A Profile of the Department of Physics

Prepared for the North Central Association

Accreditation Review

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Respectfully submitted

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PREFACE

This profile presents both general statements concerning the policies and operations within the Department and statistics concerning students and faculty. The statements concerning the Departmental policies and operations have been drafted primarily by the Head of the Department in consultation with the Faculty Advisory Committee to the Department Head and other Faculty Committees. In some cases, the faculty as a whole have indicated by resolution their support of certain statements, as noted in the text. In general, however, much of this profile may reflect the view of the Department as seen by the Department Head.

The statistics have been gleaned from both Departmental and University records. They are believed to be accurate. When estimates have been used, they are indicated in the text or tables by an asterisk(*).

I. EDUCATIONAL TASK OF THE DEPARTMENT OF PHYSICS

The role or purpose of a Physics Department in a University with an established tradition of education and research is quite broad. The faculty have passed a resolution indicating their support of the following statement concerning the role and purpose of the Department of Physics.

The Department of Physics at Kansas State University has a broad commitment to generate and disseminate knowledge. These roles are interrelated and complement each other. The Department has the responsibility to maintain an active research program in order to contribute to the society through the generation of a better understanding of the physical world and man's relationship to that world. Such a research program assures to the Department a faculty that is intellectually alive and a curriculum that is current.

The Department has a professional responsibility to educate future generations of physicists. The Department should provide the undergraduate physics major with the skills he will need to contribute effectively in his chosen career. The Department has the responsibility in its graduate education program to produce a person confident of his ability to function as a professional physicist.

The Department has the responsibility to provide education for students in scientific, engineering and other disciplines that require an understanding of some applications of the principles of physics.

An additional role of the Department is to awaken in the non-science student an interest in the nature of the physical world and to provide him with a familiarity with some of the current ideas and concepts. Such familiarity with physical concepts should enable him to be a more effective citizen in today's rapidly changing technological society.

The Department also has a responsibility to provide information for those in the geographical region of which the University is an integral part. The Department thus extends both research and educational programs beyond its laboratories and formal classrooms. [Resolution: September 28, 1971].

The general goals of the Department as reflected in the statement above can be elaborated in terms of the role of the Department in the immediate geographic community, the national community and the international community. Of importance to the immediate geographical area and state is the Department's role in providing for the professional and liberal education of physicists with a variety of career goals, who will use their education in teaching, research and community service in the neighboring area. Another role is the education in physics and physical science of non-major students who will be responsible citizens of their communities and will need some understanding of science to make decisions as citizens. In addition, the department provides less formal educational opportunities for persons in the area. These opportunities are provided to the general public and public schools of the area through planetarium showings, occasional public lectures, group tours of research facilities and open house activities. The encouragement and further training of high school physics teachers is provided by the departmental participation in summer institutes and

in the graduate school's physical science teaching program. Opportunities for educational support and exchange of information are provided to local colleges via an N.S.F. sponsored project and less formally through faculty contacts. This project is described in Appendix I. The department also serves as a source of physics knowledge for persons in other departments of the university such as the experiment stations. As part of their regional role, the department faculty members organize, host and participate in regional meetings on physics education and research.

The department also plays a role of international significance in providing facilities and staff for the education of professional physicists who will be active in other countries or internationally. This is accomplished through the acceptance of some foreign students, student exchange with a foreign university, and by having guest and visiting faculty and research associates from other states and other countries. The exchange of new knowledge and ideas through the participation of department faculty and students in international meetings and conferences is another aspect of the part played by the department in the generation and dissemination of new knowledge.

The Department will be guided in its continued growth by its role and purpose. The Department has a commitment to continue to attract well-qualified faculty and to create an environment in which each of the faculty can continue to develop and contribute effectively to the complementary roles of research and teaching.

The only true measure of the effectiveness of the Department will be the quality of the graduates as determined by their successes and the attitudes of the community of professional physicists toward the Department.

II. RESOURCES AVAILABLE FOR PERFORMING THE TASKS OF THE DEPARTMENT OF PHYSICS

In recent years, the Department of Physics has made impressive and significant increases in both faculty and in physical facilities. These advances in both human and physical resources are interrelated. While the recent additions in physical facilities are truly significant, it is the continued growth in the faculty that is most impressive.

A. Faculty Resources

The faculty at the rank of Assistant Professor and above now number 27. With the exception of one faculty member approaching retirement, the entire staff is research oriented. There are eight professors, nine associate professors, and ten assistant professors. A summary of the faculty is given in Table I. The individual faculty vitas may be consulted for detailed information.

Outstanding senior faculty include Regents' Distinguished Professor Dudley Williams and Professor Robert B. Leachman, Director of the Nuclear Science Laboratory. Professor Williams, appointed in 1964, is not only well-recognized for his research in optics and infrared spectroscopy, but is known as a superior teacher and co-author of several widely-used physics texts, Elements of Physics and Principles of College Physics. He is a Fellow of both the American Physical Society and the Optical Society of America, member of the Board of Directors of the Optical Society of America, and Associate Editor of the Journal of the Optical Society of America.

Dr. R. B. Leachman, formerly associated with the Los Alamos Scientific Laboratories, is well known for his research in nuclear fission and prepared the world survey on fission physics for the United Nations 1958 Conference on

Peaceful Uses of Atomic Energy. He represented the United States at the 1971 meeting on Atomic Research for Public Needs (Rio de Janeiro) sponsored by the United Nations. Professor Leachman served as the head of the Department from 1967 through 1971, a period of rapid growth primarily associated with the establishment of the Nuclear Sciences Laboratory. He is presently the Director of the Nuclear Sciences Laboratory, and is engaged in both basic fission research and interdisciplinary research on the problem of nuclear safeguards.

All of the faculty at or above the level of Assistant Professor have earned the Ph.D. Furthermore, of the faculty in residence in 1971, 62 percent earned their doctorate degrees from one of the thirty institutions ranking in the top group (3.0 - 5.0) as gaged by the quality of the graduate faculty indicated in the Roose and Anderson[1] report, 81 percent from the fifty-one institutions from the range of (5.0 - 2.5) and 88 percent from the sixty-nine institutions in the range of (5.0 - 2.0).

None of these faculty have received their doctorate from Kansas State University. It is not the policy of the Department to encourage inbreeding by attracting faculty or graduate students from Kansas State University. No more than 10 percent of the entering graduate student body in the last five years have received their B.S. degree from K.S.U. Furthermore, this number has declined each year.

Of even more significance, however, is the growth of the faculty as is indicated by the five year period covering the academic years 1966 - 67 through 1970 - 71. All of the present faculty who joined the staff during this period, earned doctorates at the leading institutions by rated quality of the graduate

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[1]Kenneth D. Roose and Charles J. Anderson, A Rating of Graduate Programs, American Council on Education, 1971.

faculty.[1] All of these faculty earned the doctorate at leading institutions by rated effectiveness of the doctoral program. In addition, 50 percent of these faculty earned their degree at one of the twelve top rated institutions as gaged by the effectiveness of the doctoral program and 83 percent of these faculty at one of the top 29 institutions. These faculty have accounted for 38 percent of the total accumulated publications of the present faculty. All of these faculty have authored or co-authored publications in the period 1969 - 1971 and 80 percent have done so in 1971 to date.

The preliminary teaching assignments are made to the Department Head of the Chairman of the Curriculum Committee after receiving information from the faculty on their teaching preferences for a given semester. The final teaching assignments are made by the Department Head in consultation with the Curriculum Committee Chairman.

As would be expected, the individual preferences tend to be congruent with the specialized training of each individual. The specialized training and talent of a given faculty member are matched with his teaching assignment in the majority of the cases. For example, Professor E. Brock Dale, formerly associated with the Oklahoma City Symphony and a member of the K.S.U. Chamber Orchestra, teaches the course Physics for Musicians. Dr. John C. Evans, trained as an astronomer and active in stellar atmospheric research, teaches the courses Descriptive Astronomy and Solar Physics. Regents' Professor Dudley Williams, author of the sophomore text Elements of Physics, teaches the Engineering Physics courses. Dr. Carl E. Rosenkilde, a mathematical physicist teaches graduate courses in Introduction to Theoretical Physics and Advanced Dynamics. Drs. Gregory Seaman and James Legg, both active in Nuclear Physics research at the K.S.U. 12 MeV Tandem Van de Graaff laboratory, teach Introductory

and Advanced courses in Nuclear Physics. Dr. N. O. Folland, a Solid State Theoretician, teaches graduate theoretical courses including Advanced Topic courses in Solid State. Dr. R. Dean Dragsdorf, an expert in X-ray Physics, teaches the beginning graduate course in X-ray Physics. These examples could be extended and it would be noted in almost all cases the faculty are extremely qualified to be teaching the courses with which they are usually associated.

After a faculty member has taught a given course for two years, another faculty member may request to teach the course and serious consideration is given to the request. That is, it is the general policy of the Department that an individual does not come to own a given subject or topic. This policy tends to prevent a faculty member from becoming stale or bored with the course and allows him to further his own knowledge by teaching courses other than those specifically associated with his research training. There are, of course, certain courses which tend to be associated with given individuals because of their unique talents, such as, Dr. E. Brock Dale and Physics for Musicians.

The evidence of scholarly attainment should not be reduced to the counting of publications and research grants. However, it is an expedient, if not altogether correct, measure of the activity of the faculty. An examination of the individual vita or Table I indicates that the faculty have published regularly and extensively over a broad range of physics and physics related fields. The present faculty have their names listed as author or co-author of some 489 professional publications. This number includes multiple listings of some papers where more than one of the present faculty were co-authors. Table II indicates the number of publications associated with the faculty in the most recent five year period.

TABLE I. 1971 Faculty At and Above The Rank of Assistant Professor

NAME	RANK	HIGHEST DEGREE	YEAR	INSTITUTION	SPECIALTY	PUBLICATIONS[a] (To Date)	PRESENTATIONS[b] (To Date)
Bark, L. Dean	Professor	Ph.D.	1954	Rutgers University	Agricultural Climatology, Microclimatology	38 (1971)	
Bhalla, Chander P.	Associate Professor	Ph.D.	1960	University of Tennessee	Theoretical Nuclear and Atomic Physics	28 (1970)	29
Cardwell, Alvin B.	Professor	D. Sc.	1961	University of Tennessee at Chattanooga	Applied Physics, Solid State Physics	19 (1962)	
Cocke, Charles L.	Assistant Professor	Ph.D.	1967	California Institute of Technology	Nuclear Physics, Atomic Physics	11 (1971)	6
Crawford, Francis W.	Associate Professor	Ph.D.	1934	University of Oklahoma	Chemical Physics, Applied Physics	8 (1966)	-
Curnutte, Basil	Professor	Ph.D.	1953	Ohio State University	Molecular Structure & Spectra; Atomic Physics	19 (1971)	6
Dale, E. Brock	Professor	Ph.D.	1953	Ohio State University	Semiconductors; Ion-implantation	11 (1970)	8
Dragsdorf, R. Dean	Professor	Ph.D.	1948	Massachusetts Institute of Technology	X-Ray Diffraction and Scattering	27 (1970)	8
Eck, John S.	Assistant Professor	Ph.D.	1967	Johns Hopkins University	Nuclear Physics, Heavy Ion Interactions	17 (1971)	7
Ellsworth, Louis D.	Professor	Ph.D.	1941	Ohio State University	Nuclear Physics and Instrumentation Astrophysics	15 (1970)	1
Evans, John C.	Assistant Professor	Ph.D.	1966	University of Michigan	Astrophysics	2 (1971)	10
Folland, Nathan O.	Assistant Professor	Ph.D.	1965	Iowa State University	Theoretical Solid State Physics	6 (1971)	6

Table I cont.

NAME	RANK	HIGHEST DEGREE	YEAR	INSTITUTION	SPECIALTY	PUBLICATIONS[a] (To Date)	PRESENTATIONS[b] (To Date)
Hathaway, Charles E.	Head, Associate Prof.	Ph.D.	1965	University of Oklahoma	Solid State Physics, Chemical Physics, Light Scattering Studies	12 (1971)	14
Jack, Hulan E.	Assistant Professor	Ph.D.	1961	New York University	Solid State Physics	2 (1970)	2
Leachman, R. B.	Professor	Ph.D.	1950	Iowa State University	Nuclear and Atomic Physics	28 (1968)	26
Lee, Ronald	Assistant Professor	Ph.D.	1967	Iowa State University	Solid State Physics, Radiation Effects in Insulators, Electrical and magnetic properties of thin films	4 (1971)	7
Legg, James C.	Associate Professor	Ph.D.	1962	Princeton University	Nuclear Physics	17 (1971)	26
Macdonald, J. R.	Associate Professor	Ph.D.	1966	McMaster University	Atomic Physics and Solid State Physics	13 (1971)	8
Manney, Thomas R.	Associate Professor	Ph.D.	1964	University of California	Biophysics, Radiation Phys.	19 (1970)	4
Rosenkilde, Carl	Assistant Professor	Ph.D.	1966	University of Chicago	Mathematical Physics	6 (1969)	-
Seaman, Gregory G.	Associate Professor	Ph.D.	1965	Yale University	Nuclear Physics	15 (1971)	27
Shore, Bruce	Associate Professor	Ph.D.	1960	M.I.T.	Theoretical, Astrophysics, Atomic Physics, Nuclear Physics	16 (1971)	5
Spangler, John D.	Associate Professor	Ph.D.	1961	Duke University	Molecular Spectroscopy	6 (1971)	8
Tumolillo, Thomas	Assistant Professor	Ph.D.	1969	University of Illinois	Mössbauer Spectroscopy	5 (1971)	

Table I cont.

NAME	RANK	HIGHEST DEGREE	YEAR	INSTITUTION	SPECIALTY	PUBLICATIONS[a] (To Date)	PRESENTATIONS[b] (To Date)
Weaver, O. Larry	Assistant Professor	Ph.D.	1970	Duke University	Theoretical Nuclear Physics	4 (1970)	2
Williams, Dudley	Regents' Professor	Ph.D.	1936	University of North Carolina	Infrared Studies, Mass Spectroscopy, Nuclear Physics	136 (1971)	110
Zollman, Dean	Assistant Professor	Ph.D.	1970	University of Maryland	Theoretical Nuclear Physics	5 (1971)	4

[a] Year in parenthesis indicates most recent publication

[b] Oral presentations given at meetings; does not include colloquia talks. These data are strictly estimates.

TABLE II. Faculty Publications

1966 -- 1970

1966	31
1967	34
1968	25
1969	30
1970	45

The drop in productivity as measured by publications alone in the years 1968 and 1969 is easily understood. Fifteen of the present faculty joined the staff since 1966. Six of the present faculty joined the department in 1968. Many of the faculty were involved in the installation of the 12 MeV Tandem Van de Graaff accelerator and ancillary equipment. This major facility did not become operational until early 1970. The effect of this installation period and the flux of faculty is also reflected somewhat in the number of masters degrees awarded in 1968 and doctorates awarded in 1970.

The faculty are active in numerous professional organizations such as the American Physical Society, of which five of the faculty have been named Fellows, the Optical Society of America, The American Association of Physics Teachers, Sigma Xi, the American Association for the Advancement of Science, and the American Association of University Professors. The faculty attend and contribute regularly to both national and international meetings. Five of the faculty have participated in international conferences and symposia abroad thus far in 1971. Some 85 percent of the faculty participated in a meeting of a professional society in the period of 1970 - 71 and 92 percent of the faculty in the period of 1969 - 71.

Attendance at such meetings is primarily supported by external grant funds and in some few cases from personal resources. The Department encourages the

faculty to participate in such meetings. The Department with the help of the College of Arts and Sciences attempts to provide funds to any faculty member who is actually giving a paper at a professional meeting. However, the funds provided by the State to the Department for such purposes are inadequate.

The scholarly achievements of the faculty as measured by research support from sources external to the University in the period 1967 - 68 through 1970 - 1971 are indicated in Table III. The research funds granted to the Department have increased over this period. The Department has reason to be pleased with the increasing number of grants and contracts awarded. However, the Department also realizes the present austerity and attitudes toward University research and the lessening demand for doctoral graduates could cause abrupt and unfortunate changes in the research funding situation.

The effectiveness of the faculty as gaged by student reaction can only be estimated since there is no formal program in the Department requiring student evaluation of teachers and courses. A student evaluation may certainly provide useful information to the teacher. However, this evaluation will be useful in this sense only if the teacher is seeking such information. There is no plan to initiate required student evaluations in the Department. The faculty are encouraged to use evaluations and a University-wide evaluation form is available. The Department Head will accept from a faculty member the results of this evaluation form as one possible input to demonstrate teaching capability. Over one-half of the faculty used student evaluations last year and approximately three-fourths of the faculty have indicated their intentions to use such evaluations this year.

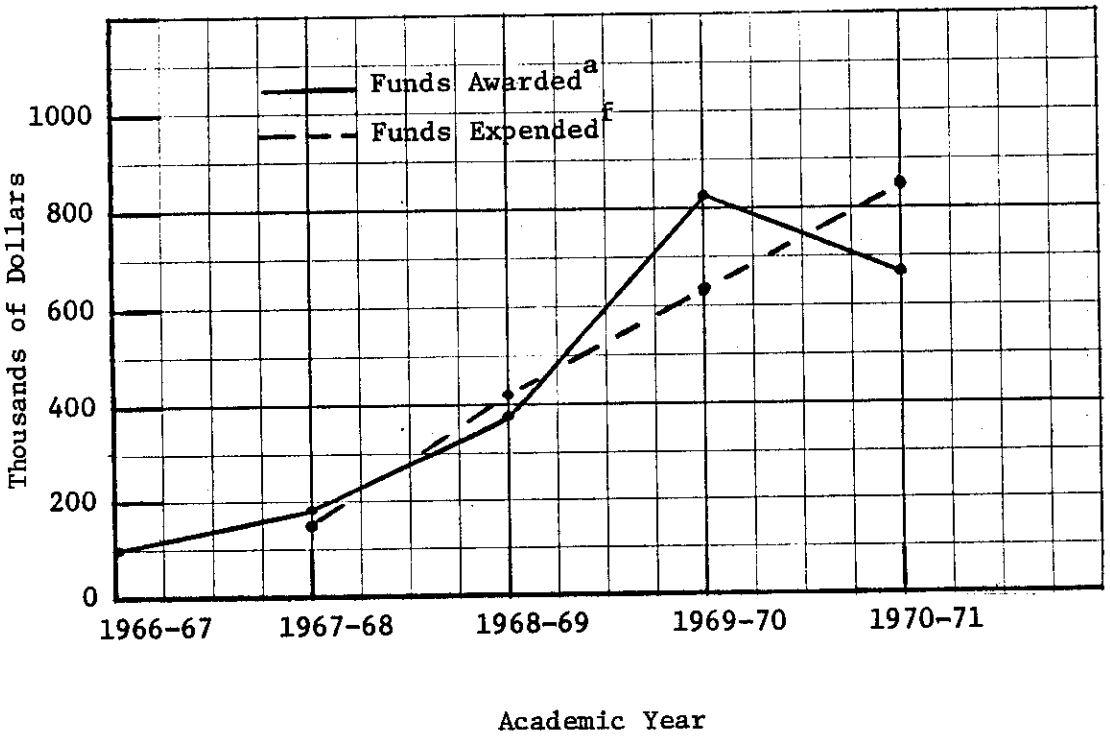
Certainly the increasing enrollment in physics courses reflects a positive reaction to the effectiveness of faculty in their role as teachers. In

TABLE III. Research Support from External Sources: 1967-68 through 1970-71[2]

1967-68 Grant Descriptive Name	Principal Investigators	Agency	Amount	Years Awarded
1. Ultraviolet Communication	Spangler	NASA[b]	$ 3,420	1
2. Measurement of Lunar Radiation	Dale	NASA[b]	3,600	1
3. Deposition of Alloy Films	Dale	Army	25,343	1
4. I.R. Studies of Atmospheric Gases	Hathaway	NASA[b]	7,920	1
5. Parameters of Nuclear States	Mandeville[c]	AEC	3,142	1
6. I.R. Studies of Water	Williams	Navy	25,465	2
7. I.R. Studies of Planetary Atmosphere	Williams	NASA	44,054	2
8. Accelerator Preoperation	Leachman	AEC	70,000	1
			$182,944	
1968-69				
1. THEMIS: Radiation Effects[d]	Dale, Dragsdorf, Hathaway, Folland, Lee	DOD	$142,000	1
2. I.R. Studies of Planetary Atmosphere	Williams	NASA	25,000	1
3. Accelerator Laboratory	Leachman, Legg Macdonald, Seaman	AEC	204,579	1
			$371,579	
1969-70				
1. THEMIS: Radiation Effects[d]	Dale, Dragsdorf, Hathaway, Folland, Lee	DOD	$142,000	1
2. Accelerator Laboratory	Leachman, Legg Macdonald, Seaman, Eck, Tumillilo,	AEC	270,765	1
3. CAPE	Hathaway, Spangler	NSF	125,800	3
4. I.R. Studies of Planetary Atmosphere	Williams	NASA	17,000	1
5. I.R. Studies of Water	Williams	Navy	11,444	1
6. Mössbauer Spectroscopy	Tumillilo	Research Corp.	4,500	1
7. Interactions of Moving Ions with a Lattice	Eck	Research Corp.	5,200	1
8. Safeguards Project[e]	Leachman et al.	NSF	231,000	2
9. Electronically Excited Molecules	Hathaway, Spangler	Army	21,002	1
			$823,511	

(Table III cont.)

Grant Descriptive Name	Principal Investigators	Agency	Amount	Years Awarded
1970-71				
1. I.R. Studies of Water	Williams	Navy	16,000	1
2. Accelerator Laboratory	Leachman, Legg Macdonald, Seaman, Eck, Tomililo	AEC	296,000	1
3. On-Line Computer	Legg, Seaman	AEC	127,910	1
4. THEMIS: Radiation Effects[d]	Dale, Dragsdorf, Hathaway Folland, Lee	DOD	142,000	1
5. Beam Foil Spectroscopy	Cocke	Research Corp.	5,833	1
6. Safeguards Project	Leachman et al.	NSF	23,000	1
7. I.R. Studies of Planetary Atmospheres	Williams	NASA	25,000	1
8. Atomic Properties Related to Ion Stopping	Bhalla	Army	25,076	2
			$660,819	



(Table III Cont.)

[a]This table list research support derived from external sources and does not include research support derived from the Bureau of General Research and the Agricultural Experiment Station. A grant or contract is listed in the academic year awarded. Incomplete data did not allow an accurate determination of research support for 1966-67. However, this support may be estimated to be between $80,000 and $100,000. All other data presented in this table are believed to be accurate to within 5%.

[b]Part of a NASA Institutional Grant.

[c]Present Address: Department of Physics, Michigan Techological University, Houghton, Michigan.

[d]One-half of a THEMIS grant of $284,000 made to investigators in physics and nuclear engineering.

[e]Interdiscipline grant involving faculty in physics, political science, sociology and pyschology.

[f]These data are based on the individual grants budgets as they reflect the expenditures of funds on a yearly basis.

TABLE IV. PHYSICS SERVICE COURSE ENROLLMENT

Courses	1964-65		1965-66		1966-67		1967-68		1968-69		1969-70		1970-71		1971-72
	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F
1. Man's Physical World I	404	246	499	244	557	279	540	274	510	422	575	447	731	491	901
2. Man's Physical World II	64	161	60	150	58	206	57	189	120	328	126	313	245	388	199
3. Descriptive Physics	102	78	118	87	93	99	93	89	65	70	58	52	52	50	64
4. Physics for Musicians	-	-	24	-	-	27	-	-	-	34	-	38	-	25	-
5. Descriptive Astronomy	37	31	35	-	39	-	52	-	47	-	55	-	116	99	134
6. Descriptive Meterology	22	-	23	-	-	52	-	54	-	37	-	82	-	87	-
7. General Physics I	193	105	177	138	220	124	236	148	307	153	370	170	324	149	413
8. General Physics II	77	131	60	124	83	169	93	170	94	227	86	300	109	245	88
9. Engineering Physics I	205	127	212	124	242	129	225	115	235	120	205	84	195	77	186
10. Engineering Physics II	86	148	66	180	97	177	85	157	71	181	58	160	65	144	60
11. Atomic Physics	-	58	52	33	39	40	40	22	19	19	28	8	15	14	18

B. Physical Resources

The Department has made remarkable advances in physical facilities in the last decade. In 1963, the Department of Physics and the Department of Mathematics moved into a $2.4 million physical science building, now known as A. B. Cardwell Hall. (See Figure 3.) An additional $729,000 in state funds was expended for physics research and undergraduate laboratory equipment. The National Science Foundation supplemented these state funds with a building grant of $200,000. Cardwell Hall provides 116,800 square feet of which 30,800 square feet are for research. (See Appendix II.)

The building houses a professional instrument shop, together with metal, glass, and electronics shops. These shops are mostly adequate for present needs but will become dated with respect to the research programs unless a continued investment is made. In addition to 17,200 square feet for the Department of Mathematics, there is also space for the accelerator laboratory and for the computing center. The building is presently full and there is some overflow into the halls. There is at this time little if any room for expansion of any of the Departments occupying the building.

Few universities can match the major facilities for nuclear and atomic physics which are operating at Kansas State University. Besides the 12 MeV tandem Van de Graaff accelerator, there is a 250,000 watt TRIGA Mark II reactor and a 14 MeV neutron generator providing a flux of 10^{11} neutrons per second, both operated by the Department of Nuclear Engineering. In addition, the Department of Electrical Engineering is installing a 600 kV Cockcroft-Walton accelerator which will be used for heavy-ion experiments.

The Van de Graaff accelerator (see Fig. 4) was installed at a cost of about $1.5 million, more than $700,000 of which was provided locally in an

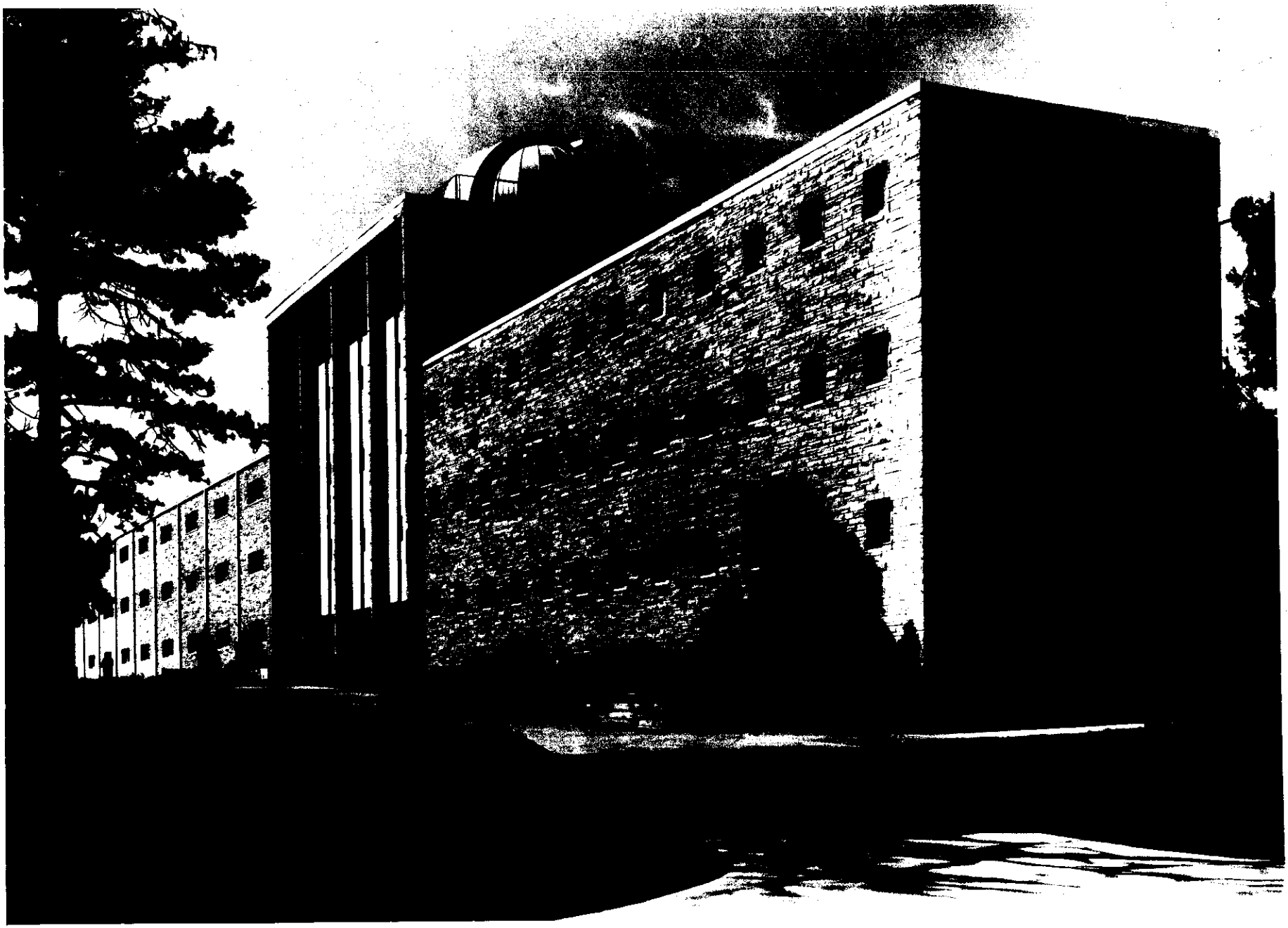


Fig.3. Cardwell Hall, Department of Physics

Fig. 4. Assembly of the 12-MeV Tandem Van de Graaff

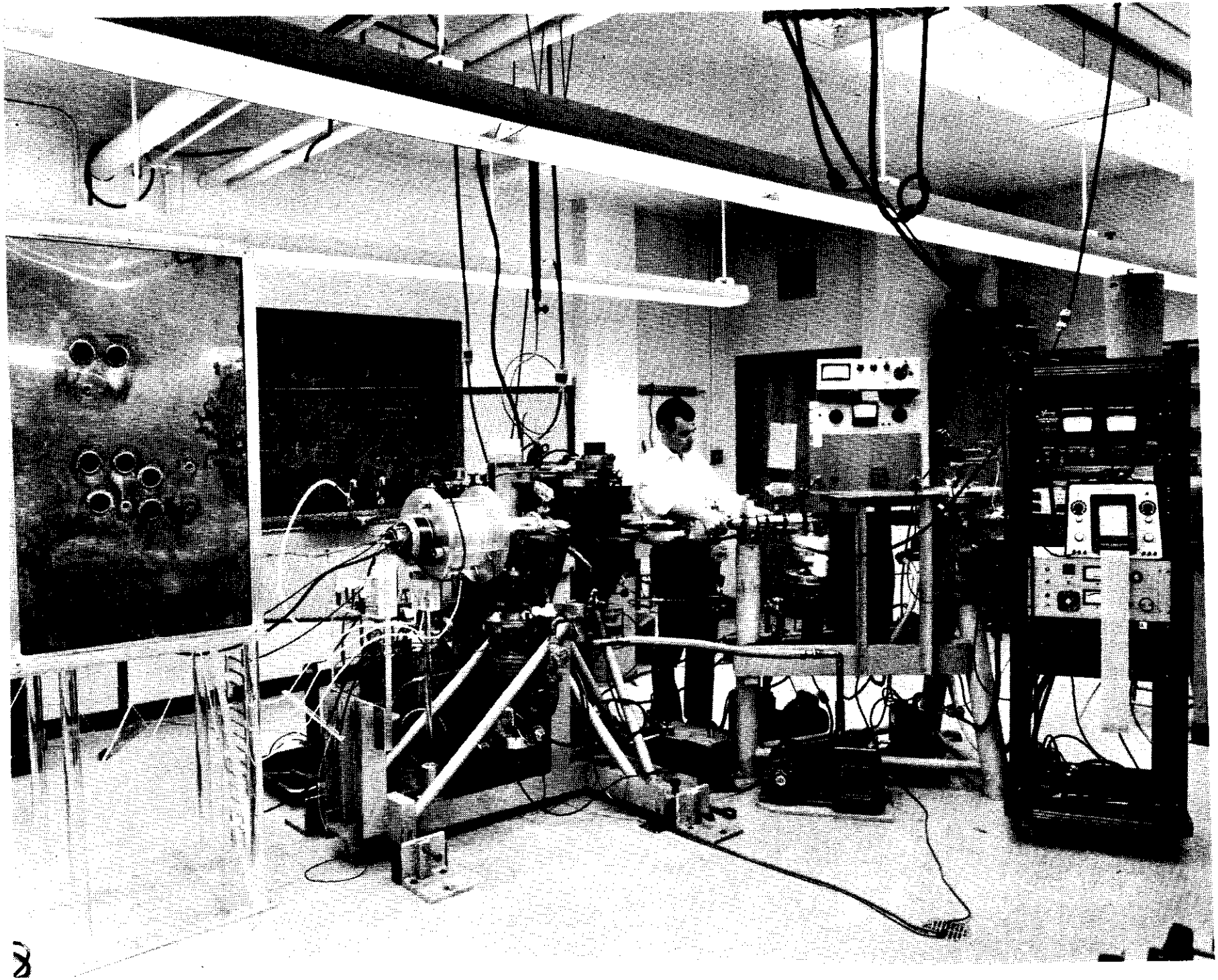


Fig. 5. 150-keV Accelerator for Materials Studies

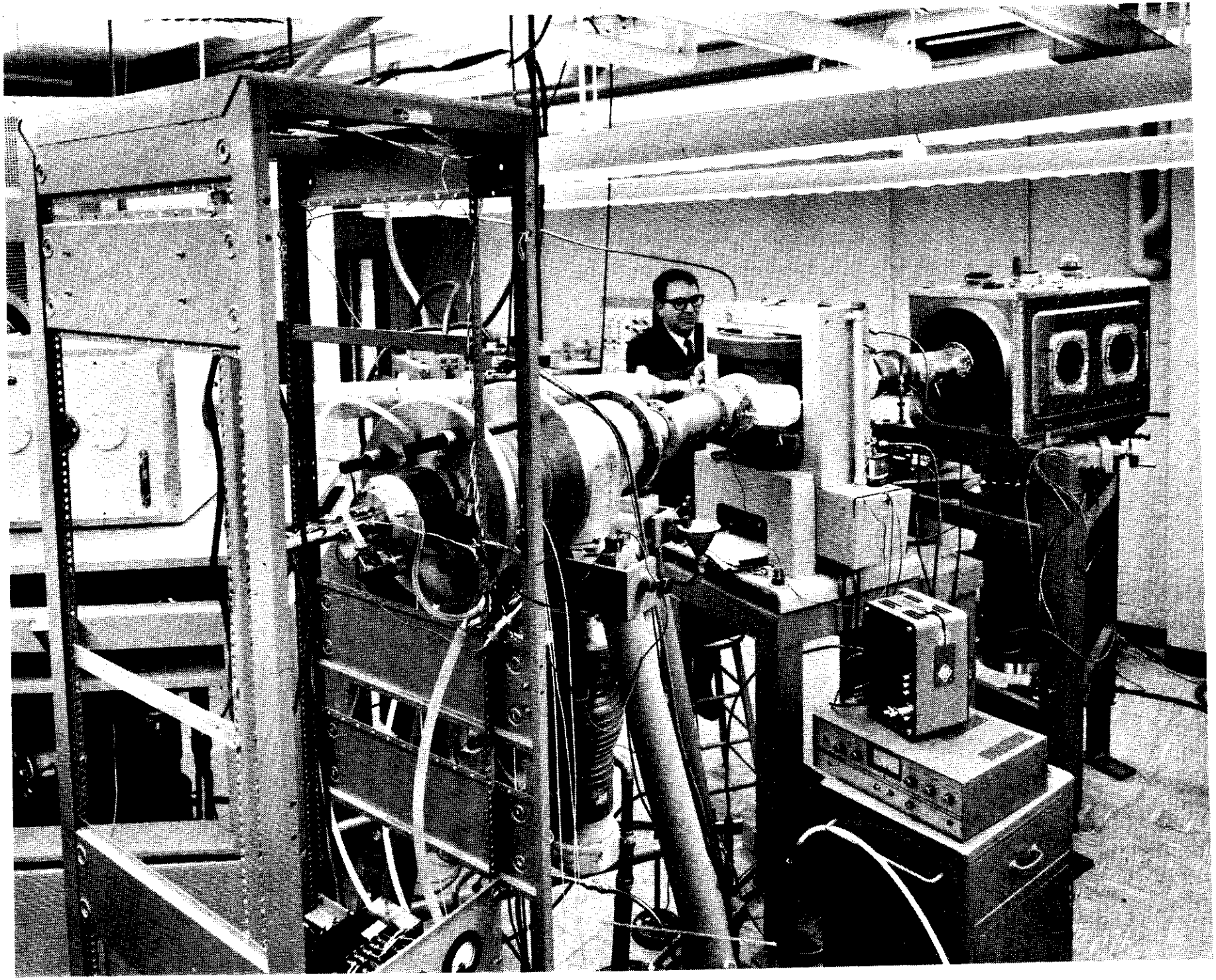


Fig. 6. 150 -KeV Accelerator for Atomic Interactions

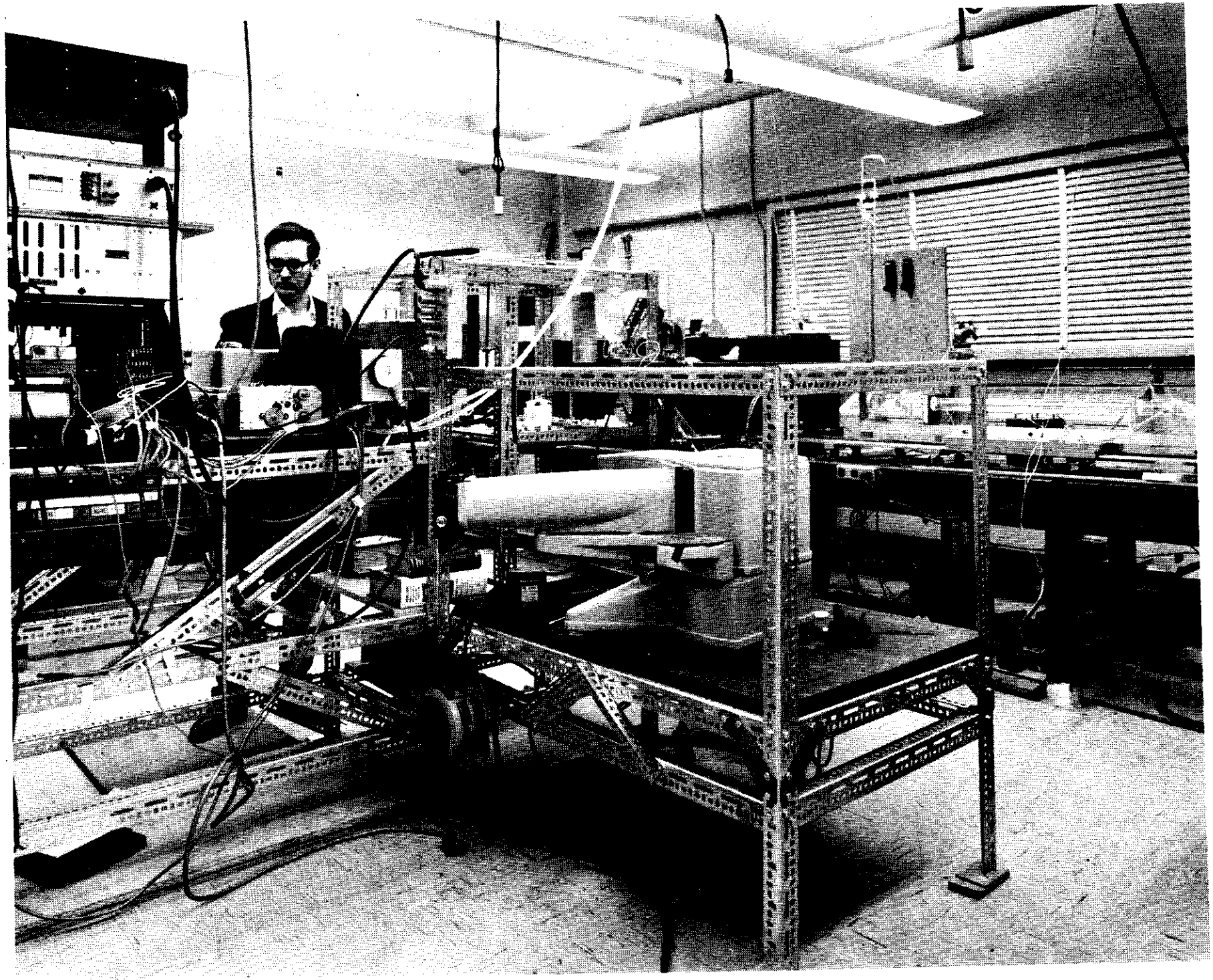


Fig. 7. Laboratory for Spectroscopy Studies with Lasers

effort to develop excellence in the physical sciences. The tandem machine is used in accelerating most of the elements and plays an important part in departmental research. One of the features of this accelerator is a unique ion source, capable of producing beams of accelerated particles of as many as 40 different elements, going up to as heavy as uranium. In the first year of operation 10 different elements have been accelerated for various experiments.

In addition, there are two high-quality 150-keV accelerators. (See Figures 5 and 6.) These instruments are used for research in atomic physics, solid state physics and astrophysics.

Adequate facilities, including x-ray diffraction equipment, electron and optical microscopes, metallurgical preparatory facilities, vacuum deposition apparatus, and magnets are available for solid state research. The small accelerators with their ability to accelerate heavy ions are used extensively in solid state studies. There also exist considerable spectroscopic equipment covering the spectral range from ultraviolet to the far infrared. (See Fig. 6).

A 500 liter nitrogen storage dewar is maintained to allow ease in performing experiments and educational demonstrations down to liquid nitrogen temperatures. However, liquid helium must be inconveniently shipped considerable distances. This makes extremely low temperature experimentation very difficult. A facility for the production of liquid helium would enhance the research effort, particularly in the area of solid state physics.

The presence of the University Computing Center in the Physical Sciences Building with its newly installed IBM 360/50 makes it easily accessible to members of the physics faculty. This system is adequate as a general system for broad use, but it falls short as a system for use in the sciences.

It is barely adequate for present day needs in computational physics. We

will certainly become out-dated in the near future. The Nuclear Sciences Laboratory has just added (1971) an on-line PDP-15 computer for use with the Tandem 12-MeV Van de Graaff accelerator. This system will also find general use in the Department.

The departmental library (2400 square feet) contains an extensive collection of references (over 2,000 volumes) and journals (125 titles). Because of rising costs and insufficient budget, 21 journal titles were eliminated this year (1971). Furthermore, there are no funds for the addition of new periodical titles. This is most serious. The library budget for physics is inadequate and is usually depleted in half of the fiscal year. The library then falls behind in the number of books ordered each year. This is a very unfortunate situation.

The Department has considerable and adequate lecture demonstration and teaching laboratory equipment. A planetarium and an observatory with an 18-inch Cassegrainian reflecting telescope are available for teaching purposes. The planetarium serves not only the physics service courses but also the general public. Over 2000 people from the local geographical region attended planetarium lectures in 1971. Unfortunately, the planetarium is not a budgeted item and operates as a boot-strap operation. An average of three request a week are being rejected for public lectures.

The Department of Physics has added significantly to the laboratory and demonstration equipment in 1971. Over 85 single concept films and eight single concept film projectors have been added to the film library. In addition, 6 helium-neon lasers have been purchased for use in the sophomore general and engineering physics laboratories. Eight telescopes, including three 4½ inch reflectors, three 60 mm refractors and two six inch reflectors, were purchased.

It is planned eventually to allow students to check out the small telescopes similar to checking out library book. Considerable other general purpose demonstration and audio-visual equipment also were purchased.

The Department plans to initiate a Physics Activity Center next to the library in 1971-72. This will be a room with changing demonstrations and exhibits. The students will be enticed to browse -- to pull, to push, to explore. The room will be operated by physics undergraduates. Plans also are underway to place limited physics demonstrations in the hall.

III. ORGANIZATION OF THE DEPARTMENT OF PHYSICS

The Department of Physics in accordance with the University operates under a Department Headship. The Department and the Department Head are reviewed every four years by the Dean of Arts and Sciences.

The faculty elect a Faculty Advisory Committee to the Department Head. The function and constitution of this committee was agreed upon by the faculty on May 5, 1971.

PHYSICS FACULTY ADVISORY COMMITTEE TO THE DEPARTMENT HEAD

FUNCTION: To represent the Faculty in aiding the Department Head in the planning and implementation of policies on matters of importance to the Physics Department. The Committee shares with the Department Head the responsibility to see that the Faculty is kept informed on matters of importance to the Physics Department and to insure that the Faculty has both formal and informal means of expressing their opinions and ideas. A Graduate Student representative will serve on the Committee and have parallel responsibilities with respect to the Graduate Students.

CONSTITUTION: The Committee will consist of one Graduate Student (to be chosen by the Physics Graduate Students in any manner they deem suitable), and four members of the Physics Faculty occupying a position in the rank of Instructor, Assistant Professor, Associate Professor or Professor. The Faculty members of the Committee will be chosen by vote of the Physics faculty of the ranks indicated above. Committee members serve a term of two years and are not eligible to succeed themselves.

The first election will be held in May 1971. Thereafter, elections will be held each April. Two of the four Faculty members of the Committee chosen in the first election, to be determined by lot, will serve until the April 1972 election. These two people may succeed themselves. The other two Faculty members chosen in the first election will serve until the April 1973 election.

The Department also utilizes certain standing committees to conduct its affairs. The 1971-72 physics department committee assignments are enclosed with this report. Each committee is briefly described on this sheet. It should be noted that undergraduates are included on the Curriculum Committee and the Undergraduate Student Affairs Committee. Graduate students are represented on the Advisory Committee, Curriculum Committee, Colloquium Committee, Graduate Student Affairs Committee, and the Undergraduate Laboratory Committee. The students thus are given working inputs into departmental matters.

All academic matters concerning the undergraduate or graduate programs are brought to the faculty for discussion and formal votes.

30 August 1971

PHYSICS DEPARTMENT COMMITTEES

1971 - 72

(The person whose name is underscored will serve as the Chairman.)

Departmental and Building Operations

FACULTY ADVISORY COMMITTEE TO THE DEPARTMENT HEAD: Basil Curnutte, Jr., R. Dean Dragsdorf, John Evans, John Spangler, Joe Gray.

CURRICULUM: Basil Curnutte, C. L. Cocke, J. C. Legg, Carl Rosenkilde, John Spangler, Jacqueline Spears, undergraduate.
Proposes changes, deletions, and additions of class offerings; coordinates with University administration on changes; suggests teaching assignments; coordinates any possible courses or programs for interim semester; coordinates class and classroom scheduling; maintains statistics of teaching loads and room useage.

COLLOQUIUM: N. O. Folland, Carl Rosenkilde, Douglas Gale.
Selects speakers for Physics Colloquium and coordinates visits of speakers.

SUPPORT SERVICES: C. E. Hathaway, J. R. Macdonald, Hulan Jack, Ron Lee, Mark Ross, J. H. Tormey, Lewis Hine.
Coordinates the support services for the Department, including the Instrument shop, Electronics shop, Glass Blowing shop and Stock Room.

GRADUATE STUDENT AFFAIRS COMMITTEE: R. Dean Dragsdorf, C. L. Cocke (Graduate Student Advisor), G. G. Seaman, Chander Bhalla, Loren Winters.
Schedules and arranges qualifier examinations; recommends general systems of examinations and courses for graduate degrees; considers any initial appeals and requests from graduate students.

GRADUATE ENTRANCE COMMITTEE: G. G. Seaman, John Spangler, Hulan Jack, Ron Lee, C. L. Cocke.
Selects incoming graduate students; recommends size of resident graduate student body; coordinates traineeship activities; coordinates introductory sessions for new graduate students.

UNDERGRADUATE STUDENT AFFAIRS COMMITTEE: C. E. Hathaway, (Advisor, S.P.S.), John Eck, Bruce Shore, Fred Zutavern.
Advises undergraduate physics students concerning undergraduate curriculum; stimulates and coordinates undergraduate activities including the freshman topics course; advises students on career possibilities.

UNDERGRADUATE LABORATORIES AND DEMONSTRATIONS COMMITTEE: Ron Lee, J. C. Legg, Ralph Green, Dudley Williams, James Macdonald, John Eck, Jacqueline Spears*.
Recommends changes and additions in the undergraduate laboratories; recommends purchases of laboratory and demonstration equipment.

SECRETARY FOR DEPARTMENTAL MEETINGS AND DEPARTMENTAL HISTORIAN: Louis Ellsworth.
Records all deliberations and decisions of Departmental and Faculty Meetings; maintains departmental archives.

COMPUTER ALLOCATIONS: T. A. Tumolillo
Allocates departmental computer allotment for research and educational purposes.

GRADUATE STUDENT ADVISOR: C. L. Cocke
Advises all graduate students on course scheduling and examination procedures.

GRADUATE PROGRAM COMMITTEE SELECTION: J. C. Legg
Assists the Department Head (with concurrence of student's faculty advisor and committee) in the approval of committee members for individual graduate programs.

RELATIONS OUTSIDE DEPARTMENT

PHYSICS COLLEGE TEACHING PROGRAM (Joint Committee with the College of Education): John D. Spangler, L. D. Bark, Arnold Moore, Robert James, Richard Owens.
Coordinates the activities of the Department of Physics and the College of Education concerning all physics-education programs including summer institutes.

PUBLIC RELATIONS: O. L. Weaver, Bruce Shore.
Assists in maintaining the public image of the Department both on and off the campus.

PLANETARIUM OPERATIONS: John Evans, Larry Testerman*, David Wenstrand*.

JUNIOR COLLEGE AND INTER-UNIVERSITY COORDINATION: John Spangler, C. E. Hathaway.

AGRICULTURAL EXPERIMENT STATION COORDINATION: C. E. Hathaway, F. W. Crawford, L. D. Bark.

LIBRARY SERVICES: Carl Rosenkilde

*graduate student

**undergraduate student

VII. STUDENT ACHIEVEMENT

A. Undergraduate Student Achievement

The Department in the last five years has reviewed the service courses and deleted those for which there is little foreseeable demand. This consolidation of courses has allowed the present courses to be strengthened. Table V gives a brief description of the service courses and the dominant clientele in these courses. Table VI shows the grade distribution in the major service course for the period 1966-67 through 1970-71.

The Undergraduate Curricula in Physics is described in the brochure enclosed. As indicated, there are three options open to the student in addition to the minimal requirement.

Option I: Physics and Astronomy -- Primarily for the student comtemplating graduate study.

Option II: Engineering Physics -- For students interested in industrial careers.

Option III: Physics Teaching -- For students who express an interest in teaching.

The committed student usually takes some variation of the graduate track, Option I. Option II is usually chosen by students seeking dual degrees with physics and engineering. This option is elected also by students who transfer into physics from the school of engineering. Option III, although desperately needed, has attracted only one or two students in the last five years.

Figure 8 shows a best estimate of the numbers of students in the various classes during the period 1965-66 through 1970-71. These are estimates only since accurate records are not available. The figures on the class who

TABLE I. 1971 Faculty At and Above The Rank of Assistant Professor

NAME	RANK	HIGHEST DEGREE	YEAR	INSTITUTION	SPECIALTY	PUBLICATIONS[a] (To Date)	PRESENTATIONS[b] (To Date)
Bark, L. Dean	Professor	Ph.D.	1954	Rutgers University	Agricultural Climatology, Microclimatology	38 (1971)	
Bhalla, Chander P.	Associate Professor	Ph.D.	1960	University of Tennessee	Theoretical Nuclear and Atomic Physics	28 (1970)	29
Cardwell, Alvin B.	Professor	D. Sc.	1961	University of Tennessee at Chattanooga	Applied Physics, Solid State Physics	19 (1962)	
Cocke, Charles L.	Assistant Professor	Ph.D.	1967	California Institute of Technology	Nuclear Physics, Atomic Physics	11 (1971)	6
Crawford, Francis W.	Associate Professor	Ph.D.	1934	University of Oklahoma	Chemical Physics, Applied Physics	8 (1966)	-
Curnutte, Basil	Professor	Ph.D.	1953	Ohio State University	Molecular Structure & Spectra; Atomic Physics	19 (1971)	6
Dale, E. Brock	Professor	Ph.D.	1953	Ohio State University	Semiconductors; Ion-implantation	11 (1970)	8
Dragsdorf, R. Dean	Professor	Ph.D.	1948	Massachusetts Institute of Technology	X-Ray Diffraction and Scattering	27 (1970)	8
Eck, John S.	Assistant Professor	Ph.D.	1967	Johns Hopkins University	Nuclear Physics, Heavy Ion Interactions	17 (1971)	7
Ellsworth, Louis D.	Professor	Ph.D.	1941	Ohio State University	Nuclear Physics and Instrumentation Astrophysics	15 (1970)	1
Evans, John C.	Assistant Professor	Ph.D.	1966	University of Michigan	Astrophysics	2 (1971)	10
Folland, Nathan O.	Assistant Professor	Ph.D.	1965	Iowa State University	Theoretical Solid State Physics	6 (1971)	6

Table I cont.

NAME	RANK	HIGHEST DEGREE	YEAR	INSTITUTION	SPECIALTY	PUBLICATIONS[a] (To Date)	PRESENTATIONS[b] (To Date)
Hathaway, Charles E.	Head, Associate Prof.	Ph.D.	1965	University of Oklahoma	Solid State Physics, Chemical Physics, Light Scattering Studies	12 (1971)	14
Jack, Hulan E.	Assistant Professor	Ph.D.	1961	New York University	Solid State Physics	2 (1970)	2
Leachman, R. B.	Professor	Ph.D.	1950	Iowa State University	Nuclear and Atomic Physics	28 (1968)	26
Lee, Ronald	Assistant Professor	Ph.D.	1967	Iowa State University	Solid State Physics, Radiation Effects in Insulators, Electrical and magnetic properties of thin films	4 (1971)	7
Legg, James C.	Associate Professor	Ph.D.	1962	Princeton University	Nuclear Physics	17 (1971)	26
Macdonald, J. R.	Associate Professor	Ph.D.	1966	McMaster University	Atomic Physics and Solid State Physics	13 (1971)	8
Manney, Thomas R.	Associate Professor	Ph.D.	1964	University of California	Biophysics, Radiation Phys.	19 (1970)	4
Rosenkilde, Carl	Assistant Professor	Ph.D.	1966	University of Chicago	Mathematical Physics	6 (1969)	-
Seaman, Gregory G.	Associate Professor	Ph.D.	1965	Yale University	Nuclear Physics	15 (1971)	27
Shore, Bruce	Associate Professor	Ph.D.	1960	M.I.T.	Theoretical, Astrophysics, Atomic Physics, Nuclear Physics	16 (1971)	5
Spangler, John D.	Associate Professor	Ph.D.	1961	Duke University	Molecular Spectroscopy	6 (1971)	8
Tumolillo, Thomas	Assistant Professor	Ph.D.	1969	University of Illinois	Mössbauer Spectroscopy	5 (1971)	

Table I cont.

NAME	RANK	HIGHEST DEGREE	YEAR	INSTITUTION	SPECIALTY	PUBLICATIONS[a] (To Date)	PRESENTATIONS[b] (To Date)
Weaver, O. Larry	Assistant Professor	Ph.D.	1970	Duke University	Theoretical Nuclear Physics	4 (1970)	2
Williams, Dudley	Regents' Professor	Ph.D.	1936	University of North Carolina	Infrared Studies, Mass Spectroscopy, Nuclear Physics	136 (1971)	110
Zollman, Dean	Assistant Professor	Ph.D.	1970	University of Maryland	Theoretical Nuclear Physics	5 (1971)	4

[a] Year in parenthesis indicates most recent publication

[b] Oral presentations given at meetings; does not include colloquia talks. These data are strictly estimates.

TABLE IV. PHYSICS SERVICE COURSE ENROLLMENT

Courses	1964-65		1965-66		1966-67		1967-68		1968-69		1969-70		1970-71		1971-72
	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F
1. Man's Physical World I	404	246	499	244	557	279	540	274	510	422	575	447	731	491	901
2. Man's Physical World II	64	161	60	150	58	206	57	189	120	328	126	313	245	388	199
3. Descriptive Physics	102	78	118	87	93	99	93	89	65	70	58	52	52	50	64
4. Physics for Musicians	-	-	24	-	-	27	-	-	-	34	-	38	-	25	-
5. Descriptive Astronomy	37	31	35	-	39	-	52	-	47	-	55	-	116	99	134
6. Descriptive Meterology	22	-	23	-	-	52	-	54	-	37	-	82	-	87	-
7. General Physics I	193	105	177	138	220	124	236	148	307	153	370	170	324	149	413
8. General Physics II	77	131	60	124	83	169	93	170	94	227	86	300	109	245	88
9. Engineering Physics I	205	127	212	124	242	129	225	115	235	120	205	84	195	77	186
10. Engineering Physics II	86	148	66	180	97	177	85	157	71	181	58	160	65	144	60
11. Atomic Physics	-	58	52	33	39	40	40	22	19	19	28	8	15	14	18

TABLE V. Service Course Description and Dominant Clientele

COURSE	Description	Dominant Clientele
101. Man's Physical World I 102. Man's Physical World II 103. Man's Physical World ILab 104. Man's Physical World IILab	An introduction to the physical sciences with emphasis on awakening in the non-science student an interest and curiosity in the nature of the physical world. This course should provide him with a familiarity with some of the current ideas and concepts. Such familiarity with physical concepts should enable him to be a more effective citizen in today's rapidly changing technological society.	M.P.W.I: Freshman,Sophomore, Transfer Students; Liberal Arts, Non-Physical Science Majors. M.P.W.II: Not open to Seniors; Same clientele as M.P.W.I
112. Descriptive Physics	A one semester survey of physics using high school algebra with an emphasis on acquainting the student with an analytical view of physical phenomena. Examples are drawn from relevant situations, germane to the students' interest, whenever possible.	Freshman through Senior; Medical Technicians, Physical Therapist, Wildlife, Biology, Agriculture, Home Economics, et al.
126. Physics for Musicians	A one semester course with emphasis on teaching physical aspects of music.	Music, Music Education
131. Descriptive Astronomy	A one semester survey of the field of astronomy with an emphasis on acquainting the student with what is known about the universe and with current concepts and theories.	Primarily non-science majors but attracts a wide range of students
135. Descriptive Meteorology	A one semester survey of known meteorological phenomena with current explanations of these phenomena.	Primarily non-science majors but attracts a wide range of students
211. General Physics I 212. General Physics II	A two semester course in physics principles with emphasis on developing in the student an analytical approach to physical phenomena. The content is designed for students in pre-professional programs. Topics of current interest are discussed and analyzed.	Sophomores through Seniors; Life Science, Pre-veterinary, Pre- Medicine, Pre-dentistry, Pre-pharmacy,Architecture, et al
310. Engineering Physics I 311. Engineering Physics II	An analytical introduction to the principles of physics requiring calculus. Problem solving involving applications of these principles is used to develop student ability and confidence.	Sophomores primarily; Engineering, Physics, Chemistry and Mathematics

TABLE V. Service Course Description and Dominant Clientele

COURSE	Description	Dominant Clientele
101. Man's Physical World I 102. Man's Physical World II 103. Man's Physical World ILab 104. Man's Physical World IILab	An introduction to the physical sciences with emphasis on awakening in the non-science student an interest and curiosity in the nature of the physical world. This course should provide him with a familiarity with some of the current ideas and concepts. Such familiarity with physical concepts should enable him to be a more effective citizen in today's rapidly changing technological society.	M.P.W.I: Freshman,Sophomore, Transfer Students; Liberal Arts, Non-Physical Science Majors. M.P.W.II: Not open to Seniors; Same clientele as M.P.W.I
112. Descriptive Physics	A one semester survey of physics using high school algebra with an emphasis on acquainting the student with an analytical view of physical phenomena. Examples are drawn from relevant situations, germane to the students' interest, whenever possible.	Freshman through Senior; Medical Technicians, Physical Therapist, Wildlife, Biology, Agriculture, Home Economics, et al.
126. Physics for Musicians	A one semester course with emphasis on teaching physical aspects of music.	Music, Music Education
131. Descriptive Astronomy	A one semester survey of the field of astronomy with an emphasis on acquainting the student with what is known about the universe and with current concepts and theories.	Primarily non-science majors but attracts a wide range of students
135. Descriptive Meteorology	A one semester survey of known meteorological phenomena with current explanations of these phenomena.	Primarily non-science majors but attracts a wide range of students
211. General Physics I 212. General Physics II	A two semester course in physics principles with emphasis on developing in the student an analytical approach to physical phenomena. The content is designed for students in pre-professional programs. Topics of current interest are discussed and analyzed.	Sophomores through Seniors; Life Science, Pre-veterinary, Pre- Medicine, Pre-dentistry, Pre-pharmacy,Architecture, et al
310. Engineering Physics I 311. Engineering Physics II	An analytical introduction to the principles of physics requiring calculus. Problem solving involving applications of these principles is used to develop student ability and confidence.	Sophomores primarily; Engineering, Physics, Chemistry and Mathematics

TABLE V: Service Course Description and Dominant Clientele (continued)

COURSE	DESCRIPTION	Dominant Clientele
400. Atomic Physics	A one semester elementary, logical development of the physical phenomena associated with the science and technology of the twentieth century.	Engineering, Physics, Mathematics

TABLE VI

GRADE DISTRIBUTIONS IN PHYSICS SERVICE COURSES

Course No. and Descriptive Title	Credit	Fall 1966-1967 No. Enrolled	A	B	C	D	F	WD	INC	CR	Spring 1966-1967 No. Enrolled	A	B	C	D	F	WD	INC	CR
Physics 101 Man's Physical World I	3	~~544~~ 519	55	181	204	50	20	5	4	-	280	33	81	98	41	8	7	1	-
Physics 103 Man's Physical World I Lab	1	Graded with P. W. Lecture										Graded with P. W. Lecture							
Physics 102 Man's Physical World II	3	58	5	21	30	-	2	-	-	-	206	17	67	101	6	6	5	-	-
Physics 104 Man's Physical World II Lab	1	Graded with P. W. II Lecture										Graded with P. W. II Lecture							
Physics 112 Descriptive Physics	4	93 ~~105~~	11	13	39	10	15	4	1	-	100	7	23	22	21	16	1	-	-
Physics 211 General Physics I	4	206 ~~214~~	39	39	66	32	24	3	3	-	124	15	25	41	15	26	-	-	-
Physics 212 General Physics II	4	77 ~~80~~	8	23	25	14	6	1	-	-	167	20	56	50	15	14	8	4	-
Physics 310 Engineering Phys.I	5	208 ~~236~~	20	41	76	22	22	5	2	-	128	12	23	36	26	23	3	-	-
Physics 311 Engineering Phys.II	5	93 ~~96~~	8	16	27	16	25	1	-	-	177	34	51	43	25	20	2	2	-
Physics 131 Descriptive Astronomy	3	39	5	17	17	-	-	-	-	-									

Table VI continued

GRADE DISTRIBUTIONS IN PHYSICS SERVICE COURSES

Course No. and Descriptive Title	Hours Credit	Fall 1967-1968 No. Enrolled	A	B	C	D	F	WD	INC	CR	Spring 1967-1968 No. Enrolled	A	B	C	D	F	WD	INC	Cr
Physics 101 Man's Physical World I	3	531	56	115	239	45	7	2	4	1	311	46	43	165	23	27	7	-	-
Physics 103 Man's Physical World I Lab	1		Graded with P. W. I Lecture								290	46	76	100	12	19	27	-	-
Physics 102 Man's Physical World II	3	116	14	36	53	8	1	2	2	-	189	18	52	74	28	5	4	-	8
Physics 104 Man's Physical World II Lab	1		Graded with Lecture of P. W. II								165	25	88	29	8	7	2	-	6
Physics 112 Descriptive Physics	4	84	8	24	31	12	7	2	-	-	87	9	24	30	13	9	2	-	-
Physics 211 General Physics I	4	235	25	55	50	31	34	13	3	-	150	13	35	40	24	19	14	1	4
Physics 212 General Physics II	4	93	8	15	35	21	11	3	-	-	170	7	40	59	44	15	2	1	2
Physics 310 Engineering Phys.I	5	211	16	38	60	27	50	16	3	-	116	13	16	26	23	20	13	-	-
Physics 311 Engineering Phys.II	5	92	10	21	21	21	12	7	-	-	155	17	53	39	19	22	5	-	-
Physics 131 Descriptive Astronomy	3	56	11	26	16	1	1	1	-	-									

Table VI continued

GRADE DISTRIBUTIONS IN PHYSICS SERVICE COURSES

Course No. and Descriptive Title	Hours Credit	Fall 1968-1969 No. Enrolled	A	B	C	D	F	WD	INC	CR	Spring 1968-1969 No. Enrolled	A	B	C	D	F	WD	INC	CR
Physics 101 Man's Physical World I	3	503	55	151	163	56	6	2	-	40	404	18	129	210	13	13	2	-	3
Physics 103 Man's Physical World I Lab	1	436	62	105	170	46	-	7	-	7	285	43	70	95	12	-	25	-	-
Physics 102 Man's Physical World II	3	60	10	16	21	6	1	3	-	-	321	42	71	137	31	18	5	-	17
Physics 104 Man's Physical World II Lab	1	60	10	16	23	6	1	3	-	-	165	25	88	29	6	7	2	-	6
Physics 112 Descriptive Physics	4	66	9	23	23	5	-	2	-	-	61	6	30	16	3	4	2	-	-
Physics 211 General Physics I	4	302	31	84	62	58	19	10	1	3	144	18	32	37	28	8	15	2	4
Physics 212 General Physics II	4	94	20	30	18	5	9	7	-	3	206	28	28	109	26	11	3	1	-
Physics 310 Engineering Phys.I	5	233	18	54	35	31	31	11	-	-	61	10	8	14	14	10	5	-	-
Physics 311 Engineering Phys.II	5	69	5	15	19	8	7	11	-	-	168	23	54	55	32	6	1	1	-
Physics 131 Descriptive Astronomy	3	47	12	22	5	2	-	1	1	4									

Table VI continued

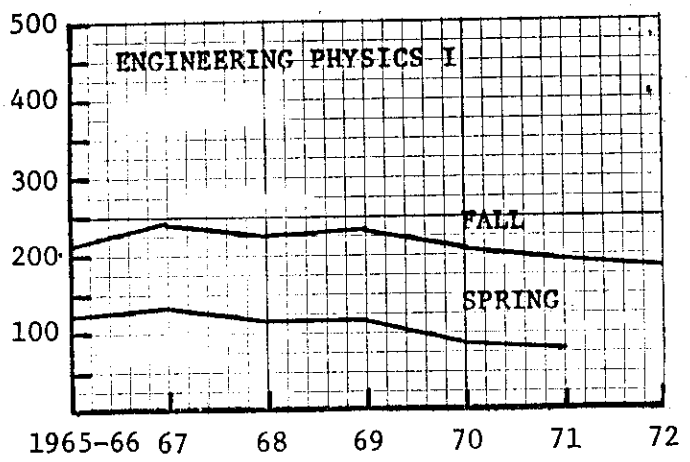
GRADE DISTRIBUTIONS IN PHYSICS SERVICE COURSES

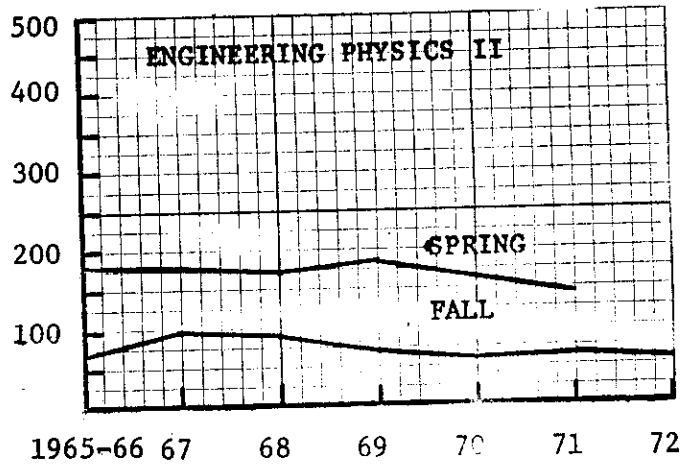
Course No. and Descriptive Title	Hours Credit	Fall 1969-1970 No. Enrolled	A	B	C	D	F	WD	INC	CR	Spring 1969-1970 No. Enrolled	A	B	C	D	F	WD	INC	Cr
Physics 101 Man's Physical World I	3	555	46	106	235	81	37	2	10	38	430	40	89	45	71	15	12	2	56
Physics 103 Man's Physical World I Lab	1	422	77	108	155	39	8	11	5	19	286	62	83	91	12	-	9	9	18
Physics 102 Man's Physical World II	3	122	17	24	41	28	5	3	-	6	299	41	72	107	9	7	5	1	57
Physics 104 Man's Physical World II Lab	1	57	11	27	9	3	1	2	-	4	148	59	48	12	4	3	5	5	12
Physics 112 Descriptive Physics	4	55	14	19	12	10	-	-	-	-	50	7	13	20	6	1	2	-	1
Physics 211 General Physics I	4	369	27	114	93	92	18	10	10	-	166	13	42	73	20	5	9	1	2
Physics 212 General Physics II	4	200	17	47	63	41	7	21	4	-	285	15	67	50	77	27	19	6	7
Physics 310 Engineering Phys.I	5	202	17	47	64	41	8	21	4	-	80	15	18	23	8	7	6	3	-
Physics 311 Engineering Phys.II	5	57	7	11	25	9	3	2	-	-	154	21	59	47	19	6	5	1	-
Physics 131 Descriptive Astronomy	3	68	10	18	16	3	4	2	-	15									

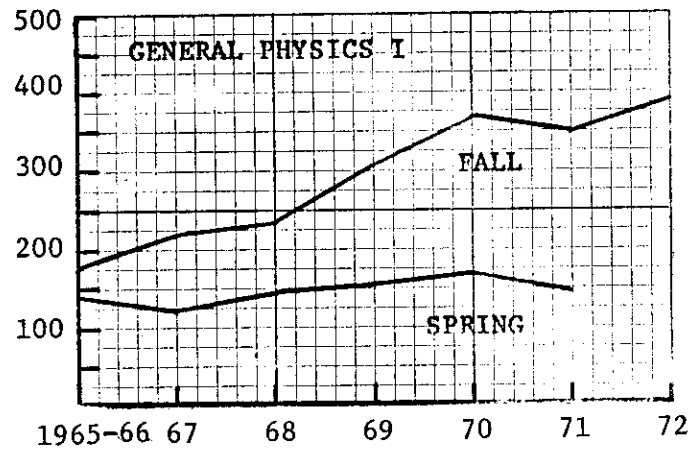
Table VI continued

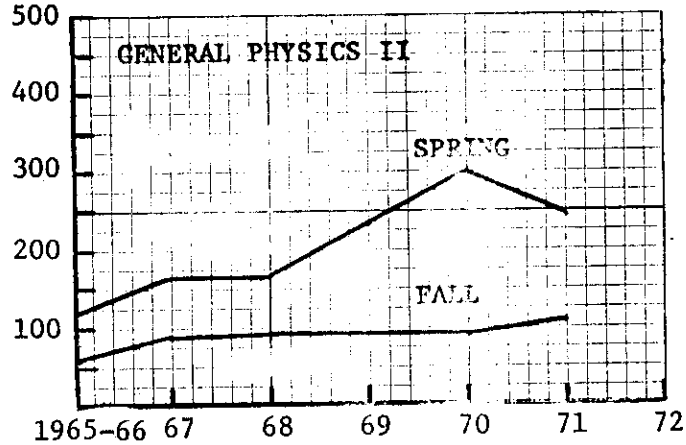
GRADE DISTRIBUTIONS IN PHYSICS SERVICE COURSES

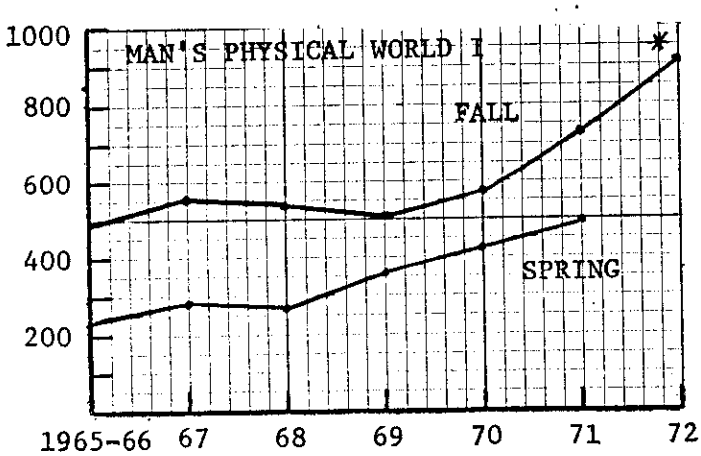
Course No. and Descriptive Title	Hours Credit	Fall 1970-1971 No. Enrolled	A	B	C	D	F	WD	INC	CR	Spring ~~Summer~~ 1970-1971 No. Enrolled	A	B	C	D	F	WD	INC	CR
Physics 101 Man's Physical World I	3	581	70	173	175	48	32	-	7	154	467	30	146	96	40	29	24	7	95
Physics 103 Man's Physical World I Lab	1	485	116	158	164	12	-	16	2	17	260	55	98	55	10	13	28	-	1
Physics 102 Man's Physical World II	3	237	31	42	58	26	8	17	-	53	362	47	88	87	31	9	6	3	91
Physics 104 Man's Physical World II Lab	1	73	15	23	14	2	1	1	4	14	153	30	56	48	2	7	7	3	-
Physics 112 Descriptive Physics	4	49	6	10	15	6	4	-	-	6	48	7	12	17	6	3	3	-	-
Physics 211 General Physics I	4	309	21	82	92	56	20	17	11	10	148	9	24	57	15	7	12	6	7
Physics 212 General Physics II	4	105	12	23	52	14	2	1	1	1	243	24	72	50	54	8	12	10	6
Physics 310 Engineering Phys.I	5	179	19	60	53	24	13	18	2	-	74	7	11	16	5	6	4	-	-
Physics 311 Engineering Phys.II	5	65	10	16	14	15	4	3	-	-	137	26	54	42	13	4	3	1	-
Physics 131 Descriptive Astronomy	3	121	15	22	24	2	3	4	1	44	95	19	16	17	7	3	3	-	26











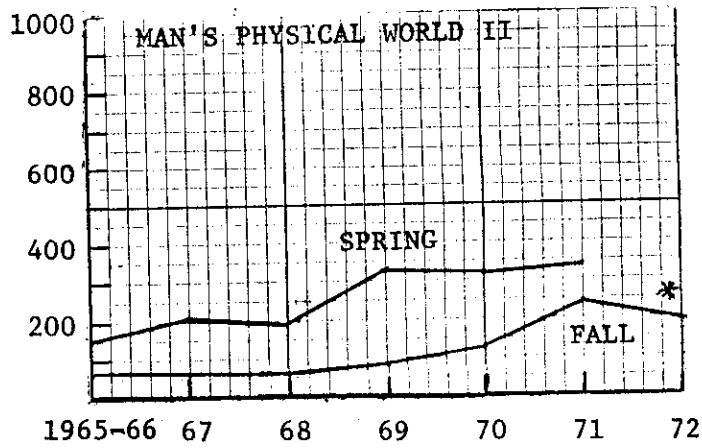
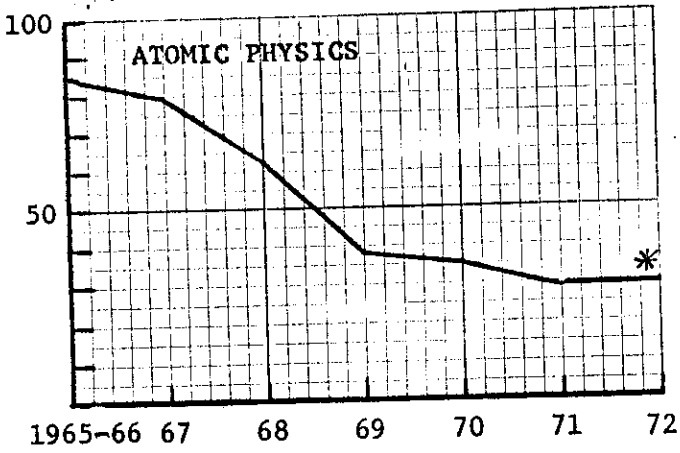
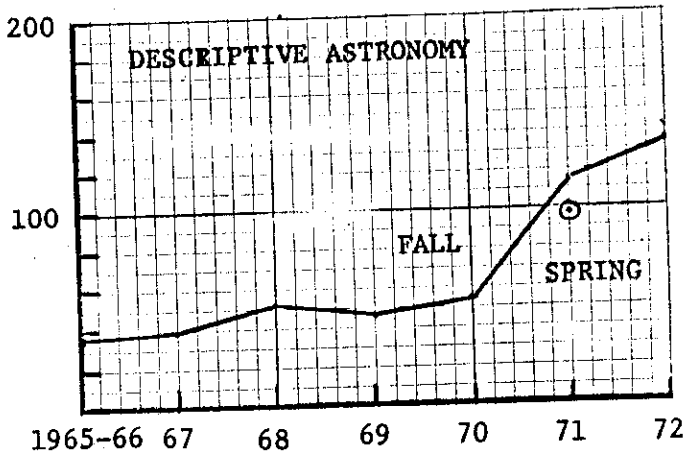
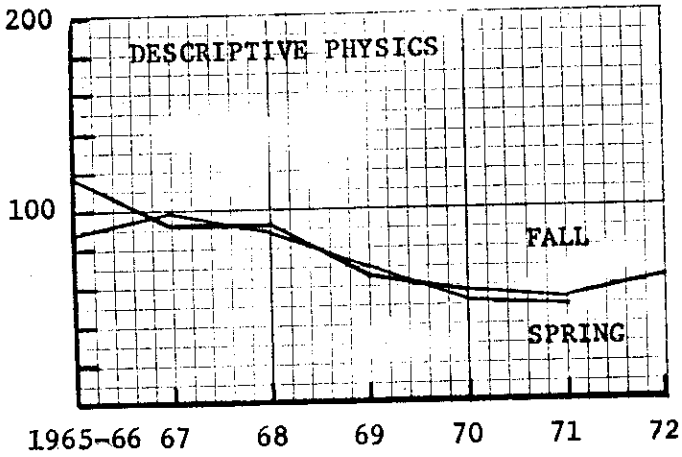


Fig. 1 . Student enrollment in Physics service courses in the period 1965-66 through 1971-72. The ordinate indicates number of students enrolled and the abscissa indicates the academic period. These data do not include summer enrollments.







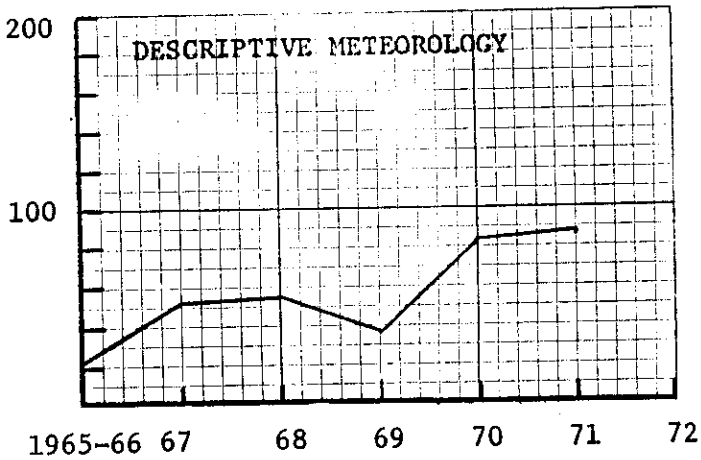


Fig. 2 . Student enrollment in Physics service courses in the period 1965-66 through 1971-72. The ordinate indicates number of students enrolled and the abscissa indicates the academic period. These data do not include summer enrollments.

some cases, the percentage increases in the enrollment in physics courses have run far ahead of the percentage increase in the total University enrollment. Unfortunately the number of physics faculty has not increased at this rate. The enrollment in the Department service courses for the period of 1965 - 66 through 1970 - 71 are indicated in Table IV and Figures 1 and 2.

It is worth noting the percentage increase in enrollment in Man's Physical World I, as gaged by the fall semester figures, is twice that of the percentage increase in total University enrollment in the period from Fall 1965 through Fall 1971, and four times the increase in University enrollment in the period Fall 1968 through Fall 1971. This is even more noteworthy since the College of Arts and Sciences until 1968 - 69 required a student to take eight hours credit in the physical sciences. Since 1968 - 69, a student is required only to take four courses in the Natural Sciences, including one laboratory course and one course above the introductory course. This increase in the enrollment in Man's Physical World is significant since the Department has given this course considerable attention in recent years. It is with this course that the Department hopes to impart to the students a familiarity with some of the current ideas and concepts of the scientific community. This familiarity should enable him to better understand the world and to be a more effective citizen in today's rapidly changing technological society.

The courses in Descriptive Astronomy and Descriptive Meteorology have likewise grown in enrollments more rapidly than the University. The Astronomy enrollment has increased by a factor of six and the Meteorology by a factor of two in the last two years.

The decrease in Descriptive Physics enrollment reflects the change in curriculum of pre-veterinary medicine from a requirement of Descriptive Physics

to a requirement of General Physics. The total enrollment in General Physics I and II has increased by 63 percent in the period from 1965 - 66 through 1970 - 1971. This more than accounts for the decreases in Descriptive Physics and again exceeds the growth rate of the University.

Atomic Physics and Engineering Physics both strongly reflect the enrollment in the College of Engineering. The sudden decrease in enrollment in Atomic Physics was caused by the establishment of a similar course in Nuclear Engineering.

The faculty review the educational program regularly. Two standing faculty committees, the Curriculum Committee and the Graduate Student Affairs Committee, consider the present programs and all modification on a continuing basis. Changes in the educational programs are made only after full faculty consideration and formal voting. The Curriculum Committee includes a graduate student and an undergraduate student as voting members. This committee considers and drafts all changes in both the undergraduate and graduate curriculum. Recommendations of this committee are then brought before the full faculty before changes are adopted or departmental recommendations are passed on to the Curriculum Committee of the College of Arts and Sciences.

The Graduate Student Affairs Committee has a graduate student as a full voting member. This committee reviews the graduate program on a continuing basis and makes recommendations for any changes. The scope of this committee goes beyond simple course considerations and involves consideration of all examinations for both the masters and doctorate degrees. Again, as in the case with the Curriculum Committee, the Graduate Student Affairs Committee makes recommendations to the full Graduate Faculty.

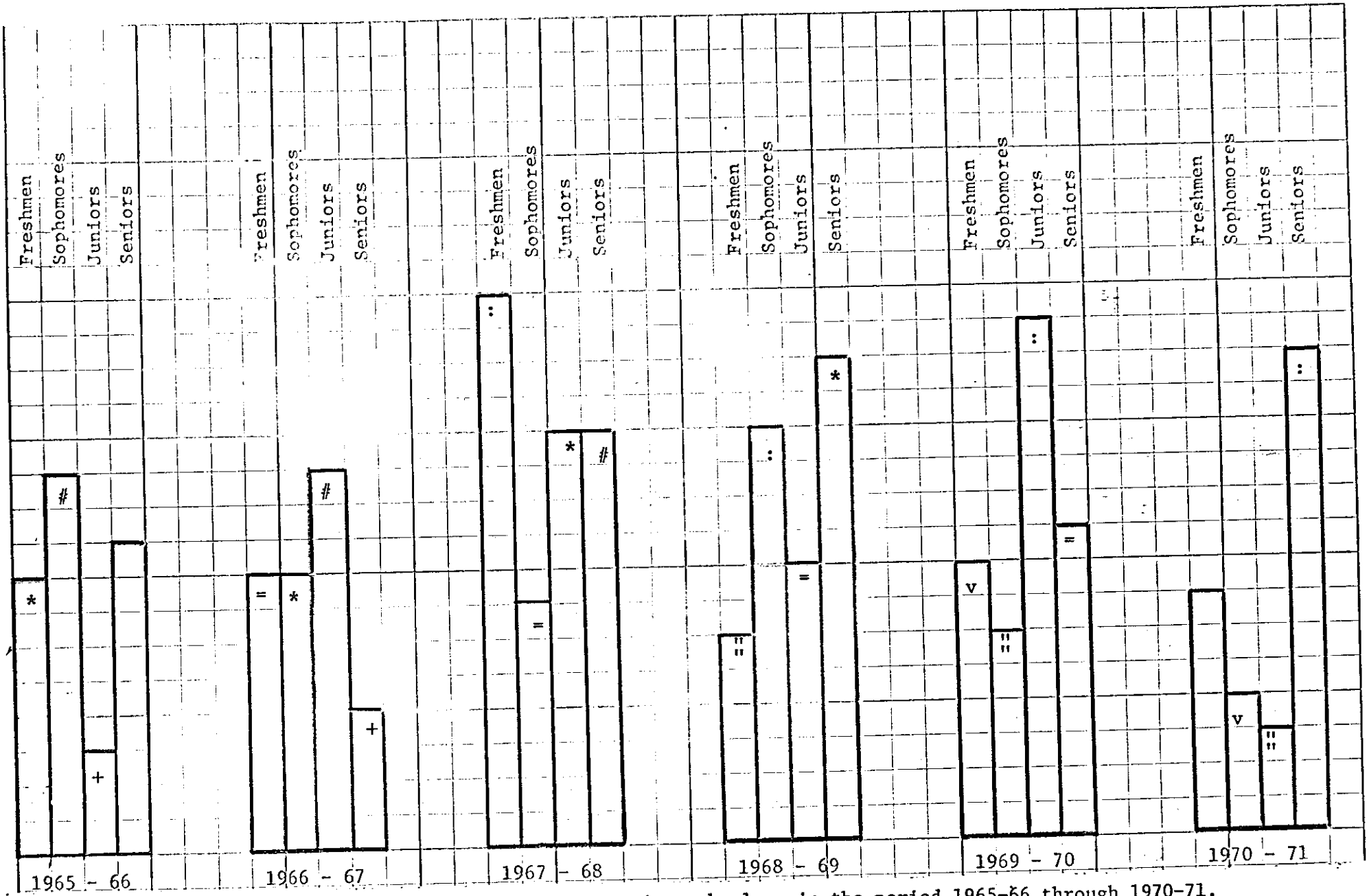


Fig. 8 Bar graph showing the number of physics majors in each class in the period 1965-66 through 1970-71. Each square represents one student.

graduated in spring 1971 are accurate.

A detailed study of the attrition of this class has been accomplished. It was possible, with the aid of the Office of the Registrar, to assemble a rather complete set of data for this class. Eight out of thirteen of the students who declared physics as a major in fall 1967 graduated with a B. S. degree in spring 1971 or will graduate in January 1972. There will be nine students eventually from the freshman class of 1967 with a B. S. degree in physics by Spring 1972. Four students from this group either changed majors or withdrew from the University. A summary of this study including transfer students from other colleges is shown in Table VII.

Figure 9 shows the accumulative grade point averages for the various classes in the period 1965-66 through 1970-71. All classes have been defined by the graduating seniors except for those students in the detailed study of the 1967-1971 period. Table VIII indicates this same data numerically. No striking trends are noted except that physics majors as a class always maintain better than a B average.

Table IX indicates the mean credit hours earned class by class at the end of each academic year. The average physics major accumulates more hours than necessary each semester and graduates with ten more hours than required.

Table X presents the statistics and information when available for all graduating classes from 1966 through 1971. Thirty-nine out of fifty students graduating with physics degrees have gone on to graduate schools; seven have received the doctorate degree.

The draft has had a considerable influence on all students and this is reflected in these data. Eighteen of these students have served or are presently serving in the armed forces. Fortunately, a number of them have attended graduate

TABLE VII: A Detailed Study of Physics Majors Listed as a Freshman Fall 1967 or as a Senior Spring 1971

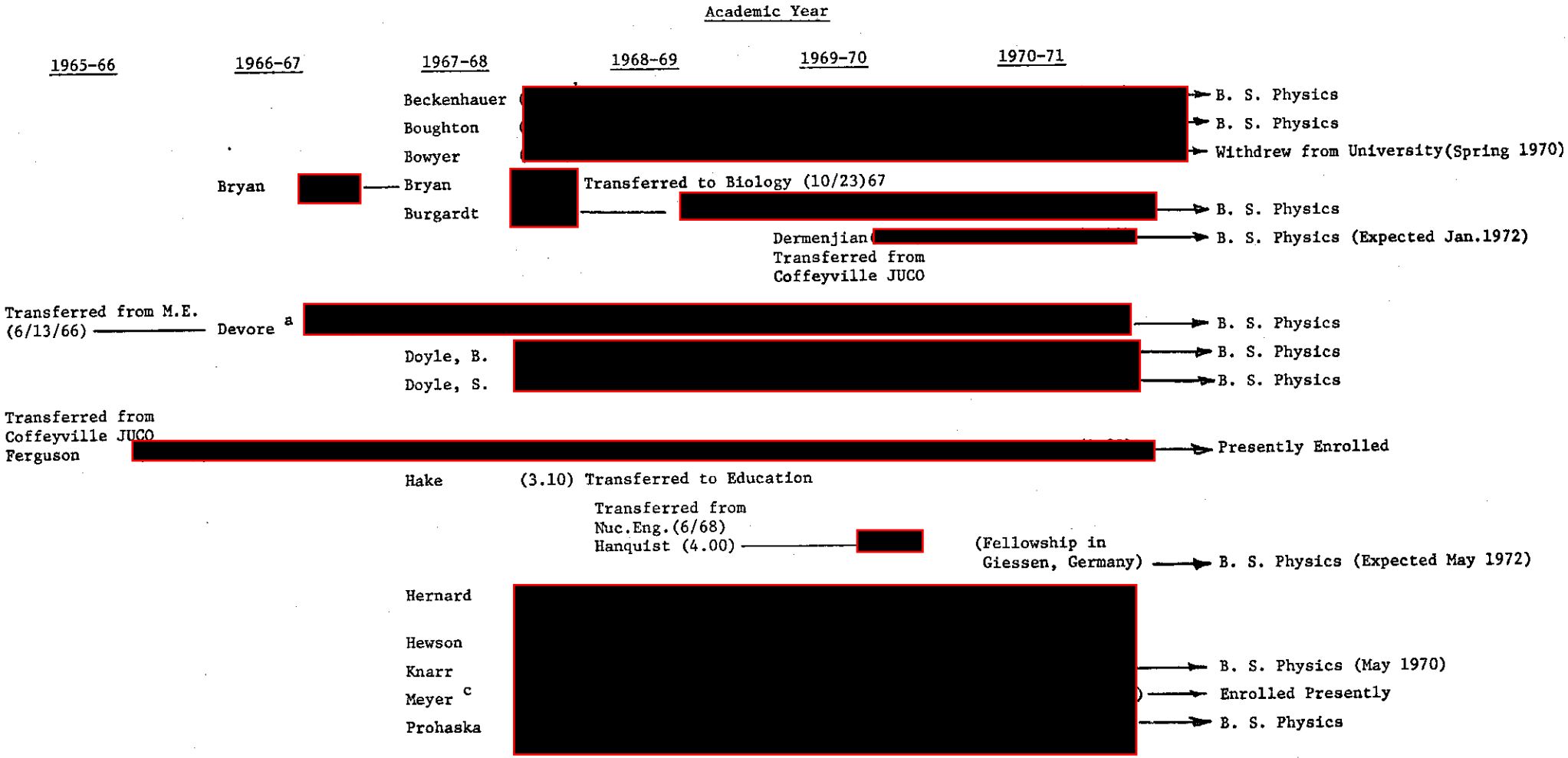


TABLE IX: A Detailed Study of Physics Majors Listed as a Freshman Fall 1967 or as a Senior Spring 1971 (continued)

Academic Year

	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71
[redacted]					Transferred from Carleton/St.Olaf	B. S. Physics
[redacted]					St. John	B. S. Physics
[redacted]			Read			B. S. Physics
[redacted]			Ruberson			Withdrew from University
Smith	(2.59)					
[redacted]			Thomas	(3.44) Transferred to Business Administration (9/9/68)		
[redacted]			Transferred fr			B. S. Physics
[redacted]			Trotter			B. S. Physics

[a] Matriculated (9/63)

[b] Resident Cummulated G.P.A.

[c] Working on joint degree in Physics and Business Administration.
Has finished requirements for Physics degree.

TABLE X. STATISTICS AND INFORMATION ON STUDENTS EARNING THE B.S. DEGREE IN PHYSICS DURING THE PERIOD 1966-1971.

Name	G.P.A.	Position After Graduating	Additional Information
1966			
1. R. T. Curry	[redacted]	Graduate School, Kansas State Univ. Mathematics, M.S. (1970)	
2. J. L. Gray #+		Graduate School, State Univ. of New York at Stony Brook	
3. B. L. Hale #+		Graduate School, Kansas State Univ., Master of Physical Science (1968)	Presently on the staff of Colb Community Junior College
4. R. M. Hunt		Graduate School, Purdue Univ. at Indianapolis	Granted M.S. Degree; presently employed by Bell Telephone
5. W. J. Plant #+-+		Graduate School, Purdue Univ.	Ph.D. in Physics (1971)
6. W. J. Romig		U.S. Armed Forces	Presently (1971) attending Graduate School of Business, University of Maryland.
7. L. D. Tubbs +		Graduate School, Kansas State University	Ph.D. expected 1972.
8. Warren Wylie		Graduate School, Kansas State Univ., Masters Degree	
9. D. L. Walters #+		Graduate School, Kansas State University, Ph.D. (1971)	Ph.D. in Physics (1971)
	3.22±0.44[a]		
1967			
1. T. W. Hinz #+	[redacted]	Graduate School, Florida State University	M.S. Degree (1970); presently serving in U.S. Navy.
2. J. V. Lambert #+		U.S. Air Force, Graduate School at Air Force School of Technology	M.S. Degree (1969); Career Officer.
3. J. E. Norberg		Graduate School at Kansas State Univ. M.S. Degree (1969)	Presently in U.S. Air Force
4. D. R. Alexander #++		Graduate School, University of Indiana	Ph.D. in Astronomy (1971), presently on staff of Univ. of Wichita.
	3.31±0.50[a]		

TABLE X cont.

Name	G.P.A.	Position After Graduating	Additional Information
1968			
1. J. H. Brand#++	[redacted]	Graduate School, Kansas State Univ., M.S. Degree (1970)	Presently working toward Ph.D. in Physics.
2. R. J. Brockman+		U.S. Armed Forces (1968-71)	Presently in graduate school at Kansas State University
3. W. D. Crank+		Naval Weapons Laboratory, Maryland	
4. W. J. Dempsey		Graduate School, University of Wisconsin	Left Univ. of Wisconsin to attend Law School.
5. G. J. Garwood		Electrical Engineering, B. S. 1967; Graduate School, Kansas State University	
6. Y. D. Hudson		U.S. Air Force	
7. J. D. Loop#		M.T.S. Telephone Laboratory	
8. T. K. Plant#+		Graduate School, Iowa State University	
9. M. G. Qualls		United States Marine Corps	
10. J. J. Ryan		U.S. Air Force	
11. R. L. Swedenburg		Graduate School, Univ. of Virginia, Applied Mechanics	
12. J. D. Warren		U.S. Air Force, Graduate School, Meteorology, Texas A&M.	
	3.19±0.51[a]		
1969			
1. H. D. Burris	[redacted]	Texas Instruments	Transfer from Kansas Wesleyan
2. R. O. Clifton		Shell Oil Company, Geophysicist	Transfer from Hendrix College
3. W. H. Cox		UNKNOWN	Transfer from Fairbury College Nebraska
4. W. H. Dawes		Graduate School, Electrical Engineering, Kansas State Univ.	
5. J. N. Edwards+		U.S. Air Force	Transfer from Butler County Junior College
6. M. R. Hjelmfeldt#		Graduate School, Purdue Univ. Meteorology	

TABLE X cont.

Name	G.P.A.	Position After Graduating	Additional Information
1969 continued			
7. A. W. Huggins	[redacted]	U.S. Air Force*	
8. D. G. Long		Graduate School, Univ. of Arkansas at Little Rock	Transfer from Sterling Colleg
9. R. D. Lyberger+		Graduate School, Kansas State University	Presently attending Graduate School in Regional Planning, Univ. of Pennslyvannia.
10. M. E. Neff		U.S. Air Force	
11. S. K. Raney+		Graduate School, M.I.T.	Presently in the U.S. Air Force
12. S. A. Smith		General Electric, Syracuse, New York	
13. J. D. Spears+		High School Teaching, Kansas City, Kansas	Returned to Graduate School, Kansas State Univ. in 1970, working on M.S. degree
14. R. A. Wagner+		UNKNOWN	
	3.05±0.47[a]		
1970			
1. K. C. Bates+	[redacted]	Graduate School, University of Illinois	
2. J. R. Chelikowsky++		Graduate School, Univ. of California, Berkeley	
3. K. L. Knarr+		Graduate School, Purdue Univ.	
4. C. A. Perry		U.S. Air Force, Graduate School at Univ. of Oklahoma	
5. S. D. Schurr		U. S. Air Force	
6. L. D. Simmons#+++		Graduate School, Purdue Univ.	
7. M. C. Webb		Medical School, University of Illinois	
8. W. P. Weber		Graduate School, University of Arkansas at Little Rock	
9. R. C. Wichman+		Law School, Georgetown Univ.	
	3.36±0.47[a]		

TABLE X cont.

Name	G.P.A.	Position After Graduating	Additional Information
1971			
1. C. D. Beckenhauer++	[redacted]	U.S. Armed Forces	
2. W. L. Boughton++		Graduate School, University of Illinois	
3. P. Burgardt#++		Graduate School, University of Texas	
4. J. J. Devore		K.S.U. Computer Center	
5. B. L. Doyle++		Graduate School, University of North Carolina	
6. S. D. Doyle		Self-employeed, farming	
7. R. D. Prohaska		U.S. Air Force	
8. M. K. Read		U.S. Air Force, Graduate School, San Jose State College, Meteorology	
9. C. A. Ruberson#		U.S. Air Force, Graduate School Meteorology, Texas A. & M.	B. S. in Physics and Modern Languages
10. D. N. St. John		Grad. School, Computer Sc.,KSU	Transfer from Carleton/St.Olfa
11. W. A. Toepfer		U.S. Air Force	
12. D. M. Trotter++		Graduate School, Iowa State University	
13. D. W. Wood++		Graduate School of Business, Northwestern University	B. S. in Physics and Mathemati
	3.26±0.49[a]		

#Participated in the Honors Program.

+Cum Laude

++Magna Cum Laude

+++Summa Cum Laude

[a]Class Mean G.P.A. and Standard Deviation

Fig. 9. Grade Point Averages by Class from the Class of 1965-66 to 1970-71

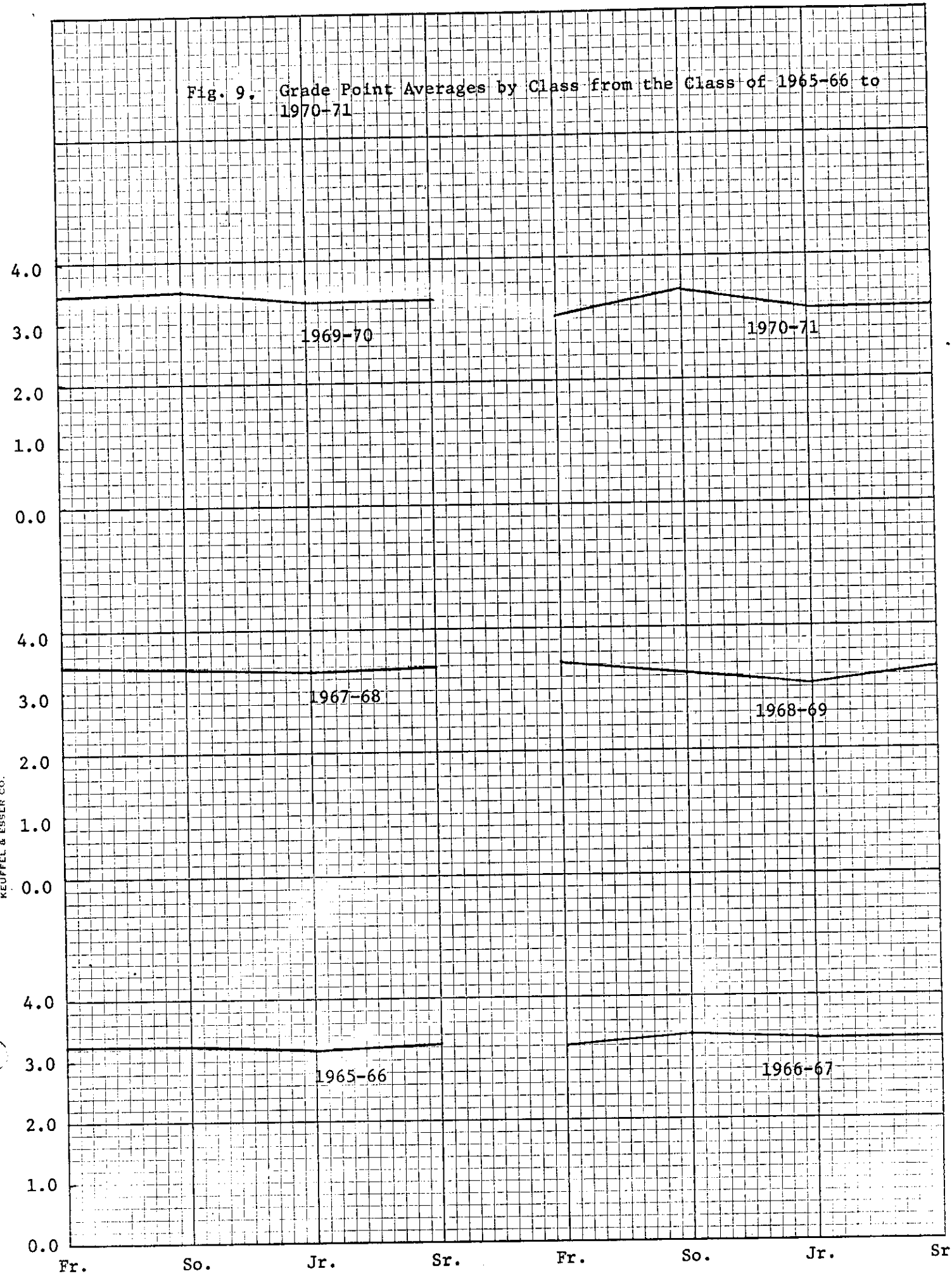


TABLE VIII Grade Point Averages by Class
1965-66 to 1970-71

Class Year	Freshman	Sophomore	Junior	Senior
1965-66	3.25 (6)[a]	3.23 (7)	3.19 (9)	3.22 (9)
66-67	3.20 (3)	3.39 (3)	3.30 (3)	3.31 (4)
67-68	3.45 (9)	3.19 (11)	3.17 (11)	3.19 (12)
68-69	3.42 (8)	3.23 (8)	3.04 (12)	3.34 (14)
69-70	3.43 (8)	3.46 (7)	3.32 (8)	3.36 (9)
70-71	3.06 (16)	3.45 (12)	3.15 (15)	3.17 (14)

[a]The number in parentheses indicates an estimate of the number of students. These numbers are not necessarily accurate except for the 1970-71 class.

TABLE IX

Mean Credit Hours Earned

Class Year	Freshman	Sophomore	Junior	Senior
1971	34±3[a]	65±5	99±5	131±6
1970	35±3	70±4	104±8	132±5
1969	36±3	68±3	104±7	133±16
1968	37±3	68±6	102±5	140±8
1967	43±8	90±17	97±12	145±18
1966	36±3	73±7	101±5	134±4

[a]Mean credit hours earned plus or minus the standard deviation.

school courtesy of the Air Force.

Approximately 50 percent of these students have graduated with honors; 17 cum laude, 10 summa cum laude, and one magna cum laude. Fourteen have participated in the honors program. Two of these students have participated in the exchange program with Justus Liebig in Giessen, Germany.

The undergraduates have a Society of Physics Students Club which provides additional student-faculty contact. This club elects one student to the Curriculum Committee and one student to the Undergraduate Student Affairs Committee. Through these committees the students have a significant voice in the Department.

B. Graduate Student Achievement

The Departmental graduate program is described in the Graduate Study and Research brochure included with this report.

The grade distributions in the physics graduate core with the numbers of students enrolled are indicated in Table XI. The statistiscs concerning graduate student who started the graduate program after fall 1965 are included in Table XII. This table includes attrition data. The number of students formally enrolled in research for credit is summarized in Table XIII.

Table XIV includes a detailed listing of all graduate degrees awarded in the period 1961-71. There have been 38 Ph.D. degrees awarded since 1961. Fifteen of these students entered the academic profession, nine became associated with government research laboratories and ten took industrial positions.

There were 63 Master of Science degrees awarded during this same period. These records speak for the students and the program.

GRADE DISTRIBUTIONS IN PHYSICS GRADUATE CORE COURSES[a]

Academic Years 1966-67 through 1970-71

TABLE XI

Course No. and Descriptive Title	1966-67							1967-68							1968-69						
	Number of Students	A	B	C	D	F	WD	INC	Number of Students	A	B	C	D	F	WD	INC	Number of Students	A	B	C	D	F	WD	INC
Physics 705, Introduction to Theoretical Physics	14	6	4	2			2		16	3	9	3		1			14	11	3					
Physics 825 Advanced Dynamics	8	3	3			1		1	11	2	8	1					4		4					
Physics 865, Quantum Mechanics I	2		2						11	5	4	2					13	3	6	2			2	
Physics 875, Quantum Mechanics II	3	1	2						13	5	4	4					7		3	3				1
Physics 710, Electro dynamics I	10	4	4				1	1	11	3	5	2			1		13	4	7					2
Physics 835, Electro dynamics II									9	2	3	4					5	1	2				2	
Physics 855, Statistical Mechanics	2	1						1	7	2	3					2	7	3	4					

[a]The graduate core courses are required of all students pursuing the Ph.D. in Physics. All graduate students are encouraged to finish these courses within two to three years of starting graduate study.

GRADE DISTRIBUTIONS IN PHYSICS GRADUATE CORE COURSES[a]

Academic Years 1966-67 through 1970-71

TABLE XI
(cont.)

Course No. and Descriptive Title	Number of Students	1969-70							Number of Students	1970-71							Number of Students						
		A	B	C	D	F	WD	INC		A	B	C	D	F	WD	INC		A	B	C	F	WD	INC
Physics 705, Introduction to Theoretical Physics	16	6	7	1			1	1	9	4	3	2											
Physics 825 Advanced Dynamics	11	2	5	3				1	9	3	4	2											
Physics 865, Quantum Mechanics I	13	7	6						6	3	3												
Physics 875, Quantum Mechanics II	14	3	9	2					5	2	2	1											
Physics 710, Electro dynamics I	12	4	5				1	2	6		4	1				1							
Physics 835, Electro dynamics II	11	2	8	1					10	5	3	2											
Physics 855, Statistical Mechanics	9	3	4				1	1	10	5	4	1											

[a]The graduate core courses are required of all students pursuing the Ph.D. in Physics. All graduate students are encouraged to finish these courses within two to three years of starting graduate study.

TABLE XII STATISTICS CONCERNING STUDENTS IN THE GRADUATE PROGRAM IN THE PERIOD 1965-66 to 1971-72

Year	Students Entering Graduate School	Students Graduating[a] with a M.S. Degree	Students Graduating[a] with a Ph.D. Degree	Attrition Information on Students Entering in Year Indicated
1965-66	8	6	1	a. Two students received Ph.D. Degrees [1969, 1970]; one received Ph.D. Degree in Mathematics [1971]. b. Two students received the M.S. as a terminal degree [1967]. c. Three students withdrew because of grades. One entered the armed services. d. None are enrolled presently.
1966-67	15	8	5	a. Five students received Ph.D. degrees [1971 (2), 1970 (2), 1969 (1)]. b. Five students received the M.S. as a terminal degree [1968 (1), 1969 (3), 1970 (2)]. c. One student withdrew because of grades. d. Three students are enrolled presently.
1967-68	9	2	8	a. None have received the Ph.D. degree. b. Four have received the M.S. degree [1969 (3), 1970 (1)] as a terminal degree. c. Two students withdrew because of draft problems; two students withdrew because of grades. d. None of these students are enrolled presently.
1968-69	22	9	6	a. Two students awarded the Ph.D. degree in 1971. b. Four received the M.S. as a terminal degree [1969 (1), 1970 (3)].

Table XII cont.

	Students Entering Graduate School	Students Graduating[a] with a M.S. Degree	Students Graduating[a] with a Ph.D. Degree	Attrition Information on Students Entering in Year Indicated
1968-69 cont.				c. Two students withdrew because of draft problems; three students withdrew because of grades; three students changed graduate schools. d. Six students are enrolled presently.
1969-70	19	9	4	a. None of these students have received the Ph.D. degree. b. Three students have received the M.S. as a terminal degree. c. Five withdrew because of grades; one withdrew because of illness; one student changed majors in graduate school. d. Nine are enrolled presently
1970-71	17	3	3	a. None of these students have received the Ph.D. or M.S. degree. b. Two students withdrew because of grades; one student because of illness; one student changed majors in graduate school. One student decided not to continue in physics. c. Twelve students are enrolled presently.
1971-72	9	-	-	

[a]A degree is counted as awarded by calender year.

TABLE XIII

GRADUATE STUDENTS ENROLLED IN RESEARCH

1966-67	(Fall)	114 Hours	31 Students
1966-67	(Spring)	94	28
1967	(Summer)	123	21
1967-68	(Fall)	158	30
1967-68	(Spring)	176	40
1968	(Summer)	119	24
1968-69	(Fall)	106	23
1968-69	(Spring)	121	30
1969	(Summer)	80	19
1969-70	(Fall)	113	27
1969-70	(Spring)	123	30
1970	(Summer)	150	32
1970-71	(Fall)	124	32
1970-71	(Spring	102	32
1971	(Summer)	121	25

Number of Graduate Students

Listed as Co-authors of Papers

Year	Number of Students
1966	6
1967	3
1968	7
1969	10
1970	20
1971	28

TABLE XIV. A DETAILED LISTING OF ALL GRADUATE DEGREES AWARDED IN THE PERIOD 1961-1971.

The student name, title of thesis, degree awarded, year, present position and major professor are listed whenever possible.

NAME	TITLE OF THESIS (PhD)	DEGREE	YR. GRAD.	WHERE NOW	MAJOR PROF.
FRY, Richard	"Effects of Crystallographic Transformations on the Photoelectric Emission From Uranium"	PhD	1961	Dept. of Physics, Colo. State University	Cardwell
CRAWFORD, John	"Lattice Strain & Domain Structure of Ferroelectric Whiskers"	PhD	1962	Sandia Labs, Alberquerque, New Mexico	Dragsdorf
CHANG, Shih-Chi	"The Investigation of the Crystal Structures of Sodium Hyponitrite & Potassium Nitrite"	PhD	1963	Phys. Sci., Univ. of Pittsburgh	Dragsdorf
JOHNSON, Ralph	"A Study of the Effects of the Cobalt Transformation on the Dislocation Structure of Cobalt Whiskers Using a High Resolution X-Ray Diffraction Technique"	PhD	1963	Air Force Weapons Laboratory, Kirtland, New Mexico	Dragsdorf
SENECAL, Gerard	"The Preparation & Properties of Thin Films of InSb"	PhD	1963	Head, Dept. of Physics, St. Benedicts, Atchison, Ks.	Dale
SWAIN , James	"Wave Functions for One & Two Atom Systems"	PhD	1963	Lawrence Radiation Labs, Livermore, Calif.	Curnutte
BORNEMEIER, Dwight	"Measurement of Some Nuclear Parameters in the Radioactive Decay of Barium 133, Cadium 115 and Platinum 197"	PhD	1964	Research Foundation, Univ. of Michigan	Mandeville
CHRISTY, Donald	"Quantum Theory of the Equilibrium Order Parameters in Disordered Solid Solutions"	PhD	1964	San Diego	Hall
HARLAND, Glenn	"High Resolution X-Ray Study of Dislocations & Domain Structure in Barium Titanate Whiskers"	PhD	1964		Dragsdorf
HOBSON, Arthur	"Application of Methods of Statistical Mechanics to Electrodynamics"	PhD	1964	Dept. of Physics, Univ. of Arkansas, Fayetteville, Ark.	Leaf
PHILHOURS, Joel	"Application of a Generalized Partition Function Method To The Binary Alloy Problem	PhD	1965	Dept. of Physics, Univ. of Kentucky, Lexington, Ken.	Hall
WOOLETT, Edwin	"A Kinetic Equation For A Warm Plasma"	PhD	1965	Dept. of Physics, Calif. State College, Long Beach, Calif.	Leaf
RINARD, Phillip	"Studies of Core-Particle Models of the Nucleus"	PhD	1966	KSTC, Emporia, Ks.	McKinley
BUTTS, Jesse	"Width of Ion & Monopole Tracks in Emulsion & Radiation Damage by Heavy Ions in Enzymes & Viruses"	PhD	1967	Aerospace, Inc., Redlands, Cal.	Katz

NAME	TITLE OF THESIS (PhD)	DEGREE	YR. GRAD.	WHERE NOW	MAJOR PROF.
DRAEGERT, Dave	"The Far-Infrared Spectra of Water & Some Aqueous Solutions"	PhD	1967	Bell Telephone, New Jersey	Williams
DREILING, Mark	"Crystal Structure Information from Measurements of X-Ray Anomalous Transmission"	PhD	1967	Phillips Oil, Bartlesville, Okla	Dragsdorf
LESSOR, Delbert	"Topics In The Theory of Weak Interactions"	PhD	1967	Calif. State, Long Beach, Calif.	McKinley
MAJOR, Schwab	"The Thermal Behavior of Stacking Faults in Graphite Platelets & Silver Films"	PhD	1967	Dept. of Physics, Univ. of Missouri, Kansas City	Dragsdorf
AGIN, Gary	"Measurement of Some Nuclear Parameters In The Radioactive Decay of Ruthenium 103, Osmium 193, Osmium 191 & Samarium 155"	PhD	1968	Michigan Tech. Univ., Houghton, Mich.	Mandeville
CHAI, Anti	"Collision Broadening of Lines in Infrared Rotation-Vibration Bands"	PhD	1968	Michigan Tech. Univ., Houghton, Mich.	Williams
DYBWAD, Gay	"Generation of Light By The Relative Motion of Mercury-Glass Contacts"	PhD	1968	Bell Telephone, Allentown, Pa.	Mandeville
HOOVER, Gary	"The Infrared Absorptance of CO and N_2O at Reduced Temperatures"	PhD	1968	Phillips Petroleum, Bartlesville, Okla.	Williams
HUDSON, Billy	"Experimental Determination of Excitation & Quenching Cross Sections for the Mercury-Thallium System"	PhD	1968	Lawrence Radiation Lab., Livermore, Calif.	Curnutte
TOMLINSON, Gary	"The Molecular Configuration of Liquid Formic Acid & Temperature Spectral Studies of Liquid Formic, Acetic & Propanoic Acids"	PhD	1968	Honeywell, Seattle, Wash.	Curnutte
BRYAN, Jon	"A Normal Coordinate Analysis of the Local Structure of Liquid Water for Interpretation of Far Infrared Spectra"	PhD	1969	Lawrence Radiation Lab., Livermore, Calif.	Curnutte
MEGLI, Darrell	"Measurement of Some Nuclear Parameters In The Radioactive Decay of Cerium 143, Erbrium 171 & Zirconium 97"	PhD	1969	Calif. Laboratories, Los Alamos, New Mexico	Mandeville
RAMSDALE, Dan	"Auger Transition Probabilities with the Relativistic Hartree-Fock-Slater Atomic Model"	PhD	1969	Globe Co., El Paso, Texas	Bhalla
REESE, Gary	"A Model for Electronic Stopping Power of Heavy Ions"	PhD	1969	Textile Mills, Charlotte, N. Carolina	Bhalla

NAME	TITLE OT THESIS (PhD)	DEGREE	YR. GRAD.	WHERE NOW	MAJOR PROF.
ROSNER, Herbert	"Relativistic Calculations of Atomic X-Ray and Auger Transition Rates"	PhD	1969	Huntsville Laboratories, Alabama	Bhalla
QUERRY, Marvin	"The Infrared Reflectance of Liquid Water"	PhD	1969	Dept. of Physics, Univ. of Missouri, Kansas City	Williams
BURTON, Donald	"Internal Conversion Processes for Electric Quadrupole Transitions In The Deformed Nuclear Region"	PhD	1970	Lawrence Radiation Lab., Livermore, Calif.	Bhalla
KILMER, Nelson	"Temperature Effects on the Phosphorescence of Benzene, Toluene, and Pyrazine"	PhD	1970	Hesston Community JUCO, Ks.	Spangler
MWANJE, Jesudas	"X-Ray Diffraction By a Thermally Excited Quartz Crystal"	PhD	1970	Makerere Univ., Kampala, UGANDA	Dragsdorf
TAPPHORN, Ralph	"Lifetime Measurements of Excited States in ^{39}K By the Doppler Shift Attenuation Method"	PhD	1970	Nuclear Effects Lab, Edgewood Arsenal, Maryland	Seaman
GRIFFITH, Gary	"Fission Modes of the 242 AM Fission Isomer"	PhD	1971	Univ. of Florida, Gainesville, Florida	Leachman
TEMPLE, Paul	"The Multiphonon Raman Spectrum of Silicon"	PhD	1971	Dept. of Physics, Northwest Missouri State College, Maryville, Missouri	Hathaway
WALTERS, Don	"Auger & X-Ray Transition Probabilities for the Nonrelativistic Hartree-Fock-Slater Model"	PhD	1971	U.S. Army	Bhalla
RHINE, Paul	"Infrared Reflection of Aqueous Solutions of Strong Electrolytes"	PhD	1971	Union Pacific Railroad, Omaha, Nebraska	Williams

NAME	TITLE OF THESIS (Masters)	DEGREE	YR. GRAD.	WHERE NOW	MAJOR PROF.
KITTERMAN, John	"Structure Analysis of Vacuum Evaporated Thin Carbon Films"	MS	1961	Timken Roller Bearing-Ohio	Dragsdorf
LAWRENCE, John	"The Intermetallic Phases of Titanium-Beryllium"	MS	1961		Dragsdorf
WINDLE, Warren	"Microwave Measurements of the Electric Dipole Moment & Other Dielectric Properties of Some Organic Compounds"	MS	1961	UNKNOWN	Ellsworth
ASCH, Arlyn	"Investigation of the Circular Magnetization Curve For Nickel-Iron Wires Under Torsional & Tensile Stress"	MS	1962	Aeromeutronics, Newport Beach, Calif.	Curnutte
BEHLE, Allen	"The Preparation of Thin Films of InSb on Crystalline Substrates"	MS	1962	UNKNOWN	Dale
McFADDEN, Robert	"A Study of Heavy Nuclear Tracks in G-5 Emulsion Employing Phase Contrast Photomicrography"	MS	1962	Goodyear, Akron, Ohio	Katz
PREVO, Charles	"The Construction & Operation of a Nuclear Magnetic Resonance Probe"	MS	1962	Lawrence Radiation Labs, Liver-	
TOBEY, William	"Stability & Improvement of Hoshino-Yoshida Filters"	MS	1962	Martin-Marietta-Denver, Colo.	McFarland
BUTTS, Jesse	"Track Widths of Heavy Ions & Unit Magnetic Poles in Electron Sensitive Nuclear Emulsion"	MS	1963	Phys. Sci. Dept., University of Pittsburgh	Katz
CLARK, Bunny	"Frequency Spectrum of Elastic Waves in Body Centered Cubic Lattices"	MS	1963	Dept. of Physics, Ohio State University	Curnutte
FOWLER, Duane	"The Use of Semiconductor Devices in Nuclear Spectroscopy"	MS	1963	Dept. of Physics, Northern Michigan University, Marquette, Mich.	Ellsworth
HUEBNER, Dave	"The Preparation & Properties of Near-Stoichiometric Non-Stratified, Thin Films of Indium Antimonide"	MS	1963	Texas Christian University, Ft. Worth, Texas working on PhD	Ellsworth
RHINE, Paul	"Microwave Measurements of the Electric Dipole Moment and Other Dielectric Properties of Nitrobenzene"	MS	1963	Union Pacific Railroad, Omaha, Nebr.	Ellsworth
WONG, Frederick	"Evaporation Kinetics of InSb"	MS	1963	Self-employed Computer Business in Calif.	Dale

NAME	TITLE OF THESIS (Masters)	DEGREE	YR. GRAD.	WHERE NOW	MAJOR PROF.
BAILEY, Bill	"Growth, Dislocation & Extinction of Cobalt Whiskers"	MS	1964		
DAVIS, William	"Theory of Oscillations In a Striated Discharge"	MS	1964	Last known working for PhD at Univ. of Maryland	Curnutte
DRAEGERT, Dave	"Measure of Two Properties of Cascade Gamma-Rays"	MS	1964	Bell Telephone, New Jersey	Ellsworth
REILING, Mark	"New X-Ray Diffraction Topograph Camera"	MS	1964	Phillips Oil, Bartlesville, Okla.	
KAHLER, Roland	"The Wave Nature of Electrons-A Classroom Demonstration"	MS	1964	Shawnee Mission H.S., Kansas City	Curnutte
QUERRY, Marvin	"Monochromatic X-Ray Radiographic Analysis of Calcium in Wheat"	MS	1964	Dept. of Physics, University of Missouri, Kansas City	Katz
CHADWICK, Curt	"Apparatus for Measurement of Electron-Gamma Directional Correlations"	MS	1965	Crother's Memorial, Stanford, Calif.	Ellsworth
GORDON, David	"A Study of the Influence of Water on the Denaturation of Deoxyribose Nucleic Acid"	MS	1965	General Dynamics, Ft. Worth, Tx.	Curnutte
HOLLIS, Ralph	"An Investigation of the Crystal Structure of Sodium Hyponitrite"	MS	1965	Autonetics, Anaheim, Calif.	Dragsdorf
HOOVER, Gary	"The Movement of Interfaces Through Permeable Media"	MS	1965	Phillips Petroleum, Bartlesville, Okla.	Crawford
MARCOTTE, Raymond	"The Fabrication of Semiconductor Detectors"	MS	1965	UNKNOWN	Ellsworth
CALVERT, James	"An Investigation of the Electrical Conductivity of Germanium Whiskers"	MS	1966	KSTC, Emporia, Ks.	Dale
CHAI, Anti	"A Single-Source Technique for Vacuum Deposition of Alloy Films"	MS	1966	Michigan Technological Univ., Houghton, Mich.	Dale
CLARK, Gary	"A Measurement of the Ni^{60} Directional Correlation With A Tunnel Diode Coincidence Circuit"	MS	1966	Lee's Summit, Missouri	Ellsworth
GOLDBERG, Harvey	"The Mass Spectrum of Cosmic Ray Primaries"	MS	1966	KSU, working on PhD	Katz
HART, Gerald	"The AC Field Effect In Germanium Whiskers"	MS	1966	S. Dakota State, working for PhD	Dale
SUBRAMANIAN, Ramaswami	"p-n Hetero Junctions of Indium Antimonide on Electropolished and Chemically Polished Silicon"	MS	1966	R.C.A., New York	Dale

NAME	TITLE OF THESIS (Masters)	DEGREE	YR. GRAD.	WHERE NOW	MAJOR PROF.
AGIN, Gary	"The Determination of Photon Detection Efficiency Parameters For Lithium-Drift Germanium Detectors"	MS	1967	Michigan Tech. Univ., Houghton, Mich.	Mandeville
CHAO, N.C.	"Relative Intensities of Gamma Rays in Beta Decay of W-187"	MS	1967	UNKNOWN	Mandeville
DYBWAD, Gay	"Properties of Glass Volumes Containing Mercury"	MS	1967	Bell Telephone, Allentown, Pa.	Mandeville
KILMER, Nelson	"Near Ultraviolet Spectra of Benzene in Frozen Cyclohexane Solutions"	MS	1967	Hesston Community Jr. College	Spangler
KOBETICH, Ed	"Spatial Distribution of Ionization Energy and Track Width"	MS	1967	Univ. of Nebraska, Lincoln, Nebr working for PhD	Katz
KULKARNI, Ramchandra	"Spatial Distribution of Ionization Energy and Track Width"	MS	1967	Ohio Univ., Athens, Ohio working for PhD	Legg
PALASKA, Ted	"Relative Intensities of Gamma Rays in Ir192 and Ir194 Delay"	MS	1967	UNKNOWN	Mandeville
REESE, Glen	"A Further Investigation of the Crystal Structure of Sodium Hyponitrite"	MS	1967	UNKNOWN	Dragsdorf
HALE, Bernadine	"New High School Physics Courses-Do They Answer the Problems?"	MS	1968	Colby Jr. College, Colby, Ks.	Curnutte
MWANJE, Jesudas	"Anomalous X-Ray Transmission By A Quartz Single Crystal"	MS	1968	Makerere Univ., Kampala, UGANDA	Dragsdorf
CHIAO, Tang	"Numerical Computation of Ionic Charge Distributions & The Analysis of Experimental Equilibrium Distributions"	MS	1969	KSU, working on PhD	Betz
EBERSOLE, Willard	"A Study of Science Achievement in the 7th & 8th Grades of the Halstead Elementary School, Halstead, Ks. 1965-1968	MS	1969	Jr. High Science Teacher in Louisiana	Curnutte
HILL, Thomas	"Analysis of Moisture Content & Heat Damage of Wheat Using Physical Techniques"	MS	1969	Last known in the Marine Corps in Sunter, South Carolina	Crawford
JOHNSTON, Harvey	"Temperature Dependence of Raman Spectrum of Sodium Chlorate"	MS	1969	General Electric, Syracuse, N.Y.	Hathaway
KRUSE, David	"Methods of Teaching Angular Momentum"	MS	1969	St. John's College, Winfield, Ks	Curnutte
NORBERG, John	"Sputtering Measurements of the Critical Angle of Channeling"	MS	1969	Ralston, Nebr.	Bradford
O'CONNOR, William	"Anomalous X-Ray Diffraction Through Calcite"	MS	1969	Connecticut Mutual Life Ins. Co. Manhattan. Ks.	Dragsdorf

NAME	TITLE OF THESIS (Masters)	DEGREE	YR. GRAD.	WHERE NOW	MAJOR PROF.
SCHMIEDER, David	"Foreign Gas Broadening of Lines in the Wings of the CO Fundamental"	MS	1969	An Electronics Firm in Cuby City, Wisc.	Williams
TESTERMAN, Larry	"Classical Calculations of Differential Scattering Cross Sections for Various Screened Potentials"	MS	1969	KSU working for PhD	Bhalla
BANDEKAR, Jesuda	"The Intermolecular Vibrations of the Water Molecule In The Liquid State"	MS	1970	KSU working for PhD	Curnutte
CHENOWETH, William	"Thermoluminescence"	MS	1970	Dept. of Physics, Phillips Univ., Enid, Okla.	Curnutte
DREILING, Leslie	"The Influence of Magnetic Fields On The Analysis of Sunspot Structure"	MS	1970	Applied Physics Lab., Johns Hopkins Univ., Silver Springs, Md.	Macdonald
MACDONALD, Dennis	"Characteristics of a Velocity Selector Used With a Tandem Van de Graaff Accelerator	MS	1970	Naval Research Lab, Maryland	Seaman
NAIR, Indira	"Scattering of Electromagnetic Radiation by Defects in Crystals"	MS	1970	Northwestern Univ., Evanston, Ill working for PhD	Hathaway
NICHOLS, Charles	"The Effects of a Magnetic Field on Abundance Determinations In Stellar Atmospheres"	MS	1970	Naval Underwater Research Lab., San Diego, Calif.	Evans
SCHNEIDER, J. David	"Boron & Phosphorus Implantation in Silicon"	MS	1970	Applied Physics Lab., Johns Hopkins Univ., Silver Springs, Md	Macdonald
WITTICK, Thomas	"A Study of the Spin of the 5th & 6th Excited States of ^{39}K"	MS	1970	TEXACO, Houston, Tx.	Seaman
WYLIE, Warren	"Electron Tunneling Between Microparticles In Thin Discontinuous Gold Films"	MS	1970	Calif. (unemployed)	Dale
HOBSON, Dana	"Infrared Reglection Spectrum of Sea Water"	MS	1971	Bell Telephone Laboratories	Williams
SAVOY, Steve	"Equilibrium Charged Distributions of Heavy Ions From 1-48 MeV"	MS	1971		Macdonald
WEST, Jon	"Analysis of Surface Composition & Contaminants in Biological Samples by Heavy Ion Scattering"	MS	1971	General Electric, New York	Seaman

IV. PROGRAMS ON INSTRUCTION

A. The Curriculum

The changes expected in the learner taking courses in the Department of Physics are most conveniently grouped into five categories.

1. Courses for Liberal Arts Education (Man's Physical World I, II and Labs, and Descriptive Physics)

   The student should find that physics is not a magical art using incomprehensible incantations, but rather a study where curiosity and logical thinking are rewarded with deep and general insight. Because of his discovery that he can understand, his curiosity is often stimulated to a better understanding of the world around him. In general, the non-physics student becomes a better-informed, responsible citizen in our technological society, interested in continuing his education and capable of understanding the basic issues involved in the great technological problems which will face this society in future years.

2. Courses for the pre-Professional Education (General Physics I, II)

   The student should suffer the same changes as indicated above. In addition, he should become more aware of an analytical view of physical phenomena. He should become confident of his ability to understand applications of physics in his field of interest.

3. Courses for Scientist and Engineers (non-physics majors): (Engineering Physics I, II: Atomic Physics)

   The student should develop an ability to analytically model physical

phenomena. That is, the student should be able to consider a physical problem associated with his field of interest and be able to apply the principles of physics to achieve an insight into and a possible solution of the problem.

4. Undergraduate Courses Primarily for the Physics Major (Courses above the 400 level)

   For the undergraduate who is preparing for a career in physics or in a discipline which requires that he be able to use physics, these courses should provide him with the skills he will need to contribute effectively in his chosen career. He should be given a grounding in the use of an analytical approach to problems and a working knowledge of the concepts and language currently used in the areas of most importance to him. The student who will continue in physics should be given a solid preparation in basic areas of physics which will allow him to enter with a strong background into graduate programs.

5. Graduate Courses

   These courses should take the student from the level of one who has a working knowledge of physics to one who can function as a competent and professional physicist.

The Course materials are carefully choosen to aid in achieving the changes in the student indicated above. The courses and the present texts are listed below.

COURSE LISTING

Course No.	Title	Hrs. Credit	Text	Author
101	Man's Physical World I	3	Conceptual Physics	Hewitt
102	Man's Physical World II	3	Conceptual Physics	Hewitt
103	Man's Physical World I Lab	1	Department Physics	Staff
104	Man's Physical World II Lab	1	Department Physics	Staff
112	Descriptive Physics	4	Physics - The Fundamental Science	Barton-Raymer
126	Physics for Musicians	3	Department of Physics	Staff
131	Descriptive Astronomy	3	Exploration of the Universe	G. O. Abell
135	Descriptive Meteorology	3	(three texts recommended but not required)	
			Introduction to Meteorology	Cole
			Elements of Meteorology	Miller & Thompson
			Meteorology	Donn
211	General Physics	4	Physics	K. R. Atkins
212	General Physics II	4	Physics	K. R. Atkins
400	Atomic Physics	3	Elementary Modern Physics	Weidner & Sells
410	Light	3	Fundamentals of Optics	Jenkins & White
421	Geophysics	3	Introductory Geophysical Prospecting	Dobrin
425	Solar Physics	3	Our Sun	Menzel
432, 632	Mechanics I & II	3	Classical Dynamics	Marion
472, 672	Electricity & Magnetism I & II	3	Introduction to Electro-magnetic Fields & Waves	Corson & Lorraine
473	Electromagnetic Circuits and Measurements	2	Electronics for Scientists	Malmstadt, Enke, & Toren
502, 503	Physics Lab I & II	3	No text	
535	Radioactive Tracer Tech.	3	Radioisotope Techniques	Overman & Clark
602	Electronic Physics	3	Electronics for Scientists & Engineers	Benedict

Course Listing Continued

Course No.	Hrs. Title	Credit	Text	Author
604	X-ray & Crystal Phys.	3	X-Ray Diffraction	Warren
607	X-ray Laboratory	1	No text	
610	Advanced Phys. Lab	2	No text	
613	Intro.to Astrophysics	3	The New Cosmos (Paperback)	Unsold
			Astrophysics and Stellar Astronomy	Swihart
630	Semiconductor Physics	3	Semiconductors	Smith
640, 642	Introductory Quantum Mechanics I & II	3	Introduction to Quantum Theory	Park
			Linear Operators for Quantum Mechanics (Paperback)	Jordan
645	Thermodynamics	3	Statistical and Thermal Physics	Reif
675	Nuclear Physics	3	Nuclear and Particle Physics	Paul
685	Intro. to Optics	4	Intro. to Modern Optics	Fowles
705	Introduction to Theoretical Physics	3	Mathematical Methods for Physicists	Arfken
710, 835	Electrodynamics I & II	3	Classical Electrodynamics	Jackson
720	Introduction to Solid State Physics	3	Introduction to Solid State Physics	Kittel
725	Atomic Spectra	3	Principles of Atomic Spectra	Shore & Menzel
726	Molecular Spectra	3	Molecular Spectra and Structure	King
730	Astrophysical Processes	3	Atomic Theory of Gas Dynamics	Bond, Watson & Welch
			Spectral Line Formation	Jeffries
825	Advanced Dynamics	3	Classical Mechanics	Goldstein
855	Statistical Mechanics	3	Statistical Physics	Wannier
860	Advanced Statistical Mechanics	3	No text	

Course Listing Continued

Course No	Title	Hrs. Credit	Text	Author
865, 875	Quantum Mechanics I & II	3	Quantum Mechanics (3rd Ed.)	Schiff
			Quantum Mechanics (two volumes) (Paperback)	Messiah
880	Modern Optics	3	No text	
885	Adv. Quantum Mechanics	3	Introduction to the Quantum Theory of Scattering	Rodberg & Thaler
890, 891	Stellar Physics I & II	3	Stellar Physics	Hong-Yee Chiu
			The Atmospheres of the Sun and stars	Aller
915	Adv. Topics in Molecular Spectra	3	No text	
916	Adv. Topics in Optics	3	No text	
925	Advanced X-ray Physics	3	The Optical Properties of the Diffraction of X-rays	Janes
936	Solid State Physics	3	Theory of Solids	Ziman
937	Adv. Topics in Solid State Physics	3	No text	
945, 946	Adv. Nuclear Physics I and II	3	Nuclear Physics	Roy and Nigam
955	Advanced Topics in Mathematical	3	No text	
970	Quantum Field Theory	3	Elementary Quantum Field Theory	Henley & Thirring
997	Advanced Topics in Nuclear Physics	3	Principles of Stelar Evolution & Nucleosynthesis	Clayton
998	Advanced Topics in Astrophysics	3	No text	

The lectures and texts are complemented by a large and modern collection of films, demonstrations and laboratory equipment.

"A Survey of Opportunities Open to the Physics Major for Graduate Study in Other Fields" by R. S. Lee gathered information form 317 Departments in 11 different academic fields at 73 Universities. (See Appendix IV.) The results of the survey support the conclusion that graduate study in another field is an attractive alternative, which should be considered by Physics undergraduates. Opportunities for graduate study open to the physics major are by no means limited to the academic fields surveyed (Philosophy, Psychology, Microbiology, Political Science, Library Science, Sociology, Economics, Public Administration, Geology, Atmospheric Science, Business Administration).

Physics Departments can make their undergraduate programs much more attractive by providing a greater flexibility in course requirements for the physics major. Since employment opportunities are presently very limited for holders of advanced physics degrees, an undergraduate physics curriculum designed to only prepare students for graduate study in physics is unrealistic and will ultimately result in a program with very few physics majors. On the other hand, a sufficiently flexible physics program could be very attractive to an undergraduate with an interest in physics who wishes to pursue graduate study or a career in some other field. The advantage of the physics major for such students is that the training received in an undergraduate program in physics may be readily applied to problems in a wide variety of disciplines. Persons with an undergraduate physics degree and a graduate degree in some other field are in an advantageous position to contribute to multidisciplinary solutions of many of current social, economic and environmental problems.

This study stimulated the Department of Physics at the University of Arkansas

to completely restructure their curriculum. The previous curriculum was one which required a large number of hours with few options open to the student. The Lee Study is footnoted in literature distributed by the University of Arkansas. In addition, the Lee Study was included in materials sent to the participants in the Conference on Priorities in Physics Education sponsored by NSF in 1971.

The Physics Department has a long history of maintaining a standing Curriculum Committee that meets regularly to review the course offerings of the Department. There is no statutory requirement for formal course reviews but both the undergraduate and the graduate programs have in the last six years received complete reviews regarding purposes and goals, content, number of courses and sequence. At present a curriculum revision for the undergraduate physics major, which allows a wider latitude of technical electives, is nearly complete and should serve to make the fitting of the student's education to his career goals and interests more readily accomplished by faculty advisors. The present curriculum is enclosed with these materials.

Suggestions for changing courses, dropping courses, or instituting new courses are received from many sources -- physics faculty, students, and other departments. These suggestions are reviewed by the Physics Department Curriculum Committee (which has both undergraduate and graduate student representation) in consultation with the originators of the suggestion and other concerned parties. The Curriculum Committee makes its recommendations to the physics faculty in open faculty meetings (including cases of recommendations for non-approval of suggested changes). After discussion, the faculty may approve or disapprove the recommendations of the Curriculum Committee or return the matter to the Committee for further study. Course changes that are approved by the physics faculty are forwarded to the Dean of the College of Arts and Sciences by the Curriculum

Committee Chairman for subsequent action by the College Curriculum Committee, College Faculty and the Faculty Senate.

In formulating recommendations concerning suggested course changes, the Curriculum Committee considers the following points:

(1) Is the course consistent with the purposes and goals of physics education at K.S.U.?

(2) Are instructors available who are competent to teach the course?

(3) Is the present or anticipated enrollment adequate (in relation to the level and content of the course) to justify its existence?

Provisions for the general education of students by the Department of Physics may be arranged into three groups: Curricula, Colloquia, and Corridors. The Department serves the whole campus by offering for the general student broadly based survey courses such as Man's Physical World and Descriptive courses in Physics, Meteorology, and in Astronomy. These offerings are particularly designed to stimulate an increased awareness and appreciation of the surrounding physical universe. In addition, the Department offers other introductory courses including Physics for Musicians, General Physics, and Engineering Physics which are designed in cooperation with other departments to satisfy more specific needs of particular groups. The Freshman Physics Seminar provides sustenance for prospective physics majors and the Journal Club attempts to broaden the horizons of entering graduate students.

The weekly departmental colloquium for students and faculty offers the opportunity to communicate an appreciation of the scope and level of activity in broad areas of science and to stimulate the exchange of ideas at all levels, Philosophers, historians, politicians, biologists and engineers as well as traditional physical scientists from a wide geographical area have accepted

invitations within the recent past. Through the sponsorship of the University's Guest Scholar Committee, the department has been able to present distinguished scholars with broad interdepartmental appeal for extended visits of several days. A listing of colloquia given in recent years is included in Appendix IV. General interest lectures in astronomy are given in the planetarium and guided tours of the weather station, accelerator facility and other research laboratories are readily arranged upon request.

The department's conference room serves as a focus for informal and spontaneous exchanges among students and faculty over coffee. Other traditional modes of teaching are being supplemented by informative multi-sensory displays in the central foyer. A new physics activity center is being assembled to provide resources for voluntary extracurricular scientific exploration beyond the limits of the traditional laboratory. These efforts attempt to move physics "into the corridors" so as to encounter the widest possible audience.

B. Quality of Instruction

The faculty passed a resolution indicating their support of the roles and purposes of the Department. This statement appears in Part I, Educational Tasks of the Department of Physics. This statement along with the written tenure policy indicates the faculty require the highest of quality in teaching and instruction.

The Department has in the past and will in the future be guided in its continued growth by its role and purpose. The Department has a commitment to continue to attract well-qualified faculty and to create an environment in which each of the faculty can continue to develop and contribute effectively to the complementary roles of research and teaching.

The written tenure policy of the faculty speaks to the type of faculty and program which has been and will be developed in the Department. The faculty passed a resolution on September 24, 1971, endorsing the most recent written statement on tenure.

GUIDELINES FOR TENURE AND PROMOTION

DEPARTMENT OF PHYSICS

The questions of tenure and promotion should encompass professional growth of the individual in the academic community as a whole as well as recognition by his professional colleagues and by his professional societies. The Department of Physics endorses the procedures and statements of the American Association of University Professors with respect to academic freedom and tenure.[1]

I. TENURE

A. The criterion for tenure is satisfactory progress toward promotion.

B. The procedural details of the tenure decision are the University regulations as indicated in the K.S.U. Faculty Handbook. The regulations follow the procedures recommended by the American Association of University Professors. A meeting of the tenured members of the faculty will be convened when necessary to discuss questions of tenure prior to a formal closed ballot.

II. PROMOTION

A. Promotion is based on consideration of a faculty member's activities in the areas of (1) research, (2) teaching and (3) service to the professional and university community. A faculty member should be competent in both research and teaching in order to achieve full development

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1. AAUP Policy Documents and Reports, 1971 Edition.

in the university environment.

B. *Each member of the faculty will have his progress toward promotion, increased remuneration, and tenure reviewed each year (Fall Semester) by the Department Head. The Department Head will consult individually with the Faculty for purposes of this review. The Department Head will meet with each non-tenured faculty member to discuss this review and to provide constructive suggestions for future activities.*

All other faculty members will have a similar opportunity for an interview with the Department Head to discuss their professional progress if they so desire.

C. *The promotion from Assistant to Associate Professor generally is based more on promise than on demonstrated distinction.*

1. *He should have demonstrated to the faculty that he has the potential to acquire a national reputation in some area of physics in his further progress and development. The quality of his work in physics should be reflected by his publications and grant proposals, and requests to serve national professional organizations.*

2. *He should be a competent teacher. He should be interested in and capable of teaching at more than one of the three levels of courses*[2] *offered by the department.*

3. *He should have worked effectively as an individual, with other faculty members and with students, for the Department and for the University.*

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2. The three levels are defined to be the lower undergraduate courses (100--399), upper undergraduate-graduate courses (400--599), and the graduate courses (600 and above).

4. *He should have worked constructively to bring outside support to the Department through his own research program, through proposals for improving the teaching program, through proposals for acquiring departmental research instruments or through other individual and collective efforts.*

D. *The promotion from Associate Professor to the rank of Professor is based on demonstrated distinction. The same considerations for promotion to the rank of Associate Professor apply to the promotion to the rank of Professor, with the substitution of the following Item 1.*

1. *He should have acquired a national reputation in some area of Physics.*

There is no formal program of orienting new faculty. However, the Department has initiated a G.T.A. Training Program. Ten new G.T.A.'s attended the first G.T.A. training course during the week of August 23, 1971. Incoming G.T.A.'s met for approximately four hours per day to familiarize themselves with experimental apparatus used in laboratory classes and to discuss aspects of effective teaching. Discussions centered around education objectives for laboratory teaching, quiz construction and evaluation techniques, grading, departmental procedures, and the social role of the instructor. Such discussions were conducted in an effort to familiarize the G.T.A. with the basic responsibilities assumed in laboratory teaching and to provide him with an initial foundation from which he could develop his individual style of teaching. At present the G.T.A.'s meet twice each month to continue discussions centered upon problems encountered in laboratory teaching. Projected plans include the development of computer assisted grading, the development of laboratory teaching evaluation forms, and the introduction of the Flanders system of interaction analysis.

C. Opportunities for Professional Growth and Development

The Department can develop only by the continued development of the faculty. The evidence of scholarly attainment should not be reduced to the counting of publications and research grants. However, it is an expedient, if not altogether correct, measure of the activity of the faculty. An examination of the individual vita or Table I (Part II) indicates the faculty have published regularly and extensively over a broad range of physics and physics-related fields. The present faculty have their names listed as author or co-author of some 289 professional publications. This number includes multiple listings of some papers where more than one of the present faculty were co-authors. Table II (Part II) indicates the number of publications associated with the faculty in the most recent five year period.

The faculty are active in numerous professional organizations such as the American Physical Society, of which five of the faculty have been named Fellows, the Optical Society of America, the American Association of Physics Teachers, Sigma Xi, the American Association for the Advancement of Science, and the American Association of University Professors. The faculty attend and contribute regularly to both national and international meetings. Five of the faculty have participated in international conferences and symposia abroad thus far in 1971. Some 85 percent of the faculty participated in a meeting of a professional society in the period of 1970-71 and 92 percent of the faculty in the period of 1969-71.

Attendance at such meetings is primarily supported by external grant funds and in some few cases from personal resources. The Department encourages the faculty to participate in such meetings. The Department with the help of the

College of Arts and Sciences attempts to provide funds to any faculty member who is actually giving a paper at a professional meeting. However, the funds provided by the State to the Department for such purposes are inadequate.

The Department encourages sabbatical leaves for the faculty. However, the University funds available for sabbatical leaves appears almost nonexistent for a university of this size. In the last five years, two faculty members have taken sabbatical leave. One was funded by the University and one by the Department. In 1972, two faculty are taking leaves in order to further their own careers. In one case, the funds are being provided by the University he will be visiting. In the second case, the faculty member is seeking external funding but may choose to spend a semester away at his own expense.

The Department has used consultants whenever it was felt necessary. Many of the research groups bring in individuals of particular interest in specific areas. However, in the last five years the Department has found it helpful to bring in several consultants prior to development of certain broad areas. Dr. I. I. Rabi, Nobel Laureate, and Dr. H. Barshall came as consultants concerning the initiation of the accelerator program. Drs. Leo Goldberg and Robert H. Dicke were visiting consultants concerning the initiation of an astrophysics program. Dr. L. Mandell was brought in as a consultant in quantum optics during a period when the Department was considering starting a modern optics group. Most recently, Dr. M. M. Elkind was brought in to help initiate a new program in radiation biophysics.

In general, the Department has found that funds spent on consultants have been extremely well spent.