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ANNUAL REPORT

of the

DEPARTMENT OF PHYSICS

Boston University

1984-1985

Submitted to the Dean of the College of Liberal Arts

by

Bernard Chasan

Interim Chair, Department of Physics

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Chairman's Comments

This was a busy and productive year. Enrollments stayed roughly at the same high level as last year, as did the general level of research activity and research support. The Intermediate Energy, low temperature, biophysics and polymer efforts maintained or increased support, as did the high energy theory effort. Michael El-Batanouny received very substantial research support from the D.O.E., this breakthrough in funding coinciding, with the completion and testing of his unique apparatus for scattering neutral atoms off surfaces. The role played in this success not only by El-Batanouny's students but also by Professor Wolfgang Franzen should be noted here. It is good to know that Franzen will continue his association with this effort even after he assumes the position of Professor Emeritus a year from now. It is pleasant also to look back at the tenure-promotion process in 1984-5 and recall that Bansil, Brooks and Redner all survived the long and arduous tenure review process. The department has been remarkably successful over the last few years in its tenure recommendations, and the demographic lump which made it necessary for three candidates to go through the process in one year turned out not to be a problem. We note too William Klein's well deserved promotion to full professor.

But the big event of this year was the appointment of Larry Sulak to be chairman beginning in September 1985. Sulak has a mandate from the administration to bring the department to a new level of excellence and research activity, initially through the recruitment of a first class high energy group. And in fact the first tangible consequences of Sulak's program at Boston University have been in recruitment. In addition to Sulak three new permanent faculty members will come in September - Steven Ahlen from Indiana, Scott Whitaker from M.I.T. and James Stone from Michigan. They will be accompanied by many visitors as well - Francois Vannucci in neutrino physics, and sometime soon, Alvaro DeRujula and Guido Alterelli in theoretical particle physics, Peter Richter and Hans Scholz in non linear dynamics.

The three new permanent members (and, of course, Sulak himself) have been chosen for their research accomplishments and potential, but it is a

nice bonus that all of them have had experience in teaching elementary physics and all of them see such teaching as part of their jobs. As everyone knows the overwhelming volume of our teaching responsibilities is in introductory teaching, and we simply need more people to meet our obligations in this area. For too long we have been teaching without adequate resources, but particularly since the School of Engineering enrollments started to grow rapidly over the last few years. The addition of a cadre of experienced and willing introductory teachers is a necessary ingredient in the improvement of these courses, and we will have valuable input from colleagues who have recently taught introductory physics at other universities.

The growth of the department over the next several years will necessarily trigger enormous changes, not only in the department but in the entire university. Shop facilities will finally be radically upgraded, and electronics design and repair facilities, discussed for several years, will undoubtedly become a reality. I would be very surprised if we didn't have a draftsman to prepare illustrations for publications and grants. In other words facilities for which we have been lobbying for years will become realities. (I remember all these issues raised directly when John Silber came to a departmental lunch about four years ago.) But beyond that there is no way that purchasing and grant accounting practices now being followed at Boston University can continue unchanged. In all these areas we simply have to come up to the standard of those universities with which we want to be compared. The same criterion should, and, I believe, will be applied to the resources made available for teaching.

List of Faculty

Rama Bansil, Assistant Professor, Ph.D., Rochester University. Joined the Department of Physics in 1977.

Edward C. Booth, Professor, Ph.D., Johns Hopkins University. Joined the Department of Physics in 1956.

James S. Brooks, Associate Professor, Ph.D., University of Oregon. Joined the Department of Physics in 1979.

Bernard Chasan, Professor (Interim Chair), Ph.D., Cornell University. Joined the Department of Physics in 1962.

Robert S. Cohen, Professor, (Director, Center for Philosophy and History of Science), Ph.D., Yale University. Joined the Department of Physics in 1957. Joint Appointment with the Department of Philosophy.

Ernesto Corinaldesi, Professor, Ph.D., University of Manchester. Joined the Department of Physics in 1966.

Dean S. Edmonds, Professor, Ph.D., Massachusetts Institute of Technology. Joined the Department of Physics in 1961.

Maged M. El-Batanouny, Assistant Professor, Ph.D., University of California, Davis. Joined the Department of Physics in 1981.

Wolfgang Franzen, Professor, Ph.D., University of Pennsylvania. Joined the Department of Physics in 1961.

Sheldon L. Glashow, University Professor, Distinguished Physicist and Research Scholar, Ph.D., Harvard. Joined the Department of Physics in 1984 while on sabbatical from Harvard.

William S. Hellman, Associate Professor, Ph.D., Syracuse University. Joined the Department of Physics in 1965.

Barbara Jensen, Visiting Assistant Professor, Ph.D., Columbia University. Joined the Department of Physics in 1978.

William Klein, Professor, Ph.D., Temple University. Joined the Department of Physics in 1977.

James P. Miller, Assistant Professor, Ph.D., Carnegie-Mellon University. Joined the Department of Physics in 1979.

Vijay Murgai, Assistant Professor, Ph.D., University of Rochester. Joined the Department of Physics in 1984.

So-Young Pi, Assistant Professor, Ph.D., State University of New York at Stony Brook. Joined the Department of Physics in 1982.

Sidney Redner, Associate Professor, Ph.D., Massachusetts Institute of Technology. Joined the Department of Physics in 1978. (LOA Sem. I)

B. Lee Roberts, Associate Professor, Ph.D., College of William and Mary. Joined the Department of Physics in 1977.

Kenneth Rothschild, Associate Professor of Physics and Physiology, Ph.D., Massachusetts Institute of Technology. Joined the Department of Physics in 1977. (Sabbatical)

Abner Shimony, Professor, Ph.D., (Philosophy) Yale University, (Physics) Princeton University. Joined the Department of Physics in 1968. Joint appointment with Department of Philosophy.

John Stachel, Professor, Ph.D., Steven Institute of Technology. Joined the Department of Physics in 1964.

H. Eugene Stanley, University Professor of Physics and Physiology, (Director, Center for Polymer Studies). Joined the Department of Physics in 1976.

Charles R. Willis, Professor, Ph.D., Syracuse University. Joined the Department of Physics in 1958.

George O. Zimmerman, Professor, Ph.D., Yale University. Joined the Department of Physics in 1963.

Armand Siegel, Professor Emeritus, Ph.D., Massachusetts. Joined the Department of Physics in 1960. Retired in 1980.

J. Gordon Stipe, Professor Emeritus, Ph.D., Princeton University. Joined the Department of Physics in 1958. Retired in 1978.

Asim Yildiz, Research Professor, Ph.D., Harvard University, 1972 (Theoretical Physics), Doctor of Engineering, Yale University 1960.

CENTER FOR POLYMER STUDIES

VISITING SCHOLARS

A. Coniglio, Research Professor
H. Gould, Research Professor
L. Moseley, Visiting Scholar (Fulbright Fellow)
F. Leyvraz, Research Associate
P. Meakin, Visiting Scholar
H.J.Herrmann, Visiting Scholar
H. Kaplan, Visiting Scholar (sabb. leave at BU)
V. Chukanov, Visiting Scholar (IREX Fellow from USSR)
A. Bunde, Visiting Scholar

Research Associates, Center for the Philosophy and History of Science 1984-85

Miriam Balaban
Kevin Brien
Anne Cox
Umberto Curi
Arran Gare
Anne Marie Mailin
Debra Nails
John Norton
Katie Platt
Santiago Ramirez
Richard Sens
Marx Wartofsky
Irene Winner
Thomas Winner
Wu Zhang

Physics Department Staff

Departmental Administrator	- Alfred Stone
Administrative Assistant	- Kathi Ann LaVoie
Secretaries	- A. Helen Siegel (Administrative Senior)
	- Sally Flint
Laboratory Assistant	- Joseph M. Gonsalves
Instrument Maker	- John Sousa
Physics Demonstration Asst.	- Richard A. Johns

Administrative Organization of the Department of Physics

Bernard Chasan, Interim Chair of the Department and ex-officio member of all committees.

Alfred Stone - Department Administrator, in charge of non academic personnel and physical facilities.

A. Helen Siegel - Senior Administrative Secretary to the Department Chair; in charge of scheduling, room assignments, catalog preparation, various committee business.

Flora Greenan - Administrative Assistant, in charge of Department Office.

Jeffrey Goettee and Mark Zagaeski, Graduate Student Representatives and Conveners.

Graduate Committee	Zimmerman (Chair Hellman Klein Roberts Willis
Liaison - Astronomy & Physics	Zimmerman
Undergraduate	Edmonds (Chair) Bansil Brooks Franzen
Photon	Edmonds
Honors	Edmonds
Science Curriculum (A Committee of the College)	El-Batanouny
Admissions	Willis (Chair) Hellman Miller
Language	Corinaldesi Edmonds
Library	Corinaldesi
Bulletin Board	Corinaldesi

Merit Advisory Committee	So-Young Pi E.C. Booth J. Brooks
Physics Education	Franzen Zimmerman (Co-Chair)
Colloquium	Klein Pi
Comprehensive	Corinaldesi (Chair) Brooks Murgai Pi Roberts
Search	Stanley (Chair) Booth Brooks
Premedical	Edmonds
International Student	Bansil
Safety	Miller
Info. Proc.	Miller (Chair) Redner (Sem. II) Zimmerman El-Batanouny
Liaison with Engineering	Chasan Brooks Booth
Representative to Applied Sci and ENG	Zimmerman

GRADUATE STUDENTS AND ADVISORS
1984-1985

STUDENTS	ADVISORS
*Heisey	Bansil
*Kondo	
Reina	
*Hettinger	Booth
Tapper	
Fortune	Brooks
Ma	
Naughton	
*Swanson	
*Considine	Chasan
Zagaeski	
*Boesch	El-Batanouny
Burdick	
Martini	
Willings	Edmonds
*Goettee	Franzen
Leonard	Hellman
Mustaki	
*Vyas	
*Given	Klein
Samiullah	
Ray	
Austin	Miller
Folkerts	
Fleming	

*New students.

STUDENTS	ADVISORS
Huang, Young-sea	Pi
Hoffman	
Stancioff	
*Stassinopoulos	
DeArcangelis	Redner
Kang	
O'Brien	Roberts
VanRiper	
Whitehouse	
Earnest	Rothschild (Sabbatical)
Hao	
Huang, Xudong	
Marrero	
Leao	Shimony (Sabbatical)
Morley	
Morrill	Stachel
Rosen	
*Holden	Stanley
Hong	
Gall	Willis
Meyer	
*Caserta	Zimmerman
Galuszewski	
Hartnett	
Lees	
*Powers	
Papaconstantinou	

SHAWN BURDICK ~~Nina Willings~~ was the recipient of the Best Teaching Fellow award.

6/6/85

Physics Major	Advisor
Abegg, Michael	
Allor, Beth	Bansil*
Armstrong, Eileen	Redner*
Ashby, Scott	Roberts*
Belanger, Adrian	
Berger, Ted	Bansil
Boettner, Richard	Edmonds (BUCOP w/Eng)
Boffa, JeanPaul	Edmonds
Brodbar, Debbie	El-Batanouny*
Chaudhry, Daniyal	Bansil
Cooper, Sarah	
Das, S.	Cohen (PY/PH)
Droznin, Vadim	on leave
Duffy, Liam	Chasan
Ford, Christopher	Edmonds
Graser, Timothy	Roberts
Hagopian, Lorie	Edmonds
Hoo, Lick	Edmonds
Kehoe, John	Brooks
Johnson, Robert	Edmonds
Laukien, Dirk	Roberts*
Lee, Kwang Suk	Bansil
Loeb, Alejo	Roberts
McLaughlin, Wayne	
Mandel, Robert	Edmonds
Mindes, Leonard	Bansil
Naegele, Sam	Rothschild*
Nenninger, Philip	Zimmerman
Newton, Richard	Zimmerman
Noble, John	Brooks
Osovski, Lynne	Chasan*
Overzet, Connie	Edmonds (MA/PY)
Prokop, Jane	Edmonds
Ramired, Carlos	Zimmerman*
Schnepf, Neil	Booth (AS/PY)
Slater, Daniel	
Soroff, Daniel	Brooks (PY/GL)
Stafilakis, Stefanos	
Tuczapec, Anna	Roberts
Valley, Glenn	Zimmerman*
Walsh, Brian	Zimmerman
Warner, David	Booth*

* From Redner's tentative list of PY majors and advisors, 11/83

List of Graduate Recipients

Ph.D. Degrees

January, 1985

Zorica V. Djordjevic
"Statistical Mechanics for Linear Polymers, Branched Polymers and Gels."
First Reader: H.E. Stanley; Second Reader: Sidney Redner

Tara Maithreyan
"Gravitational Collapse of a Scalar Field."
First Reader: Abner Shimony; Second Reader: Douglas M. Eardley, University of California at Sata Barbara

Ranasinghage Chandrasiri Samaratunga
"Field Dependent Spin-Lattice Relaxation Times of Nuclear Paramagnetic Systems at Low Temperatures."
First Reader: James S. Brooks; Second Reader: George O. Zimmerman

May, 1985

Kiho Kang
"Fluctuation Dominated Kinetics in Diffusion-Controlled Reactions."
First Reader: Sidney Redner; Second Reader: Charles Willis

Francis Edward O'Brien, Jr., B.S., M.A.
"High-Z Kaonic and Sigma Hyperonic Atoms."
First Reader: Bradley Lee Roberts; Second Reader: James Paul Miller

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M.A. Degrees

September, 1984

Zhong Wang - Astronomy and Physics

Shawn Burdick - Physics

Kenneth Peter Gall - Physics

Xin Hao - Physics

May, 1985

Eric Jon Austin - Physics

Marina Willings - Physics

B.A. Degrees

Physics

Graham Charles Wiggins SCL*
With Distinction in Physics
Alumni Student Award
Trustee Scholar
National Science Foundation Fellowship for Graduate Study
Phi Beta Kappa

Astronomy & Physics

Peter Gerard Braccio

Astronomy & Physics With a Minor in Mathematics

David Philip Allen MCL

Donald Patrick Russell III SCL
With Distinction in Physics
College Prize for Excellence in Physics
Trustee Scholar
Alumni Student Award in Astronomy
Harold C. Case Scholar Award
National Science Foundation Fellowship for Graduate Study
Phi Beta Kappa

Courses Offered During 1984-85 School Year
Semester I

Undergraduate

Col	Course #	Course Title	Instructor	Enr.	CLA	ENG	MET	SAR	CBS	SPC	SED	SMG	GRS
CLA	ID 124	Sci. & Religion	Cohen										
CLA	PY 105	Elem. Physics I	Booth	102	97		1	3		1			
MET	PY 105	Elem. Physics I	Miller	23	12		10	1					
CLA	PY 115	Phys.Life Sci I	Hellman	77	7		2	67			1		
CLA	PY 181	Physics	Bansil	53	53								
CLA	PY 211A1	Gen. Physics I	Brooks	222	45		176	1					
CLA	PY 211B1	Gen. Physics I	Murgai	77	19	41	13		3		1		
CLA	PY 212A1	Gen. Physics II	Edmonds	60	10	47	2					1	
CLA	PY 212B1,2	Gen. Physics II	Zimmerman	52	12	38	1			1			
CLA	PY 231	Phys. in Music	Roberts	13	8	2				1	1	1	
CLA	PY 251	Princ. Phys. I	Edmonds	125	34	90	1						
CLA	PY 313	Elem. Mod. Phys.	Corinaldesi	119		119							
CLA	PY 353	Vibrat., Waves	Chasan	148	14	133	1						
CLA	PY 401R1	D.S.	Roberts	2	2								
CLA	PY 403	Meth. Theor. Phys.	Klein	12	12								
CLA	PY 405B1	Elem.Mag.Fld/Waves	Corinaldesi	28	16	10					1		1
CLA	PY 451	Quantum Mech.	Brooks	4	3			1					
				1117	344	480	207	73	3	3	4	2	1

*Lab + Disc. 981

±Non Lab but disc. 77

First Yr.

Sem I	Sem II
503	508
507	509
505	

2 Nd Yr.

Sem I	Sem II
510	512
511	700 Level Course
541	

Graduate and Undergraduate

College	Course #	Course Title	Instructor	#Enrolled
CLA	PY 503	Math Physics	Klein	15
CLA	PY 505	Class. Mech.	Miller	7
CLA	PY 507	Quant. Mech. I	Hellman	13.
CLA	PY 510	Electromagn. II	Willis	10
CLA	PY 511	Stat Phys/Therm I	Willis	9
CLA	ID 539	Sci Tech & Soc	Cohen/Ojha	14
CLA	PY 541	Adv. Lab	El-Batanouny/Burdick	8
				76

Graduate

GRS	PY 711	Adv. Quantum Th. I	Pi	9
GRS	PY 716	Intermed. Energy	Roberts	6
GRS	PY 901M1	Res. in Phys.	Miller	1
GRS	PY 901R1	Res. in Phys.	Roberts	1
GRS	PY 909E2	D.S. in Phys.	El-Batanouny	2
GRS	PY 909B3	D.S. in Phys.	Brooks	1
GRS	PY 909H2	D.S. in Phys.	Hellman	1
GRS	PY 909W1	D.S. in Phys.	Willis	1
				22

Grand Total - 1215

Courses Offered During 1984-85 School Year
Semester II

Undergraduate

Col	Course #	Course Title	Instructor	Enr.	CLA	ENG	MET	SAR	CBS	SPC	SED	SMG	GRS
CLA	PY 101	Phys. Science	Cohen	11	5		1			5			
CLA	PY 106	Elem. Physics II	Booth	60	57	1		2					
MET	PY 106	Elem. Physics II	Miller	40	27		9	3			1		
CLA	PY 118	Phys. Life Sci 2	Hellman	20	4		1	15					
CLA	PY 182	Physics II	Bansil	53	53								
CLA	PY 211B1	Gen. Physics I	Booth	166	19	143	2		2				
CLA	PY 211C1	Gen. Physics I	Zimmerman	226	28	195		1	2				
CLA	PY 212A1	Gen. Physics II	Brooks	260	43	215		1				1	
CLA	PY 212B1,2	Gen. Physics II	Murgai	52	22	20	10						
CLA	PY 251	Princ. Phys. I	Edmonds	16	3	13							
CLA	PY 252	Princ. Phys. II	Edmonds	49	23	26							
CLA	PY 313	Elem. Mod. Physics	Corinaldesi	174	1	173							
CLA	PY 354	Mod. Physics	Roberts	38	11	26					1		
CLA	PY 406B1	Elem.Magn.Fld/Waves	Corinaldesi	12	10	2							
CLA	PY 408	Intermed. Mech.	Franzen	12	11		1						
CLA	PY 410	Therm/Stat Phys.	Redner	6	5	1							
CLA	PY 452	Quantum Physics	El-Batanouny	2	1								1
				1197	323	815	24	22	4	5	2	1	1

* Lab + Disc. 1074

± Non Lab but disc. 20

Graduate and Undergraduate

COLLEGE	COURSE#	COURSE TITLE	INSTRUCTOR	#ENROLLED
CLA	PY 508	Quant. Mech.	Hellman	10
CLA	PY 509	El. Magn. Th. I	Willis	16
CLA	PY 512	Stat. Phys. 2	Willis	8
CLA	PY 633	Energy	Chasan	6
				40

GRADUATE

GRS	PY 718	Gen.Rel. & Cosmology	Brecher	6
GRS	PY 719	Low Temp. Physics	Zimmerman	5
GRS	PY 721	Biophysics	Chasan/Rothschild	3
GRS	PY 910B2	D.S. in Physics	Booth	1
GRS	PY 910P1	D.S. in Physics	Pi	1
GRS	PY 910S4	D.S. in Physics	Shimony	1
GRS	PY 910Z1	D.S. in Physics	Zimmerman	2
				19

Grand Total - 1256

Summer Term

Sem. I

CLA PY 105 - Elem. Physics I	- Hellman	18
CLA PY 211 - General Physics I	- Hellman	26
CLA PY 313 - Elem. Mod. Physics	- Willis	25
CLA PY 491 - D.S.	- Hellman	1
		70

Sem. II

CLA PY 106 - Elem. Physics II	- Abou-Aly	14
CLA PY 211 - Gen. Physics I	- Murgai	20
CLA PY 212 - Gen. Physics 2	- Kaufman	27
GRS PY 492 - D.S.	- Kaufman	1
GRS PY 900 - Teaching of Phys.	- Haber-Schaim	61
CLA PY 192 - Lower Div. D.S.	- Alston	17
		140

Graduate Committee Report - G.O. Zimmerman

The full committee met four times this year. The main issues were:

1) The difficulty of fulfilling our 700-850 course requirements for Astronomy graduate students. A proposal from the Astronomy Department on how to restructure the 500-800 level courses was requested. This matter will have to be taken up next year. (unfinished business)

2) A 3-year sequence of 700-850 courses was worked out. In this connection it was suggested that courses like PY 704 - Advanced Mathematics Physics and PY 716 - Intermediate Energy Physics be added to the now existing list. In the sequence worked out, every course appearing on the required list was offered within the 3 year span.

   A reexamination of the required course list, appearing on the last page of the "Formal Requirements...." should take place next year in view of the new faculty interests represented by new departmental members next year. In view of that, the 3 year sequence should also be revised.

The rest of committee business concerned petitions of students who wanted to modify or be excused from some of our graduate studies requirements as well as the attempt of trying to enforce rules like the one year limitation on completing incomplete grades and one year limitation on taking an oral exam after passing the comprehensive exam with honors.

There was also a question about the content of our Solid State courses which will be resolved during the summer.

For next year we have to make sure that the desirability of teaching experience during a graduate student's career be included in the Graduate Catalog. We will also have a busy time revising courses and introducing new ones so as to reflect the new research interests of our faculty.

(Enclosed are Committee Meeting minutes as well as the list of "required" courses.)

Boston University

Department of Physics
111 Cummington Street
Boston, Massachusetts 02215

October 29, 1984

To: K. Brecher, R. Daley, N. Fortune, W. Hellman, W. Klein, L. Roberts, C. Willis

From: G.O. Zimmerman

Subject: Report of the Graduate Committee Meeting, October 9, 1984

1. Two petitions were discussed. Karl Martini petitioned to be exempted from the Advanced Lab because he has been the teaching fellow for this lab for the past two years. This petition was granted.

Mr. Apostolos Mastichiadis, an Astronomy and Physics PhD candidate, asked to be exempted from one of the 700-level course requirements on the grounds that he has had an equivalent course at a British university, and also that there are not enough 700-level astronomy courses available. The petition was granted subject to a letter from Professor Brecher enunciating the course which would be substituted for the 700-level course.

2. The question of the number of 700-level courses astronomy students would have to take was discussed because if they take a 700-level course in physics, they also have to take a 500-level course in preparation for the 700-level course. There is a set of basic 500-level courses in astronomy which, with extra work for graduate students, might become suitable substitutes for the 700-level courses. Discussion and action on this matter was postponed pending a proposal from astronomy.

3. The question of whether PY 716 (Nuclear Physics II) should be included in the list II of 700-level courses was discussed.

4. Future topics will be the creation of the next three-year cycle of 700-800 level courses and an examination of the two lists of 700-level courses on the last page of "Formal Requirements for Graduate Studies in Physics".

TO: Physics Faculty and Graduate Committee Members

FROM: George O. Zimmerman

DATE: February 15, 1985

Report on the Graduate Committee Meeting on February 5

Attending:
Brecher, Daley, Fortune, Hellman, Klein, Roberts, Willings and Zimmerman.
(Guest: J.S. Brooks) (Absent: Willis)

a) The question of the content of PY714, Solid State Physics I, was discussed in view of the fact that students were not exposed to some of the fundamental concepts of Solid State Physics in that course. (Contents of Kitell expanded or Ashcroft and Mermin)
Two methods of dealing with this question were proposed.

1) To institute a new course.
2) To make PY714 cover the Ashcroft and Mermin material and use PY715 for specific application and advanced material.

Suggestion 2) was adopted.

The course content will be decided on by the group of "Solid State" physicists in the department. Those are: Brooks, El-Batanouny, Murgai, and Zimmerman. Others who would like to get in on the act are welcome. Please let Zimmerman know about it.

b) The case of a physics student who wants to take an Engineering 500 level course was discussed. The decision was to allow such aberations through the petition route, with the student having to justify the choice in terms of research interests and prior preparation.

c) The matter of whether to allow a student to write a Dissertation in "Physics education" as a Physics Ph.D. was debated.
The concensus was that we can not do this without the collaboration of SED and the prospective advisor-Prof. Habershaim-did not want SED involved. Since the Astronomy Dept. was interested in such a project and the prospective student was an Astrophysicist, the matter was referred to Astronomy.

Next Meeting Agenda-

1) 3-year Graduate Course Sequence.
2) Petition.

Graduate Committee Report

May 2, 1985

The Graduate Committee met May 2 and decided on a tentative 3 year rotation of the 700-850 courses. These courses will be given subject to departmental approval and availability of instructors. Additional courses at this level may be offered depending on demand and the availability of instructors.

1985-6		
	PY711	Advanced Quantum Theory I
	PY713	Nuclear Physics I
	PY807	(Hellman) - Theory of Elementary Particles (Quantum Field Theories)
	PY705	Plasma Physics
or	PY818	Many Body Topics in Solid State Physics
	PY714	Solid State Physics I
	PY717	Special Theory of Relativity
1986-7		
	PY711	Advanced Quantum Theory I
	PY715	Solid State Physics II
	PY805	Elements of Quantum Field Theory
	PY707	Statistical Mechanics
	PY712	Advanced Quantum Theory II
	PY721	Biophysics
1987-88		
	PY711	Advanced Quantum Theory I
	PY713	Nuclear Physics
	PY817	Symmetry in Solid State Physics
	PY705	Plasma Physics
	PY718	General Theory of Relativity
	PY719	Low Temperature Physics

APPENDIX

At least two 700-850 level courses must be selected from each of the following two lists.

List I

PY 707 Statistical Mechanics
PY 711 Advanced Quantum Theory I
PY 712 Advanced Quantum Theory II
PY 717 Special Theory of Relativity
PY 718 General Theory of Relativity
PY 805 Elements of Quantum Field Theory
PY 807 Theory of Elementary Particles

List II

PY 705 Plasma Physics
PY 713 Nuclear Physics
PY 714 Solid State Physics I
PY 715 Solid State Physics II
PY 719 Low Temperature Physics
PY 721 Biophysics
PY 817 Symmetry in Solid State Physics
PY 818 Many Body Topics in Solid State Physics

{Nucl #2 716}

LIBRARY COMMITTEE E. CORINALDESI (PHYSICS DEPT.) AND DAVID SAUER (SCIENCE AND ENGINEERING LIBRARY) 22.

BOSTON UNIVERSITY

To: Prof. E. Corinaldesi *Date:* 25 April 1985

From: David Sauer

Subject: Physics allocation statistics for 1984-1985 Annual Report

Cost of Periodical Subscriptions		46,425.00
Cost of Standing Orders		2,678.00
Amount Spent on Monographs	10,062	
Amound Encumbered for Books not Recd.	1,013	
Total Book Expenditures	11,075	11,075.00
Total Expenditures		60,178.00
Allocation for 1984-1985		60,000.00
Allocation overspent by (as of 4/25/85)		178.00

Approximate Number of Monographs Purchased: 225

New Journal Titles ordered:

Applied Optics (subscription cancelled in 1978 due to budget cuts)

Journal of the Physical Society of Japan (our subscription was cancelled in 1975 due to budget cuts)

New Standing Order:

Advances in Solid State Physics (issues we lacked were also ordered)

Journal Backfiles ordered:

Applied Optics (1978-1983)

Atomic Data (1969-1973)

Current Physics Index (1975-1983)

Physics Today (1973-1984)

New Reference Standing Order:

Graduate Programs in Physics, Astronomy, & Related Fields

Library News: 1984-85 saw further organization of services & materials. Starting in May '85, additional shelving will be erected to hold material from the Chemistry Library, which will be moved to the Science Library during May & June. Many of the older years of Chemistry journals will be stored in the Mugar Library pending completion of the Science Library.

Bulletin Board Committee - E. Corinaldesi

NOTHING SPECIAL TO REPORT

However: Bulletin Board "C" is a mess, but I have no jurisdiction on it!

Language - E. Corinaldesi; D. Edmonds

My work consisted in sending notice to students, writing what Edmonds calls my "great" letter about standards, and determining spheres of influence. I think Edmonds examined two students in his (sphere of influence, French).

Nobody has come unto me!

Comprehensive Examination - E. Corinaldesi, Chair; Brooks, Murgai, Pi, Roberts

[Miller provided "scramble" program so as to enable me to use the VAX without fear that candidates might snoop!]

First session, January 1985: 10 students took exam (3 were Astronomers)
5 HP
2 P
3 F

Second session, May 1985: 8 students took exam (No Astronomers)
2 HP
4 LP
2 F

Graduate Admissions Committee

There were 96 applications and 16 acceptances of which 10 are Teaching Fellows; 1 has received tuition remission and is a Presidential University Fellow. In addition we welcome 2 transfers from University of Indiana who are coming to work with Professor Ahlen.

The award of a University Fellowship to an incoming student is particularly heartening because we have made several offerings of such fellowships and this is the one acceptance we have had in several years. This year we had an early acceptance who opted for Brandeis at the last minute.

One unfortunate aspect of admissions is that applicants kept dribbling in very late, long after all financial aid had been awarded and long after it was possible to give them the attention they deserve. We are tightening this process up by stipulating that all completed applications must be in by May 1 rather than July 1. This new deadline does not preclude special consideration for special cases.

PUBLICATIONS

Bansil

R. Bansil, H. J. Herrmann and D. Stauffer, "Computer simulation of kinetics of gel formation by addition polymerization in the presence of a solvent" Macromolecules 17, 998 (1984).

R. Bansil, B. Carvalho and H. J. Herrmann, "Cluster size distribution in three-dimensional kinetic gelation in the presence of a mobile solvent" J. Phys. A 18, L159-L163 (1985).

R. Bansil, "Fractal aspects of gelation," PROCEEDINGS OF SYMPOSIUM ON FRACTALS (Materials Research Society), 1984.

Booth

"Measurement of the Reaction He(gamma,pi0)He for E-gamma=290 MeV", D.R. Tieger, E.C. Booth, J.P. Miller, B.L. Roberts, J. Comuzzi, G.W. Dodson, S. Gilad, R.P. Redwine, Phys. Rev. Lett. 53(755)1984.

Brooks

F.M. Ellis, J.S. Brooks, and R.B. Hallock, Third Sound in 3He-4He Mixture Films, J. Low Temp. Phys. 56, 69(1984).

M.P. Sarachik, D.R. He, W. Li, M. Levy, and J.S. Brooks, "Magnetic Properties of Boron Doped Silicon", accepted for publication in Phys. Rev. B.

M.B. Maple, J.W. Chen, S.E. Lambert, M. J. Naughton, J.S. Brooks, Z. Fisk, J.L. Smith, and H.R. Ott, "Upper Critical Magnetic Field of the Heavy Fermion Superconductor UBe13", accepted for publication in Phys. Rev. Lett.

Chasan

Effect of Thiourea on pCMBS Inhibition of Osmotic Water Transport in Human Red Cells (with Toon, M.R., and Solomon, A.K.) Biochim et Biophys Acta, 778 185 (1984)

The Reflection Coefficient for Urea in the Red Cell (accepted for publication by Biochim et Biophys Acta) (with Solomon, A.K.).

Cohen

Editor, Studies in the Philosophy of J. N. Findlay (SUNY Press 1985) (with assistance of R.M.Martin and M.Westphal)

Editor, English edition of M. Markovic, Dialectical Theory of Meaning (Boston Studies in the Philosophy of Science, vol 81) (Dordrecht and Boston: D. Reidel, 1984)(orig: Serbo-Croat)

Editor, with M. W. Wartofsky, Physical Sciences and History of Physic (Boston Studies..., vol 82)(Dordrecht and Boston: D. Reidel,1984)

Editor, English edition of Émile Meyerson, The Relativistic Deduction Epistemological Implications of the Theory of Relativity (Boston Studies....vol 83)(Bordrecht and Boston: D. Reidel, 1985) (orig: French)

Editor, Foundations of Objective Knowledge by Sergio L. de C. Fernand (Boston Studies...vol 86)(Dordrecht and Boston: D. Reidel, 1985) (orig: Portuguese)

El-Batanouny

with K.M. Martini, S. Burdick, and G. Kirczenow "Dynamics of Mismatched Overlayers ". Proceedings of the 1984 Summer School on Dynamical Phenomena at Surfaces, Interfaces, and Superlattices. K.H. Rieder, R.F. Willis, and F. Nizzoli Editors, (Springer Verlag 1985). (Few selected contributed papers.)

With K.M. Martini, S. Burdick, and G. Kirczenow, " Molecular Dynamics Study of Dislocation-Depinning Transitions in Mismatched Overlayers." Proceedings of the First International Conference on the Structure of Surfaces, Berkeley, August 1984 ". M. Van Hove Editor. (Springer Verlag 1985). (refereed)

With M. Strongin, " Structural and Electronic Trends in the Growth of Cu Overlayers on the Nb(110) Surface". Phys. Rev. *B*31, April 15, 1985.

Charles R. Willis (with El-Batanouny and Stancioff) "Theory of Sine-Gordon Kinks on a Discrete Lattice I - Hamiltonian Formalism" submitted to Phys. Rev. B.

Charles R. Willis (with El-Batanouny, Stancioff and Burdick) "Theory of Sine-Gordon Kinks on a Discrete Lattice - II Static and Quasi-static Properties" submitted to Phys. Rev. B.

Franzen

"Surface Structure Studies of Clean and Hydrogen Covered Fe(110) and Fe(100) Surfaces using He-diffraction and a Novel Metastable-Atom Detector)"Bull. Am. Phys. Soc. 30, No. 3, p. 218 (March 1985).

Klein

C. Unger and W. Klein, "Nucleation near the classical spinodal," Phys. Rev. B 29, 2698 (1984).

W. Klein and A. D. J. Haymet, "Linear integral equations and renormalization group," Phys. Rev. B 30, 1387 (1984).

D. Heermann, A. Coniglio, W. Klein and D. Stauffer, "Monte Carlo simulation of metastable states in 3-D Ising models," J. Stat. Phys. 36, 447 (1984).

Miller

"Two-pion Correlations in Heavy In Collisions", W.A. Zajc, J.A. Bistirlich, R.R. Bossingham, H.R. Bowman, C.W. Clawson, K.M. Crowe, K.A. Frankel, J.G Ingersoll, J.M. Kurck, C.J. Martoff, D.L. Murphy, J.O. Rasmussen, J.P. Sullivan, E. Yoo, O. Hashimoto, M. Koike, W.J. McDonald, J.P. Miller, P. Truol, Phys. Rev. C29(2173)1984.

"Measurement of the Reaction He(gamma,pi0)He for E-gamma=290 MeV", D.R. Tieger, E.C. Booth, J.P. Miller, B.L. Roberts, J. Comuzzi, G.W. Dodson, S. Gilad, R.P. Redwine, Phys. Rev. Lett. 53(755)1984.

"Antiprotonic Atoms in Gaseous H and He and in Liquid H", J.R. Lindemuth, M. Eckhause, K.L. Giovanetti, J.R. Kane, M.S. Pandey, B.L.Roberts, A.M. Rushton, P.D. Barnes, J.N. Craig, R.A. Eisenstein, J.D. Sherman,

Murgai

Photon Energy Dependent Branching Ratios of the Inner Valence Satellites in the Photoemission of Solid Ethylene (with S.L. Hulbert, P.D. Johnson, Myron Strongin and W. Eberhardt) Chem. Phys. Lett. 111, 157 (1984).
Mössbauer Effects and L_{III} Absorption Measurements on $EuPd_2Si_2$ (with E. Kemly, M. Crof L.C. Gupta, C. Godart, R.D. Parks and C.U. Segre) in Proceedings of the Köln Conferenc on Valence Instabilities (1984) to be published in Journal of Magnetism and Magnetic Materials.

Pi

Inflation - Driving Scalar Field, Nucl. Phys. B252, 127 (1984).

Progress in the Inflationary Universe, to be published in Comments on Nuclear and Particle Physics, Volume XIV, Number 5 (1985).

QCD Chiral - Symmetry Breaking in a Raleigh - Ritz Variational Calculation, with P. Castorina, Phys. Rev. D15, 31, 411 (1985).

Quantum Mechanics of the Scalar Field in the New Inflationary Universe, with A. Guth, MIT Preprint, 1985, to be published in Phys. Rev. D.

Quantum Mechanical Behaviour of the Higgs Field in the Inflationary Universe, to be published in the Proceedings for APS, Division of Particles and Field Annual Meeting, Santa Fe (Nov. 1984).

Redner

S. Redner and K. Kang, "Kinetics of the scavenger reaction" J. Phys. A 17, L451 (1984).

M. E. Fisher, V. Privman, and S. Redner, "Winding angle of self-avoiding walks" J. Phys. A 17, L569 (1984).

K. Kang, P. Meakin, J. H. Oh, and S. Redner, "Universal decays in multiparticle reactions", J. Phys. A 17, L665 (1984).

S. Redner and K. Kang, "Unimolecular reaction kinetics", Phys. Rev. A 30, 3362 (1984).

J. L. Cardy and S. Redner "Conformal invariance and self-avoiding walks in restricted geometries", J. Phys. A 17, L933 (1984).

K. Kang and S. Redner, "Fluctuation effects in Smoluchowski reaction kinetics", Phys. Rev. A 30, 2833 (1984).

L. de Arcangelis, S. Redner and A. Coniglio, "Anomalous voltage distribution of random resistor networks and a new model for the backbone at the percolation threshold" Phys. Rev. B 31, 4725 (1985).

Roberts

M.J. Leitch, J.L. Matthews, W.W. Sapp, C.P. Sargent, S.A. Wood, D.J.S. Findlay, R.O. Owens, and B.L. Roberts, *$^{16}O(\gamma,p)^{15}N$ Reaction for E_γ = 100-400 MeV*, Phys. Rev. C May 1985, to be published.

"Measurement of the Reaction He(gamma,pi0)He for E-gamma=290 MeV", D.R. Tieger, E.C. Booth, J.P. Miller, B.L. Roberts, J. Comuzzi, G.W. Dodson, S. Gilad, R.P. Redwine, Phys. Rev. Lett. 53(755)1984.

"Antiprotonic Atoms in Gaseous H and He and in Liquid H", J.R. Lindemuth, M. Eckhause, K.L. Giovanetti, J.R. Kane, M.S. Pandey, B.L. Roberts A.M. Rushton, P.D. Barnes, J.N. Craig, R.A. Eisenstein, J.D. Sherman,

Rothschild

1. K.J. Rothschild, H. Marrero, M. Braiman and R. Mathies "Primary Photochemistry of Bacteriorhodopsin: Comparison of Fourier Transform Infrared Difference Spectra with Resonance Raman Spectra" Photochem. Photobiol. (1984) 40,675-679

2. K. J. Rothschild, P. Roepe, J. Lugtenburg and J. A. Pardoen "FTIR Evidence for Schiff Base Alteration in the First Step of The Bacteriorhodopsin Photocycle" Biochemistry 23, 6103-6109 (1984)

3. S.M. Gruner, K.J. Rothschild, W.J. DeGrip and N.A. Clark "Co-existing Lyotropic Liquid Crystals: Commensurate, Faceted and Co-planar Single Hexagonal (HII) Domains in Lamellar Photoreceptor Membranes J. de Physique, 46, 193-201 (1985)

5. K.J. Rothschild, P. Roepe and J. Gillespie "Fourier Transform Infrared Spectroscopy of Bacteriorhodopsin: Two Conformation of bR570 and the K Intermediate" (to appear in Biochim. Biophys. Acta) (1985)

7. K.J. Rothschild, P. Roepe, T. Earnest and J. Herzfeld "Evidence for Tyrosine Protonation in the Primary Photochemistry of Bacteriorhodopsin" Proc. Natl. Acad. Sci. (to appear, 1985)

Shimony

"Comment on 'Proposed molecular test of local hidden-variables theories'", Physical Review A 30, 2128-9 (1984).

"Commont on 'Bell's Theorem: does the Clauser-Horne Inequality hold for all local theories?'", Physical Review Letters 53, 1296-7 (1984), with Michael Horne.

Stachel

"The Dynamical Equations of Black Body Radiation," Foundations of Physics 14, 1163 (1984)

"Congruences of Subspaces," Robinson Festschrift (Bibliopolis, Naples, 1985)

"Eddington and Einstein," in The Prism of Science (Humanities Press,1985), pp. 225-249.

Stanley

I. Majid, N. Jan, A. Coniglio and H. E. Stanley, "The kinetic growth walk: A new model for linear polymers" Phys. Rev. Lett. 52, 1257-1260 (1984).

A. Margolina, H. Nakanishi, D. Stauffer and H. E. Stanley, "Monte Carlo and series study of corrections to scaling in two-dimensional percolation" J. Phys. A 17, 1683 (1984).

P. Meakin, I. Majid, S. Havlin and H. E. Stanley, "Topological properties of diffusion-limited aggregation and cluster-cluster aggregation" J. Phys. A 17, L975-L981 (1984).

H. E. Stanley, I. Majid, A. Margolina and A. Bunde, "Direct tests of the Aharony-Stauffer argument" Phys. Rev. Lett. 53, 1706 (1984).

H. E. Stanley, R. L. Blumberg, A. Geiger, P. Mausbach and J. Teixeira, "The 'locally-structured transient gel' model of water structure" J. de Physique 45, C7[3]-C7[12] (1984).

A. Bunde, A. Coniglio, D. C. Hong and H. E. Stanley, "Transport in a two-component randomly-composite material: Scaling theory and computer simulations of termite diffusion near the superconducting limit" J. Phys. A Lett. 18, L137-L144 (1985).

Willis

2. Charles R. Willis (with El-Batanouny and Stancioff) "Theory of Sine-Gordon Kinks on a Discrete Lattice I - Hamiltonian Formalism" submitted to Phys. Rev. B.
3. Charles R. Willis (with El-Batanouny, Stancioff and Burdick) "Theory of Sine-Gordon Kinks on a Discrete Lattice - II Static and Quasi-static Properties" submitted to Phys. Rev. B.
4. Charles R. Willis "Is Optical Bistability a Broken Symmetry" to be published in Roy Glauber festscrift Oct. 1985.

Zimmerman

(With A. Ibrahim and K. Galuszewski), "Electrical Conductivity of $FeCl_3$ Intercalated Graphite" Extended Abstracts Graphite Intercalation Compounds Ecklund, Dresselhaus and Dresselhaus edts., (Materials Research Society, Pittsburgh 1984) p. 63

(with C. Nicolini, D. Solenberger, D. Gata and B. Holmes), "Critical Exponent γ of the Magnetic Anomaly of Stage-6 $FeCl_3$ Intercalated Graphite" ibid.* p. 101.

(with R. Meservey and J.S. Brooks) "Non-Resonance Measurement of the Nuclear Susceptibility and Relaxation Time of Liquid ^3He"*. Paper FF1, p. 1217

(with B. Holmes) "Magnetic Properties of Frozen Aqueous Cerous Magnesium Nitrate Solution"*. Paper EQ9, p. 1169.

"A Comparison of SVP Liquid ^3He Specific Heat Measurements"*. Paper FF3, p. 1221

GRANTS

Bansil, Rama

ONR: Physics of Gels - $245,000 (with Stanley)

NSF - Theoretical and experimental research on polymer materials (3 years)
First year - $160,000 (with Redner, Stanley)

Booth, Edward

(with Miller, Roberts as co-principal investigators)

Continuing NSF support - $257,000 for this year

NSF award for Vax computer - $80,000

Brooks, James

NSF - $45,000

NSF (through MIT) - $210,000

Cohen, Roberts

IREX grant for US - USSR symposium on recent work on History and Philosophy of Science in the Soviet Union. (B.U. March 15-16)
Institute of Philosophy of Academia Sinica (Beijing); travel and support grant for research and lecture fellowship in China (May 25-June 17)

El-Batanouny, Maged

DOE Grant - $330,000/3 years

Klein, William

ARO: The percolation problem - $80,000 (with Redner, Stanley)

Miller, James (with Booth, Roberts as co-principal investigators)

Continuing NSF support - $257,000 for this year

NSF award for VAX computer - $80,000

Pi, So-Young

Outstanding Junior Investigator, DOE - $60,000

Redner, Sidney

ARO: The percolation problem - $80,000 (with Klein, Stanley)

Roberts, B. Lee

(with Miller, Booth as co-principal investigators)

Continuing NSF support - $257,000 for this year
NSF award for VAX computer - $80,000

Stachel, John

National Endowment for the Humanities 1/15/85 -
Collected Papers of Albert Einstein, 5 years $280,150

Alfred P. Sloan Foundation: matching grant to NEH grant.

National Science Foundation, Collected Papers and Correspondence of Albert Einstein (1 year, $145,000)

Stanley, H. Eugene

ARO: The percolation problem - $80,000 (with Klein, Redner)
ONR: Physics of gels - $245,000 (with Bansil)
NSF: Theoretical and experimental research on polymer materials (3 years) (with Bansil, Redner)

Yildiz, Asim DOE $60,000

Zimmerman, George O.

AFOSR Grant for Graphite Interaction $74,000/3 years

NSF Co-investigator, High School Teacher Program $150,000/3 years)

Boston University
DEPARTMENT OF PHYSICS
590 Commonwealth Ave., Boston, MA 02215

(COLLOQUIUM)

BOSTON UNIVERSITY PHYSICS COLLOQUIUM SERIES - SEMESTER I, 1984

SEPTEMBER 19	A. GUTH, MIT *"The New Inflationary Universe"*
OCTOBER 3	R. JACKIW, MIT *"Fractional Charge"*
OCTOBER 17	N. ISGUR, UNIVERSITY OF TORONTO *"Deriving Nuclear Physics from the Quark Model"*
OCTOBER 24	M. ZUCKERMANN, McGILL UNIVERSITY *"Why Some Physicists Love Lipids and Membranes"*
OCTOBER 31	J. STACHEL, BOSTON UNIVERSITY *"How Did Einstein Discover Special Relativity?"*
NOVEMBER 7	M. DRESDEN, SUNY STONY BROOK *"Macroscopic Description of Black Holes"*
NOVEMBER 28	R. WEBB, IBM WATSON RESEARCH LAB *"Flux Quantization in Normal Metals"*
DECEMBER 5	H. LISZT, NATIONAL RADIO ASTRONOMY OBSERVATORY *"The Structure of the Galactic Center"*

All Colloquia are in Room 115 of the Science Center, 590 Commonwealth Avenue, at 4:15. Refreshments are at 3:45 in the same room.

For further information contact:

So-Young Pi 353-4780
William Klein 353-2188

Please Post

COLLOQUIUM

BOSTON UNIVERSITY PHYSICS COLLOQUIUM SERIES - SEMESTER II, 1985

January 30	P. Meakin, DuPont *Growth of Fractal Aggregates* Room 115, Refreshments in the same room
February 6	R. Webb, IBM Watson Research Lab *Flux Quantitization in Normal Metals* Room 115, Refreshments in the same room
February 20	G. Field, Harvard University *Title to be announced.* Room 115, Refreshments in the same room
February 27	The Benson Chertok Lecture P. Morrison, MIT *The Stem of the Crab Nebula; A Shadowed Flow* Room 107, Refreshments in Lounge
March 20	R. Swendsen, Carnegie Mellon University *Monte Carlo Renormalization Group & Lattice Gauge Theories* Room 115, Refreshments in the same room
March 27	M. Feigenbaum, Cornell University *Chaos and Scaling* Room 115, Refreshments in the same room
April 3	A.H. Benade, Case Western Reserve University *The Evolution of Woodwinds as a Problem in Physics* Room 115, Refreshments in the same room
April 10	The Dean S. Edmonds Lecture S. Weinberg, Univ. of Texas at Austin *Title to be announced.* Room 107, Refreshments in Lounge.

All Colloquia are in the Science Center, 590 Commonwealth Avenue, at 4:15. Refreshments are at 3:45. Rooms are specified above.

For further information contact:

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SYMPOSIUM: HISTORY AND PHILOSOPHY OF SCIENCE IN THE U.S.S.R. TODAY

Friday and Saturday, March 15 and 16
Terrace Lounge, GSU*

HISTORY AND PHILOSOPHY OF PHYSICS

Times to be announced

S. R. MIKULINSKII, *Institute of the History of Science and Technology,* Moscow
M. D. AKHUNDOV, *Institute of Philosophy,* Moscow

HISTORY AND PHILOSOPHY OF BIOLOGY

I. T. FROLOV *Institute of Philosophy,* Moscow

THE ORGANIZATION OF SOVIET SCIENCE

M. S. BASTRAKOVA *Institute of Philosophy,* Moscow

DISCUSSION: MARK ADAMS, *History and Sociology of Science,* University of Pennsylvania; ROBERT S. COHEN *Physics and Philosophy,* Boston University, LOREN GRAHAM, *Philosophy of Science,* Massachusetts Institute of Technology; JOHN STACHEL, *Physics,* The Einstein Papers at Boston University; WILLIS TRUITT, *Philosophy of Technology,* University of South Florida; ALEXANDER VUCINICH, *History and Sociology of Science,* University of Pennsylvania
[In association with the Subcommission on the History, Philosophy, and Social Study of Science]

THE SNAKE IN THE GARDEN OF EDEN: REFLECTIONS ON FORERUNNERS OF LANGUAGE IN OTHER SPECIES

Tuesday, March 19
Terrace Lounge, GSU*

NORMAN GESCHWIND, *Neurology,* Harvard University and Beth Israel Hospital
Commentator: PETER MARLER, *Neurology,* Rockefeller University
Chair: JEAN BERKO GLEASON

PROTOPHYSICS: A SYMPOSIUM IN HONOR OF PAUL LORENZEN

Thursday and Friday, April 18 and 19

Chair: ROBERT S. COHEN

FOUNDATION OF GEOMETRY

Place and times to be announced

PAUL LORENZEN, University of Erlangen

CHRONOMETRY AND KINEMATICS

PETER JANICH, University of Marburg

CLASSICAL RATIONAL MECHANICS

CHRISTIAN THIEL, University of Erlangen

GRAVITATION AND ELECTROMAGNETISM

KLAUS MAINZER, University of Konstanz

SPECIAL THEORY OF RELATIVITY

HOLM TIETENS, University of Marbug

GENERAL THEORY OF RELATIVITY

RÜDIGER INHETVEEN, *Befreundet Institute,* Erlangen

Commentators: JÜRGEN EHLERS, University of Munich; PETER MITTELSTAEDT, University of Cologne; JOACHIM PFARR, University of Cologne; FRIEDRICH RAPP, Technical University of Berlin; PAUL SAGAL, New Mexico State University; ABNER SHIMONY, Boston University; JOHN STACHEL, Boston University; JUDSON WEBB, Boston University; HANS ZUCKER, Belmont, Massachusetts
[In association with the Boston University Department of Physics]