Jr., Dislocation Mobility and Density in Metallic Crystals. \$69,769.
- California, University of, Berkeley, California. C. D. Jeffries, Dynamic Nuclear Polarization and Solid State Physics. \$62,675 (18 months).
- California, University of, Berkeley, California. Alan M. Portis, Microwave Faraday Rotation and Other Studies. \$50,000.
- California, University of, Los Angeles, California. W. Gilbert Clark, Experimental Research in Solid State Physics by Magnetic Resonance Methods. \$43,634.
- California, University of, Los Angeles, California. Marvin Chester, Second Sound in Solids; Electroabsorption Studies in Semiconductors. \$36,209.
- California, University of, Riverside, California. A. W. Lawson, Electric and Magnetic Properties of Transition Metals and Their Compounds. \$64,648.
- Carnegie Institute of Technology, Pittsburgh, Pennsylvania. Paul G. Shewmon, Surface Diffusion on Metals. \$28,590.
- Carnegie Institute of Technology, Pittsburgh, Pennsylvania. Charles L. Bauer, A Study of the Interaction Between Point Defects and Dislocations Through Dislocation Damping Experiments. \$27,700.
- Carnegie Institute of Technology, Pittsburgh, Pennsylvania. D. A. Wiegand, Radiation Effects in Solids. \$48,000.
- Carnegie Institute of Technology, Pittsburgh, Pennsylvania. Paul A. Flinn, Application of the Mossbauer Effect to the Study of Metallic Solid Solutions. \$41,661.

Metallurgy and Materials

- Case Institute of Technology, Cleveland, Ohio. R. F. Hehemann, Kinetics of Phase Transformation in Zirconium-Niobium Alloys. \$20,840.
- Case Institute of Technology, Cleveland, Ohio. Charles S. Smith, Solid State Physics. \$76,243.
- Catholic University of America, Washington, D. C. Paul H. E. Meijer, Ultrasonic Studies of Alkali Metals. \$19,933 (2 years).
- Chicago, University of, Chicago, Illinois. Robert Gomer, Interactions on Metallic Surfaces. \$47,000.
- Clemson University, Clemson, South Carolina. Robert L. Chaplin, Radiation Effects in Crystalline Materials. \$34,348.
- Columbia University, New York, New York. James M. Galligan, Studies of Radiation Damage and Hardening. \$26,339.
- Columbia University, New York, New York. Stephen P. Denker, Electronic Properties of Refractory Monoxide Having Intrinsic Lattice Vacancy Concentrations. \$27,700.
- Columbia University, New York, New York. Arthur S. Nowick, Defects in Crystals. \$50,662.
- Columbia University, New York, New York. Eugene S. Machlin, A Study of the Feasibility of Obtaining Field Ion Microscope Images of Interstitial Solutes. \$30,526.
- Connecticut, University of, Storrs, Connecticut. O. R. Gilliam, Investigations of Radiation Effects in Solids (Metal Oxides, Alkali Azides and Bifluorides) by Electron Spin Resonance. \$36,950.
- Connecticut, University of, Storrs, Connecticut. Ralph H. Bartram, Theoretical Investigations of Radiation Effects in Ionic Crystals. \$15,865.
- Cornell University, Ithaca, New York. R. H. Silsbee and Raymond Bowers, Solid State Physics: Magnetic Phenomena. \$121,034.
- Cornell University, Ithaca, New York. J. A. Krumhansl, A. J. Sievers, R. O. Pohl, and A. Taylor, Experimental Phonon Physics and Dynamitron Utilization. \$168,125.
- Cornell University, Ithaca, New York. Henri S. Sack, A Study of Imperfections in Crystals. \$57,387.
- Cornell University, Ithaca, New York. Arthur L. Ruoff, Elastic and Plastic Deformation of Solids. \$100,000.
- 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. \$34,765.
- Cornell University, Ithaca, New York. Che-Yu Li, Solid Liquid Interface. \$29,801.
- Cornell University, Ithaca, New York. Mark S. Nelkin, The Theory of Slow Neutron Inelastic Scattering by Liquids. \$40,765.
- Cornell University, Ithaca, New York. Douglas B. Fitchen, Electronic Properties of Defects in Ionic Crystals. \$32,079.

Metallurgy and Materials

- Cornell University, Ithaca, New York. Robert W. Balluffi, Defects in Metal Crystals. \$127,965 (15 months).
- Cornell University, Ithaca, New York. James A. Krumhansl and P. A. Carruthers, Theoretical Phonon Physics. \$77,371.
- Denver, University of, Denver, Colorado. C. E. Lundin, Alloying Behavior of the Rare Earths. \$29,652.
- Florida, University of, Gainesville, Florida. F. N. Rhines, John Kronsbein and R. T. DeHoff, Topological Study of the Sintering Process. \$41,314.
- Florida, University of, Gainesville, Florida. Robert E. Reed-Hill, Deformation Processes in Zirconium. \$24,964.
- Florida, University of, Gainesville, Florida. R. E. Hummel and J. J. Hren, Neutron-Irradiation of Copper-Based Alloys with Martensitic Transformations. \$27,408.
- Franklin Institute, Philadelphia, Pennsylvania. Martin A. Pomerantz, Solid State Investigations Utilizing Electron-Bombardment Phenomena. \$35,000.
- Franklin Institute, Philadelphia, Pennsylvania. John D. Meakin, A Study of Non-Stoichiometry in Metallic Carbides Using Field Ion Microscopy. \$36,566.
- Georgia Institute of Technology, Atlanta, Georgia. E. J. Scheibner, Surface Properties of Magnetic Materials. \$46,560.
- Illinois Institute of Technology, Chicago, Illinois. L. I. Grossweiner, Investigation of Energy Transfer Processes by Flash Photolysis. \$34,000.
- Illinois Institute of Technology, Chicago, Illinois. Harold Weinstock, Thermal Measurements on Solids Below 1 K. \$34,200.
- Illinois, University of, Urbana, Illinois. Robert J. Maurer, The Science of Materials. \$1,682,000.
- Illinois, University of, Urbana, Illinois. J. J. Gilman, Laser Radiation Damage Studies. \$42,685.
- Johns Hopkins University, Baltimore, Maryland. Richard I. Joseph, Phonon Imprisonment Studies. \$33,757.
- Kansas, University of, Lawrence, Kansas. Robert J. Friauf, Point Defects in Ionic Crystals. \$36,030.
- 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. \$16,542.
- Little, Inc., Arthur D., Cambridge, Massachusetts. D. W. Lee, Investigation of Deformation of Transition Metal Carbides and Borides at High Temperatures. \$23,170 (16 months).
- Litton Systems, Incorporated, St. Paul, Minnesota. G. K. Wehner, Surface Bombardment Studies. \$29,076 (6 months).
- Louisiana State University, Baton Rouge, Louisiana. J. M. Reynolds, Conductivity Tensors in Metals and Semiconductors. \$75,054.
- Loyola University, New Orleans, Louisiana. David G. Keiffer, Jr., Electron Spin and Optical Absorption in Compacted Silica. \$15,951.

Metallurgy and Materials

- Maine, University of, Orono, Maine. Douglas W. Wylie, Effects of Radiation on Alkali Azides Using Electron Spin Resonance Techniques. \$40,365.
- Marquette University, Milwaukee, Wisconsin. Robert N. Blumenthal, Defect Structures in Non-stoichiometric Oxides. \$25,807.
- Maryland, University of, College Park, Maryland. Robert M. Asimow, An Investigation of Solid Solution Hardening in Metallic Solid Solution Alloys. \$30,224.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. M. B. Bever, Thermodynamic and Other Aspects of Metallic Systems. \$64,200.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. W. D. Kingery and R. L. Coble, Basic Research in Ceramics and Noncrystalline Systems. \$248,327.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. B. L. Averbach and Morris Cohen, Atomic Arrangements, Imperfections and Diffusion. \$98,092.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. B. E. Warren, X-Ray Study of Structure and Defects. \$8,800 (2 years).
- Massachusetts Institute of Technology, Cambridge, Massachusetts. C. G. Shull, Low Temperature Neutron Physics Studies. \$171,039 (18 months).
- Massachusetts Institute of Technology, Cambridge, Massachusetts. Robert E. Ogilvie, Fundamentals of Diffusion. \$79,000 (4 years).
- Massachusetts Institute of Technology, Cambridge, Massachusetts. Harry C. Gatos, Studies on the Distribution of Impurities in Solids. \$33,000 (17 months).
- Massachusetts Institute of Technology, Cambridge, Massachusetts. W. A. Backofen, Mechanical Properties of Metals at Low Temperatures. \$17,100.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. Benjamin Lax and John E. C. Williams, Research on Instability in Superconducting Magnets. \$89,695.
- Mellon Institute, Pittsburgh, Pennsylvania. T. B. Massalski, Research on the Theory of Alloys. \$34,647.
- Michigan State University, East Lansing, Michigan. F. J. Blatt and J. Bass, Studies of Electrical and Defect Properties of Thin Metallic Wires. \$43,208.
- Michigan State University, East Lansing, Michigan. Edward H. Carlson, Study of Interactions Between f-Shell Transition Ions in Non-metallic Crystals. \$28,289.
- Michigan State University, East Lansing, Michigan. Gerald L. Pollack, Properties of Rare-Gas Solids. \$25,473.
- Michigan Technological University, Houghton, Michigan. A. A. Hendrickson, Structure and Properties of Solid Solutions. \$35,854.
- Michigan Technological University, Houghton, Michigan. Donald E. Mikkola, Effect of Annealing on the Substructure of Cold Worked fcc Metals and Alloys. \$26,625.
- Michigan, University of, Ann Arbor, Michigan. Lawrence O. Brockway, The Oxidation of Thin Single Crystals of Copper. \$25,000.
- Michigan, University of, Ann Arbor, Michigan. R. E. Balzhiser, E. E. Hucke and R. D. Pehlke, Thermodynamic and Transport Properties of Liquid Metal Systems. \$121,555.

Metallurgy and Materials

- Minnesota, University of, Minneapolis, Minnesota. Richard A. Swalin, Diffusion Studies in Liquid Metals. \$42,432.
- 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. \$19,058.
- Minnesota, University of, Minneapolis, Minnesota. William Zimmermann, Jr. and Lewis H. Nosanow, Experimental and Theoretical Studies in Solid State and Low Temperature Physics. \$158,585.
- Mississippi, University of, University, Mississippi. Arthur B. Lewis, The Effects of Neutron ϕ Irradiation on the Electronic Properties of Binary Alloys. \$31,646.
- Missouri, University of, Rolla, Missouri. Robert Gerson, Ferroelectric Properties of Bismuth Ferrate and Related Materials. \$44,031.
- Missouri, University of, Rolla, Missouri. Charles A. Goban, Nuclear Radiation Effects on Silicon P-N Junctions. \$66,640.
- Montana State University, Bozeman, Montana. Harry W. Townes, An Investigation of Turbulent Flow in a Rough Pipe. \$30,931.
- National Bureau of Standards, Washington, D. C. Various Research Projects. \$78,290.
- Nebraska, University of, Lincoln, Nebraska. Edgar A. Pearlstein, Studies of Imperfections in Solids. \$84,050.
- New York, City University of/Queens College, Flushing, New York. Robert D. Hatcher, Theoretical Research on Radiation Induced Defects in LiH. \$18,153.
- New York University, New York, New York. Edward Miller, Thermodynamic Properties of Intermetallic Compounds. \$34,936.
- North Carolina State University, Raleigh, North Carolina. Hayne Palmour, III, Grain Boundary Sliding in Alumina Bicrystals. \$28,000.
- North Carolina State University, Raleigh, North Carolina. Thomas S. Elleman, The Effects of Radiation and Gas Concentration on Rare Gas Diffusion in Solids. \$15,656.
- North Carolina, University of, Chapel Hill, North Carolina. Lawrence Slifkin, Research in Intermetallic Diffusion. \$30,011.
- North Dakota, University of, Grand Forks, North Dakota. Harold D. Bale, Radiation Damage to Silica Structures. \$13,340.
- Northwestern University, Evanston, Illinois. R. L. Hines, Radiation Effects of Ion Bombardment. \$34,703.
- Northwestern University, Evanston, Illinois. John W. Kauffman, Studies of Radiation Damage Resulting from Electron Bombardment. \$45,000.
- Northwestern University, Evanston, Illinois. M. Meshii, Effect of Point Defects on Mechanical Properties of Metals. \$27,298.
- Notre Dame, University of, Notre Dame, Indiana. B. D. Cullity, Magnetoelastic Phenomena in Metals. \$13,500.
- Ohio State University, Columbus, Ohio. Robert A. Rapp, An Investigation of Mixed Conduction in Solid Electrolytes. \$24,387.

Metallurgy and Materials

- Oklahoma, University of, Norman, Oklahoma. Raymond D. Daniels and C. R. Haden, Influence of Imperfections and Interstitial Contaminants on the Mechanical Properties and Superconducting Behavior of Metals. \$24,995.
- Oklahoma, University of, Norman, Oklahoma. C. A. Plint, Formation Energies of Individual Vacancies in Alkali Halides. \$12,900.
- Oklahoma, University of, Norman, Oklahoma. Frank B. Canfield, Diffusion in Binary Liquid Metal Systems. \$22,330.
- Oklahoma, University of, Norman, Oklahoma. Robert J. Block, The Effects of Surface Coatings on the Plastic Deformation of Metal Single Crystals. \$24,126.
- Oregon State University, Corvallis, Oregon. Melvin Cutler, The Electronic Properties of Liquid Semiconductors. \$22,248.
- Pennsylvania State University, University Park, Pennsylvania. P. L. Walker, Jr., Research on Graphite. \$97,905.
- Pennsylvania State University, University Park, Pennsylvania. L. E. Cross, Fundamental Studies in High Temperature Materials Phenomena. \$109,984.
- Pennsylvania State University, University Park, Pennsylvania. Arnulf Muan, Thermodynamic Properties of Solid Solutions at High Temperatures. \$27,463.
- Pennsylvania State University, University Park, Pennsylvania. Della M. Roy, Gases in Solids: High Volatile Content Glasses. \$7,281.
- Pennsylvania State University, University Park, Pennsylvania. Earle Ryba, Transformations in AB_2 Intermetallic Compounds. \$20,132.
- Pennsylvania, University of, Philadelphia, Pennsylvania. Norman Brown, Study of Alloys by Electron Transmission Microscopy. \$2,455 (7 months).
- Pittsburgh, University of, Pittsburgh, Pennsylvania. Richard A. Butera, Magneto-thermodynamics of Para- and Antiferromagnets. \$27,429.
- Pittsburgh, University of, Pittsburgh, Pennsylvania. R. S. Craig and W. E. Wallace, Thermal, Structural and Magnetic Studies of Metals and Intermetallic Compounds. \$92,427.
- Pittsburgh, University of, Pittsburgh, Pennsylvania. John R. Townsend, A Study of Radiation Induced Defects in Metals. \$27,024.
- Puerto Rico, University of, Mayaguez, Puerto Rico. Mortimer I. Kay, Neutron Diffraction Program. \$157,989.
- Puerto Rico, University of, Rio Piedras, Puerto Rico. Amador Cobas, Radiation Damage in Organic Crystals. \$46,858.
- Purdue University, Lafayette, Indiana. John W. MacKay, Basic Radiation Damage Studies. \$71,448.
- Purdue University, Lafayette, Indiana. Richard E. Grace, Transport and Thermodynamic Properties of Solids. \$17,982.
- Purdue University, Lafayette, Indiana. James G. Mullen, Mossbauer Studies of the Properties of Solids. \$23,371.
- Rensselaer Polytechnic Institute, Troy, New York. H. B. Huntington, Anisotropic Diffusion and Electromigration. \$55,000.

Metallurgy and Materials

- Rensselaer Polytechnic Institute, Troy, New York. Edmond Brown, Theoretical Research on Electron Behavior in Crystals. \$32,000.
- Rensselaer Polytechnic Institute, Troy, New York. Fritz V. Lenel, Studies of Sintering. \$30,000.
- Rensselaer Polytechnic Institute, Troy, New York. Wylie J. Childs, Dendrite Growth in Supercooled Metals. \$22,000 (17 months).
- Rensselaer Polytechnic Institute, Troy, New York. Philip A. Casabella, Nuclear Quadrupole Coupling Studies in Solids. \$23,380.
- 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. \$21,100.
- 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. \$29,003.
- Rochester, University of, Rochester, New York. Theodore G. Castner, Electron Spin Resonance in Solids. \$44,000.
- Rutgers University, New Brunswick, New Jersey. John A. Sauer, Relaxation Behavior, Molecular Motion and Structure in Polymers and Related Materials. \$32,972.
- 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.
- Southern California, University of, Los Angeles, California. Marcel LeBlanc, A Study of Magnetization, Thermal, and Transport Current Phenomena in High Field Superconductors. \$65,000.
- Stanford University, Stanford, California. David A. Stevenson, Thermodynamic Properties and Defect Structure of Intermetallic Compounds. \$28,300.
- Stanford University, Stanford, California. R. A. Huggins, Kinetics in Solid State Systems. \$25,375.
- Stanford University, Stanford, California. Oleg D. Sherby and O. Cutler Shepard, Effect of Point Defects on Mechanical Behavior of Crystalline Solids. \$20,000.
- Stanford University, Stanford, California. Craig R. Barrett and William D. Nix, Structure Dependence of Viscous Deformation of Metals. \$21,700.
- Syracuse University, Syracuse, New York. F. A. Kanda, Physical Properties and Alloying Behavior of Alkali and Alkaline Earth Metals. \$45,995.
- Syracuse University, Syracuse, New York. Richard W. Vook, In Situ Ultra High Vacuum High Energy Electron Diffraction Studies. \$21,178.
- Temple University, Philadelphia, Pennsylvania. Leonard Muldawer and Henri Amar, Study of the IB-IIB Beta Phase Alloys. \$80,000.
- Tennessee, University of, Knoxville, Tennessee. E. E. Stansbury and C. R. Brooks, Application of Adiabatic Calorimetry to Metal Systems. \$18,216.
- Texas Christian University, Fort Worth, Texas. Richard F. Raeuchle, Structural Studies of Amorphous Aluminum Oxide. \$43,483.

Metallurgy and Materials

- Utah, University of, Salt Lake City, Utah. Ivan B. Cutler, Recrystallization and Sintering of Oxides. \$15,300.
- Utah, University of, Salt Lake City, Utah. William D. Ohlsen, A Magnetic Resonance Study of Defects in Solids. \$23,237.
- Utah, University of, Salt Lake City, Utah. Owen W. Johnson, Interstitial Diffusion in Non-Metallic Crystals. \$18,645.
- Utah, University of, Salt Lake City, Utah. John W. DeFord, Radiation Damage in Nb and Ta. \$26,452.
- Utah, University of, Salt Lake City, Utah. Ronald S. Gordon, Impurity Effects on the Creep of Polycrystalline Magnesium and Aluminum Oxides at Elevated Temperatures. \$15,340.
- Vanderbilt University, Nashville, Tennessee. James J. Wert and S. G. Cuschalk, Deformation Studies of Superlattice Structure. \$25,670.
- Vermont, University of, Burlington, Vermont. Ted B. Flanagan, Absorption of Hydrogen and Deuterium by Palladium-Rich Alloys. \$29,826.
- Virginia, University of, Charlottesville, Virginia. J. W. Mitchell, The Properties of Crystalline Solids. \$46,419.
- Virginia, University of, Charlottesville, Virginia. Robert V. Coleman, Electronic Properties of Metals and Alloys. \$63,000.
- Virginia, University of, Charlottesville, Virginia. Doris Kuhlmann-Wilsdorf, Investigations on the Behavior of Point Defects and Dislocations. \$56,024.
- Virginia, University of, Charlottesville, Virginia. Kenneth R. Lawless, Electron Diffraction Studies of Single Crystal Metal Surfaces. \$21,824.
- Wake Forest College, Winston-Salem, North Carolina. Thomas J. Turner and G. P. Williams, Jr., A Study of Atomic Mobility in Crystalline Materials. \$14,655.
- Washington, University of, Seattle, Washington. Douglas H. Polonis, Phase Transformation in a Eutectoid Binary Alloy System. \$19,540.
- Wayne State University, Detroit, Michigan. Yeong-Wook Kim, Electron Paramagnetic Resonance Studies of Radiation Effects in Solids and Chemical Compounds. \$45,509 (13 months).
- Westinghouse Electric Corporation, Pittsburgh, Pennsylvania. Earl A. Gulbransen, Reactions of Hydrogen with Alloys of Zirconium. \$42,050.
- West Virginia University, Morgantown, West Virginia. Arthur S. Pavlovic, Volume Magnetostriction in Ferromagnetic Materials. \$20,792.
- Wisconsin, University of, Madison, Wisconsin. C. W. Maynard and W. F. Vogelsang, Radiation Interactions in Solids; Surface and High Pressure Effects. \$56,056.
- Wisconsin, University of, Madison, Wisconsin. Richard A. Dodd and P. R. Strutt, Creep Mechanisms in Alloy Crystals. \$23,577.
- Wisconsin, University of, Madison, Wisconsin. J. S. Hirschhorn, The Effect of Oxygen on the Sintering Rate of Silver. \$8,704.
- Yale University, New Haven, Connecticut. C. N. J. Wagner, X-Ray Study of the Structure of Liquid Metals and Alloys. \$19,870.

Metallurgy and Materials

Yale University, New Haven, Connecticut. Werner P. Wolf, The Study of Ideal Magnetic Crystals.
\$101,364.

Yeshiva University, New York, New York. Martin Goldstein, Phase Convectivity in Diffusion
Limited Separations. \$15,035.

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Controlled Thermonuclear Research

- California, University of, Berkeley, California. Charles K. Birdsall, Computer and Alkali Plasma Instability Experiments. \$43,910.
- California, University of, San Diego, California. Marshall N. Rosenbluth, Plasma Physics Research (Theoretical). \$99,928.
- Georgia Institute of Technology, Atlanta, Georgia. David W. Martin, Ionization and Charge Transfer Cross Sections for Hydrogen and Helium Ions in Gases in the Energy Range 0.15-1.0 MeV. \$65,625.
- Georgia Institute of Technology, Atlanta, Georgia. J. W. Hooper, The Excitation of Alkali Ions by Electron Impact. \$21,927.
- Maryland, University of, College Park, Maryland. Hans R. Griem, Applications of Light Scattering to Plasma Diagnostics. \$54,181.
- Maryland, University of, College Park, Maryland. Herbert Lashinsky, Investigation of Universal Plasma Instabilities. \$50,714.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. Sanborn C. Brown, Plasma Physics, Plasma Production, and Plasma Diagnostics Studies. \$283,365.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. David J. Rose, Non-Adiabatic Trapping of Particles in Magnetic Field and the Interaction of Optical Radiation with Plasmas. \$90,000.
- Massachusetts Institute of Technology, Cambridge, Massachusetts. Louis D. Smullin and Abraham Bers, Study of Radio Frequency Emissions from Hot Electron Plasmas. \$13,000 (17½ months).
- Miami, University of, Coral Gables, Florida. Harry S. Robertson, Instabilities and Turbulence in Alkali Vapor Plasmas. \$35,933.
- Miami, University of, Coral Gables, Florida. Daniel R. Wells, Investigation of Plasma Vortex Structures. No Fund.
- Michigan, University of, Ann Arbor, Michigan. Terry Kammash, Microinstabilities in Inhomogeneous Plasma. \$18,000.
- National Bureau of Standards, Washington, D. C. High Field Magnetic Research; Hydrogen Cross Section Measurements; Ultraviolet Optical and Photoelectric Properties of Solid Materials. \$194,237.
- National Bureau of Standards, Institute for Environmental Research, Boulder, Colorado. C. Gordon Little, Plasma Density Correlation and Diffusion. \$30,000 (8½ months).
- New York University, New York, New York. Harold Grad, Plasma Physics and Magneto Fluid Dynamics. \$227,000.
- Roanoke College, Salem, Virginia. Charles R. Finfgeld, Proton Sputtering. \$3,110.
- Stanford Research Institute, Menlo Park, California. Ralph A. Pasternak, Interaction of Hydrogen and Other Gases with Clean Metal Surfaces. \$47,987 (6 months).
- Stanford University, Stanford, California. F. W. Crawford, Research on Plasma Oscillations and Instabilities. \$140,800.
- Stanford University, Stanford, California. Oscar Buneman, Study of Anomalous Cross-Field Diffusion. \$97,000 (18 months).
- Stevens Institute of Technology, Hoboken, New Jersey. George Yevick, Experimental Investigation of Cusped Containment Geometries. \$120,545.

Controlled Thermonuclear Research

- Stevens Institute of Technology, Hoboken, New Jersey. Kenneth C. Rogers, Investigations in Plasma Dynamics. \$77,003.
- Swarthmore College, Swarthmore, Pennsylvania. Milan W. Garrett, Magnetic Field Theory, Calculations, and Design, Based on Zonal Harmonic Series. \$13,661 (16½ months).
- Tennessee, University of, Knoxville, Tennessee. Edward G. Harris, Instabilities Due to Anisotropic Velocity Distributions. \$5,750.
- Texas, University of, Austin, Texas. Hans Schluter, Investigations of the Hybrid Ion-Electron Cyclotron Resonance. \$25,000.
- Texas, University of, Austin, Texas. William E. Drummond, Anomalous Diffusion and Thermalization of Turbulent Plasmas. \$49,631.
- United Aircraft Corporation, East Hartford, Connecticut. Alan F. Haught, Production of Plasmas for Thermonuclear Research by Laser Beam Irradiation of Solid Particles. \$33,343.
- Washington State University, Pullman, Washington. Edward E. Donaldson, Chemical Sputtering of Solids. \$51,396.
- Westinghouse Electric Corporation, Pittsburgh, Pennsylvania. W. J. Lange and J. H. Singleton, Surface Physics and Ultra-high Vacuum Techniques. \$69,358.
- Westinghouse Electric Corporation, Baltimore, Maryland. R. E. Fox, High Temperature Plasma by Laser Heating. \$53,786 (16 months).
- Wisconsin, University of, Madison, Wisconsin. Donald W. Kerst, Studies of the Trapping, Stability, and Characteristics of Plasma in Toroidal Multipole Magnetic Fields. \$180,800.
- Yale University, New Haven, Connecticut. Ira B. Bernstein, A Review of the Kinetic Theory of Waves in a Plasma External Magnetic Field. \$21,938 (16 months).