Dept. Complete

ANNUAL REPORT

of the

DEPARTMENT OF PHYSICS

Boston University

1982 - 1983

Submitted to the Dean of the College of Liberal Arts

by

George O. Zimmerman

Chairman, Department of Physics

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Chairman's Comments

Three items seem to have occupied most of the time of the Physics Department during the 1982-83 school year. The first was the planning of the new physics building to which we are scheduled to move this August. The second is the attempt to hire a good experimental solid state physicist, and the third, and somewhat associated with the second, was the budget crisis brought on by the revocation of operating funds by CLA and the associated revocation of a faculty line which was then restored after an appeal. The mood of the department has also changed, in my opinion, for the worse. The change was towards more apparent factions rather than a united department. That might be inevitable once the department grows to a certain size, and if it contains active and ambitious faculty. I hope that the factionalism will diminish in the future.

The Department continued to follow its upward trend with more vigor than before, and steps were taken to correct some of the deficiencies which we suffered under in the past. Because of the increased size of the department, and the work which a Chairman was faced with, the Department voted, and the Dean agreed, to appoint an Associate Chairman. Professor Bernard Chasan was appointed Associate Chairman, and he has assumed many of the tasks which previously were handled by the Chairman. I would like to express my gratitude to Professor Chasan for the great load he took upon himself.

A first step was taken to improve our undergraduate education by putting Prof. Franzen in charge of the elementary laboratories. Because of the large increase in our undergraduate enrollment (see graph of credit hours taught), some of our labs were overcrowded, our equiment was old and in disrepair and our write-ups were outdated. Also, because of the large teaching loads, some of the Teaching Fellows were not properly supervised. Prof. Franzen was appointed to correct those deficiencies and with the help of Mr. Gonsalves (laboratory curator), put experiments into workable condition.

The conditions of our undergraduate labs will improve greatly in the new science building which, in addition to new space and furniture, will also have $175,000 worth of new teaching instrumentation which was planned for by Prof. Franzen, Prof. Chasan and Mr. Stone.

The year was also taken up by the search for an experimental solid state physicist to be hired as a faculty member. We interviewed several worthy candidates but the hiring process was hampered by indecisions on the part of the administration. This year we started our search early but for a period of time the Dean disallowed the replacement of the position vacated by Kolk. It was not until late in the year that we received permission to offer somebody the position. By that time many of the good candidates have already received offers from other universities with funds for setting up their labs. Although we finally did receive permission to recommend some set up funds for new young faculty, that did not come soon enough to hire our first choice. Instead, we decided to offer a temporary position to a person who would be helpful in taking up part of our teaching load, and appoint that person for one year. For the future, I would recommend that both the Department and the Dean act with alacrity so that when the proper person is spotted, the Department can get prompt authorization for the position as well as set up funds. I would also recommend that once an appropriate candidate is located, the Department decide quickly to offer that person a position and not insist on looking further.

The Department was active on many other fronts as well. In publications, we have surpassed previous years and our grant awards, including the Polymer Center, which includes the grants obtained by Rothschild, were over 1.2 million dollars per year this year as compared with slightly over 1 million dollars last year, a 20% increase. Next year we already have 1.4 million dollars promised or in hand, and I expect that by year's end we might likely hit 1½ million. The Polymer Center is bringing in about 1/2 of the above grants.

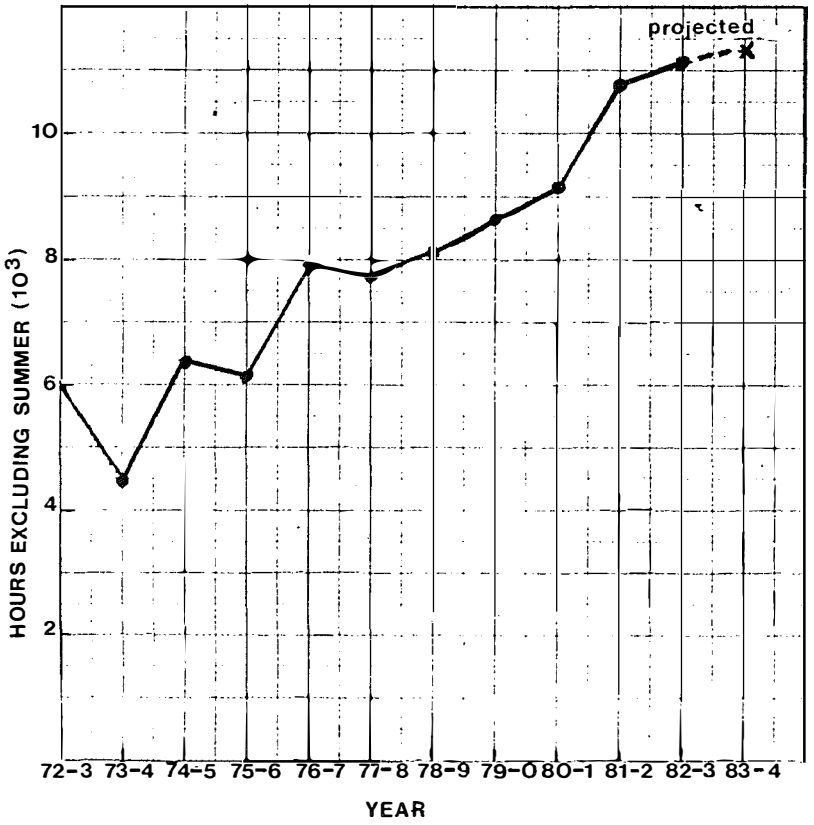
The Graduate Committee has been extremely active. It has carried out a comprehensive review of graduate courses, it has carried through the approval of the Ph.D. program in Applied Physics and the Biophysics program is nearing its completion after being in the planning stages for several years. The Undergraduate Committee initiated a program in physics with an electrical engineering minor and introduced a course, Hi Fidelity. The Comprehensive Examination Committee has undergone a reorganization whereby the members of the enlarged committee are responsible for putting together the examination. We have initiated a new committee for the planning of computer needs and the 2 special lectures went off under the aegis of the Colloquium Committee in grand style, the grander one being the Dean Edmonds Senior lecture being

delivered by Sheldon Glashow while the first Benson Chertok lecture was given by Raymond Arnold. (Both Chertok and Arnold received their Ph.D. from Boston University.)

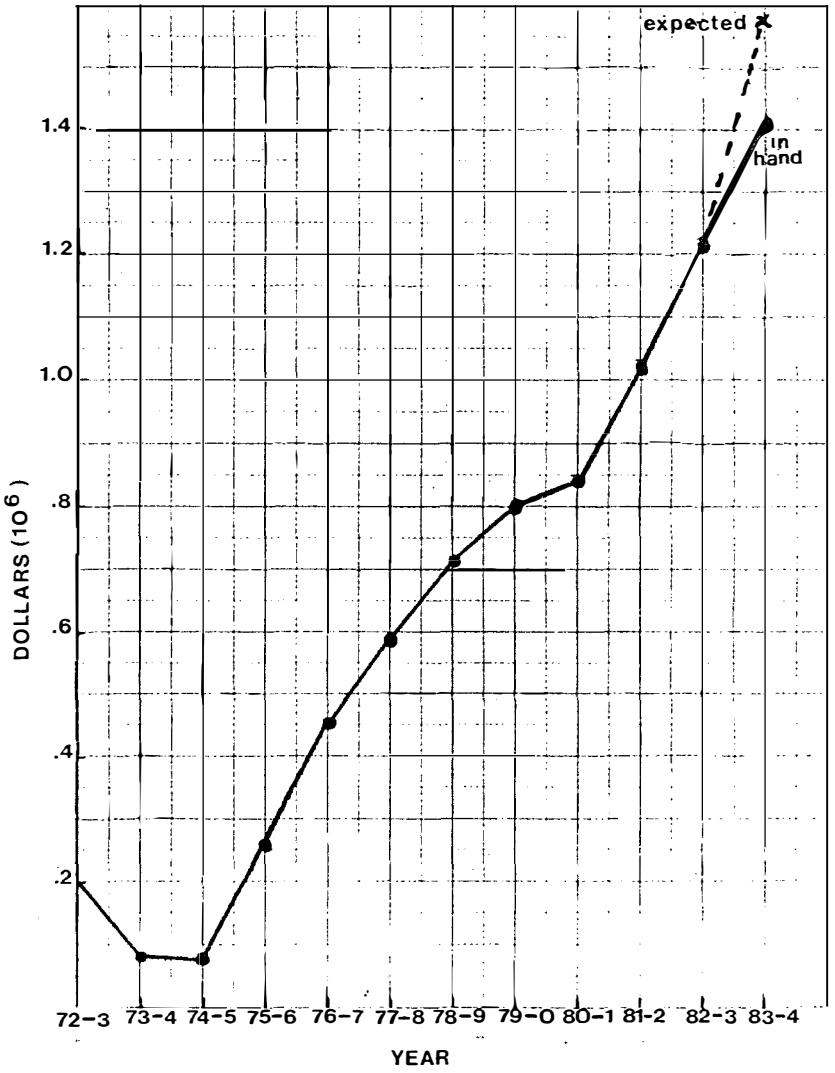
Other events were the visit of V.P. Jones to the Department to acquaint himself with the research done in physics, the resignation of the Chairman effective June 30 and the subsequent decision to convene a Chairman's Search Committee to look for both inside and outside candidates. In this I believe that the Physics Department was treated rather well by the Administration, and that further progress might be helped by the advent of a new chairman. In the meantime, Professor Bernard Chasan has agreed to become the Interim Chairman. Finally, Sheldon Glashow expressed his willingness to spend a sabbatical during 1983-84 at Boston University which, in addition to Polymer Center, the Nuclear Group, the Solid State and Low Temperature efforts, the Boston University Philosophy and History of Science, with the possible bringing of the Einstein papers to Boston University, and all the other excellent research areas in the Department should put the Boston University Physics Department on the map.

The above were mainly academic matters. We also distinguished ourselves in non academic areas. A. Helen Siegel received the Faculty Council Distinguished Service Award, Al Stone became Chairman of one of the task forces and the Department could not have functioned without the assistance of all of our staff to whom I would like to express special thank.

CREDIT HOURS TAUGHT



EXTERNAL FUNDING FOR DEPT. OF PHYSICS INCLUDING CENTER FOR POLYMER PHYSICS PER YEAR (NOT TOTAL AWARD BASIS)



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, Assistant Professor, Ph.D., University of Oregon. Joined the Department of Physics in 1979.

Bernard Chasan, Professor (Associate Chairman), 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. (LOA Sem. I)

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

Geoffrey N. Epstein, Assistant Professor, Ph.D., University of Sydney. Joined the Department of Physics in 1980.

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

Uri Haber-Schaim, Professor of Physics and Science Education, Ph.D., University of Chicago.

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.

George Kirczenow, Assistant Professor,D. Phil.Oxford University. Joined the Department of Physics in 1979.

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

Berend Kolk, Assistant Professor, Ph.D., R.U. Groningen, The Netherlands. Joined the Department of Physics in 1976.

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

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

Sidney Redner, Assistant Professor, Ph.D., Massachusetts Institute of Technology. Joined the Department of Physics in 1978.

B. Lee Roberts, Assistant 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.

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., Stevens Institute of Technology. Joined the Department of Physics in 1964. Leave of absence.

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 (Chairman), 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, Visiting Professor, Ph.D., Harvard University. 1972 (Theoretical Physics)
Doctor of Engineering, Yale University 1960

CENTER FOR THE PHILOSOPHY AND HISTORY OF SCIENCE - Research Appointments
1982 - 1983

Miriam Balaban, Research Associate, scientific communication, International Federation of Scientific Editors' Associations; Ed. Desalination, Israel

Frederic Bender, Research Associate, Philosophy, University of Hawaii at Manoa

Myriam Bienenstock, Research Associate, philosophy, Hebrew University of Jerusalem

Ernesto Bravo, Visiting Scholar, biochemistry and philosophy of science, Medical School of Havana, Cuba

Kevin Brien, Research Fellow, philosophy (Ph.D. , Boston University)

Carloalberto Cavallo, Research Fellow, psychology, University of Rome

Jean Eisenstaedt, Research Fellow, relativity physics, Institut Henri Poincaré, Paris

Ingeborg Helling, Research Fellow, sociology, University of Bielefeld, West Germany

Zhen Li, Visiting Scholar, philosophy, University of Peking

Richard Martin, Research Associate, philosophy, Northwestern University

Debra Nails, Research Fellow, philosophy

John Norton, Research Associate, theoretical physics and history of relativity theory, University of New South Wales, Australia

Katherine Platt, Research Fellow, anthropology, London School of Economics

Michael Roth, Research Fellow, sociology, University of Frankfurt, West Germany

Wolf Schäfer, Visiting Scholar, sociology, University of Frankfurt, West Germany

Richard Sens, Research Associate, psychoanalysis, Boston Psychoanalytic Institute and private practice

Armand Siegel, Research Associate, physics and physiology, (Boston University, retired)

James Walker, Research Fellow, philosophy, University of Sydney, Australia

Caroline Whitbeck, Research Associate, philosophy of medicine, MIT Center for Policy Alternatives

Wu Zhong, Research Fellow, philosophy and political science, Shaanxi Teachers University, Xian, Shaanxi Province, People's Republic of China

Martin Zwick, Research Associate, philosophy and systems science, Portland State University

Polymer Center - Research Associates

Michael Steven, Visiting Professor, Ph.D. Rutgers
Sub Krishnamurthy, Ph.D., Pittsburgh University
Mark Braiman , U. of California, Berkeley, Ph.D.
Patrick Ahl , Ph.D. Johns Hopkins

Assistant Research Professor

Izumi Nishio, Ph.D., Tokyo University

Visiting Professors

F.Y Wu, Ph.D., Northeastern University
Antonio Coniglio, Ph.D., University of Naples
Harvey Gould, Ph.D., Univ. of Cal., Berkeley

Low Temperature Physics

Kevin P. Martin, Lecturer and Research Associate, Ph.D. Ohio State University
Claudio Nicolini, Research Assistant Professor, Ph.D., Brandeis

Mössbauer

Zheng Yufang, Visiting Scholar, Zhongshan University, PRC

Physics Department Staff

Departmental Administrator	Alfred Stone
Administrative Assistant	Susan E. Savransky
Secretaries	A. Helen Siegel (Administrative Senior) Flora Greenan Susan Wiard
Laboratory Assistant	Joseph M. Gonsalves
Instrument Maker	John Sousa
Physics Demonstration Assistant	Richard A. Johns

Administrative Organization of the Dept. of Physics

George O. Zimmerman, Chairman of the Department and ex-officio member of all committees.

Bernard Chasan, Associate Chairman of the Department.

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

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

Susan E. Savransky - Administrative Assistant, in charge of Department Office.

Michael J. Naughton - Graduate Student Representative and Convener.

Graduate Committee	Booth (Chair) El-Batanouny Epstein Hellman Klein	Student E. Hoffman D. Solenberger(Faculty Meeting Observer)

Liaison - Astronomy and Physics - Chair of Graduate Committee

Undergraduate Committee	Franzen, Chair Chasan Klein Redner Roberts
Photon	Redner
Honors	Franzen
Interdisciplinary	Roberts, Chair Brooks Shimony Willis
Science Curriculum	Klein
Admissions	Rothschild, Chair Brooks Cohen Hellman Chasan
Language	Corinaldesi (Co-Chair) Kirczenow

Equity	Brooks Chasan Cohen Epstein	(Sem.I)	Kirczenow Klein Miller (Sem. II)
Colloquium	Kirczenow Miller	(Co-Chair)	
Comprehensive	Hellman, Chair Bansil El-Batanouny Kolk Pi Redner Roberts Willis		
Search	Chasan, Chair Booth Shimony Stanley		
Commonwealth	Chasan		
Premedical	Chasan Edmonds Rothschild		
International Student	Rothschild		
Safety	Miller		
Teaching Fellows	Chasan		
Building	Brooks, Chair Bansil Edmonds Epstein Franzen		
Chertok	Booth, Chair Miller		
Edmonds Sr.	Cohen, Chair Booth Brooks Miller		
Chairman's Search	Booth El-Batanouny Epstein Rothschild Dill (Chemistry) Coburn (ENG)		

Computer Planning -	Epstein (Co-Chair) El-Batanouny Brooks Miller Redner
Members Task Force for Science & Engineering Center	
Machine Shop & Stock Room	Stone El-Batanouny Bansil Edmonds
Scheduling & Teaching Facilities	Chasan
Library	Redner Corinaldesi
New Teaching Equipment	Franzen Stone Chasan Edmonds
Consulted on Particular Areas	Entire Department

COMMITTEES - 1983-84

Graduate

Zimmerman (Chair)
El-Batanouny
Hellman
Roberts
Willis

Liaison - Astronomy & Physics

Zimmerman

Undergraduate

Redner (Chair)
Brooks
Edmonds
Franzen
Roberts

Photon

Redner

Honors

Edmonds

Science Curriculum

Roberts

Admissions

Rothschild (Chair)
Miller
Hellman
Willis

Language

Corinaldesi
Kirczenow (Co-Chair)

Library

Corinaldesi
Redner (Co-Chair)

Bulletin Board

Corinaldesi

Physics Education

Franzen
Zimmerman (Co-Chair)

Colloquium

Bansil
Kirczenow (Co-Chair)

Comprehensive

Epstein (Chair)
Bansil
Franzen
Hellman
Pi
Shimony

Search

El-Batanouny (Chair)
Booth
Brooks
Stanley

Premedical

Edmonds
Franzen (Co-Chair)

International Student

Bansil

Safety

Miller

Info. Proc.

Epstein (Chair)
El-Batanouny
Kirczenow
Redner

Radio Isotope Com.

Miller

Chairman's Search Com.

Booth
El-Batanouny
Epstein
Rothschild
Dill, Chemistry

PHYSICS GRADUATE STUDENTS AND ADVISORS

STUDENTS	ADVISORS
Reina Tungare Wiafe-Akenten	Bansil
Iliopoulos Tieger	Booth
Naughton Ma Samaratunga	Brooks
Leao Scafidas	Chasan
Burdick Martini Stancioff	El-Batanouny
Willings	Edmonds
Hoffman	Epstein
Austin Lerner	Franzen
Friedman Inabata Leonard Mustaki	Hellman
Kang Maithreyan	Kirczenow
Blue Heermann Unger	Klein
Glinski Hall Quanrude	Kolk
Fleming	Miller
deArcangelis Gawlinski Kaprelian VanRiper	Redner

STUDENTS	ADVISORS
Coleman O'Brien	Roberts
Earnest Huang, X Marrero	Rothschild
Kellerman	Shimony
Morrill	Stachel
Djordjevic Hong Majid Margolina Gawlinski	Stanley
Gall Meyer	Willis
Millman Solenberger	Zimmerman

BEST TEACHING FELLOW AWARD

Earnest

RUNNERS UP

Inabata
Willings

PHYSICS MAJORS AND ADVISORS

STUDENTS	ADVISORS
Sarris, Apostolos (Fr) Russell, Donald (So) Willson, Richard (Sr)	Bansil
Dickinson, Suzanne (Jr) Hutchings, Jennifer (Fr) Phipps, David (So)	Brooks
Allen, David (So) Beiswenger, John (Fr) deJesus, Stephen (Jr) Huffnagle, William (Fr)	Chasan
Boesch, Richard (Jr) Brodbar, Debbie (Fr) Reilly, Kevin (Jr) Rettig, John (Sr)	El-Batanouny
Duke, Christine (Fr) Monteiro, David (So) Piasati, Fred (Fr)	Epstein
French, Paul (Sr) Herniter, Marc (Sr) Kisler, Yana (Sr) Larcinese, Alfonso (Jr) Osouski, Lynn (Fr) Taitel, Janice (Jr) Tharenos, Michael (Sr)	Franzen
Avello, Miriam (Fr) Braccio, Peter (So) Feldman, Geoffrey (Jr) Stafilakis, Stefan (So)	Hellman
Berger, Theodore (Fr) Longstaff, Thomas (Sr) Motamed, Farzin (Fr)	Kirczenow
Jessup, Kimberly (So) Lumetta, James (Sr) Walsh, Brian (So)	Kolk
Duke, Christine (Fr) Lavalla, Bryon (Fr) Morales, Hector (So)	Klein
Breen, Jacqueline (Fr) Bronson, Steven (Fr) Freiheit, Keith (Fr) Mariano, Chris (Fr)	Miller

STUDENTS	ADVISORS
Davis, Emery (Sr) Plast, Pauline (Fr) Silber, Laura (Fr) Watson, Marcell (Fr)	Redner
Chiaramonte, Eugene (Fr) Melzak, Jeffrey (Jr) Spence, Harlan (Sr) Williamson, Brent (So)	Roberts
Glass, Steven (Fr) Shea, Stephen (Fr) Wiggins, Graham (Sr)	Rothschild
Cachelin, Arnold (So) Hamerski, Joseph (So)	Shimony

List of Degree Recipients

Ph.D. Degree	Advisor
Dieter Heermann	Klein
Alla Margolina	Stanley
Steven Millman	Zimmerman/Kirczenow

M.A. Degree in Physics

Charles Johnson Blue, Jr.	Klein
Robert Lloyd Friedman	Hellman
David Brooks Hall	Kolk
Yoriko Inabata	Hellman
Peter L. Kellerman	Shimony
Ronald Duane Quanrude	Kolk
Juan Carlos Reina	Bansil

B.A. Degree in Physics

Paul A. French, Magna Cum Laude	Franzen
Marc E. Herniter, Cum Laude	Franzen
Kevin Michael Reilly	El-Batanouny

B.A. Degree in Physics, Minor in Math

Yanina Kisler, Magna Cum Laude (Distinction in Physics)	Franzen

B.A. Degree in Physics & Astronomy

Brian Lee Walter

B.A. Degree in Physics & Astronomy & Minor in Math

Harlan E. Spence, Magna Cum Laude (Distinction in Astronomy)

B.A. Degree in Physics, Minor in Chemistry and Minor in Math

John E. Rettig	El-Batanouny

B.A. Degree in Computer Science and Physics

Michael John Tharenos, Cum Laude	Franzen

B.A. Degree in Geology and Physics

Margarita Hernandez	Klein

B.A. Degree in Mathematics and Physics

Thomas A. Longstaff, Cum Laude	Kirczenow
James Thomas Lumetta , Magna Cum Laude (with Distinction in Physics)	Kolk
Richard Edward Willson, Magna Cum Laude	Bansil

Courses Offered During the 1982-83 School Year

Semester I

Undergraduate

College	Course #	Course Title	Instructor	#Enrolled
UNI	ID 539	Sci.,Tech. & Soc.	Cohen	27
CLA	PY 101	Physical Science	Cohen	16
*CLA	PY 105	Elem. Physics I	Booth	131
*MET	PY 105	Elem. Physics I	Kirczenow	21
†CLA	PY 115	Phys. Life Science I	Hellman	99
*CLA	PY 181	Physics I	Rothschild	52
*CLA	PY 211A1	Gen. Phys. I	Corinaldesi	239
*CLA	PY 211B1	Gen. Phys. I	Booth	88
*CLA	PY 211C1	Gen. Phys. I	Corinaldesi	117
*CLA	PY 212A1	Gen. Phys. II	Zimmerman	175
*CLA	PY 212B1	Gen. Phys. II	Brooks	53
CLA	PY 231	Phys. in Music	Roberts	22
*CLA	PY 251	Princ. of Phys. I	Kolk	155
*CLA	PY 313	Elem. Mod. Phys.	El-Batanouny	53
*CLA	PY 353	Vibrations, Waves	Martin	79
CLA	PY 401E2	Sr. Indep. Work	Epstein	1
CLA	PY 401F1	Sr. Indep. Work	Franzen	2
CLA	PY 403	Meth. Theor. Phys.	Pi	15
†CLA	PY 405	El. Mag.Fld. Waves	Redner	87
CLA	PY 421	Solid State	Brooks	5
CLA	PY 451	Quantum Phys. I	Chasan	10
CLA	PY 492B2	D.S. Seniors	Booth	1
CLA	PY 491B3	D.S. Seniors	Brooks	1
				1449

* Lab + Disc.	1163
† Non Lab but Disc.	186
	1349

Graduate and Undergraduate

College	Course#	Course Title	Instructor	Enrolled
CLA	PY 503	Math Physics I	Klein	8
CLA	PY 505	Class. Mechanics	Miller	5
CLA	PY 507	Quantum Mech. I	Epstein	8
CLA	PY 510	Electromag. II	Willis	14
CLA	PY 512	Stat. Phys/Therm I	Willis	2
CLA	PY 541	Advanced Lab I	Franzen	8
				45

Graduate

GRS	PY 711	Adv. Quant. Th. I	Hellman	10
GRS	PY 715	Solid St. Phys. II	Kirczenow	9
GRS	PY 717	Spec. Th. Relat.	Shimony	3
GRS	PY 721	Biophysics	Bansil	6
GRS	PY 895W1	S Sp Tp Th Phys. I	Willis	2
GRS	PY 901S4	Res. in Phys. I	Shimony	1
GRS	PY 909H2	D.S. in Phys. I	Hellman	1
GRS	PY 909R3	D.S. in Phys. I	Bansil	1
GRS	PY 909S2	D.S. in Phys. I	Stanley	2
				35

Grand Total 1529

Courses Offered During the 1982-83 School Year

Semester II

Undergraduate

College	Course#	Course Title	Instructor	#Enrolled
*CLA	PY 106	Elem. Physics II	Kirczenow	104
*MET	PY 106	Elem. Physics II	Miller	18
†CLA	PY 118	Physics Life Science II	Hellman	79
CLA	PY 132	How Things Work	Edmonds	18
*CLA	PY 182	Physics II	Chasan	52
*CLA	PY 211A1	General Physics I	El-Batanouny	117
*CLA	PY 211B1	General Physics I	Booth	61
*CLA	PY 212A1	General Physics II	Edmonds	220
*CLA	PY 212B1	General Physics II	Corinaldesi	100
*CLA	PY 212C1	General Physics II	Corinaldesi	121
CLA	PY 238	Nuclear Weapons	Shimony	9
*CLA	PY 252	Principles of Physics II	Kolk	77
*CLA	PY 313	Elem. Modern Physics	Roberts	123
*CLA	PY 354	Modern Physics	Roberts	37
CLA	PY 402E2	Sr. Indep. Work	Epstein	1
CLA	PY 402F1	Sr. Indep. Work	Franzen	2
CLA	PY 406	Elem.Magn.Fld.&Waves	Pi	9
CLA	PY 408	Inter. Mech.	Miller	14
CLA	PY 410	Therm/Stat Phys	Redner	15
CLA	PY 451	Quantum Physics II	El-Batanouny	9
CLA	PY 491B2	D.S. Srs.	Booth	1
CLA	PY 492E3	D.S. Srs.	El-Batanouny	1
CLA	PY 492C2	D.S. Srs.	Cohen	1
CLA	ID 124	Science & Religion	Cohen	27
				1216

*Lab & Disc. 1030
†Non Lab but Disc. 79

Graduate and Undergraduate

College	Course#	Course Title	Instructor	#Enrolled
CLA	PY 508	Quantum Mech. II	Epstein	11
CLA	PY 509	Electromagnetic I	Willis	7
CLA	PY 511	Stat Physics/Therm. I	Yildiz	7
CLA	PY 541	Adv. Lab	Franzen	4
				29

Graduate

GRS	PY 704	Adv. Math. Physics	Klein	4
GRS	PY 712	Adv. Quantum Th. II	Hellman	6
GRS	PY 718	Gen. Th. Relativity	Brecher	3
GRS	PY 719	Low Temp. Physics	Martin	10
GRS	PY 818	Many Body Top.Sol.St.Phys.	Willis	6
GRS	PY 902B3	Res. in Physics	Brooks	1
GRS	PY 902R3	Res. in Physics	Rothschild	1
GRS	PY 902S4	Res. in Physics	Shimony	1
GRS	PY 910S1	D.S. in Physics	Stanley	1
GRS	PY 910C1	D.S. in Physics	Chasan	2
				35

Grand Total 1280

Summer Session Sem. I

CLA	PY 105S	Elem. Physics I	Hellman	22
CLA	PY 211S	Gen. Physics I	Hellman	44
CLA	PY 313S	Elem. Modern Physics	Roberts	21
CLA	PY 491H2	D.S.	Hellman	4
				91

Summer Session Sem. II

CLA	PY 106S	Elem. Physics II	Prasad	20
CLA	PY 212S	Gen. Physics II	Prasad	50
				70

Grant Activity

Total Grant	# Years	82-83	83-84	Agency	P.I.
$348,000	3	$130,000	$250,000	NSF	Miller, Roberts Booth
162,000	3	60,000		NSF	Miller, Roberts
18,000	1	18,000		Res. Corp.	El-Batanouny
(Several applications pending for DOE, ONR)					
65,000	2	29,000	34,000	DOE	Epstein
205,000	3	71,000	93,000	DOE	Jensen
43,000	3	13,000	18,000	NSF	Kirczenow
149,000	2		70,000	DOE	
120,000	2		56,000	DOE	Pi
6,000	1	6,000		NSF	Shimony
65,000	1	22,000	Applied	DOE	Yildiz
30,000	2	10,000		NSF	Kolk
40,000	1	40,000		M.I.T.	Brooks
175,000	3	60,000	57,000	NSF	Brooks/Zimmerman
202,000	2	85,000	117,000	AFOSR	Zimmerman
375,000	3	140,000	132,000	NSF,AHA,NATO,CTF	Rothschild
123,000	2	62,000	62,000	NSF	
450,000	3	115,000	120,000	ONR	Stanley/Bansil
113,000	3	40,000	40,000	NSF	Stanley/Bansil
600,000	6	80,000	80,000	NIH	Stanley, Rothschild, Bansil
40,000	3	15,000	15,000	NSF	Stanley, Bansil, Klein, Redner
400,000	3	120,000	132,000	ARO	Klein, Redner, Stanley
300,000	3	100,000	100,000	NSF	Bansil, Redner, Stanley
5,000	1		5,000	Gillette Corp.	Bansil
30,000	1		30,000	NSF	Klein
4,064,000		1,216,000	1,411,000		

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Physics Colloquia

Organized by Profs. Kirczenow and Miller

Sept. 22, 1982	C. Austen Angell - Purdue U. "On the consequences of being Liquid Tetrahedrally Coordinated and under pressure."
Sept. 29, 1982	M.S. Dresselhaus - M.I.T. "The Physics of Intercalated Graphite".
Oct. 6, 1982	G. Epstein - B.U. "An Introduction to Intermediate Energy Physics".
Oct. 13, 1982	J.W. Gadzuk - National Bureau of Standards "Hindered Rotors, Infinite Cones and Molecular Processes at Surfaces".
Oct. 20, 1982	A. Yildiz - U.N.H. "Why Finite Temperature Field Theories?"
Nov. 3, 1982	G. Rathjens - M.I.T. " Nuclear Weapons - Physics and Strategy".
Nov. 10, 1982	R. Servranckx - U. of Saskatchewan "Some Considerations of Storage Rings".
Nov. 17, 1982	R.A. Watson - Brookhaven Lab "Electronegativity and Charge Transfer in Compounds and Alloys".
Dec. 1, 1982	D. Nelson - Harvard U. "Order and Frustration in Liquids and Glasses".
Dec. 8, 1982	S.H. Chen - M.I.T. "Structure, Interaction and Critical Phenomena in Micellas and Microemulsion Systems".
Jan. 26, 1983	R. Brower - U.C. Santa Cruz "Correlated Quark Trajectories for Lattice QCD".
Feb. 2, 1983	G. Kirczenow - B.U. "Theoretical Models of Staging and Island Structures in Intercalated Graphites".
Feb. 16, 1983	J. Thomas - M.I.T. "Quantum Diffractive Collisions in 2-level, Radiators".
Feb. 23, 1983	L. Pondrum - U. Wisconsin "Baryon Magnetic Moments "
Mar. 2, 1983	R. Bansil - B.U. "Physics of Gels".
Mar. 16, 1983	R. Parks - Polytechnic Institute of New York "f-electron instabilities in the solid state".
Mar. 23, 1983	S. Glashow, Harvard U. "Underground Physics". Dean S. Edmonds Sr. Lecture

Mar. 30, 1983	D. Mermin - Cornell U. "The Cholesteric Blue Phase: An Adventure in Mean Field Theory".
Apr. 6, 1983	J. Miller - B.U. "Measurement of the Σ^- magnetic moment using exotic atoms".
Apr. 13, 1983	R. Arnold - SLAC "High Energy Electron Scattering from Light Nucleii". Benson Chertok Memorial Lecture
Apr. 20, 1983	E. Schatzman - U. of Nice "The Physics of White Dwarfs".
Apr. 27, 1983	R. Hallock - U. of Mass. Amherst "Persistent Currents and two-dimensional Behavior in Superfluid Films".

BUCPHS - Director, Robert S. Cohen
Boston Colloquia for the Philosophy of Science.

The following colloquia were of direct relevance to the Department of Physics.

Oct. 26, 1982	Michael L.G. Redhead, History and Philosophy of Science Chelsea College, University of London "The Quantum View of the World" Commentator: Abner Shimony, Philosophy and Physics, B.U. Chair: Kenneth Brecher
Dec. 7, 1982	Michael Hoskin, History of Science, Churchill College, Cambridge "The Riddle of the Nebulae". Commentator: S.S. Schweber, Physics, Brandeis University Chair: Kenneth Brecher
Mar. 25, 1983	Symposium: The Reception of the Theory of Relativity Chair: John Stachel "Is it possible to popularize relativity theory?" A Case Study: France in the early 1920s Michel Biezunski, History of Science, University of Paris
Apr. 5, 1983	John Worrall, Philosophy, Logic, and Scientific Method, London School of Economics and Political Science "Hypotheses and Mr. Newton". Commentator: Laurence Breiner, English, B.U. Chair: Robert S. Cohen
Apr. 12, 1982	Alan L. Mackay, Crystallography, Birkbeck College, University of London "From the Axioms of Lucretius Toward a Philosophy of Spatial Structure". Commentator: Cecil Schneer, Geology, U. of New Hampshire Chair: Kenneth Brecher

Center for Polymer Studies: Seminars and Colloquia

March 12, 1982: seminar...Dr. Alan C. Brown
(Boston University)
"Mean field theory of freezing"

March 15, 1982: seminar...Professor Dietrich Stauffer
(Univ. of Cologne)
"Monte Carlo simulation of VERY large systems"

March 22, 1982: seminar...Professor S. L. Hsu
(U. Mass, Amherst)
"Structural characterization of semi-crystalline polymers by Raman spectroscopy"

April 14, 1982: seminar...Professor Ray Mountain
(Nat'l Bureau of Standards)
"Dynamic molecular studies of supercooled rubidium"

May 17, 1982: lecture...Professor Bernard Souillard
(Ecole Polytechnique, PARIS)
"Exact results in percolation models"

May 18, 1982: lecture...Professor Bernard Souillard
(Ecole Polytechnique, PARIS)
"Introduction to localization theory in disordered systems"

May 24, 1982: lecture...Dr. Alex Müller
(IBM Zurich and ETH)
"Lifshitz point in $RbCaF_3$ and critical point in $SrTiO_3$"

May 28, 1982: seminar...Dr. Eberhard Leuthhesser
(M.I.T.)
"Diffusion and Localization in a Classical Random Potential"

June 7, 1982: seminar...Dr. Michael J. Stephen
(Harvard Univ. and Rutgers Univ.)
"Diffusion in One Dimension"

June 14, 1982: lecture...Professor David Chandler
(Univ. of Illinois and MIT)
"Physics in liquids: from van der Waals to Feynman revisited"

June 18, 1982: lecture...Professor Mal Kalos
(Courant Institute)
"Computer Simulation of Phase Segragation"

June 21, 1982: lecture...Professor Etienne Guyon
(ESPCI and University of Paris)
"Granular Matter and Porous Media"

June 25, 1982: lecture...Professor Paul Rujan
(University of Budapest)
"Order and Disorder Lines in Systems with Competing Interactions"

June 28, 1982: lecture...Professor Amnon Aharony
(Tel-Aviv University)
"Fractal Aspects of the Percolation Problem"

Center for Polymer Studies: Seminars and Colloquia

July 2, 1982: lecture...Professor Boris Shapiro
(Technion, Haifa, Israel)
"Localization in disordered systems"

July 9, 1982: lecture...S. Ross-Murphy
(Unilever Corporation, U.K.)
"Elasticity in polymer networks"

July 9, 1982: lecture...L. Léger
(College de France, Paris)
"Critical exponents of gelation"

July 9, 1982: lecture...A. Holland-Moritz
(U. of Cologne)
"Infrared spectroscopy of polymers"

July 22, 1982: seminar...Erik Geissler
(University of Savoie)
"Collective diffusion in deswelling gels"

July 26, 1982: seminar...Karel Dusek
(Institute of Macromolecular Chemistry, Czeckoslovak Acad. of Sciences)
"Crosslinking and structure of polymer networks"

July 30, 1982: seminar...Walter Burchard
(University of Freiburg)
"Characterization of epoxide resins near the gel point"

August 2, 1982: seminar...Per Rikvold
(University of Oslo, Oslo, Norway)
"A model of gelation kinetics"

August 4, 1982: seminar...Alastair Bruce
(University of Edinborough, Scotland)
"Droplet theory of low-dimensional Ising systems"

September 13, 1982: seminar...Jacques des Cloiseaux
(Centre d'Etude Nucleaire (CEN), Saclay, France)
"A Reformulation of the Schrodinger and Dirac Equations in Terms of Local Densities and Electromagnetic Fields"

September 20, 1982: seminar...Yuval Gefen
(Tel-Aviv University)
"Percolation and Fractals with Application to Anomalous Dielectric and Optical Properties"

September 22, 1982: colloquium...C. Austen Angell
(Purdue University)
"On the Consequences of Being Liquid, Tetrahedrally Coordinated, and Under Pressure: Aquaphysics, Geophysics and Metaphyics"

October 4, 1982: seminar...Izumi Nishio
(Boston University)
"Critical Density Fluctuations Within a Single Polymer Chain"

Center for Polymer Studies: Seminars and Colloquia

October 8, 1982: seminar...Alfons Geiger
(University of Aachen, W. Germany)
"Informal Introduction to Molecular Dynamics"

October 18, 1982: seminar...Peter Nightingale
(University of Delft, Delft, The Netherlands)
"Finite-size scaling and renormalization"

October 25, 1982: seminar...Dale Schaeffer
(Sandia Laboratories)
"Structure of Silica Gels"

October 27, 1982: colloquium...A.D.J. Haymet
(Harvard University)
"Physics and Chemistry of Freezing"

November 8, 1982: seminar...David Nicoli
(University of California Santa Barbara)
"Light Scattering from Micelles and Microemulsions"

December 3, 1982: seminar...Elliott W. Montroll
(Institute for Fundamental Physics, University of Maryland)
"The Wonderful World of Random Walks"

December 13, 1982: seminar...John Deutch
(M.I.T.)
"Diffusion-controlled colloidal growth rate of non-spherical clusters"

December 14, 1982: seminar...Izume Nishio
(Boston University)
"Critical density fluctuations in a single polymer chain"

January 4, 1983: seminar...Hans Herrmann
(CEN Saclay, Paris)
"Phenomenological Renormalization Group"

January 7, 1983: seminar...Hans Herrmann
(CEN Saclay, Paris)
"Computational procedures in renormalization calculations"

January 17, 1983: seminar...Constantino Tsallis
(C.B.P.F. Rio de Janeiro)
"Spin-Peierls instabilities in quasi-one-dimensional systems"

January 24, 1983: seminar...Paul W. Schmidt
(University of Missouri)
"Experiments on correction to scaling near critical points"

January 31, 1983: seminar...Paul Meakin
(Du Pont)
"Fractal structures from diffusion controlled growth"

February 7, 1983: seminar...Shlomo Havlin
(Bar-Ilan University, Ramat-gan, Israel)
"Diffusion on fractals and percolation clusters"

February 8, 1983: seminar...Shlomo Havlin
(Bar-Ilan University, Ramat-gan, Israel)
"Fractal dimension of polymer chains"

February 14, 1983: seminar...Hy Hartman
(MIT)
"The origin of life and spin glasses"

February 25, 1983: seminar...Sub Krishnamurthy
(Boston University)
"Nucleation and growth in polymer solutions"

February 28, 1983: seminar...Michael J. Stephen
(Boston University & Rutgers University)
"Phonons in disordered media"

March 7, 1983: seminar...David Wilkinson
(Schlumberger-Doll Research Center)
"Invasion percolation"

March 11, 1983: seminar...Jörg Bilgram
(ETH Zurich)
"Metastable phenomena associated with the liquid/solid transition: Experiments near t

March 14, 1983: seminar...Hal Snyder
(DuPont Central Research Laboratory)
"Dynamical aspects of phase transitions"

March 21, 1983 seminar...Izumi Nishio
(Boston University)
"Experimental determination of critical exponents near the gelation threshold"

March 24, 1983: seminar...Peter Nightingale
(University of Washington)
"Wetting phenomena in surface adsorption"

March 28, 1983 seminar...Walther Burchard
(University of Frieburg, W. Germany)
"Critical branching: The essential assumption in the generalized Flory Stockmayer th

March 29, 1983 seminar...Mustansir Barma
(Tata Institute of Fundamental Research)
"Directed percolation and diffusion"

March 31, 1983: seminar...Alan Perelson
(Los Alamos Laboratories, New Mexico))
"Applications of gels to biophysics problems"

April 4, 1983: seminar...Edouard Brézin
(Harvard University and Saclay, France)
"Critical wetting in three dimensions"

April 7, 1983: seminar...Gary Grest
(Exxon)
"Kinetics of ordering in two dimensions"

Center for Polymer Studies: Seminars and Colloquia

April 8, 1983: seminar...T.A. Witten, Jr.
(Exxon)
"Mean field theory of diffusion limited aggregation"

April 28, 1983: seminar...Jennifer and Lincoln Chayes
(Princeton University)
"Percolation transition in a system of random plaquettes"

May 2, 1983: seminar...Richard Brower
(Harvard University & UC Santa Cruz)
"Geometric models for dendritic instabilities"

May 6, 1983: seminar...Kurt Binder
(KFA Jülich, W. Germany)
"Spinodals and unmixing in polymer mixtures"

May 9, 1983: seminar...D. Kurtze
(Clarkson College)
"The Lee-Yang edge singularity for ferromagnetic models"

May 20, 1983: seminar...John Chalupa
(Northeastern University)
"Bootstrap Percolation"

May 27, 1983: seminar...Gerard Vichniac
(M.I.T.)
Simulating physics with cellular automata"

June 10, 1983: seminar...P.J. Reynolds
(Lawrence Berkeley Laboratories)
"Quantum Monte Carlo"

June 14, 1983: seminar...Vladimir Privman
(Cornell University and Technion, Haifa, Israel)
"Series expansions analysis of corrections to scaling..."

June 15, 1983: seminar...Vladimir Privman
(Cornell University and Technion, Haifa,Israel)
"First-order phase transitions--finite size effects..."

June 27, 1983: seminar...Joel Koplik
(Schlumberger-Doll Research Center)
"Percolation and capillary fluid displacement"

Report of the Physics Graduate Committee

Members: E. Booth (Chair), M. El-Batanouny, G. Epstein, E. Hoffman (student), W. Hellman and W. Klein

1. The Committee made a survey of incomplete (I) grades given to Graduate Students and requested each student to explain how the I would be removed. The breakdown by courses was as follows:

   504 (2); 505 (1); 508 (2); 509 (2); 541 (5); 711 (1); 712 (5); 716 (4); 718 (2); 721 (1); 805 (1); 818 (3); 892 (1); 896 (1); 901 (1); 902 (1); 909 (1); 910 (1).

   The survey shows that the practice of giving I grades is widespread and suggests that professors be urged to restrain their generous impulses. We hope that the 83-84 Committee will follow up on the progress of the removal of Incomplete grades.

2. A major effort to establish the content of the 500 level courses was undertaken as described in the minutes of our Oct. 13th meeting, excerpted below.

   The Graduate Committee is concerned with some perceived problems involving student preparation, course content, student performance on the Comprehensive Examination and finally the overall breadth and depth of our graduate students' preparation for their profession.

   We believe that there are often gaps in the undergraduate background of our students. We think that there is occasional disparity between course descriptions in the catalogue and the material actually covered. We know that different professors sometimes teach rather different material for the same course. We know that it is common to cover lower level material in a course to remedy the gaps in the background of a particular set of students. We also know that the failure rate on the comprehensives is fairly high. We suppose that this may reflect either inadequate preparation by the students or the requirement of physics outside the normal range of topics which one might assume to be appropriate to the M.A. level.

   We agreed that an attempt should be made to rectify these perceived problems. We would like to create a situation in which both faculty and students have a reasonably clear picture of basic core topics at the M.A. level which the students will be required to know, not just to pass an exam but because the material is a prerequisite to higher level (700 level) courses, and is an adequate set of tools for a person who terminates the program at that point. We hope that a clear perception of the extent and depth of this body of knowledge will help the student accept responsibility for acquiring that knowledge and will encourage the Faculty to impart it.

   Pending the approval of the Faculty, the Committee proposes to proceed as follows:

   a) Obtain an extended set of syllabi for all basic 500 level courses. Identify a set of topics considered to be basic. Propose a set of core topics in each course which the student may expect to meet. This material should occupy about 2/3 of the course time.

b) Bring these core descriptions to the Faculty for debate, revision and eventual approval.

c) Publish the core descriptions and bring the catalogue copy into agreement with the descriptions.

d) Review 400 and 500 level courses to reduce repetition and thus create more time to increase breadth and depth.

e) We propose that the Comprehensive exams be largely (perhaps 2/3) concerned with this core material.

f) We propose that students who need to take courses as a preparation for 500 level course be asked to take them, even though this may delay their taking of the Comprehensive Exam. That is, we would like to set up our undergraduate level course as a standard which every graduate student is expected to meet.

The Committee carried out steps (a) and (b), with no objections received from the faculty as to the final wording of the core material. This material is attached below. It clearly needs some editing in some cases and expansion in other cases, but it serves the required purpose.

The core material for the 500 level courses is described below. This material is required for a basic understanding of physics and is a prerequisite for many of the 700 level courses. The instructor will deal adequately with the topics listed below. In addition, the course is expected to contain non-core topics at the discretion of the instructor -- typically 70% of the material is described as core and 30% as discretionary.

PY 403 Mathematical Physics: Vector analysis; curvilinear coordinates; linear algebra; infinite series; ordinary D.E.'s; special functions; Sturm-Liouville and orthogonal functions.

PY 503 Mathematical Physics: Introduction to complex variables; Fourier series; integral transforms; integral equations; ordinary differential equations with integral transforms.

PY 505 Classical Mechanics: Contact transformations; Lagrangian and Hamiltonian formalisms; the Kepler problem; rigid body motion; canonical transformations; Poisson brackets; Hamilton-Jacoby theory; coupled harmonic oscillators and small oscillations; continuous medium.

PY 507, 508 Quantum Mechanics: Quantum mechanical operators; eigenfunction equations; Dirac notation, role of matrices; the Superposition Principle, amplitudes, completeness; hermiticity; Hamiltonian; Eigenvalue Spectra -- discrete, non-degenerate/continuous; degenerate; orthonormal sets of vectors; position and momentum operators and eigenstates, Dirac delta function; coordinate space wave function; non-local potentials, local potentials; wave packets; commutators; Heisenberg uncertainty principle and the minimum wave packet.One-dimensional problems; barrier, well; probability current, continuity equation; Parity, time reversal, simple harmonic oscillator in one dimension, raising and lowering operators; angular momentum, commutators, representation in polar coordinates, eigenvalues and eigenvectors; rotations and rotation operator.Central forces; center-of-mass separation, 3-D square well, H-atom.Unitary transformations; displacements, rotations, Schrodinger

picture, Heisenberg picture.Potential scattering; wave packet description (fully time dependent), cross section, Born approximation, Born series, scattering amplitude. Partial wave expansion and phase shifts, optical theorem. Addition of angular momentum, Clebsch-Gordan coefficients. Intrinsic spin -- spin ½, spin 1; Pauli matrices. Stationary state perturbation theory, Rayleigh-Schrodinger; degenerate perturbation theory; time dependent perturbation theory; Fermi Golden Rule; interpretation of $\Delta E \Delta t \geq \hbar$ uncertainty principle; interaction of matter with electromagnetic fields; external E, B fields; photons; Atomic transitions -- electric dipole, magnetic dipole. Rotations and irreducible spherical tensors; Wigner-Eckart theorem. Identical particles -- fermions and bosons; projection operators; scattering of spin ½, spin 1 particles; polarization, coulomb scattering, variational principles.

PY 509 Electromagnetic Theory: Structure of Maxwell's Equation -- identities, conservation of charge, uniqueness of solutions; electrostatics boundary value problems; magnetostatics boundary value problems; Maxwell's equation in matter definition and discussion of ε, μ, P, M, etc.; conservation laws; plane waves, wave propagation; reflection, refraction and diffraction; wave guides.

PY 510 Electromagnetic Theory: Relativity: (a) Lorentz transformations, tensor analysis, covariant form of E & M, conservation laws, (b) elementary Green's function treatment of the scalar wave equation; Radiation Theory: (a) electric dipole, electric quadrupole and magnetic dipole, (b) Thomson Scattering, (c) Raleigh scattering; absorption and emission of radiation in matter; dispersion relations; radiation by moving charges, chapter 14 of Jackson, synchrotron radiation; scattering of radiation by particles, cylinders.

*PY 511 Statistical Mechanics and Thermodynamics I: Statistical description of a system of particles -- micro/macro states, concept of ensemble, equal a priori probabilities, relation between statistical mechanics and thermodynamics, Boltzmann relation, thermal equilibrium (level of Reif); ideal gas -- calculation of entropy from Boltzmann relation and counting of total number of states, entropy of mixing; Thermodynamics -- definition of thermodynamic quantities, different types of processes, work and heat, ideal gas thermodynamics, fundamental equation and extensive-intensive variables/Euler equation/Gibbs-Duhem relationship, free energy functions, physical meanings of F, G, H and U, Maxwell relations; Microcanonical Ensemble/phase space -- Liouville theorem, definition of microcanonical ensemble, examples of microcanonical ensemble (ideal gas and harmonic oscillator, Pathria level); Canonical Ensemble -- thermal equilibrium, derivation of canonical from microcanonical and also by method of most probable values, energy fluctuations in canonical ensemble, thermodynamics for canonical ensemble, examples (ideal gas/classical and quantum oscillators/two state system-statistics of paramagnetism/other examples of two state system/ideal gas in gravitational field); Grand Canonical Ensemble -- equilibrium between systems and particle reservoirs, density fluctuations in grand canonical ensemble, thermodynamics from grand canonical ensembles, examples (ideal gas/two phases in equilibrium); Quantum Statistical Mechanics -- basic principles, density matrix; Statistics of Real Gases -- Bose, Einstein, Fermi, Dirac and Maxwell-Boltzmann statistics, evaluation of microstates, grand canonical partition function, statistics of occupation numbers (dispersion in n_ε); Ideal Bose Systems -- thermodynamics of ideal Bose gas, black body radiation; Ideal Fermi System -- ideal gas thermodynamics for fermions, free electron gas in a metal (Fermi and energy/density of states, etc.).

*PY 512 Statistical Mechanics: Phase Transitions -- (a) thermodynamic theory of phase transitions, (b) mean field theories (Landau theory), (c) Ising model/ transfer matrix; Fluctuations -- (a) equilibrium fluctuations, (b) instabilities, (c) fluctuation dissipation theories; Elementary Kinetic Theory -- (a) mean free path approach, (b) Boltzmann equation, (c) Chapman Enskog solutions/ transport coefficients and hydrodynamics; Stochastic Mathematics -- (a) probability theory, (b) Markoff processes, (c) Gaussian processes, (d) integral and differential equations for Markoff processes; Brownian Motion -- (a) Langevin equations, (b) Fokker-Planck equation, (c) Smolukowski equation, (d) escape over a barrier.

*Note: 511, 512 constitutes an integrated two semester course in Stat. Mech. and Thermo. Thus, it may sometimes be necessary to do some of the topics listed in 511 in the second semester, i.e. 512.

Items (d) and (e) have yet to be brought before the Faculty for approval.

3. The subject of the failures by our students of the Written Comprehensive examinations surfaced often in our meetings. While the comparative success of our students in the May 1983 Comprehensive is encouraging, most of the Committee felt that the majority of our students cannot be rushed through the Written Comprehensives in the 1½ - 2 year period that we hoped for when we tried to tailor our course structure and examination offerings to make it possible. The Committee feels that it is time (1983-84) to make a serious study of the success of the experiment.

   Relevant to this subject, the Committee felt that every effort should be made to induce students to take both PY 511 and PY 512, since a good knowledge of Thermodynamics and Statistical Mechanics is fundamental to all fields of Physics. We stopped short of recommending that PY 512 be required, hoping that the goal can be accomplished by the action of the Faculty Advisors.

4. The course rotation scheme was worked out through 1985-86 and was accepted by the faculty. It was accepted as shown below.

   83-84

   GRS PY 711 Adv. Quantum Theory I
   713 Nuclear Physics
   716 Intermediate Energy Physics
   714 Solid State Physics I
   707 Statistical Mechanics
   805 Elements of Quantum Field Theory
   817 Symmetry in Solid State Physics
   820 Advanced Quantum Field Theory

   84-85

   711 Adv. Quantum Theory I
   715 Solid State Physics II
   717 Special Theory of Relativity
   718 General Theory of Relativity
   719 Low Temperature Physics
   705 Plasma Physics
   721 Biophysics

85-86

711 Adv. Quantum Theory I
714 Solid State Physics I
713 Nuclear Physics
716 Intermediate Energy Physics
707 Statistical Mechanics
807 Theory of Elementary Particles
818 Many Body Topics in Solid State Physics

5) The document "Formal Requirements for Graduate Students"was reviewed and a number of changes were proposed. These were distributed to the Faculty for their information after the end of classes, but no action is anticipated before the Fall Semester.

6) We note that the press of other business in the regular Tuesday luncheon meetings often delayed Faculty consideration of Graduate Committee proposals for several weeks.

7) The Committee exercised its option of granting petitions by students for various exemptions from requirements in about six cases.

8) The Committee is thanked by its retiring Chairman, E. Booth, for their cooperative spirit and brisk work during and outside our meetings.

9) Applied Physics Ph.D. was accepted by the CLA Faculty in December, 1982. For text of adopted program, see Appendix.

Report of the Undergraduate Studies Committee
W. Franzen, Chairman

The Undergraduate Committee concerned itself last year with a number of issues related to our academic program. In the first place, in the person of its Chairman, a good deal of effort was spent on identifying (and partly correcting, to the extent allowed by limited resources) problems connected with the operation of our teaching laboratories. Many of our laboratories are overcrowded, the equipment is partly worn out, and the graduate-student teaching fellows were neither adequately instructed, nor supervised sufficiently in the past. Some of these conditions will improve in our new building, with more laboratory space, new equipment, etc. The instruction and supervision of teaching fellows has been addressed.

Another issue of concern to the Committee was the unfortunate practice of allowing unlimited transfers of engineering students, as late in the semester as they wished, from one beginning physics course (PY 251) to another, quite different course, run on a different schedule, with different subject content, and a different laboratory format (PY 211). We suggested, and the Department approved, an absolute deadline of October 1 for such transfers in the future.

We also discussed Prof. Redner's concern about the Electromagnetic Fields and Waves course (PY 405), which has been a perennial thorn in our flesh for some time. We acceded in the past to changes in course content and textbook demanded by the College of Engineering to accommodate their own students, to the detriment of CLA students. The problem has been partly solved by the institution of two sections next fall, one primarily for electrical engineers, and the second primarily for physics majors (but open to selected engineering students, interested in an intensive two-semester course).

The Committee proposed and the Department, Academic Policy Committee, and CLA Faculty approved, a new Physics major with minor in electrical engineering. (See copy of statements submitted to the Faculty). This program will be of interest to many of our students who want to pursue technological careers after graduation.

Last fall, the Committee proposed, and the Faculty approved, a course suggested by Prof. Roberts entitled "The Physics of High Fidelity". It is a type of course on technological and similar subjects related to physics, but not focussed on the academic subject of physics itself, that we were strongly urged to suggest in the past, in order to introduce students in the humanities and social sciences to the scientific methods of the natural sciences. The course was approved by the CLA Faculty on Feb. 9, 1983.

The overlap in materials in PY 403,404 and 503,504 was also discussed.

Approved by CLA Faculty April 13, 1983

CONCENTRATION IN PHYSICS

WITH MINOR IN ELECTRICAL ENGINEERING

Prerequisites: CLA MA 127, or 123, 124; CLA PY 251, 252, 353. This sequence of courses should normally be started in the Freshman year. Students are expected to acquire facility in computer programming, either by self study or by enrollment in MA 191.

Principal Courses: CLA PY 354, 403, 405, 406, 410, 421, 451. ENG SC 411, 412, and one of the following sequences of two courses: (1) ENG SC 421, 422; (2) ENG SC 501, 502; (3) ENG SC 503, 550. Student must attain a minimum grade of C (2.00 grade points) in each of the principal courses. The first two engineering courses should normally be taken in the junior year and the last two in the senior year.

Related Courses Required: CLA MA 225,226. This sequence should normally be completed by the end of the Sophomore year.

Note: The engineering courses have the following titles:

ENG SC 411, 412: Electronics I and II

ENG SC 421, 422: Digital Circuits I and II

ENG SC 501: Dynamic Systems Theory

ENG SC 502: Dynamic Systems Applications

ENG SC 503: Switching Theory and Logic Design

ENG SC 550: Microprogramming and Microprocessors

For final revised catalog copy see appendix.

MEMORANDUM

TO: Faculty DATE: January 25, 1983

FROM: Undergraduate Studies Committee,
Department of Physics

RE: Proposed Concentration in Physics
and Electrical Engineering

The standard undergraduate curriculum for physics majors is a pyramidal structure, in which elementary courses in the Freshman and Sophomore years are followed by intermediate and more advanced courses in the last two years. Although the professional societies in the field of physics do not certify or accredit undergraduate programs, as the American Chemical Society does for chemistry education, nevertheless the structure of the undergraduate curriculum in physics is nearly the same in all the better colleges. Any substantial deviation or omission would make it difficult for our graduates to be accepted by the better graduate schools.

However, an undergraduate curriculum based primarily on preparation for graduate school does not correspond to the needs and career goals of a good proportion of our students, namely those who seek employment in industry, or in some sort of government or private laboratory on graduation from college. Even among our best students, an interval of technical employment before entering graduate school is frequently a desirable step, either in order to gain a broader perspective of the real world of technology and/or to enable them to pay off college debts.

The strongly theoretically-oriented standard undergraduate curriculum in physics is not very suitable as preparation for such employment. Employers look for more direct links to the practical application of physics than such a curriculum can provide. In response to this problem, we have explored a number of alternative programs in the past, such as an undergraduate degree in applied physics, or the Applied Science concentration now in the CLA catalogue. We discovered on investigation that the applied physics concentration, where it has been adopted in other colleges, tends to segregate the physics majors into two groups -- the better students, who concentrate in pure physics, and the weaker ones who study applied physics, an undesirable development. The Applied Science concentration now in effect has attracted almost no students for one reason or another.

The example of the chemistry and engineering program recently adopted by the CLA faculty inspired us to take a new look at the situation. It turns out that one can devise a physics major with a minor in electrical engineering, (including three alternate tracks in engineering) with only a small modification of the standard physics major curriculum. The total required course load is substantially lighter than in the case of chemistry, and the leeway for taking elective courses in the humanities and social sciences is substantial, particularly in the first two years.

Furthermore, the three engineering tracks (including four courses in each case) correspond quite accurately to the career objectives of many of our students. We urge acceptance of this program.

Report of the Faculty Search Committee - Prof. Bernard Chasan, Chair
Chasan, Chair; Booth, Shimony and Stanley

The Committee got an early start because the advertisement for our position(s) appeared in September of 1983. By the inter-semester period we had candidates visiting us. It soon became apparent that there existed a consensus in the department only for a solid state or surfaces experimentalist, despite the fact that the advertisement covered several experimental interests. Consequently our search narrowed in scope considerably. We set our sights high, and only a dozen or so candidates were invited to visit. Of the very top flight candidates who were either tendered offers or seriously considered, one went to the University of Washington, another to Brookhaven, a third to Berkeley, a fourth to IIT. For the second year in a row we failed to recruit in the preferred field.

In retrospect we were hurt by the need to negotiate with the administration for start-up funds separately for every serious candiate. We should have a general commitment in hand so that we can negotiate with candidates quickly. We were also hurt by the fluctuating and uncertain nature of the opening itself, which was so severe that one candidate was told by the Dean that there was no position available. Since a tenure-line assistant professor is leaving, this uncertainty was surprising. We need somehow to persuade the administration that the department can grow or even keep its present size only if long term plans are not completely messed up by short term crises, particularly since the crises are likely to be recurrent.

There is a good deal of anecdotal evidence that the promise-much-do-little recruiting of the last few years hurts the credibility of the department in the physics community. It is tempting to solicit applications from a variety of fields, particularly as a hedge against unexpected resignations. In my opinion the damage to our credibility far exceeds the benefits. For next year I suggest a limited-scope advertisement and a strong attempt to educate the administration that good people in solid state must be recruited aggressively and with start-up money.

Report of the Library Task Force - Prof. Sidney Redner

The library task force was formed in the fall of 1982 to coordinate plans for the new Science and Engineering library. Task force members included faculty from the Physics, Chemistry, Biology, Mathematics, and Engineering Departments, while representatives from other science-related departments participated in planning to a lesser degree. The new library is planned to house the collections from the existing libraries of the above-mentioned departments.

The location of the library will be 36-38 Cummington St., and a first phase of operation is planned for fall 1983. In this initial phase, two floors of the building will house the physics, chemistry and biology collections, and partial support services. The remaining two floors of the building are scheduled for completion in the fall of 1984, at which point the collections from the remaining departments will be moved, and full support services should be ready.

Some of the important features of the new library include

1) Operation hours of approximately 8 A.M. - 12 midnight, with somewhat shorter hours on Friday and Saturday nights.

2) Expanded space and budget for current periodicals and monographs.

3) Computerized card catalog and book borrowing.

4) Professional staff to be available during all hours of operation.

5) Magnetic security for books in the library.

I will communicate further details as soon as they become available.

Library Committee Report - Professor E. Corinaldesi

Cost of periodicals subscribed		$36,365
Cost of Standing Orders (series)		1,569
Amount spent on monographs (books)	$6,668	
Amount encumbered on books not yet received	1,781	
Total book expenditures	8,449	8,449
Total allocation		$ 46,000
Assuming all books now on order arrive before fiscal 1982/83-budget overspent by		$ 383

Number of monographs purchased 170
Policy: Any request for a library purchase of a book of reasonable price by a Physics Department faculty member was honored by the Committee.

Journals: new subscriptions were added for Surface Science Reports and Macromolecules. Subscriptions were reinstated for the Journal of Polymer Science and Optics Communications.

Prof. S. Redner was the Physics Department representiative on the New Science Library Task Force.

Our thanks are once more expressed to Miss Paula Carey of the Mugar Library. We are looking forward to our collaboration with her in future years.

Language Committee - Profs. E. Corinaldesi and G. Kirczenow

The proficiency in English of the foreign student Dieter W. Heermann was certified. Paul N. Stancioff, Zaven Kaprelian, and Edward Gawlinski passed the examination in French (Nov. 2, 1982, April 16, 1983 and April 16, 1983 respectively). Ronald D. Quanrude and Charles J. Blue passed the examination in German on Nov. 4, 1982 and April 14, 1983, respectively.

Bulletin Board - Prof. E. Corinaldesi

Graduate Admissions Report - Kenneth J. Rothschild, Chair
Members: Rothschild, Brooks, Cohen, Hellman, Chasan

As seen below, the profile of graduate admissions remained steady for the last two years. This may be compared to 57 completed admissions received for 1981. One significant change this year was the number of incoming graduate students from the U.S. (7 out of 11). The overall quality of the students applying also appears to have increased as judged by the Advanced Scores, transcripts and undergraduate training.

	1982	1983
Completed Applications	73	70
Accepted T.F.	10	11
Admission-No aid	1	0
Cancelled Offers	1	0
Refused Offers of Aid	10	12
Rejected	22	12
Offered Admissions with no aid	25	30
Applications incomplete, action deferred	11	5

The following have been offered financial aid and are coming to B.U. Their interests and/or previous fields of research experience are also indicated.

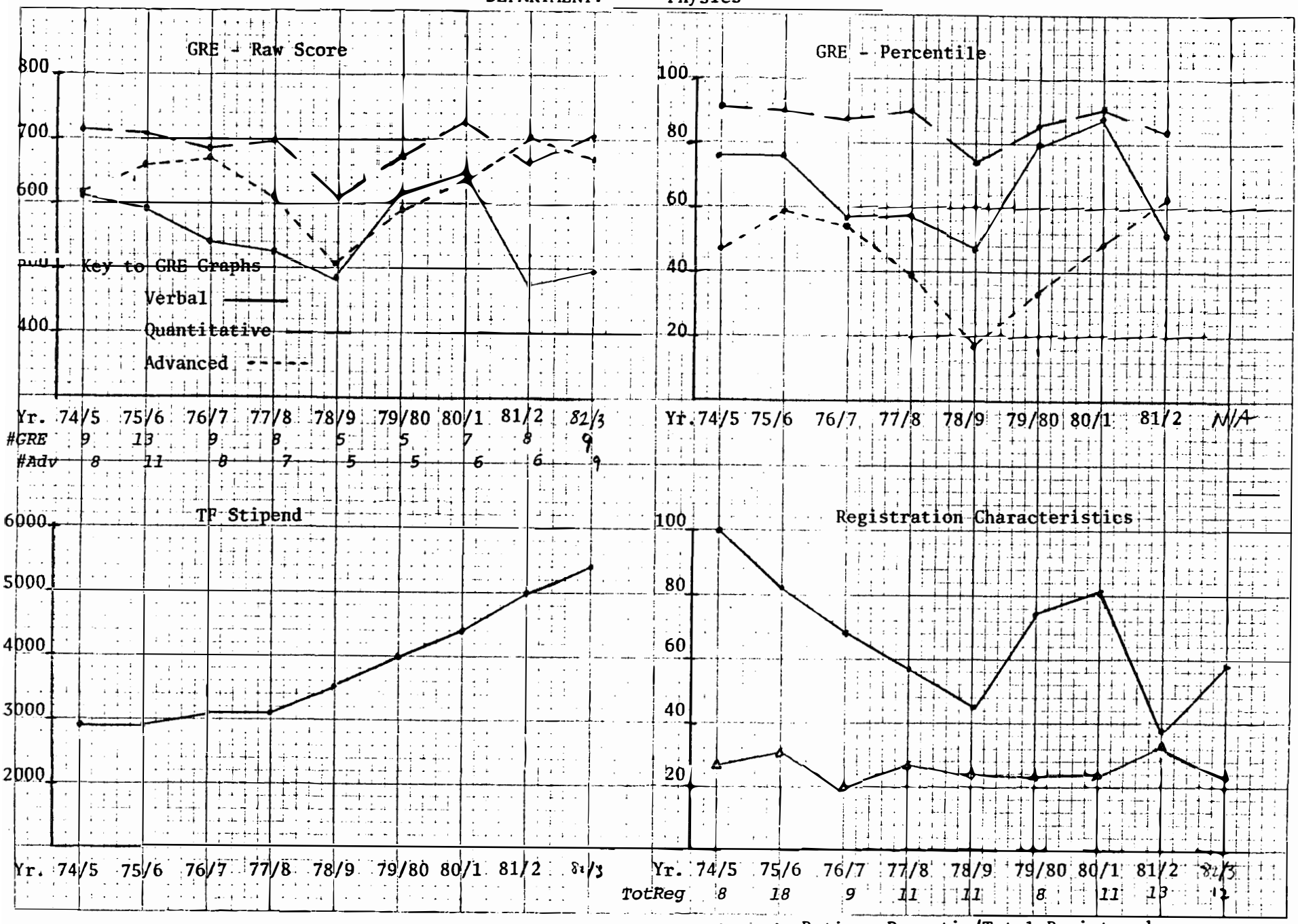
Fortune, Nathanael	Theoretical Physics
Samiullah, M.D.	Theoretical Physics
Mattingly, Byron	Theoretical Physics
Lees, Martin	Theoretical Physics
Ray, Taine	Statistical Physics
Tufillaro, Nicholas	General
Whitehouse, David	Foundations of Physics
Hartnett, Kathleen	Low Temperature
Folkerts, Robert	Theoretical Physics
Hao, Xin	Biophysics
Amitrano, Concezione	Theoretical Physics

The incoming class appears to be one of the best (if not the best) in recent years.

Many of the applications we received this year noted that interest had been generated by knowledge of specific faculty and research being conducted in the Department.

SUMMARY OF INCOMING GRADUATE STUDENTS

DEPARTMENT: Physics



Report of the Computer Planning Committee - George O. Zimmerman

The Computer Planning Committee concerned itself with 3 main items:

1. The utilization of 4VT 103 terminals donated by the Digital Corp. It turned out that there were as many computers as there were takers.

2. In consultation with the faculty, a 5 year plan for computer needs was put together by Epstein and El-Batanouny. See appendix - "Information Processing ..."

3. The preliminary allocation of computer network ports and subsequent policy for port allocation

June 24, 1983

To: Faculty

From: George O. Zimmerman

Subject: Computer Network Report Allocation

At a meeting of Al Stone, G. Epstein, M. El-Batanouny, S. Redner, G. O. Zimmerman and B. Chasan, which took place on June 23, 1983, the following assignments were proposed.

Under the assumption that each department will be assigned 100 communication ports, it was decided that each faculty office will be allocated 1 port. Each Research Associate office will be allocated 1 port and each graduate student office will be allocated 1 port. Each research laboratory will be allocated 2 ports with an increase if there are multiple investigators involved in those labs. 10 ports were allocated for department administrative use, 2 ports were allocated to the Polymer Center administrative use and 1 port each was allocated to the elementary labs, intermediate labs and the demonstration room with 2 ports going to the Advanced Lab.

Report of the Comprehensive Examination Committee - William S. Hellman

This year as has been done in recent years, the written comprehensive examination was given in January and May.

Eleven students took the examination in Jan., 1983.

The results were:

Pass with distinction (6) Ms DeArcangelis, Mr. Heermann, Mr. Kaprelian, Mr. Kang, Mr. Naughton and Mr. Reina. This represented 55% of the group.

Pass (3) Mr. Blue, Ms. Ma and Mr. O'Brien (27%)

Fail (2) Ms. Benes and Mr. Glinski (18%)

These results were an improvement over those in recent years.

Nine Physics students took the examination in May 1983. The results were

Pass with Distinction (6): Mr. Austin, Mr. Burdick, Mr. Hoffman, Ms Ma, Mr. O'Brien and Mr. Stancioff (67%)

Pass (2) Mr. Iliopoulos and Ms. Solenberg (22%)

Fail (1) Mr. Herlich (11%)

Two Astronomy people also took the examination in May.

The results of the May examination were better than was expected.

Comments

I have been chairman at the examination committee for about six years and during this period I have seen the character of the exam change from a rather long 5 section test to the present 2 section version. Also during this period I have seen a serious decline in the percentage of Distinction grades achieved. However, in my opinion this downward trend was not due to the change in examination format but rather due to the poor preparation of the students taking the test. This condition was in large part due to a departmental policy of encouraging students to take the test too early. It now appears that people are returning to a previous policy of allowing students two years of preparation here at Boston University before taking the exam and to remove any stigma attached to not taking it earlier. I believe this is a wiser road for us to take. The high percentage of passes with distinction in the year described in this report is due to

a) students who have failed finally after some years of work reaching a point of competency and

b) other students waiting longer to take it.

Of course I am in favor of encouraging students with excellent backgrounds to take the exam as early as possible.

Since this is my last year as chairman, I hope that the future chairman of the committee will be vigilant and wise in the handling of very important task of designing and administering the examination.

General Faculty Meeting Report

9/7/82 The meeting was concerned mainly with housekeeping details.

The Xerox machine was discussed as well as enrollments in courses.

Several items were discussed and voted on:

1. The representation of graduate students at physics faculty meetings was approved by a vote of 11 for with 3 against.
2. The attendance of research professors (Assistant, Associate and Full) was approved by a vote of 14 with 1 abstention.
3. The course on How to Teach Teaching Fellows How To Teach Physics was discussed with Franzen given the mandate of organizing a variation of the course or a substitute for it by the following week. Subsequently Franzen reported that he called all the new T.F.'s on Friday, the 10th where they had a fruitful exchange of views with some of the senior good T.F.'s.

9/14/82

1. Faculty were requested to report the population of their classes to Chasan. It turns out we are currently teaching approximately 200 more students than we did 1st semester last year.
2. A report of the CLA Chairmen's meeting which took place on Sept. 8 was given to the faculty. The most important items were:
   a. The mandatory salary increases will appear in the Sept. faculty paychecks while the Merit and Equity increases will be decided on as soon as the M/E guidelines committee can agree on the distribution with the Dean.
3. b. The Dean will be on sabbatical during the 2nd semester of this year.
   c. Several grant applications are pending or will be submitted, 1) to the Mellon Foundation to support curricula changes in CLA, 2) an NIH equipment grant; 3) a DOD grant.
4. A report of a meeting of new T.F.'s with Senior T.F.'s was given by Franzen who reported great success in the communication between those two groups regarding the teaching of lab and discussion sections.
5. Zimmerman announced the intention of the appointment of Bernard Chasan as Associate Chairman for the current school year and received only approving comments from the faculty. The nomination of Chasan as an Associate Chairman was approved unanimously. Detailed duties will still have to be worked out but his immediate portfolio will be items which pertain to the assignments of T.F.'s, scheduling of courses, faculty assignments to courses, graduate admissions, etc.
6. After a brief discussion, the nomination of Prof. Yildiz as a Visiting Professor of the Dept. of Physics and the Dept. of Mechanical Engineering was approved by a vote of 19 with 2 abstentions.
7. In preparation for a meeting on Friday, the 17th with the architects and the Dean, a brief report was given regarding the status of the building and faculty with labs were asked to make detailed drawings for the requirements of the labs. Other faculty were assigned to the detailed planning of other rooms in the building such as elementary labs, stockrooms, etc.

9/21/82

1. In view of the fact that there will be shared services in the new Science Complex, 4 task forces were set up among the science departments and ENG. Representatives to those task forces from the Physics Dept. are:

   a. Chasan - scheduling
   b. Batanouny and Bansil - research support facilities
   c. Roberts and Edmonds - stock room (research and teaching) } Stone
   d. Corinaldesi and Redner - Library
   e. Booth - safety (this was suggested by Prof. Booth)

2. A discussion on the disposal of computers which were given to the Department by Digital toook place. The gift which was organized by an application submitted by Brooks to Digital was for having the terminals used by students, graduate and undergraduate. A proposal by Brooks was presented by him and follows his memo of 9/14/82. The outcome of the discussion was that guidelines for the use of those computer facilities be established by the committee on the planning of computer requirements.

3. The Computer Planning Committee and Plan was presented to the Department for its information.

   I have appointed a committee on the planning of computer requirements of the Department. That committee consists of:

   Epstein
   El-Batanouny — Co-Chairmen
   Brooks
   Kirczenow
   Redner
   Miller

4. A discussion of the B.A./M.S. in Physics and Science Communication took place with the decision of setting up a committee consisting of Brecher, Shimony and Stanley to study the matter further.

5. The program in Applied Physics was discussed with the vote and discussion to take place at the beginning of next meeting. Booth will have copies of the program available in the main office.

6. An announcement of our first colloquium was made by Kirczenow and the host of our visitor, Stanley.

9/28/82

1. The Applied Physics program was approved after a brief discussion by a vote of 18 to 0.
2. It was announced that the Biophysics program will be submitted to the University approval procedures.
3. The Hi-Fi physics course, CLA PY 232 was approved by the faculty with a vote 18 to 0.

10/5/82

1. Dean Kornfeld and his advisor, Muriel Ladenberg, talked about the Academic Advising Handbook.

2. Prof. Brooks made a plea to the faculty for help with the staffing of the Open House on Oct. 17, 1982.

3. Prof. Chasan made a brief statement about faculty search. During that statement, the subject of approaching Prof. Overhauser came up. A committee will be set up to investigate this subject.

4. In connection with a reserve book list, the state of the Physics Library was discussed in uncomplimentary terms. G.O. Zimmerman and the head of the libraries met about the situation on Thursday, Oct. 7, and we were promised that conditions will be drastically improved.

10/19/82

1. The minutes of the Graduate Studies Com. were read and discussed. After a half-hour discussion the faculty gave an overwhelming endorsement to the committee to proceed with the project of reviewing 500 level, as well as 400 level courses and to proceed identifying a set of topics considered to be basic.

   The question of a test for our incoming graduate students in order to determine their abilities and background was also discussed.

2. The budget of the department was discussed and ways to curb overspending on telephone mailing, and copying were agreed on. Mechanisms described on attached regulations will be implemented in order to prevent intentional and unintentional abuses.

3. The Merit and Equity guidelines were pointed out to Faculty members. In order to receive a merit and equity salary increase, the faculty member has to notify the Chairman that he wishes to apply for a salary increase, and point out at least two of the three areas on which he would like to base the recommendation.

   The requests have to be in by Friday, Oct. 22.

   The requests will be based on the annual report, which has already been submitted, and any additional documentation the Faculty wants to submit. The activities upon which the recommendations will be based should have taken place between July, 1981 and July 31, 1982.

   I have inquired about the cases which would rather be considered by the Chairman alone and received the reply that according to the present understanding of the regulations this might make the college liable to a grievance from the union. Thus all requests will be submitted to the Merit Equity Salary Com. unless the Faculty member has specific objections, in which case I will have to negotiate with the union and Administration.

4. A report of the very successful open house last Sunday was given by Prof. Edmonds with the credit for organization to Prof. Brooks.

Boston University

111 Cummington Street
Boston, Massachusetts 02215

Department of Physics

TO: Faculty and Students

FROM: George O. Zimmerman, Chairman
Department of Physics

DATE: October 21, 1982

RE: Expenditures For Postage, Copying and Telephones

Because of the excessive expenditures in the above categories, there will be regulations instituted in order to curb those expenditures.

1) A. Postage: From now on any mail sent without a department member's return name will be taken out of the mail box and put into a separate box so that mail can be retrieved by the faculty. B. Any reprints or pieces of mail larger than regular letter size will be sent third class unless specific approval is given for first class mailings. C. Mailings should be held to a minimum and large manuscripts if feasible should be reduced so as to cut down on postage. D. We are currently spending over $1,000. per month and this has to stop.

2) A. If at all possible, class materials should be mimeographed. Any xeroxing should be held to a minimum. B. To that end there will be a sign out sheet for everyone using the xerox machine. The person using the xerox machine will have to enter the meter reading (the meter is located on the left hand side of the machine) before and after use of the xerox machine. The allotment is 200 copies per month for every faculty member and 20 copies per month for every student. All other copies which do not pertain to course hand outs and exams will have to be paid for either personally or on grants. C. Any abuses can result in the loss of some of the privileges granted to department members.

3) A. Telephones: Long distance calls should be made only on business and duration held to a minimum. The same applies to local calls since the usage charges for local calls are almost equal to those for long distance. If at all possible long distance calls should be made after 5 p.m. B. Any calls which are personal have to be paid for. C. Any unnecessary telephones or extensions should be pointed out to Al Stone so that we can take them out. D. Any phone calls which could be paid for on grants should be included as such on the phone reports you get from Al Stone.

11/16/82

1. Faculty Search Com. reported on the applications for positions which it had received, and urged faculty to write to their professional acquaintances to solicit applications in specific fields.

2. Because of the fact that a proposal for a course in high fidelity physics was sent back to committee at the CLA Faculty meeting on Nov. 10, the faculty was urged to attend future CLA Faculty meetings especially those where our courses come up for discussion.

11/23/82

1. The Chairman reported on a visit of Lichtin, Chemistry; Baghdady, ENG; Behr, Development Office to Foxboro Corp. to explore any possible mutual interests.

2. The status of the library was reviewed and members were asked to come up with comments about the library and let the Chairman know if there are any disastrous deficiencies.

3. A visit of the Fisher Scientific representative who is concerned with laboratory furniture was announced. People who had a new request or wanted to go over old ones were encouraged to get in contact with the representative.

4. A report of the salary increases in the Physics Dept. was given. Overall this department came out well with an average Merit/Equity of 4.4% as compared with the average CLA allocation of 2.8%.

5. Attention was called to the fact that faculty members in this department are, in general, uninterested in attending meetings which deal with undergraduate courses. It was urged that the attitude towards undergraduate courses be much more constructive and serious in the future.

12/7/82

1. The members of the Subcommittee on Support Services for the new Science Center reported on their meetings. The Shop and Stockroom Com. members as well as the library members reported. It is very important that our representatives be advised by the Department. The representatives to the Stockroom and Shop Services Com. are Stone, El-Batanouny. Bansil and Edmonds. Those to the Library Co . are Corinaldesi and Redner.

2. Zimmerman reported that he met with Jones in order that he again introduce him to the Department and its research capabilities in relation to any possible industrial connections. V.P. Jones requested that at the beginning of next semester a set of meetings between him and members of the Department be scheduled for that purpose.

3. The Comprehensive Com. was urged to set a date for the examination.

4. A report by the Faculty Search Com. was given and a set of visitors announced by Chasan. The faculty was asked to move fast on any hiring especially since we have had our advertisements in much earlier than last year. The response to the ad was smaller than expected and therefore faculty were asked to write to their colleagues requesting names of worthy candidates.

   Attention was called to Senior candidates who may be in the wings. One of those candidates was Overhauser. A committee to investigate his candidacy was formed and will meet on Dec. 14. The other candidate was Dr. A. Yildiz. A discussion of the latter case took place with the faculty voting to have the Chairman name a subcommittee to investigate this case. The subcommittee was subsequently named and consists of Booth, Chasan and Willis. A subcommittee on Overhauser was appointed. Members were Franzen, Stanley, Klein, Kirczenow, Zimmerman.

1/18/83 The outcome of the Comprehensive Examination was discussed. Students were assigned grades and their progress towards a doctorate degree was discussed.

1/27/83 1. Announcements

a. Sigma Xi nominations for undergraduates and graduate students are due by March 15. Application copies are to be obtained in the Chairman's office.

b. A meeting was arranged for the discussion of the state of our secretarial help in the front office.

c. There will be small grants - $200 maximum for graduate students from Sigma Xi.

2. Report of the Undergraduate Studies Com. was made by Prof. Franzen.

a. The proposed concentration in physics and electrical engineering was discussed. After a brief discussion of whether the concentration is too much loaded with prerequisite courses, the concentration was approved.

b. A brief report then followed by Prof. Redner about CLA PY 405, 406, E and M course. Ideally, we should be giving two courses, one where the subject can be furtively covered in 1 semester and the other where the subject is covered in depth in 2 semesters. Because of the implications of this on the Engineering enrollment in this course as well as the implications regarding teaching load, this matter was relegated back to the Undergraduate Studies Com.

c. The matter of wholesale transfers from CLA PY 251 to PY 211 in the middle of the semester was discussed and a meeting between Dean Smithberg and Profs. Booth, Franzen and Chasan was proposed.

3. The matter of the Mathematics Dept. teaching a course in Hamiltonian mechanics was discussed. The course is GRS MA 764. The faculty concluded that the math course was quite different from the mechanics courses which we teach with the conclusion that we would encourage some of our more mathematically inclined students to take that course.

4. The possibility of Prof. Glashow from Harvard spending a sabbatical at Boston University was announced to the faculty. There was general agreement that it would be a good thing for us.

2/8/83 1. The meeting began with a report by Prof. Chasan of the ratings of faculty candidates.

After some discussion of these results, the faculty voted by a 14 to 1 margin that the Department should make offers to Sorensen and Morgai simultaneously.

2/8/83 (continued)

2. Prof. Booth, for the Graduate Com., distributed a draft of core curricula for 500 level courses. Eventually these will be distributed to students but before that happens faculty members are invited to express opinions about these curricula.

3. A discussion of the candidacy of one of our senior candidates took place (Yildiz). The Committee on Yildiz gave its preliminary report and comments by other members of the faculty were made. Any firm decision would have to await a teaching evaluation by Chasan who will visit Yildiz' class.

4. Announcements

   a. Be sure to attend tomorrow's CLA FAculty meeting. Besides our Physics of Hi Fi course being on the agenda, there are some controversial suggestions from the APC Com. to be voted on which will affect our teaching.

   b. Eugene Cook of SPC would like to do several "photographic essays" on the Physics Dept. which we could subsequently use for publicity. Volunteers are called for.

2/15/83

1. Various household problems were discussed, among them the possible interim replacement of Richard Johns who is undergoing an operation.

2. The grouping of faculty members for a visit with Dr. Jones was discussed and final assignments will be made according to faculty wishes. (Those have been finalized.)

3. There was an announcement by Prof. Haber-Schaim that he was misquoted in the Boston Globe.

4. There was a discussion of a letter written by graduate students commenting on the teaching of one of our Visiting Faculty members. A consensus was reached that the Chairman should handle the situation.

5. The Chairman announced that he has submitted his resignation as a chairman as of June 30, 1983 and that the Dean will be present at the departmental meeting on Feb. 22.

2/22/83

Dean Blaustein and the Director of Faculty Actions, Lynn Oulette, were present. They outlined the procedure for selecting a new Chairman as well as initiated a discussion. The procedure is to appoint a Chairman Search Com. with three out of the six members of that committee being elected by the Department. The possibility of a search for an outside Chairman was not excluded meaning that the Administration will allow us to search for an outside chairman.

In subsequent discussion the sentiment was that an outside chairman would be desirable if he were a "star" and would help the Department undergo another quantum improvement. There was also some sentiment for an inside chairmanship.

Subsequent to the departure of the Dean, the method of electing our faculty representatives to the Chairman's Search Com. was discussed, and it was agreed that there should be a general ballot with the people getting the largest vote being nominated to that committee unless they decine to serve on it. Also brought up was the notion that this might be the proper time for an outside departmental review.

3/1/83

1. It was announced that we are scheduled to move into the new building in the middle of August with some of our facilities such as the Machine Shop being moved in May with the machines being stored in the new building until Sept.

2. A brief report was given of the Science Chairman's meeting of 2/23 at which it was announced that

   a. The CLA budget will come through with an 8% cut.

   b. The T.F. stipend has increased from $5400 to $5750.

   c. Students being supported on grants and receiving tuition may be asked to perform some teaching duties. That started a debate which expressed the Department's disapproval of that policy which will be communicated to the Dean.

3. It was announced that we have 1 or 2 faculty positions and a discussion followed which included the possibility of start up money for incoming faculty members. A consensus was reached that

   the top candidate who is available be offered a position and that a search should be resumed in the following fields, nuclear, polymer, low temperature and solid state, the latter if the top candidate does not accept the position. In each of these fields, we should have at least 2 candidates. That includes those already interviewed.

4. Faculty members were given ballots for the Chairman's Search Com. and the MEAC. For the Chairman's Search Committee, Booth was the top vote getter with Zimmerman, El-Batanouny, Epstein tieing for 2nd place. All 4 names will be sent to the Dean.

   For MEAC - Klein, Miller and Kirczenow were elected.

3/8/83

1. After a brief discussion, the faculty voted by 11 to 1 to launch a search for an outside chairman. The search, however, should not exclude candidacy for the chairmanship of any of the present Physics Department members. If a chairman is brought in from the outside, he should be a person of stature, and although a thorough search should be undertaken, there should be a time limit.

2. Report of a chairman's meeting was given by the chairman. Among the highlights reported were:

   a. The number of university fellowships has been increased this year.

   b. The graduate student stipend will go from $5400 to $5750.

   c. The university is launching a capital campaign and suggestions for fundable items are solicited.

   d. There will be a meeting of the faculty assembly on March 22. Since that is a way of expressing one's views directly to the President and the administration, it is important to attend.

   e. As usual, departmental budgets will have to be justified in terms of a functional analysis.

3/8/83 (continued)

f. The Alumni Association would like to know the names of our distinguished alumni. Please let the chairman know of such persons.

3. The faculty search committee report was given by Chasan. Sorensen, our top choice has received an offer from somewhere else and will take that. Murgai has taken a position at Brookhaven and was approached about our present position. He will probably reply within a week.

4. The secretarial situation was discussed by Susan Savransky and the faculty commented that more frequent encounters were desirable.

3/15/83

1. An announcement was made that the chairman is to be notified in writing whenever a faculty member goes on a trip where classes are either taught by other faculty, graduate students, etc. The notification should detail how the classes are covered or made up. Notification is necessary before the trip occurs. Extended absences will need a notification at least 2 weeks prior to the trip.

2. The faculty was notified that the School of Education proposes a MAT program. The program which includes physics comes for approval at the Wednesday, March 16, CLA faculty meeting.

3. The visit of V.P. Jones was discussed and despite the fact that faculty were individually contacted prior to the time appointments were made, the entire schedule was reworked. The new schedule is enclosed.

4. The purpose of V.P. Jones' visit is to find out about our research and what we can do in relation to possible industrial grants and other funding opportunities. Please be on your best behavior and think of the good of the Department.

5. B. Chasan gave a brief report of prospective faculty members who are going to visit our Department. An outstanding solid state theorist was brought to the attention of the Department and it was decided to invite him to visit us as a prospective candidate.

6. Klein brought up the subject of natural science distribution requirements in CLA and reported that a laboratory requirement in the natural sciences is being discussed. There were views pro and con and Klein requested that any opinion and ideas be transmitted to him for further deliberation.

3/29/83

1. A discussion of faculty recruitment took place. In view of the fact that we have lost several desirable experimentalists, the faculty asked the Chairman to determine whether one could count on a certain amount of seed funds so that one could offer it to an experimental faculty member, otherwise we might have to alter our strategies.
2. Graduate Committee's report on the new 3 year rotation was accepted. However, it was decided that the final decision should be made after a poll of graduate students on what courses they want to take. The rotation is in the Graduate Committee report.
3. It was reaffirmed that there is a Comprehensive Committee whose membership is

   Hellman, Chair; Bansil, El-Batanouny, Kolk, Pi, Roberts, Willis

   It was further reaffirmed that each member of the committee has to submit the problems asked for and that that is one of our most important duties as a graduate faculty. Unsatisfactory performances should be communicated to the MEAC.
4. The new building was discussed. Moving into the new building is scheduled for Aug. 15.

   The Machine Shop will have to be moved in April and stored in the new building. In the interim, we are making arrangements to use the ENG Machine Shop.
5. The visit of David Mermin was announced with Shimony asking for volunteers to go to dinner with him.

4/5/83

1. Redner and Corinaldesi gave a brief report on the library with the new development that the BUCPHS will not be housed in the Science Library Building.

   Stone and El-Batanouny gave a report on the Machine Shop with the current battle being that for an overhead crane.

   Chasan gave a report about classrooms with provisions being made for arm rests and blackboards in the new Nickolodeon Theatres.
2. Graduate Committee report was given by Booth. It was also reaffirmed that thesis should be handed to the examiners at least two weeks before the examination. This rule should be written into our guide to requirements for graduate study.
3. Faculty Search was further discussed and progress reported.

4/12/83 1. Announcements

1. Room assignments in the new building.
2. Research capabilities questionnaires, April 15 - try to do it on April 14.
3. Book Orders! To be in by April 15 through Helen Siegel.
4. Big celebration on Tuesday, April 19 for Distinguished Service Award - Castle - 5:30 P.M. Anna Helen Siegel will receive an award.
5. First Ben Chertok Memorial lecture to be given Wednesday, April 13 By Dr. Raymond Arnold.

4/12/83 (continued)

2. R.S. Cohen gave a report of the status of negotiations between Boston University and the Princeton University Press on the Einstein papers. Stachel is the editor and there will be two senior associate editors. A Boston University Center for Einstein Studies will probably be established at Boston University during the 1984-85 school year.

4/19/83

1. The faculty voted to extend Dr. Bringans an offer of employment at Boston University.

2. A discussion of CLA PY 511, 512 was initiated and the faculty voted that PY 511 should be taught next semester with a revised curriculum. Also that all students should be strongly advised to take PY 512.

4/26/83

1. a. The meeting started with a set of announcements and admonitions. The memo from Dean Blaustein of April 5 regarding student retention was brought to the attention of the faculty, especially the sentence, "With this in mind, I have been asked to ensure that each member of the faculty teaches at least 3 days per week and preferably 4, so as to be on campus and available to students on a regular basis".

   b. Faculty's attention was called to the note by Richard Landau, Director of Development of April 8 stating that gifts to the Department should be processed through the Development Office.

   c. A brief discussion of nomination of candidates for University and CLA committees took place and the Department decided to nominate:

      Zimmerman - for a position in the Faculty Council (pink);
      Chasan - for a position on the Excecutive Council (yellow);
      Booth - for a position on the Academic Policy Com. (blue).

      Nominations should be sent to Karen Mura, CLA Rm. 302 no later than April 29. (The faculty promised to read this notice.)

   d. Prof. Chasan reminded the faculty to put in their book orders by the end of this week. They were due April 15. Book order forms can be obtained from Helen Siegel. Make all requisitions through her.

   e. Chasan announced that all faculty having T.F.'s should evaluate those T.F.'s within the week. Forms for individual T.F.'s will be in Helen Siegel's office and she will assist you in filling out those forms. Please make the necessary appointments. The number of our T.F.'s might be at stake and thus our graduate program.

2. The attempt of the ENG to evaluate the teaching in some of our classes was discussed. In past years, there was an evaluation of our classes by CLA although this year this did not materialize. In the past, ample notice was served to the Department and teachers to be evaluated. This year the announcement of evaluation was rather sudden. There were opinions expressed both for and against evaluations. The consensus was that:

4/26/83 (continued)

this year the decision on whether to evaluate a class be left to the instructor so as to help him/her to improve the course;

in the future, the Department should be informed of any intended evaluations early in the term.

3. The faculty recruiting was briefly discussed and Zimmerman informed the faculty that he has recommended to the Dean that Bringans be extended an offer of employment. In case he does not accept the offer, another candidate, Zack Schlesinger from Bell Labs will visit the Department on Thursday, May 5.

4. The speaker for the Wednesday colloquium was announced. He will be Bob Hallock from Univ. of Mass-Amherst, who will talk about The Two Dimensional Behavior in Superfluid Films. A brief get together after the talk in the Pub was announced.

5. Al Stone was conducting a tour of our offices to justify furniture requests.

5/3/83

1. A report from members of the Chairman's Search Com. and the announcement of its membership engendered a discussion which resulted in a suggestion to the Dean voted on 10 for, 1 against, with 5 abstentions, that a member be appointed to the committee who is outside of the sciences and technical fields so as to benefit from the input of people from the humanities and social sciences or arts. The constitution of the committee is Booth, Epstein, El-Batanouny, Rothschild from Physics, Dill from Chemistry and Colburn from Engineering.

2. This Chairman announced the rumor that Prof. Chasan has been approached by the Dean and asked to become the Interim Chairman starting July 1. Prof. Chasan acknowledged the rumor and his acceptance of the Interim Chairmanship to the applause of the Physics faculty.

3. A report of the Stockroom Com. was given by El-Batanouny with the current plan to integrate any material needs in hardware and electronics into the Chemistry Stockroom. Al Stone is the Chairman of that subcommittee.

4. It was announced that the Department received $175,000 from the Administration and the Dean for the purchase of undergraduate laboratory equipment (the request was for over $500,000).

5/10/83

1. Dean Padulo visited the Department and expressed some dissatisfaction with some of our elementary courses. He also announced that ENG was criticized for not requiring Chemistry in its curriculum. There were several replies but a more detailed discussion was relegated to a meeting with a smaller group. That meeting took place on Friday, May 20, where some of the things which have to be done were discussed by G.O. Zimmerman, Chasan, Blaustein, Padulo, Smithberg, Udelson and Colburn.

2. The list of committees and committee chairmen was presented to the Department with some comments from the faculty. In addition to the list, Miller will be assigned to the Radio Isotope Com. which is a CLA wide Committee.

5/10/83 (continued)

3. The faculty was made aware of the graduation ceremonies as well as a meeting which was called for Wednesday, May 18, to consider the results of the Comprehensives.

4. The visit of Dr. Kitchens was announced for Monday, May 16. He is the monitor from the DOE and various faculty signed up to go to lunch with him and to talk to him.

5. The faculty was notified of the CLA faculty meeting on May 11.

6. The faculty was also notified by Prof. Brooks of an additional source of funding for small projects by the Community Technology Foundation of Boston University which funds projects which lead to patentable inventions.

7. A brief discussion of contingencies in terms of hiring faculty took place with suggestions that either Nishio or Slesinger be appointed to the faculty in case Bringans does not accept our offer. The consensus was that if that eventuality takes place, a general faculty meeting be called to resolve the question.

5/31/83

1. The meeting was held primarily to decide our plan of action regarding new appointments in view of Dr. Bringans' deciding not to accept our offer of employment. After a discussion, a vote was taken on whether to pursue at this time candidates for a permanent position, and the vote was negative on all those candidates presented. A vote was taken on whether to leave the decision to the chairman and associate chairman (soon to be interim chairman) or whether to appoint Mr. Kellerman for one year, or a combination of two part-time appointments, both of whom would be primarily employed as research professors or associates. That vote ended in a tie and the motion did not pass. A subsequent vote resulted in 9 votes being cast for Mr. Kellerman and 3 votes being cast for the combination of research appointees.

   I approached Mr.Kellerman this morning (June 1, 1983) and he is willing to accept the appointment and to teach four courses next year. The appointment will probably be on the Lecturer's level.

2. Prior to the vote above, a discussion of confidentiality of departmental proceedings was introduced and took place in spite of being ruled out of order. Near the end of the meeting the faculty could not be polled on whether they wanted another meeting during summer on this issue. Subsequently after talking to several members of the department, I have decided to delay the discussion until the beginning of the school year since many people seemed reluctant to meet on this issue during the summer.

Personal Observation

This department has functioned and has acquired the reputation of being a nice department to be in because its members behaved with civility toward each other. I saw this civility break down yesterday. I hope that we can behave in a civilized manner toward each other until at least the beginning of the next school year when we might or might not decide to debate this issue further.

Individual Faculty Profile

Bansil

POSTER: "Raman spectroscopy of supercooled water", Gordon Conference, Plymouth, July 1982.

POSTER: "Low-frequency vibrations in supercooled water", VIII INTERNATIONAL CONFERENCE ON RAMAN SPECTROSCOPY, Bordeaux,France, Sept. 1982.

SEMINAR: "Raman spectroscopy of biological molecules", Laboratory of Prof. F. Stenman, Physics Dept., Univ. of Helsinki, Finland, Aug. 1982.

CONTRIBUTED PAPER: "Computer simulation of gelation", WORKSHOP ON DYNAMICS OF POLYMERS, Santa Barbara, Dec. 1982.

COLLOQUIUM: "Physics of gels", Physics Dept., Clark Univ., March 1983.

COLLOQUIUM: "Physics of gels", Physics Dept., Clark Univ. March, 1983.

Junior Faculty Research Award, American Cancer Society (final year).

Biomedical Research Advisory Committee (GRS).

Referee - Proposals for NSF.

Referee - Several papers for Phys. Rev. Lett., Phys. Rev. and Biochemistry

Booth

Student - Joseph Comuzzi, M.I.T., Dissertation - (γ,π^o) Reactions in ^{12}C in the $\Delta(1232)$ Region (completed 3/1/83).

Free School Lecture - Nuclear Weapons

Seminars at MIT; organized summer research seminars; presented one on "Internal Targets in a Stretcher Ring".

"Physics in a Stretcher Ring", Int. Conf. on New Horizons in Electromagnetic Physics, Univ. of Virginia.

(with J. Miller), "Coherent (γ,γ) Reactions in the Resonance Region", Int. Conf. on Electron Rings for Nuclear Physics Research, Lund, Sweden, Oct., 1982.

Author of sections of major proposal to DOE, "Future Expansion of Bates Linear Accelerator",Dec., 1982.

Com. for Ph.D. in Engineering and Applied Science (4 hrs/month).

Search Committee for New Physics Chairman.

Research Affiliate: MIT; Group leader 2 hrs/week.

Search Com. for New Director of MIT-Bates Linear Accelerator (total 50 hours).

Three-day visit to Stanford Linear Accelerator to study design of storage rings.

Brooks

MEAC, Fall 1982

University Com. for Inventions and Discoveries.

Seed Grant Com./Grad. School-CLA

Chasan

Member, Premed. Advisory Com.

Chairman - Task Force on Science Center Classrooms.

Faculty advisor, Fission-Fusion Club.

Research affiliation, Biophysical Laboratory at Harvard Medical School.

Cohen

Chair, Center for Philosophy and History of Science (including Boston Colloquium for the Philosophy of Science): average 12-15 hours/week including work with 5-8 post-doctoral Research Associates.

Planning Com. for new Center for Judaic Studies: about 1 hr/wk.

Adjunct Faculty GRS-STH Div. Theological Studies for section on science and theology and for section on social ethics.

Invited Lectures:

Sept. 11-15 Int'l Darwin Centenary: Chantilly & Paris
Oct. 27-31: Biennial Phil. Sci. Assoc. mtg (Chair & President)
Nov. 6: 'Schlick vs Neurath' at Sympos on Vienna Circle (B.U.)
Dec. 1-6: 'Marx, Science & Utopia' at Intn'l Symposium on science and utopias, Univ. Bielefeld, Germany
Jan. 19: 'Technology & Ideas' at Colloquium on Technological Determinism, MIT Program in Science Technology & Society
Feb. 12: 'Science at Crossroads: Beyond Hessen' Marx & Science/ Symposium (B.U.)
Mar. 5-10: 'American Philosophy of Physics', Israel Colloq. on History and Philosophy of Science, Tel-Aviv and also lectures at Weizmann Institute (Rehovot), Van Leer Jerusalem Foundation (Jerusalem), Bir Zeit University (Ramallah), etc.
Mar. 11-4/2: 'Science and Individuality', Intn'l Congress on science and society, Univ. of Pisa and Univ. of Palermo: Palermo, Sicily.
Apr. 23: Commentator to lecture by Prof. Huston Smith at B.U. Institute of Philosophy and Religion (B.U.).
May 1-June 3 (approx): Lecture series at Institute of Philosophy & History of Science, East China Univ., Shanghai; also at Inst. of History of Science, Academy of Science, Beijing; at similar institutes at Univ. of Beijing, Univ. of Xian, Tientsin Univ., Beijing Normal Univ., Huazhong Univ. of Science and Tech., Wuhan.
June 9-10: 'Critique of Marx and Science' Marquette Univ. Centenary Symposium on Karl Marx: Milwaukee

Trustee, Wesleyan University

Panel on History & Philosophy of Science, N.S.F.

Cohen (continued)

President, Philosophy of Science Association (through 1984)

Chair, American Institute for Marxist Studies (retiring Spring 1983)

Secretary-Treasurer, Boston Philosophy of Science Association.

CLA: Exec. Com. (rescinded by CLA Faculty vote to change procedure so remainder of term in doubt)

University: Faculty member of Trustees Com. on Academic Affairs (3 hrs/mo.).

Consulting:

External visiting com., Marquette Univ. Dept. of Philosopy

Faculty Associate, MIT Program in Science Technology & Society

Editorial Bd./Com: Foundations of Physics, Science Technology & Human Values; Fundamenta Scientiae; Philosophy & Phenomenological Research; Philosophical Forum

Referee on manuscripts for: Amer. J. Physics; Cambridge University Press; Univ. of Cal. Press; Humanities Press; D. Reidel Publishing Co.

El-Batanouny

Technical Support Services Task Force Com.

Stockroom Facilities Task Force Com.

Visiting Scientist at Brookhaven National Lab. (Aug. 2-Sept. 4, 1982).

Epstein

Physics Colloquium, Fall Semester "An Introduction to Intermediate Energy Nuclear Physics".

Paper contributed to meeting: "A Study of Neutral Pion Photoproduction off ^{12}C", Symposium on Delta-Nucleus Dynamics, Argonne National Lab. May 2-4, 1983.

Gordon Conference on Photonuclear Reactions (Aug. 9-13, 1982)

Refereeing: NSF; Dept. of Energy; Physical Review, Phys. Rev. Letters

Franzen

Chairman of Com. on Arrangements of 33rd Triennial Council Meeting of the United Chapters of Phi Beta Kappa at the Copley Plaza Hotel, Boston, Aug. 19-22, 1983. B.U. was host institution for meeting.

Issued U.S. Patent #437406, Jan. 4, 1983. Title: "Cylindrical Mirror Electrostatic Analyzer Free of Third-Order Angular Aberration".

Member of Com. on Education of the American Physical Society until Dec. 31, 1982. In charge of a special project designed to ascertain whether retired physicists can be enlisted in an attempt to improve secondary school education in the sciences.

Franzen - (continued)

Appointed Chairman of a subcommittee of the APS Com. on Education to continue the same project on Jan. 20, 1983.

Awarded a visiting professorship for the summer term at the Eidgenössische Technische Hochschule, Zürich, Switzerland, summer 1983. (Swiss Fed. Institute of Technology.)

Member, Metropolitan College Board, University

Member, Bd. of Editors, Zeitschrift für Angewandte Physik und Mathematik (Swiss Journal of Applied Physics and Mathematics

Referee, Physical Review Letters on 2 occasions

Referee, American Journal of Physics on 3 occasions

Editorial Consultant to Birkhäuser Verlag, Basel, Switzerland

Editorial Consultant to Allyn & Bacon, Textbook publisher

Hellman

Consultant to research project in Psychophysics in the Dept. of Audiology

Jensen

Conference Paper at Boulder Damage Symposium "Laser Induced Damage in Optical Materials: 1981" at National Bureau of Standards, Boulder, Colorado Nov. 15, 1981.

APS Meeting - Washington, D.C., April 1982

Member: APS, IEEE, American Vacuum Society, AAAS Materials Research Society, Elected member - N.Y. Academy of Science (1982).

Invited to give paper - U.S. Workshop on the "Physics and Chemistry of HqCdTe-1983" (at Honeywell - Bloomington, MN)

Consulted on research contract for Air Force at Hanscom Air Force Base - August 1982.

Kirczenow

Merit and Equity Committee - amount of time to be determined.

Invited Public Scholarly Lectures

"Models of the Structure of Graphite Intercalation Compounds", invited paper to be presented at the general meeting of the Canadian Association of Physicists in Victoria, Canada, in June, 1983.

"Recent Progress in Electron-Hole Liquid Physics - Theory and Experiment", colloquium given at Simon Fraser Univ., Nov. 1982.

"Theoretical Models of Staging and Island Structures in Intercalated Graphites", seminar given at Simon Fraser Univ., Nov., 1982.

Kirczenow (continued)

Contributed Talks

(with S.E. Millman), "On the Origin of Simple Staging in Graphite Intercalation Compounds", talk given at the annual meeting of the Materials Research Society, Boston, Nov. 1982.

(with S.E. Millman), "Mössbauer Analysis of the Acceptor Site for the Donated Electrons in Graphite $FeCl_3$", talk given at the annual meeting of the Materials Research Society, Boston, Nov. 1982.

Refereering - Refereed for following journals: Physical Review Letters; Physical Review; Solid State Communications. Also refereed proposals for the NSF.

Klein

Associate Director, Center for Polymer Studies (about 10 hrs/wk)

Invited talks: Harvard Univ., Sept. 1982; Univ. of Toronto, Mar. 1983; Montana State Univ., March 1983; Digital Equipment Co., March 1983.

Chairman, Natural Science Curriculum Com., CLA 10 hrs/mo

Miller

Talk before Photon (Undergraduate Physics Club at B.U.), on the Measurement of the Σ^- Magnetic Moment, Oct. 27, 1982.

Attended Second LAMPF II Workshop, Los Alamos, N.M., July 19-22, 1982.

Presentation before the Program Advisory Com. Bates Linear Accelerator Mar. 7, 1983, "Nuclear Compton Scattering from ^{4}He in the Δ-Resonance Region".

Talk at MIT, Laboratory for Nuclear Science, "Measurement of the Sigma-minus Magnetic Moment", Nov. 23, 1982.

Talk at B.U. Colloquium Series, "The Baryon Magnetic Moments and the Quark Model", April 27, 1983.

Attended Spin Conference, Brookhaven National Laboratory, Sept. 4-8,198

Technical consultation with Harshaw Chemical Co. and Biocron Corp. on the development of a high resolution sodium iodide detectors; Jan. 10-11, 1983.

Consultation on data analysis for the sigma-minus magnetic moment experiment, Aug. 15-19, 1982, College of William and Mary, Williamsburg, Va.

Set up and conduct an experiment to measure the pseudoscalar weak coupling constant, Los Alamos National Laboratory, Los Alamos, N.M. July 17-28, Aug. 1-21, Oct. 16-24, 1982.

Technical consultation at Stanford Linear Accelerator on storage-rings and sodium iodide detectors; experimental work on two-pion correlation Lawrence Berkeley Laboratory, July 7-14, 1982.

Pi

Seminars given at Brandeis Univ., 10/82; Harvard Univ., 12/1/82; Univ. of California at Berkely, Jan. 10, 1983.

Redner

Seminars

Schlumberger-Doll Research Center, Ridgefield, Conn. 9/21/82.
"Transport in directed random networks".

Mathematics Department Seminar, B.U., Oct. 6, 1982.
"Geometrical structure of random resistor-diode networks or, Stuck forever in random Manhattan?"

Theoretical Chemistry Seminar, M.I.T., Oct. 20, 1982.
"Novel transport and anisotropic critical phenomena in directed percolation".

Physics Dept. Colloquium, Univ. of Alberta, Edmonton, Alberta, Canada, Nov. 18, 1982.
"Lost forever in random Manhattan?"

Theoretical Physics Seminar, Univ. of Alberta, Nov. 19, 1982.
"Novel critical behaviour and transport in directed percolation".

Condensed Matter Theory Seminar, Northeastern Univ., Boston, MA., Dec. 2, 1982.
"New results in directed percolation".

Combined Polymer Science and Engineering, Chemistry, and Physics seminar, Univ. of Mass., Amherst, MA, Dec. 29, 1982.
"Directed Percolation: The effect of bias on polymer conformation, critical phenomena, and transport problems".

Theoretical Solid State Seminar at the Univ. of British Columbia, Vancouver B.C., Canada. Feb. 10, 1983.
"Percolation theory for composite media".

Condensed Matter Theory Seminar, Simon Fraser Univ., Vancouver, B.C.
"Novel critical behavior and transport in directed networks".

Invited speaker for Mathematics and Physics of Disordered Media: "Percolation, Random Walk, Modeling and Simulation", Institute for Mathematics and its Applications, Univ. of Minnesota, Minneapolis, MN, Feb. 14-19, 1983.
"Recent progress and current puzzles in percolation".

Condensed Matter Theory Seminar Series, Harvard Univ., Feb. 24, 1983.
"Lost forever in random Manhattan?"

Photon Lecture, B.U., March 2, 1983.
"Lost forever in random Manhattan?"

Member of the University Science Library task force (responsible for the planning of the new Science Library facilities).

Referee for: Physical Review and Physical Review Letters; Journal of Physics; Journal de Physique; Journal of Statistical Physics.

Roberts

5th Int. Symposium on High Energy Spin Physics.
Brookhaven National Lab, 12-22 Sept., 1983. Invited talk.
"The Σ^- Magnetic Moment Experiment at Brookhaven"

Presentation to visiting Dept. of Energy panel at Brookhaven on our experimental progress at BNL. 28 Sept., 1983.
Spokesman for BNL AGS Experiment 723

Univ. Radioisotope Committee

Summer research at Los Alamos Meson Physics Facility, the Bates Linac, and Brookhaven National Lab.

Rothschild

Member of Dept. of Physiology, lecture in the course Cellular Physiology, as well as to offer a tutorial for medical students in techniques in biophsyics.

Seminar in Dept. of Biology, MIT (8/82), H. Boind Khorana.

Invited Lecturer-NATO School on Molecular Spectroscopy of Biomolecules to be held in Italy, 7/83

Invited Lecturer at International Biochemistry Conference, Perth, Australia 8/82 (declined).

Member of CLA-Academic Promotions and Tenure Com.

Shimony

Colloquy with W. C. Quine on Epistemology - Harvard Faculty Club June 1982 (International Center for Epistemology).

Lecture to Physics Dept., SUNY Albany (Oct. 1982).

Lecture to Physics Dept., U. of Conn. (Sept. 1982).

Lecture on Carnap on Induction - Boston Colloquium for Phil. of Science (Nov. 1982).

Commentator on two lectures to Boston Colloquium (Oct. 1982)

Commentator on lecture to Colloquium on Religion and Philosophy (March, 1983).

Member of Steering Com. of Wellesley Com. for a Nuclear Weapons Freeze.

Numerous public lectures on nuclear weapons.

Chairman of a session on decision theory - Philosophy of Science Association (Philadelphia, Oct. 1982) .

Referee for Philosophy of Science, Physical Review, Physical Review Letters, American Journal of Physics, Journal of Mathematical Physics, Foundations of Physics .

Faculty advisor for STAND (Students Against Nuclear Destruction) (arranged teach-in in Marsh Chapel on Veteran's Day 1982).

Invited Lecture at Workshop on Theory and Observation in Contemporary Physics, Center for Philosophy of Science, Univ. of Pittsburgh, May 6-7.

Invited Lecture at Workshop on Wholes and Parts, Univ. of Lund, Sweden June 1-3.

Shimony (continued)

Invited participation and talk at International Symposium on Foundations of Quantum Mechanics in the Light of New Technology, Tokyo, Aug. 29-31, 1983.

Stachel

Editor - Einstein Papers - Princeton Univ. Press.

Professional presentations

"Aharonov-Bohm Effect and its Gravitational Analog," Talk at Relativity Seminar, N.Y.U., Nov.3, 1982, and at

a Joint Relativity Seminar, Princeton University - Institute for Advanced Study

Four invited talks during trip to Israel:

"Eddington and Einstein," at the Eddington Centennial Symposium, Tel Aviv University, December 28, 1982.

"Editing the Einstein Papers," at the Van Leer Jerusalem Institute, December 29, 1982.

"The Aharonov-Bohm Effect and its Gravitational Analogue," at the Physics Colloquium, at Ben Gurion Univ., Beersheva, December 30, 1982.

"Einstein, The Man and the Scientist," public lecture at Birzeit University, (West Bank), January 3, 1983.

Member Planning Committee, 20th Annual Orbis Scientiae Meeting, Miami, Florida, Jan. 17-21, 1983. Attended meeting, and was Annotator (Commentator) at Session on General Relativity and Astrophysics. (Comments to be published).

One of organizers of Symposium on Marx and Science held by Boston Colloquium for Philosophy of Science, Feb.11-12, 1983, gave talk on "Science and Capitalism," and after-dinner remarks at celebration of Bob Cohen's 60th Birthday.

This semester my activities will include:

Chair symposium of Boston Colloquium on the Reception of Relativity, March 25, 1983.

Talk to N.Y.U. Relativity Seminar on: "The Development of General Relativity," April 14, 1983.

Joseph Henry Lecture at Princeton University, "'What Song the Syrens Sang': Conjectures on the Origins of Special Relativity," April 18, 1983.

Stachel - (continued)

Participant in Symposium at AAAS meeting in Detroit on Creativity in Science and Art, May 25, 1983.

Attend 10th International Conference on General Relativity and Gravitation, Padova, Italy, give contributed paper, July 4-9, 1983.

Attend 7th International Congress of Logic, Methodology and Philosophy of Science, Salzburg, Austria and give invited paper on "Special Relativity from Measuring Rods," July 11-16, 1983.

Speak at Seminar on The Peace Movement in the United States, Berkshire Forum, Stephentown, N.Y., August 12-21, 1983.

Stanley

Invited Talk, EUROPEAN MEETING ON WATER AND ASSOCIATED LIQUIDS, Pisa, Italy.

Invited Talk, INTERNATIONAL CONFERENCE ON TWO-DIMENSIONAL MEMBRANE PHENOMENA, Nova Scotia.

Invited Talk, INTERNATIONAL CONFERENCE ON MAGNETISM SATELLITE MEETING, Tokyo, Japan.

Invited Talk, AMERICAN PHYSICAL SOCIETY, Philadelphia, PA.

Invited Talk, INTERNATIONAL CONFERENCE ON DYNAMICS OF MACROMOLECULES (Institute of Theoretical Physics, Univ. of California at Santa Barbara).

Invited Talk, INTERNATIONAL CONFERENCE ON KINETICS OF AGGREGATION AND GELATION.

Invited Talk, Exxon Symposium on SCALING PHENOMENA IN DISORDERLY GROWTH PROCESSES.

Director, Center for Polymer Studies.

Member, Honorary Degree Com., Univ. (coordinated 5/82 degree for P.G. deGennes).

Member, Research Activities Committee, University

Willis

Attended Quantum Optics Conference at M.I.T.
Took regular part in the biweekly Quantum Optics Colloquium.
Quantum Optics Conference, Rochester June 1983.
Reviewed a manuscript for Addison Wesley.
Refereed contract proposals for NSF.
Refereed papers for Optics Communications, Journal of Physics A and Physical Review.

Zimmerman

Attended AIP-Industrial Associates meeting in October 1982 at Sandia Laboratories, Albuquerque, N.M.

Northeastern University, Solid State Seminar "He^3 Liquid in High Magnetic Fields" , March 10, 1983

Advisory Board of the University Professor's Program.

Computer Access Allocation Board.

University Council Research Activities/Libraries Committee.

Faculty Council Research Activities/Libraries Committee (Chairman Elect).

Associate of the Francis Bitter National Laboratory, MIT.

Motivation

The Boston University Department of Physics now awards a Ph.D. in Physics at the rate of approximately five per year. The time required for completion of course requirements, dissertation research and the writing of the thesis is typically 3 - 4 years beyond the Masters level. The thesis topic must be one of a basic nature, dealing with some aspect of theoretical or experimental physics which is new to the field. The holder of the Degree is expected to be an expert on the thesis subject, and in addition to have a set of skills and knowledge which will enable him or her to perform well in areas outside the immediate area of the thesis topic. These conditions enable the Department to penetrate deeply through the relatively narrow set of subjects in which it has expertise. The Ph.D. in Applied Physics is proposed as a mechanism to handle a relatively small number of students who chose to work in areas where accepted physics concepts, techniques and knowledge are applied to the solution of problems or the development of systems either in other fields or in the field of physics itself. In this way, some investigations now described as Medical Physics, or Solid State Physics development can be subsumed under the category of Applied Physics. Alternatively, a device or technique or product is the goal of the thesis project. There are two components of the proposal which are closely linked but should be considered separately. One is the interdisciplinary component which, in practice, is often part of an Applied Physics program. (In principle, an interdisciplinary thesis could be written which concerned strictly basic research in more than one discipline. These cases will be handled by the Interdisciplinary Studies Ph.D. Program already extant.) The other is the applications component which legitimizes the intent of performing research which applies the tools of physics and other disciplines either to the solution of some problem in a non-physics discipline, or to the understanding of systems or the development of devices useful to the field of physics. It is believed that the availability of the degree program will increase the awareness of student and faculty of the rich variety of physics-related subjects in other fields and technologies. The program should foster contacts with industry and might be linked with their R&D departments in a mutually beneficial way. It should increase the flexibility of the students on on the regular Ph.D. track by interaction with the Applied Students, and should provide the Faculty with the opportunity of developing research support sources, creating opportunities for individual consultation, and encouraging the creation

of patented processes or devices. A small but solid program in Applied Physics could prove to be a bulwark against attrition which may occur if student enrollments drop. Moreover, the Applied Physics degree may have appeal to students interested in returning to academic life after a time in high technology industry. The existence of the Applied program is expected to augment the services and facilities available in the Physics Department, and this will have a favorable impact at all levels of the Physics program.

A consideration of prime importance is that of insuring that the graduates are of high quality and not simply those individuals who could not succeed in the present basic Physics Ph.D. program. The Applied Physics students will be required to achieve the same high level of success on the Written Comprehensive Examination as is required of all the Physics Ph.D. candidates; namely, a pass with distinction. A dissertation committee will be set up at the request of an admitted student in accordance with the rules of the Division consisting of five or more members at least one of whom is from outside the Physics Department and is approved by the division. The committee will read and approve or disapprove the proposed thesis outline, it will sit at an oral progress examination scheduled approximately one year after the written comprehensive, and it will constitute the final thesis defense committee. The membership of this committee must be approved by the Executive Committee of the Division. From time to time it may be appropriate to appoint an external examiner to ensure the quality of the thesis research. In such cases a special service appointment in the graduate school is required. The most important guarantee will continue to be the high standards of the whole Physics Department applied at every level of the process.

Supporting Disciplines

The supporting disciplines are expected to be one or more of mathematics, engineering, and the physical, biological and medical sciences. Students will take undergraduate and graduate level courses in these fields, and are expected to have access to the respective faculties for advice on aspects of the research work which go beyond the classroom. The primary resource person will be the appropriate member of the student's Committee.

Admission to the Program

Students are admitted to the program by an Admissions Committee responsible to the Executive Committee of the Division. The Admissions Committee will be comprised of two members of the Physics faculty and one member appointed by the Division. Applicants are normally expected to have an undergraduate degree in Physics and a Master's degree in Physics or a closely related field. Students who wish to enter the program but do not have the MA degree will be encouraged to enter the regular Physics MA program and then transfer to the applied Physics Program. Note that transfer students holding the MA will be required to pass the Written Comprehensive Examination with distinction as a degree requirement. Students who have been absent from academic life for several years are strongly urged to take an informal test at the B.A. major or M.A. level before they commit themselves to the program. Students who wish to enter the program with a particular Applied Physics project in mind should determine in advance whether or not the Department has the competence in that area.

Degree Requirements

The Division will require that for the Applied Physics degree, the student will take at least eight courses after successfully passing the Written Comprehensive Examination. These will be divided among more advanced Physics courses (3 at the 700 level) and those needed for the Applied Physics specialty. A requirement for continuation in the Ph.D. program in Applied Physics is a pass with distinction on the Written Comprehensive Examination in Physics.

The interdisciplinary aspect likely to be present will require the student to take courses outside his or her field: courses in mathematics, computer science, engineering, chemistry or biology for example, count toward the degree requirement.

A possible source of students for the Applied Physics degree is persons already employed in local industry. For these cases, a student could be enrolled in a part-time program until thesis work is begun, after which full time enrollment would be necessary.

"Outside" Thesis

In a few cases after some experience in the program it might be feasible to carry on "outside" thesis work, where the primary supervisor is located outside Boston University perhaps in a National Laboratory or in another University, or in an industrial research laboratory. There is a precedent for such outside thesis work, and the prime requirement is close contact with competent faculty at Boston University.

Doctor of Philosophy in Applied Physics (Catalogue Copy)

The Department has prepared a pamphlet entitled, "Formal Requirements for Graduate Study in Applied Physics," which lists the requirements for the Ph.D. degree in some detail. Copies of this pamphlet are available at the Office of the Department of Physics and at the Division of Engineering and Applied Sciences.

Admissions Tests and Prerequisites

The general requirements of the Graduate School apply. The candidate must have completed the requirements for the M.A. or M.S. degree with a major in Physics or a closely related field. The student applies for admission to the division of Engineering and Applied Science as a candidate for the Ph.D. degree in Applied Physics. Students lacking the MA degree may obtain it through the the regular Physics degree program.

Degree Requirements

Course Requirements

Among the total of eight courses beyond the M.A. level, three must be selected from the advanced (700-850) level.

Graduate level courses in mathematics, physical science and engineering can be used to satisfy the eight course requirement. Students normally will be required to audit one course approved by the advisor each term after the completion of formal course requirements. The tuition for such audits is covered by the continuing student fee.

Language Requirement

A written examination in French, German or Russian will be taken during the student's first year. Any student failing the examination twice must enroll in a year course in the language at Boston University and receive a grade of B- or higher.

Comprehensive Examinations

A. Written

All students admitted to the Applied Physics program must take the written comprehensive examination required of students in the Physics program. The written comprehensive examination covers the following topics: general physics, quantum mechanics, statistical mechanics, thermodynamics, and electromagnetic theory. The topics are covered in two four-hour examinations on consecutive days. The examination is not broken up into specific categories and contains some problems which emphasize the coherence and overlap of the topics itemized above. A grade of pass with distinction must be achieved to continue in the program.

B. Oral

The student is required to take an oral examination within a year of having passed with distinction the written examination. This examination has three purposes:

1. To enable the faculty to test a student's ability to carry out research of the type required for the completion of a Ph.D. dissertation in Applied Physics.
2. To make it possible for a student to explore in a preliminary way a field of research related to a possible dissertation topic.
3. To allow the student and faculty members to test a working relationship with each other.

To accomplish these objectives, the student should discuss a test project with members of the Dissertation Committee, and request to be allowed to carry out a test project under their direction for one semester. In the course of the test project, the student would be expected to study intensively and with concen-

tration on aspects of the test project. When the test project is completed, students will present themselves for oral examinations. Examinations will normally last one-and one-half hours and will begin with a forty-five minute talk in which students report on their work.

The oral qualifying examination should be taken as soon as possible, and certainly within a year after passing the written comprehensive examination with distinction. In many cases, a student who passes the examination as just described will continue the association with the faculty members who supervised the test project; the faculty members will then become the readers of the student's Ph.D. dissertation.

Committee

A Dissertation committee will be formed at the request of the student who has passed the Written Comprehensive examination with distinction. The committee will consist of five or more members at least one of whom is from outside the physics department, and must be approved by the Executive Committee of the Division. The Committee will help the student to create a thesis outline and must approve that outline. The committee also will sit on the oral comprehensive examination and at the final oral thesis defense.

SAMPLE PROGRAMS

(1) Accelerator Physicist

A regular program physics student with a good hardware aptitude passes the Written Comprehensive Examination at Boston University and joins the Intermediate Energy Group. The group is embarking on a design and construction project for a pulse stretcher ring required to extend the duty factor (% on-time) for a pulsed linear electron accelerator from 1% to 90%. The resultant beam must be made compatible with the proposed experiments in photon scattering at 250 MeV. A senior machine physicist is available at M.I.T. who suggests the design approach and outlines the computer computational work to be done. The student learns sufficient nuclear physics, electrical engineering and advanced computer programming to handle the project. She or he carries out the project under a Boston University nuclear physicist as 1st reader with the M.I.T. machine physicist as 2nd reader. A Boston University computer science professor and an electrical engineer complete the Committee. The physics design is finished in a year, and the engineering work is completed during a second year. The pulse stretcher is built the third year. The required time after the M.A. degree is three years. The graduating student finds immediate employment as an accelerator physicist at a national laboratory or as a high power radio-frequency expert at a local defense industry.

(2) Models for Brain Wave Analysis

A student of theoretical bent at University X learns of the brain-wave research program at Boston University. He transfers to Boston University after getting the M.A. degree at X and is taken on as a student by a physics professor doing brain-wave research. The student takes courses in biology and physiology to fill in his background, and also takes some advanced mathematics and computer analysis courses to provide research tools. The thesis subject is basically mathematical physics applied to brainwaves, and as such is not basic physics research. It could fit into our present inter-disciplinary format, but the emphasis on the application of known

techniques as opposed to basic studies of a multi-disciplinary nature suggest that a program in Applied Physics is appropriate. The Committee would include, as always, the physics professor as 1st reader with a physiologist and mathematician as co-second readers. With a wide range of background work to be done, the Ph.D. might require 3-4 years. The student could then go on to Medical School or become part of a medical research team.

(3) Applications of Polymer Science

A chemistry M.A. degree candidate with a strong physics background becomes interested in polymer physics and is taken on by the Polymer Science Center at Boston University as a Research Assistant, funded by an industrial company. She undertakes a project jointly supervised by a Boston University polymer physicist and by an industrial polymer physicist with the purpose of developing a new type of commercial polymer. A number of remedial physics courses are taken and the M.A. level written comprehensive is passed. An organic chemist from Boston University joins the Committee. With theoretical help from the Boston University physicist and with the synthetic skills of the Boston University chemist, a material is developed which is found to be useful by the industrial polymer scientist. The industrial-academic liaison is strengthened and additional R and D support funds are forthcoming from industry. The Committee includes the Boston University polymer physicist as 1st reader, with the Boston University chemist and industry persons as joint second readers. A temporary Research Professor appointment is secured for the industrial physicist.

(4) Other Fields

Similar scenarios can be written for surface physics studies, Mossbauer work, Raman-laser studies of biological systems, and other experimental physics broadly referred to as condensed matter studies.

CONCENTRATION IN PHYSICS
WITH MINOR IN ELECTRICAL ENGINEERING

Prerequisites: CLA MA 127, or 123, 124; CLA PY 251, 252, 353. This sequence of courses should normally be started in the Freshman year. Students are expected to acquire facility in computer programming, either by self study or by enrollment in MA 191.

Principal Courses: CLA PY 354, 403, 405, 406, 410, 421, 451. ENG SC 411, 412, and one of the following sequences of two courses: (1) ENG SC 311, 421 (2) ENG SC 401, 501 or 501, 502 (3) ENG SC 503, 550. (ENG 503 has as a prerequisite the basic knowledge of Boolean algebra and number theory, ENG 550 has the prerequisite of Assembler language e.g. CLA MA 291 or ENG EK 412). Student must attain a minimum grade of C (2.00 grade points) in each of the principal courses. The first two engineering courses should normally be taken in the junior year and the last two in the senior year.

Related Courses Required: CLA MA 225,226. This sequence should normally be completed by the end of the Sophomore year.

Note: The engineering courses have the following titles:

ENG SC 311: Introduction to Logic Design

ENG SC 401: Signals and Systems

ENG SC 411, 412: Electronics I and II

ENG SC 421, 422: Digital Circuits I and II

ENG SC 501: Dynamic Systems Theory

ENG SC 502: Dynamic Systems Applications

ENG SC 503: Switching Theory and Logic Design

ENG SC 550: Microprogramming and Microprocessors

ENG EK 412: Minicomputers

COURSE APPROVAL FORM

Faculty of Arts and Sciences

Submission to:
(x) CLA
( ) GRS
( ) CLA/GRS
( ) MET
( ) MED
( ) SUM
( ) STH

From (Dept.): Physics

( ) New course, first offering Sem II Year 82-83
( ) Revision of ( ) number
( ) title
( ) description
( ) prerequisite
( ) other (describe at bottom of page*)

NUMBER: CLA / PY / 136 INSTRUCTOR: B. Lee Roberts

TITLE: The Physics of High Fidelity

SHORT TITLE (15 spaces or less): Hi Fi Physics

DESCRIPTION (40 words or less):

Study of basic principles of mechanics and electromagnetism applied to high fidelity sound recording and reproduction. The principles of oscillations and wave phenomena, decibel scale, force and torque will be applied to familiar electrical devices such as amplifiers, loud speakers, digital recording and others.

PREREQUISITES (Specify AND or OR):
( ) Class standing (CLA only): _____
( ) Courses: _____
( ) Consent of Instructor
( ) Other: _____

CREDITS:
( ) Half course - 2
(x) Full course - 4
( ) Year course - 8
( ) Variable

THE FOLLOWING MUST BE SUBMITTED ALONG WITH THE COURSE APPROVAL FORM:

1. Syllabus with assigned readings
2. Memos from individuals with cognate courses in relevant departments

There are no cognate courses in other departments, as far as we know.

Information Required for Chairman:

1. How frequently will the course be offered?

2. Enrollment Limit 40 Anticipated Actual Enrollment 25

3. a. Are present facilities such as library, laboratory, and other technical resources adequate for the proposed course? Yes

   b. If not, please explain what is being done to make those resources adequate

*

4. Are any courses being deleted if the proposed course is approved?

No

5. What is the budgetary source of support for this course?

CLA

6. How does the offering of the proposed course affect the distribution of teaching resources at various levels of instruction in your department? (In a total profile of 100-200, 300-400, 500-600, 700-900 courses, this course increases what level and decreases what level in terms of courses to be taught?)
This course will be offered in alternate semesters with other interdisciplinary courses not offered.

7. How does the offering of the proposed course affect the teaching assignments of the faculty member regarding his or her participation at various levels of instruction? (Please enclose the teaching assignments of that instructor for the last two years and his or her enrollments.).
No change in the teaching assignment.

8. What is the intended function of the course, i.e., concentration, prerequisite?
Divisional distribution.

9. Are there other courses within the department which duplicate the material to be taught in the proposed course? Their level? Degree of overlap? Enrollments?

10. Are there other courses within the College or University which duplicate the material to be taught in the proposed course? At what level? Enrollments? Please submit reviews from relevant faculty or chairpeople of the affected departments.
Possibly Physics in Music (CLA PY 231) which Roberts is also teaching.

Requested by: Department Chairperson _____ Date 12/15/82

Approved by: Curriculum Committee _____ Date _____

Faculty Meeting Date _____

( ) Not approved for the following reasons: _____

Department Notified By: _____ Date _____

Please submit yellow, pink and white copies to Curriculum Committees, Room CLA 109. The blue copy is your department copy and should be kept when submitting the proposal. The white copy will be returned to the department when full approval is received.

THE PHYSICS OF HIGH FIDELITY

Syllabus:

(1) Introduction

(2) Waves and oscillations; wave properties and sound

(3) Complex waves and interference

(4) The decibel scale; loudness and intensity; Fletcher-Munson curves and the response of the human ear

(5) The basic components of a hi-fi system

(6) Loudspeakers and earphones: basic mechanical principles

(7) Electrical principles and circuits

(8) Amplifiers

(9) Heat; temperature and thermal conduction

(10) Tuners: electromagnetic waves; frequency and amplitude modulation

(11) Magnetism: permanent magnets; electromagnets; forces exerted on a current by magnetic fields; Faraday's law of induction

(12) Turntables and records, tone arm, cartridges, stylus, record grooves

(13) Tape decks, noise reduction systems

(14) Digital recording and reproduction

This course will serve two purposes: (i) It will explain how basic physical principles are applied to a rather complex electromechanical system familiar to almost every student -- the high fidelity system. (ii) It will contribute to the technological literacy of our students by providing them with a basic understanding of ideas important to a large part of our industrial society.

Text: The Science of Hi-Fidelity, K.W. Johnson, W.C. Walker, and J.K. Cutnell (Kendall/Hunt Pub.) 1981.

Boston University Medical Center

School of Medicine
80 East Concord Street
Boston, Massachusetts 02118
617/247-6131

Department of Physiology

MEMO

To: Steering Committee, Division of Medical & Dental Sciences

From: Benjamin Kaminer BK

Date: June 16, 1983

Subject: Cellular Biophysics Program

Enclosed is an amended and corrected draft of the Cellular Biophysics Program. The changes include suggestions made by Drs. Levine, Simons (in consultation with Dr. Franzblau) and Troxler.

This proposal is for consideration at the meeting of the Steering Committee to be held on Thursday, June 23, 1983 at 1:00 p.m. in the Dean's Conference Room L-102.

BK/sm
Enclosure

A. IDENTIFICATION OF PROGRAM BY DEGREE

NAME: Cellular Biophysics Program
DEGREE: Ph.D
ORIGINATING GROUP: Members of the Departments of Physics, Physiology and the Biophysics Institute.

B. ACADEMIC OBJECTIVES AND PROGRAM

1. DESCRIPTION OF THE PROGRAM

General Description

The Department of Physics of the College of Liberal Arts and the Department of Physiology and the Biophysics Institute of the School of Medicine of Boston University offer a joint program in cellular biophysics. The program is designed for students with a strong background in physics or biophysics who are interested in conducting biophysical research in cellular physiology. Some of the areas of research include the application of physical techniques to study biomolecular structure, biopolymers, cooperative phenomena in living systems, membrane biophysics, ionic transport, nonequilibrium thermodynamics, visual transduction and muscle contraction.

The program consists of two stages. In Stage I, the student completes at least 4 graduate level courses in the physical sciences. A graduate degree at the Master's level or higher in physics, chemical physics, biophysics or the equivalent can be used to satisfy the stage I requirements. In Stage II, the student receives comprehensive training and conducts research in the area of cellular physiology and biophysics under the supervision of the core cellular biophysics faculty or of other members of the faculty of either CLA or the School of Medicine whose research program fits the broad outline of "Cellular Biophysics" and whose supervision of dissertation research by students enrolled in the Program is approved by the Cellular Biophysics Program Committee.

Admissions

Applicants for admission normally will have completed an undergraduate major in physics or have a strong background in physical sciences. Students may also enter the Program after completing an M.A. in Physics. Applicants with undergraduate majors other than physics may be required to complete prerequisite courses in physics. Other undergraduate prerequisites for the program are referred to under course requirements.

Course Requirements

In total 16 graduate level courses are required. At least one graduate level course (4 credits) must be completed in each of the following areas as defined in the Stage I Curriculum: electromagnetism, statistical physics, quantum mechanics (molecular orbital theory) and physical chemistry. Additional courses must be selected in the areas of biophysics (minimum 2 from core list), cellular physiology and biochemistry. A minimum of 3 courses must be 500 level or higher and 5 courses

700 level or higher. (see Curriculum, for more details)

Curriculum

The curriculum consists of distribution requirements in both the physical and biological sciences. Note: Prerequisite undergraduate requirements for the courses taken below must be met as specified in the graduate school bulletin (cf. Appendix IV).

Physical Sciences (STAGE I)

Graduate level courses in at least four different areas of physical sciences must be selected. Allowed courses in each of the specified areas are listed below (alternative appropriate courses in the categories below can be substituted with the approval of the cellular biophysics program committee). See prerequisites in graudate school bulletin for additional information.

Electromagnetism		Semester	Credits
PY 405,406*	Electric and Magnetic Field and Waves I & II	1,2	4
PY 509,510	Electromagnetic Theory	1,2	4
Statistical Physics:			
PY 410*	Statistical Thermodynamics	2	4
PY 511,512	Statistical Physics	1,2	4
CH 733	Statistical Thermodynamics	1	4
Quantum Physics and Molecular Orbital Theory:			
PY 451,452*	Quantum Physics	1,2	4
PY 507,508	Quantum Mechanics	1,2	4
CH 507,508	Quantum Chemistry and Spectroscopy	1,2	4
Biophysics or Physical Chemistry:			
CH 500	Physical Chemistry	2	4
PY 721	Concepts in Biophysics(required)	1	4
PY 722**	Techniques in Biophysics	2	4
CH 713	Physical Chemistry of Biological Macromolecules	2	4
CH 715,716	Molecular Structure Determination	1,2	4
ME 771	Biophysics of Macromolecular Assemblies***(required)	1	4
CH 734	Topics in Molecular Spectroscopy***	2	4

Biological Sciences: (STAGE II)

A minimum of one course must be taken in each of the following areas: Note: Undergraduate prerequisites in biology, chemistry and organic chemistry must be

completed (see graduate student bulletin).

Cellular Physiology:		Semester	Credits
ME 843	Cellular Physiology (required)	1	4
ME 540	Human Physiology	1	4
ME 841,842	Physiology Seminar	1,2	2
ME 745,746	Special topics in Physiology	1,2	variable
ME 840	Neurobiology	1	2
MS 542	Human Physiology	1	4
BI 545	Neurobiology	1	4
BI 552	Molecular Biology	1	4
Biophysics:			
PY 721	Concepts in Biophysics (required)	1	4
PY 722**	Techniques in Biophysics	2	4
BI 550	Biophysics	2	4
BI 711	Biological Transport Mechanisms	2	4
BI 704	Biological Macromolecules	2	4
ME 771	Biophysics of Macromolecular Assemblies (required)***	1	4
ME 851	Special Topics (Biophysics of of water)***	1	2
ME 871,872	Biophysics Seminar	1,2	2
Biochemistry: (at least one course required)			
CH 535,536	Biochemistry I & II	1,2	6
MS 555-6	Biochemistry A&B	1,2	8 total
ME 751	Biochemistry and Morphology of the cell	1	8

** To be proposed
*** Offered alternate years

---

* This course can be taken with the permission of the biophysics committee by students with insufficient background in physics or cell physiology.

Language Requirement

The candidate must complete a written language examination in French, German or Russian. In special cases, the candidate may be allowed to substitute another language for which a significant body of scientific literature exists.

Examination and Research

(1) All candidates must pass a comprehensive examination as early as possible and in no case later than the end of the third year.

(2) The student shall select a Ph.D research topic and an advisor as soon as possible. A brief description of the project and the name of the research advisor will be submitted to the Cellular Biophysics Program Committee (CBPC) which will appoint in consultation with the advisor a three member examining committee. The student will be examined on specific details of the research project including the background, proposed rationale, techniques, significance and possible pitfalls.

(3) Thesis research will be conducted under the guidence of a research advisor. In some cases interdisciplinary research under the guidence of more than one advisor may be carried out with permission of the CBPC.

(4) Dissertation. Candidates shall demonstrate their abilities for independent study in dissertations representing original research or creative scholarship.

Final Oral Examination. Students shall present themselves for final oral examinations, in which they must defend their dissertations as worthy contributions to knowledge in their fields and demonstrate mastery of their fields of specialization as they relate to the dissertations. The examining committee is composed of at least five Graduate School faculty members of the department. At the discretion of the department, one of the five may be disignated by the dean of the Graduate School to represent a department or division other than that of the candidate.

2. RATIONALE

An increasing number of first year and upper-level graduate students have expressed an interest in obtaining a Ph.D. in biophysics. While these students often want to specialize in an area of expertise within a department (i.e. biological physics, molecular biophysics, biophysics of transport processes) the departmental degree program offered is not sufficiently flexible for the interdisciplinary training needed in biophysics. The Ph.D. Program in Cellular Biophysics is designed to provide broad based interdisciplanary training while still allowing specialization in a particular subfield of biophysics.

There are a number of specific reasons at this time for the offering of a comprehensive cellular biophysics program which include:

1) The existence at Boston University of excellent resources for the formation of a comprehensive cellular biophysics program. This includes the availability of complete biophysics facilities in the areas of X-ray scattering, nuclear magnetic resonance, Fourier transform infrared spectroscopy, Raman spectroscopy, quasi-elastic light scattering, low temperature spectroscopy, and Mossbauer spectroscopy (see Appendix for more complete list). This also includes a substantial faculty involved in both biophysics research and instruction. This combination of elements makes it feasible to assemble a quality program with almost no additional investment by the University.

2) An increasing number of students wish to enroll in a graduate level biophysics program. Many of these students have a strong background in the physical sciences with an undergraduate degree in Physics. Without an identifiable Ph.D level program in cellular biophysics most of these students will not apply to Boston University.

3) The formation of a Ph.D program in Cellular Biophysics would act as a catalyst for interdisciplinary research at Boston Univesity between biological and biomedical researchers and those trained in the physical sciences. This will be particularly important since the program involves two units at the Medical School and one at the Charles River Campus. These interdisciplinary collaborations would have many beneficial spinoffs including the attraction of new research funds. Such benefits have already been achieved by the successful Interdepartmental Biochemistry Program

3. RELATIONSHIP TO OTHER EXISTING PROGRAMS

The proposed Cellular Biophysics Program does not overlap with any other existing program in the University. It will however provide a new pool of graduate students trained in the physical methods of research who are interested in applying these methods to biological problems. These students should help contribute to many of the existing biologically oriented research efforts at Boston University.

All relevant cognate units are being contacted and letters of consultation will be attached. A task committee consisting of representatives from the Departments of

Physics, Physiology, Chemistry, Biology and Bioengineering were involved in the initial planning of this program and provided a feedback mechanism to the above mentioned departments.

4. PROJECTED ENROLLMENT

An initial enrollment from 3-5 students per class is projected. Future enrollment should average 5 per class.

5. ADMINISTRATION

A cellular biophysics program committee (CBPC) will be formed consisting of representatives from each participating unit as well as from affiliated Departments. The Director of the program who will chair the CBPC will be selected by a steering committee consisting of the Chairman of the Departments of Physics, Physiology and the Chief of the Biophysics Institute. The steering committee will act as an oversight body in academic and financial matters. There will be three subcommittees of the CBPC, each reporting to the CBPC. These are 1) the admissions committee, 2) the academic program committee and 3) the membership committee. The admissions committee will be responsible for the student admissions into the program. The program committee will oversee and recommend courses, appoint thesis advisors, examining committees and oversee students' overall progress through the program. The membership committee will recommend the appointment of new faculty to the program.

6. COMPARISON WITH SIMILAR PROGRAMS AT OTHER INSTITUTIONS (see appendix V)

7. EXTERNAL ACCREDITATION - NONE REQUIRED

8. CATALOGUE COPY-The Catalogue copy is identical to section B.1. (Description of the Program.)

C. ACADEMIC RESOURCES

1. Existing Faculty

The core faculty comprised of members of the Department of Physics, College of Liberal Arts, and the Department of Physiology and the Biophysics Institue of the Medical School is expected to participate directly in the cellular biophysics program by providing research facilities, directing dissertation research and participation in cellular biophysics related courses. In all cases the faculty will be derived from existing departments at the University.

Core Faculty

W. Adelman
Adjunct Professor of Physiology

David Atkinson, Ph.D.
Associate Research Professor of Medicine and Biochemistry

Rama Bansil
Assistant Professor of Physics
Assistant Professor of Physiology

Bernard Chasan
Professor of Physics

Susanne Bennett Clark, Ph.D.
Associate Research Professor of Medicine

Melvin C. Cornwall
Associate Professor of Physiology

Alvin Essig
Professor of Physiology
Research Professor of Medicine

A. Fein
Adjunct Associate Professor of Physiology

F. Garcia-Diaz
Assistant Research Professor of Physiology

James A. Hamilton, Ph.D.
Assistant Research Professor of Medicine and Biochemistry

F. Harosi
Adjunct Associate Professor of Physiology

Ronald A. Laing
Associate Professor of Ophthalmology and Physiology

Edward F. MacNichol, Jr.
Professor of Physiology

Robert J. McLaughlin
Associate Professor of Physiology

Paul O'Bryan
Associate Professor of Physiology

Trevor G. Redgrave, M.B., Ph.D.
Associate Research Professor of Medicine
Associate Professor of Physiology

S. Rosenthal
Assistant Research Professor of Physiology

Kenneth J. Rothschild
Associate Professor of Physics
Associate Professor of Physiology

G. Graham Shipley, Ph.D.
Research Professor of Medicine
Professor of Biochemistry

Donald M. Small, M.D.
Professor of Medicine and Biochemistry
Chief, Institute of Biophysics

H.E. Stanley
University Professor
Professor of Physics
Professor of Physiology

William C. Ullrick
Professor of Physiology

Charles Willis
Professor of Physics

Note: In addition to the core cellular biophysics faculty, there are faculty in other Departments conducting research which may be considered appropriate for dissertation research in this program. These faculty could potentially serve as advisors with approval of the Cellular Biophysics Program Committee. These include but are not limited to members of the Chemistry Department as listed in Appendix V.

2. New Faculty and Staff Requirement

No additional faculty is anticipated. A secretary will be necessary for approximately 20 hrs/week in order to facilitate the administration of the program.

3. No new library or computer resources are anticipated outside those already available in the respective Departments.

D. FINANCIAL AND PHYSICAL RESOURCES

1. Special equipment or supply needs

A typewriter will be necessary for program administration. Secretarial supplies are also requested.

2. Financial Assistance Available and Requested

It is anticipated that many of the students entering the program through the Physics Department will be supported in the initial stages of the program by Teaching Fellowships. Research Assistantships will also be available which normally provide a stipend without tuition support. It would thus be necessary to supplement these Research Assistantships by tuition waivers. We anticipate an average of 4 full-time tuition waivers (3-4 courses/semester) per year. A number of pre-doctoral stipends are also available for qualified students from the Biophysics Institute.

3. Additional Financial Assistance Requested

A brochure to advertise the program will be printed and distributed to various Universities and interested students.

APPENDICES

I. Samples of Curricula for Ph.D in Cellular Biophysics

II. Core Faculty and Facilities in the Three Participating Units

- A. Biophysics Institute
- B. Department of Physics
- C. Department of Physiology

III. Comparison with Similar Programs at Other Institutions.

IV. Catalogue Description of Courses in Cellular Biophysics Curriculum.

V. Chemistry Department Faculty

VI. Correspondence

APPENDIX I
Samples of Curricula for Ph.D in Cellular Biophysics

Example A.

Background: Undergraduate with B.A. in Physics, one year of basic biology, chemistry and organic chemistry.

YEAR 1

E&M (PY509)	Concepts in Biophysics (PY721)
Statistical Phys. (PY511)	(Biology Elective)
Quantum Mechanics (PY507)	Quantum Mechanics (PY508)

YEAR 2

Cellular Physiology (ME843)	Techniques in Biophysics (PY722)**
Biochemistry I (CH535)	Biochemistry II (CH536)
Biophysics of Macromol. (ME771)	Biophysics Laboratory Rotation**

After 2nd year student takes comprehensive examination

YEAR 3

Research Credits and elective courses

After 3rd year student makes research presentation

YEAR 4

Research Credits and elective courses
Receives Ph.D. in Cellular Biophysics

Note: In the case of the above curriculum a student could also receive an M.A. in Physics after the second year by substituting the biology elective with E&M PY510 and by passing the Physics Comprehensive Examination with distinction (A biophysics comprehensive exam is still required in order to receive a Ph.D in cellular biophysics. However, some parts of the exam dealing with the physical science courses would be deleted).

Note: The Biochemistry sequence in Year 2 could be concentrated in semester 1 by taking ME751. Biophysics of Macromolecules (ME771) would then be taken in the second semester.

** To Be Proposed

Example B.

Background: Undergraduate with B.A. in chemistry, with two years of physics, and one year of biology. '

YEAR 1

E&M (PY405)	E&M (PY406)
Statist Thermo. (CH 733)	Concepts in Biophys. (PY 721)
Quantum. Chem. (CH 507)	Quantum. Chem (CH 508)

YEAR 2

Cellular Physiology (ME843)	Techniques in Biophysics (PY722)**
Biochemistry I (CH535)	Biochemistry II (CH536)
Biophysics of Macromol. (ME771)	Biophysics Laboratory Rotation**

After 2nd year student takes comprehensive examination

YEAR 3

Research Credits and elective courses

After 3rd year student makes research presentation

YEAR 4

Research Credits and elective courses

Doctor Thesis Examination for Ph.D in Cellular Biophysics

** To Be Proposed

Appendix II: Core Faculty and Facilities in Three Participating Units

A. BIOPHYSICS INSTITUTE

FACULTY

Donald M. Small, M.D.
Professor of Medicine and Biochemistry
Chief, Biophysics Institute

David Atkinson, Ph.D.
Associate Research Professor of Medicine and Biochemistry

Susanne Bennett Clark, Ph.D.
Associate Research Professor of Medicine

James A. Hamilton, Ph.D.
Assistant Research Professor of Medicine and Biochemistry

Trevor G. Redgrave, M.B., Ph.D.
Asssociate Research Professor of Medicine
Associate Professor of Physiology

G. Graham Shipley, Ph.D.
Research Professor of Medicine
Professor of Biochemistry

Biophysics Institute Training Program

The major purpose of the Biophysics Institute is to apply physical-chemical techniques and rationale to the study of physiological and pathological processes. The objectives of our training program are to instruct postdoctoral (M.D., Ph.D. or equivalent) fellows and predoctoral students in the use of basic biophysical and physical-chemical techniques to study the chemical composition, structure and molecular interactions of lipids and proteins in human serum lipoproteins, isolated cell membranes, cultured cells, and cells of normal and pathological tissues. Students study lipid-lipid and lipid-protein interactions using phase equilibrium techniques, surface chemistry, x-ray (neutron) diffraction, differential scanning calorimetry, polarizing, phase contrast and electron microscopy, isotope exchange, and NMR spectroscopy. They learn to isolate,purify, and characterize chemically the lipoproteins, lipids, apolipoproteins, membranes, membrane proteins, and lipid inclusions of cells and tissues, and to determine the state of lipids (crystal, liquid crystal, liquid) in a variety of normal and pathological tissues. The physical states and molecular interactions of model systems of known lipid and protein compositions are corellated with chemical and physical states of native lipoproteins, membranes, and tissues. Thus, the interactions of molecules in normal and diseased tisusses may be compared with model systems and conclusions drawn concerning:
1) The structure and stability of lipoproteins, inclusions and membranes 2) the molecular basis underlying the pathogenesis and revesibility of atherosclerosis and other lipid disorders.

The purpose of this integrative, multidisciplinary program is to produce highly trained research scientists capable of adapting modern physical rationale to the study of biological processes and human disease states. Special emphasis is placed on human atherosclerosis. Because of their unique training, we feel that trainees will be able to contribute significantly to the molecular description of membrane related biological processes but also to understanding the pathogenesis of membrane or lipid related disorders.

BIOPHYSICS INSTITUTE
EQUIPMENT

Balances	1. Mettler (4) 2. Micro, Cahn (1)
Calculators	1. Texas Instruments SR-57 c/PC100A Printer
Camera	1. Nikon PX-35A system
Centrifuges	1. International PR-2 refrigeratred 2. Beckman L-2 (ultra) 3. Beckman L5-75 (ultra) 4. Sorvall RC-2 (hi-speed) 5. Beckman L8-70 (ultra) 6. Beckman Airfuge
Chromatography	1. Column chromatography (including columns, peristalic pump, fraction collectors, etc.) 2. Thin layer chromatography (including Kratos 3300 recorder, densitometer, photometer, recorder, etc.) 3. Gas-liquid chromatography (including Hewlett Packard 5710 w/integrator, etc.) 4. Polyacrylamide gel electophoresis (Buchler Power supply) and (Corning) Agarose gel electrophoresis cassette cell. 5. Flatbed electrophoresis (LKB multiphor) 6. Immunoeletrophoresis apparatus 7. HPLC, Varian 5000 liquid chromatograph with UV50 variable wavelength detector and recorder.
Computing	1. IBM 370 - Boston University time sharing facility 2. IBM 370 - University Hospital
Density Meter	1. Paar DMA 02C (precision)
Differential Thermal Analyzer	1. Dupont 900 with scanning calorimetry attachment
Differential Scanning Calorimeter	1. Perkin Elmer DSC-2
Microbalance	1. Langmuir surface microbalance designed for a) multilayer dipping experiments and, b) transfer of surface monolayer to different subphases.
Microdensitometer, Scanning	1. Joyce-Loebel MDM IIICS
Microscopes	1. Zeiss, phase contrast 2. Zeiss, polarising with hot/cold stage 3. Zeiss, dissecting 4. Leitz Dialux

5. Leitz Diavert (phase contrast for tissue culture w/heating stage)

Nuclear Magnetic Resonace Spectrometer and

Fourier transform, Brucker WP 200 NMR spectrometer with a C^{13},H^{2}, and P^{31} prebes, computer temperature control.

Osmometers
1. Freezing point Advanced 66-316A
2. Vapor pressure Hewlett Packard 301A

pH Meter
1. Beckman 3560
2. Beckman Zeromatic
3. Radiometer

Photometer
1. Light scattering Brice-Phoenix 2000-25

Refractometer
1. Diferential C.N. Wood RF-600
2. AO Abbe refractometer

Sonicator
1. Branson W350

Spectrometer, Liquid Scintillation
1. Beckman LS-250

Spectrophotometer
1. Beckman ACTA-III
2. Bausch & Lomb Spectronic 70
3. Bausch & Lomb Spectronic 710

X-ray Diffraction/Scattering Apparatus

X-ray generators:
1. Elliot rotating anode-GX-6
2. Jarrell Ash microfocus
3. Norelco 2.5 kW (sealed tube)

X-ray cameras:
1. Franks double mirror focussing
2. Toroidal mirror focussing
3. Luzzati- Baro small angle with single mirror focusing
4. Debye-Scherrer powder diffraction

All focusing camera are equipped with variable temperature (Haake, Heto ultrathermostats) facilities ($-10^{o}C$-$150^{o}C$)

X-ray detection and analysis:
1. Tennelec PSD 100 position sensitive proportional counter
2. Tracor Northern TN1710 multichannel analysis system with 64K LSI-11 (Digital Corp) computer, with dual floppy disk, point plotter, data calibrator, data processor, programmable under Tracor O/S or Digital

Equip. Corp. RT-110/S languages - Flextran, Fortran, Macro 11

The following is also available on a regular basis:

1. Analytical ultracentrifuge (Beckman Spinco Model E) shared with Biochemistry
2. Electron microscope (Hitachi) - collaborative arrangement with Pathology
3. Dr. Hamilton is a member of the National Magnet Laboratory, Cambridge, and has access to the high field NMR equipment 3-4 days/month.
4. Drs. Shipley and Atkinson hold visiting appointments at Brookhaven National Labs. and have access to the nuetron scattering facility at the high flux beam reactor, and biological structure facility at the National Synchrotron Light Source (x-rays)

B. Department of Physics

Faculty

Rama Bansil
Assistant Professor of Physics
Assistant Professor of Physiology

Bernard Chasan
Professor of Physics

Kenneth J. Rothschild
Associate Professor of Physics
Associate Professor of Physiology

H.E. Stanley
University Professor
Professor of Physics
Professor of Physiology

Charles Willis
Professor of Physics

Izumi Nishio
Assistant Research Professor of Physics

Areas of specialization in the Deparment of Physics include membrane structure and function, biopolymers and cooperative phenomena in biomembranes.

FACILITIES

[1] SPEX Ramalog IV Spectroscopy System This system includes an 0.75 meter Czerny-Turner double grating spectrometer with holographic gratings, a steping-motor grating drive, a beam expander, a periscope viewer, a Claasen filter, an f 1.0 - f 2.5 set of collection optics, a thermoelectrically-cooled RCA GaAs photomultiplier (near flat response 3000-9000A), photon counting electronics, a chart recorder for output and interface with the computer.

[2] Nicolet MX-1 Fourier Transform Infrared Spectroscopy System. This system is a state of the art absorption spectrometer enabling small changes in macromolecular conformaton to be detected. It includes a dedicated 1200s Nicolet Data Analysis and Graphics Computer, Zeta Plotter, 1280 Nicolet Minicomputer, Floppy Disk Data Storage and interface to IBM/370. In addition, a second FTIR facility which has time-resolved capbility, microfocus and near-IR sensitivity will be installed in July 1983.

[3] Nicolet 1180 Mini-Computer System for SPEX Ramalog IV. This mini-computer drives the spectrometer, averages data, and performs data analysis. The mini-computer is also interfaced with the central computer facility at Boston University (an IBM/370).

[4] 4-Watt Argon Ion Laser (Spectra Physics Model 164).

[5] Continuously Tunable Dye Laser Head (Spectra Physics Model 370). Presently available dyes permit selection of laser frequencies over most of the visible spectrum.

[6] Low-Temperature Cooling Systems for Optical Spectroscopy

(A) Air Products Displex Split Cycle Refrigerator and Computer control for temperatures from 40-400K. This system requires no cryogenic fluids, operating closed cycle for up to 10,000 hours. It is designed for use with the FTIR and UV-Visible absorption spectrometers.

(B) Liquid-nitrogen dewar with variable heater for sample cooling from 77-300K.

(C) Thermoelectric Peltier solid-state cooling for small samples.

(D) Circulators for cooling from -10 to 100 C.

[7] Quasi-elastic light scattering facility This includes Langley-Ford Model 1096 auto-correlator, Spectra Physics 15 mW He-Ne laser Model 124, light scattering apparatus mounted on optical table, photon counting system and chart recorder and oscilloscope for display.

[8] Bausch & Lomb Stereozoom 7 microscope with automatic camera fokr photomicrographic studies.

[9] Cary-219 Spectrophotometer This is a UV-Visible absorption spectrometer which is interfaced to an Apple Computer for data storage and analysis. Low-temperature sample cooling is available with this facility as well as soft-ware for automated kinetic spectroscopy.

[10] Rapid Kinetic Spectroscopy Facility This facility provides rapid signal acquisition (50 nsec) and averaging using a Nicolet 1270 Data Acquisition Computer and associated digitizers. It is presently used with pulsed lasers for flash photolysis experiments on biomembranes.

Related Physics Facilities Available for Biophysics Research

[11] Electron Spin Resonance Spectrometer

[12] High Sensitivity Electrical Instruments for Measurement of Dielectric Constants

[13] Mili-Kelvin Low Temperature Facilities

[14] High Energy Neutral Atom Beam Facility

[15] Mass Spectrometer

[16] Mossbauer Spectroscopy

In addition to the facilities listed above, equipment for biophysics research is available to us through our joint collaboration with the MIT Regional Laser Center, the MIT Francis Bitter National Magnet Laboratory, the Stanford Synchrotron Radiation Laboratory and the Brookhaven National Synchrotron Light Source.

C. Department of Physiology

Faculty

Melvin C. Cornwall
Associate Professor of Physiology

Paul M. O'Bryan
Associate Professor of Physiology

Edward F. MacNichol, Jr.
Professor of Physiology

A. Fein
Adjunct Associate Professor of Physiology

F. Garcia-Diaz
Assistant Research Professor of Physiology

F. Harosi
Adjunct Associate Professor of Physiology

W. Adelman
Adjunct Professor of Physiology

William C. Ullrick
Professor of Physiology

Robert J. McLaughlin
Associate Professor of Physiology

Paul O'Bryan
Associate Professor of Physiology

Alvin Essig
Professor of Physiology
Research Professor of Medicine

S. Rosenthal
Assistant Research Professor of Physiology

Ronald A. Laing
Associate Professor of Ophthalmology and Physiology

Major areas covered

(1) Electrophysiology of nerve cells, including visual cells and microspectrophotometry of visual cells.

(2) Membrane transport.

(3) Muscle contraction.

110.

FACILITIES IN THE DEPARTMENT OF PHYSIOLOGY

Essig, Garcia-Diaz, Rosenthal

1. Apparatus for transepithelial and intracellular electrophysiological studies includes micro-electrode pullers, manual and automatic micromanipulators, dissecting and high power microscopes, oscilloscopes, dual and multi-channel recorders, and associated electronic equipment.

2. Apparatus for the study of membrane vesicle transport and metabolism includes sonicators and standard equipment for preparative and analytical biochemical procedures. (A high speed centrifuge and dual-beam spectrophotometer are borrowed.)

3. Apparatus for microprobe analysis of routes of transepithelial water transport includes a quadrupole mass spectrometer and high vacuum system, a micropipette puller, a micromanipulator, dissecting and high power microscopes, an oscilloscope and strip chart recorders, and associated electronic equipment.

4. Apparatus for radioactivity detection comprises a gamma counter and a liquid scintillation counter.

5. A minicomputer system consists of a PDP 11 computer, with floppy and Winchester drives, a video-terminal, and printer.

6. A small machine shop and electronic shop are available.

Cornwall, O'Bryan

Three electrophysiological recording units equiped with recording (oscilloscopes, pen recorders, tape recorders) and stimulating equipment.

Two LSI 11/23 microcomputers with direct access inputs, 1 hard disc and 1 floppy disc.

One Tracor Northern Nova based digital analyzer.

One dual wavelength, pulsed microspectrophotometer.

Three voltage clamps.

One optical stimulator.

2 High input impedance microelectrode amplifiers
2-TEKTRONIX - DUAL BEAM oscilloscopes with dual time base Amp. and Diff. Amplifiers
Tektronix TM 500 based pulse and waveform generator
WPI - Hi gain extracellular recording amplifier
Grass - C4 oscilloscope camera
2 BRUSH 3 channel pen recorders
Livingston type - Electrode puller

2 - Aus Jena - dissecting microscopes
1 - Nikon compound microscope
1 - Reichart - inverted microscope
2 - dual beam optical benches with Xenon pulsed light sources

CO_2 controlled incubator

LSI 11/23 CPU 12bK random access memory A/D boards data translation
Data Systems Floppy Disk Mass Storage System
2 Terminals - 1 equipped with Graphics capability
1 - Thermal printer for raster dump printing
1 Tiger impact printer
1 Rockwell Aim 65 microcomputer

R. McLaughlin

Our approach emphasizes the design of new high-performance technological apparatus for studying intracellular mechanical events in heart muscle. The apparatus includes a new fibter-optic force transducer for high-speed measurement of smal muscle forces, and a high-speed computer image processing system for automatic analysis of intracellular motion during normal contractions, and during rapid applied external mechanical perturbations. Laboratory facilities include a Zeiss WL microscope with CCTV video monitor and vibration table, 5 mw He-Ne laser, PDP-11/23 minicomputer with MACRO, BASIC, and FORTRAN languages, computer image processing system utilizing high-speed line and area CCD image sensors, low-inertia optical scanning motor system, strain-gage and fiber-optic force and displacement transducers, and miscellaneous precision mechanical, optical, and electronic measurement apparatus.

W. Ullrick

Apparatus for investigating mechanical properties of muscle include strain gauges, displacement transducer, automatic stress-strain cycling instrumentation, and tape deck and computer controlled instrumentation for measurement of muscle elasticity, viscosity, etc. via force-displacement phase charges, and so forth.

Ronald A. Laing,

OPTICAL EQUIPMENT:

Multi-channel photon counting spectrofluorometer for tissue redox studies with computer interface

Scanning microspectrophotometer with computer interface

Operating microscope for animal surgery

Clinical specular microscopes for animal and human studies with video capability

Choroidal eye oximeter for choroidal oxygen saturation measurements

Scanning eye oximeter for retinal oxygen saturation measurements

Slit-lamp biomicroscopes for corneal and anterior segment examination

Ocular fundus cameras for retinal examination and measurements

Optical table, optical benches, and ancillary equipment for optical breadboarding

Cadmium, argon, and helium/neon lasers

Operating microscope for animal surgery

ELECTRONIC INSTRUMENTATION:

Four channel signal averager with computer interface

Digital correllator for photon autocorrelation spectroscopy

Lock-in amplifiers, low noise preamps, etc.

oscilloscopes, chart recorders, tape recorders, TV cameras etc.

oscillographic chart recorder

COMPUTER EQUIPMENT for data aquisition, modeling studies, image analysis, etc.

PDP 11/34A computer system

MINC (LSI-11/2) computer system

BOA-10 computer system with digitizer and image analysis capabilities

PROPHET terminal system

GENERAL LABORATORY EQUIPMENT:

blood gas analyzer

whole blood oximeter

pH meter, temperature meters, etc.

refrigerated circulating bath

laboratory microscopes

small animal respirator

facilities and equipment for cell culture studies, tissue culture studies, whole animal studies, and human studies

E. MacNichol, A. Fein, F. Harosi

Facilities available in the MBL Laboratory of Sensory Physiology

I. Electrophysiology

Three complete setups are available for single cell recording (currently used to study Limulus ventral photoreceptors). These consist of (1) dual-channel photostimulator with precision control of intensity and duration of the light. (2) Two-electrode voltage-clamp electronics and oscilloscopes. (3) An on-line digital computer (Analog Devices MACSYM) and a FM tape recorder for data reduction. These setups are readily adaptable for studying single vertebrate receptors. (4) A photostimulator equipped with special electronics for measurement of intracellular calcium ion activity by the use of ion-sensitive electrodes. (5) A variety of components such as; amplifiers for fast intracellular microelectrode recording and low-level dc differential amplifiers, spare oscilloscope, micromanipulators and electronic timers. There is probably sufficient apparatus to put together an additional photostimulator and electrophysiological set-up if space were available.

II. Optics - (1) Infrared - Several dissecting microscopes have been equipped with infrared image converters and additional image tubes and power supplies are available for special set-ups. One of the recording set-ups incoporates an infrared television monitor. Similar equipment is used in one of the microspectrophotometers and a third microscope equipped with IRTV is used to study the preservation of isolated retinas in various media in the presence or absence of visible light to determine how best to prepare material for microspectrophotometry. (2) Two Leiss quartz-prism monochromateros have been equipped with high efficiency diffraction gratings and compact-filament Tungsten-Halogen Lamps. These are available for stimulation and adaptation of photoreceptors. (3) In addition to dissecting microscopes, a Nomarski interference-contrast microscope and a fluorescence microscope are available.

III. Microspectophotometers. One instrument (DMSP) is designed to measure linear and circular dichroism of small objects including small photoreceptors. In addition to measuring changes in dichroism during chemical changes in receptor pigments, it can be used to measure spectral properties in very small receptors in terms of their natural dichroism. It is probably the most sensitive instrument developed thus far for measuring very small photoreceptors.

The other instrument (PMSP) is designed for obtaining the best possible signal-to-noise ratio in measuring the absorbance of photoreceptors. It uses photon-counting and a cooled photomultiplier tube. It also has a stimulating channel incorporating tungsten and xenon strobe sources, neutral filters and precisely timed shutter. Sufficient space is provided in the instrument for micromanipulators, preamplifiers, etc. so that receptor absorbance may be studied during electrophysiological recording. Both MSPS's contain dedicated minicomputers for programming of experiments and analysis of data.

IV. Some equipment and supplies are available for biochemical studies, however most work involving ultracentrifugation, radioactivity, electrophoresis, and electron microscopy makes use of the general facilities provided by the Marine Biological Laboratory.

Laboratory of Biophysics (NINCDS)
at Marine Biological Lab

William J. Adelman, Jr.

Our facilities include a PDP-11/60 computer with a PDP-11/10 processor as an adjunct via an interprocessor link. This central device is time-shared configured and has at present several DMA data acquisition terminals and several general user terminals available. With several tape drives and two 5-megaword disks the system is quite versatile.

There are three complete voltage clamp set-ups with complete on-line control by computer for data acquisition via DMA.

LB has an extensive electron microscope facility with a Philips EM400 scope usable in both TEM and STEM modes. This microscope is fully automated and is capable of the following analytical procedures.

a. EDAX, energy dispersive x-ray analysis
b. EELS, electron energy loss spectroscopy
c. single line Fourier analysis for specimen periodicity
d. Fourier analysis of full raster images
e. electron optical tomographic line processing of thick sections
f. conventional stereological imaging in both TEM and STEM.

The laboratory has a set-up for combined voltage clamp tension clamp measurements to measure electromechanical transduction at the membrane level.

The laboratory is implementing a video analysis system using Normarski optics for visualizing axoplasm transport and flow in living cells, particularly neurons. This system when fully operative will be interfaced to our digital computer via such devices as video tape frame grabbers, etc. for image analysis and processing.

Appendix III: COMPARISON WITH SIMILAR PROGRAMS AT OTHER INSTITUTIONS

Data is provided below about the structure of biophysics programs offered at 7 schools surveyed: Harvard University, MIT, Yale, University of Chicago, Brandeis, Rochester and Michigan State University.

A) PREREQUISTITES AND ADMISSIONS POLICY

Undergraduate major: All schools surveyed normally admit students with a variety of background in each of the science including undergraduate majors in physics, chemistry, biochemistry, biology and mathematics.

Tests: Brandeis and MSU require GRE
Number of students/year: varies widely (Harard 10)
Most programs allow switching to biophysics after first year.

B) STATUS OF FACULTY OR PROGRAM

Degrees Offered: Ph.D in biophysics (all)
M.S. in biophysics (only some, MSU)

Departmental status: MSU, Chicago, Rochester, Yale
Program status: MIT, Havard, Brandeis
Faculty: Normally faculty is drawn from other departments with only a small core faculty in biophysics.

C) EMPHASIS

Chicago: Mathematical and Theoretical Biology
Brandeis: Application of Physical techiniques to Biology
MIT: Molecular and Structural Biology
Harvard: Membrane biophysics, Neurophysiology (very broad)
Michigan: Membrane biophysics, solid-state physics
Yale: Molecular Biology
Rochester: Radiation biology and biophysics

D) TRAINING

All training consists of a combination of formal courses, laboratory rotation and orientational seminar series.

a. Formal Courses

A distribution requirement of a fixed number of courses in selected areas is required. Most courses are chosen from preexisting courses in physics, biochemistry, biology and physiology. Students with weaknesses in some of these areas may be steered to undergraduate level courses. Most of the programs are very flexible.

Examples: U of Chicago: 12 required courses selected from biology, physics and mathematics. Yale: two semesters required of both biophysics and biochemistry. MSU: 3 semesters of principles of biophysics. Harvard: structural biology, physical biochemistry, genetics and membranes. MIT: molecular biology, cell biology, methods and logic in molecular biology and genetics. Rochester:

three courses in biochemistry, molecular genetics and biological ultrastructure.

In many case "core" biophysics courses are developed to augment courses offered in other areas.

b. Laboratory Rotations

These are required training periods, usually around 6-8 weeks in duration, during which time the student studies in several laboratories doing biophysics oriented research. This can include training in biophysical techniques such as Mossbauer spectroscopy. A major objective of these training periods (rotations) is to familiarize the student with basic biophysical techniques and ongoing research which may lead to a Ph.D project.

Examples: Harvard: usually three rotations starting after Thanksgiving and continuing until June (summer rotations are optional) Brandeis: also three but longer duration.

c. Orientational Seminar Series

Many programs offer a series of orientational lectures on different current research (required attendence). These are designed to familiarize the students with both the research opportunities and current concepts in biophysics.

Examples: Brandeis: The emphasis is on the understanding, critical evaluation, and use of scientific literature. Students also present seminars. Havard: Faculty present 3 seminars a week for the first half semester on current research. MIT: same as Havard but during one month holiday recess (IAP). Note course credit is often given for these.

E) QUALIFYING EXAMS

Harvard: Research proposal outside of thesis topic must be defended in front of committee. (no formal tests)

MIT: 5 member commitee, each member submits 2-3 questions dealing with the course they teach.

Brandeis: Students present research proposal and defend in oral exam

Yale: same as above

Michigan State U: both oral and written comprehensives

Chicago: Presentation of creative literature review and a second oral on research proposal.

A. CATLOGUE DESCRIPTION OF COURSES IN CORE BIOPHYICS CURRICULUM

Physics

CLA PY 405 Electrical and Magnetic Fields and Waves I Prereq: CLA PY 212 or 252; and CLA MA 226 or consent of instructor. Vector analysis; Gauss's Law; electric field intensity; energy and potential; conductors, dielectrics, and capacitance; Poisson's and Laplace's equations; steady magnetic fields; Maxwell's equations; electromagnetic waves; transmission lines. *Redner*. 4 cr, 1st sem.

CLA PY 406 Electrical and Magnetic Fields and Waves II Prereq: CLA PY 405 or consent of instructor. Maxwell's equations; electromagnetic waves in vacuum and matter; reflection and refraction; diffraction and interference; coherence; special theory of relativity. *Redner*. 4 cr, 2nd sem.

CLA PY 410 Statistical Thermodynamics Prereq: CLA PY 251, 252 (or equivalent) and CLA MA 226. Introduction to statistical methods and their application to systems with large numbers of degrees of freedom. Topics include statistical-mechanical formulation of mechanical problems, irreversibility and the attainment of equilibrium, theory of ensembles, and applications to physical systems. *Klein*. 4 cr, 2nd sem.

CLA PY 507, 508 Quantum Mechanics Prereq: CLA PY 451, 452, 503. Non-relativistic quantum mechanics of single and several particle systems; probability amplitudes and wave functions, central force problems, bound states and scattering, symmetry in quantum mechanics, angular momentum and intrinsic spin, Hilbert space and the abstract theory, perturbation theory, interaction of radiation with matter, second quantization, Hartree-Fock theory. *Epstein*. 4 cr each, 1st & 2nd sem.

CLA PY 509, 510 Electromagnetic Theory Prereq: CLA PY 405; CLA PY 503 concurrent. Selected advanced topics in electrostatics and magnetostatics. Review of Maxwell's equations, conservation laws, plane electromagnetic waves, wave guides and resonant cavities, diffraction, radiation by moving charges, collisions between charged particles, and electromagnetic theory of continuous media. *Willis*. 1st & 2nd

CLA PY 511 Statistical Physics and Thermodynamics I Prereq: CLA PY 505, 508. Introduction to statistical physics. Phase space, microcanonical, canonical, and grand canonical ensembles. Applications. Equilibrium fluctuations, relation to thermodynamic functions, review of thermodynamics. Quantum statistical mechanics. density matrix. Ideal Bose and Fermi gases. Superfluidity of helium. Non-equilibrium systems, kinetic theory, transport processes. Cluster expansions. *Kirczenow*. 1st sem.

CLA PY 512 Statistical Physics and Thermodynamics II Prereq: CLA PY 511 or equivalent. Continuation of PY 511; emphasis on applications. Free energy formulation and fundamental equation. Chemical thermodynamics. Stability criteria. 1st and 2nd order phase transitions. Critical phenomena. Mean field theory. Magnetic systems. Ginzburg-Landau theory. Superconductivity. Statistical mechanics of polymers. Non-equilibrium thermodynamics. *Bansil*. 2nd sem.

GRS PY 713 Nuclear Physics Prereq: CLA PY 507, 508. Nuclear properties. Methods of nuclear physics. Electron scattering and nuclear form fractors. Muonic atoms. Symmetries and conservation laws in nuclear physics. Nuclear models. The nucleon-nucleon force and the nuclear forces. Weak interactions and ñ decay. *Booth, Epstein, Miller, Roberts*. 1st sem.

GRS PY 715 Solid State Physics II Prereq: GRS PY 714 or consent of instructor. A selection from the following topics: transport theory; Boltzmann equations and their application, density matrix, and Kubo approach; group theory of solids; interaction between electrons in metals and semiconductors, dielectric response surfaces; magnetism, superconductivity. *Kirczenow*. 1st sem.

GRS PY 716 Intermediate Energy Physics Prereq: CLA PY 507, 508; GRS PY 711, and consent of instructor. The pion-nucleon system, pion physics, muon physics and weak interactions, photo production of mesons of nucleons and nuclei, exotic atoms and hypernuclei. Hadron scattering at intermediate and high energies. *Booth, Epstein, Miller, Roberts*. 2nd sem.

GRS PY 721 Biophysics Prereq: facility with calculus; a BA in physics, chemistry, or the equivalent; and consent of instructor. Introduction to biomolecular forces, energy flow, and thermodynamics in biological systems. Hydrophobic interactions and membrane structure. Feedback and control mechanisms, allosteric enzymes. Mechanisms of transport in biological membranes. Emphasis on the physical principles underlying biological structure and function. *Bansil, Rothschild*. 1st sem.

CLA CH 507, 508 Quantum Chemistry and Spectroscopy Prereq: CLA CH 204 or 212 or 282, CLA MA 225 or equivalent, CLA PY 212. Introduction to quantum theory, atomic and molecular structure, spectroscopy. The chemical bond; Born-Oppenheimer approximation, electronic, vibrational, and rotational motion in molecules. NMR, ESR, microwave, IR, raman, visible, and UV spectroscopy. For undergraduate credit: three hours lecture, one hour discussion. For graduate credit: three hours lecture, two hours discussion. *Dill, assistant.* 1st & 2nd sem.

GRS CH 713 Physical Chemistry of Biological Macromolecules Prereq: CLA CH 500, 507, 508, 535, or consent of instructor. Physical properties and structures of proteins and related biological macromolecules. Size and shape of macromolecules; denaturation and cohesive forces in proteins; methods for studying such macromolecules in solution and in the crystalline state. *Hartman, Mohr.* 2nd sem.

GRS CH 715, 716 Molecular Structure Determination Prereq: differential and integral calculus and general physics. Principles of X-ray crystallography. Vectors, reciprocal space, and symmetry elements. Fourier and Patterson functions; statistical methods and inequalities as applied to X-ray crystallography. Refinement procedures. Electron and neutron diffraction. *Eriks.* 1st & 2nd sem.

CLA CH 535 Biochemistry I Prereq: CLA CH 204 or 212 or 282; 500. The informational biopolymers, nucleic acids, and proteins: structure and behavior in aqueous media. Mechanisms of nucleic acid and protein biosynthesis. Two hours lecture. *Hartman.* 2 cr, 1st. sem.

CLA CH 536 Biochemistry II Prereq: CLA CH 204 or 212 or 282; 500. Enzymes as proteins and as catalysts. Mechanism of enzyme action and control. Energetics: thermodynamics of living systems. Elements of the metabolism of carbohydrates, lipids, and amino acids. Three hours lecture, one hour discussion. *Hartman.* 2nd sem.

CLA CH 537 Biochemistry Laboratory Coreq: CLA CH 535. Techniques of modern biochemistry; special relation to the material covered in CLA CH 535. Four hours lab. *Hartman, assistant.* 1st sem.

GRS CH 733 Statistical Thermodynamics Prereq: CLA CH 500; 503 or 508 or equivalent. Introduction to models of statistical mechanics. Spectroscopic and calorimetric entropies of atoms and molecules. Theory of strong electrolytes. Chemical potential and chemical equilibrium. Absolute rate theory. Imperfect gases; Lennard Jones potential. Fundamental aspects of random coil molecules. *Prock.* 2 cr, 1st sem.

Medical & Dental Sciences

MED ME 751 Biochemistry and Morphology of the Cell Prereq: consent of instructor. Basic principles of biochemistry and cell biology. Lectures and tutorials cover proteins, enzymes, bioenergetics, intermediary metabolism, and molecular biology. *Kagan*. 8 cr, 1st sem.

MED MS 555 Biochemistry A Prereq: Organic Chemistry, CLA CH 204 or equivalent, consent of instructor and associate dean in CLA 302. Structure and function of macromolecules. Mechanisms of enzyme action, introduction to metabolism of carbohydrates and lipids, biochemical energetics. *Brecher*. 1st sem.

MED MS 556 Biochemistry B Prereq: MED MS 555 or consent of instructor and associate dean in CLA 302. Metabolism of amino acids, lipids and nucleotides, control of metabolic processes, hormone action, biochemical genetics, transcriptional and translational events. *Brecher*. 2nd sem.

MED MS 542

Introduction to Human Physiology

consent of associate dean in Room 302, CLA. A component of the Modular Medical Integrated Curriculum, this course provides an overview of the functions of the human body. It deals with the organ systems and the integrative and regulatory aspects of human physiology.

MED MS 540 Human Physiology Prereq: consent of instructor and associate dean in CLA Room 302. An in-depth course in cellular and organ physiology (excluding endocrinology and neurophysiology) emphasizing integrated regulatory aspects. *Kaminer, Ullrick*. 1st sem.

MED ME 841, 842 Physiology Seminar Students present seminars on their research and/or review literature related to their research. Students attend the seminars presented by staff and other students. *Lehman, staff*. 2 cr each, 1st & 2nd sem.

MED ME 840 Neurobiology Prereq: consent of instructor. Functional organization of primitive cell systems, electrical properties of excitable cells, mechanisms of synaptic transmission, sensory processes, plasticity of nerve cell sytems. *Gorman, O'Bryan*. 2 cr, 1st sem.

MED ME 843 Cellular Physiology Prereq: MED ME 703, 740; consent of instructor. Lectures and discussion on: (1) membrane transport, thermodynamic and kinetic analysis; (2) electrophysiology of cell membranes, excitable membrane properties, electrical coupling, synaptic transmission; (3) cell motility, molecular mechanism, and regulation of contraction of muscle and other cells; mechanics of muscle contraction. *Kaminer, staff*. 1st sem.

MED ME 745, 746 Special Topics in Physiology Prereq: consent of instructor. Current and classical papers in a given area of physiology assigned for reading and later discussion with students. Topics include mechanics of muscle, cell motility, membrane transport, sensory physiology, and instrumentation in physiological research. Variable cr, 1st & 2nd sem.

MED ME 771 Biophysics of Macromolecular Assemblies Prereq: MED ME 763, GRS CH 713; CLA CH 535 or 536 or MED ME 751, consent of instructor. Advanced course. Assembly of biomacromolecules, their structure and stabilizing forces; biological function as related to structure, with examples drawn from assemblies of proteins, lipids, lipid-protein systems, membranes. *Shipley, Lange*. 1st sem

MED ME 871, 872 Biophysics Seminar A program combining seminars by the faculty, student presentations of current research, and in-depth research lectures by visiting scientists. *Small*. 2 cr, 1st & 2nd sem.

CLA BI 528 Introduction to Human Physiology Prereq: CLA BI 104 and 203, CLA CH 102 and consent of associate dean in Room 302, CLA. A component of the Modular Medical Integrated Curriculum, this course provides an overview of the functions of the human body. It deals with the organ systems and the integrative and regulatory aspects of human physiology. *Callard, staff.* 2nd sem.

CLA BI 545 Neurobiology Prereq: senior or graduate standing and consent of instructor. Comparative physiology and anatomy of nervous systems. Emphasis on cellular neurophysiology and neurochemistry. Focus of lab is on extracellular recording techniques with some neurochemistry and physiology. Three hours lecture (exams) and three hours lab (reports). *Price.* 1st sem.

CLA BI 550 Biophysics Prereq: senior science concentration or consent of instructor. Ionizing and nonionizing radiation interactions, applications, and limitations; especially x-rays and ultrasonics. Sensory systems and their absolute limits. Animal sonar. Modeling of biological systems. Telemetry applications. Size and shape of creatures and organs. Hyperbaric physiology. Other topics selected by class. Three hours lecture, one hour discussion or demonstration. *Mackay.* 2nd sem.

CLA BI 552 Molecular Biology Prereq: CLA BI 206, CLA CH 506 or equivalent, consent of instructor. Structure, synthesis, and control of biologically important macromolecules, especially DNA, RNA, and proteins. Biochemistry of transcription and translation of genetic material. Introduction to molecular problems peculiar to eukaryotes. Three hours lecture, one hour discussion. *Raacke.* 1st sem.

GRS BI 704 Biology of Macromolecules Prereq: CLA BI 203, 206, and biochemistry. Emphasis on current models for membrane structure, structural comparisons between different membrane systems, specific membrane transport mechanisms, lipid-protein interactions, growth control and membranes. Three hours lecture. *Peterson.* 2nd sem.

GRS BI 711 Biological Transport Mechanisms Prereq: GRS BI 704 or consent of instructor. Familiarity with membrane biochemistry strongly recommended. A survey of transmembrane and intracellular transport mechanisms. Relationships of transport to cell physiology, metabolism, and energetics. Three hours lecture, one hour discussion. *Jacobson.* 2nd sem.

APPENDIX V

Chemistry Department Faculty

Richard H. Clark
Professor of Chemistry

Klass Eriks
Professor of Chemistry

Morton Z. Hoffman
Professor of Chemistry

Scott C. Mohr
Associate Professor of Chemistry

Richard Laursen
Professor of Chemistry

Martha Teeter
Assistant Research Professor of Chemistry

APPENDIX VI

Correspondence

TO: Dr. Ruth R. Levine

FROM: Dr. John Dittmer, Chairman, Academic Policy Committee

SUBJECT: Report of Academic Policy Committee on Proposed Ph.D. Program in Cellular Physiology/Physics

The Academic Policy Committee met on Tuesday, April 14 at 2:00.

The committee voted to return the proposal to Dr. Zimmerman for clarification. We felt that a Ph.D. program in Biophysics was an excellent idea but the proposal simply lacked enough information on which we could base a recommendation for either approval or disapproval of the program.

If Dr. Zimmerman would like to provide the committee with more information we would be happy to reconsider the proposal. The committee would like more information on the following questions:

1. Would this program have a director?
2. Who are the faculty members that would teach this program?
3. Would this program require the hiring of new faculty members?
4. What is the relationships of this program to the faculty of the Biophysics institute here at the Medical School?
5. Why is stage I only physics since the stage II Physiology courses do not now have physics prerequisites?
6. What provisions are planned for research credits and where are the faculty advisers for the thesis work?
7. To which office would the prospective student direct his application?
8. A course description and faculty for each course should be provided.

Boston University

Department of Physics
111 Cummington Street
Boston, Massachusetts 02215

February 14, 1983

Dr. Ruth R. Levine
Associate Dean, Division of Medical Sciences
Boston University Medical Center

Dear Dr. Levine,

Please find enclosed the latest copy of the proposed Cellular Biophysics Program. Drs. Kaminer and Small will contact you to set up an appointment to discuss this proposal.

You have previously requested information concerning an earlier draft of this program which was discussed at the Academic Policy Committee meeting last year. Since a memo from Dr. John Dittmer, the prior Chairman of the APC, to you posed specific questions (see attached), our answers below correspond to the items in that memo. Some of the information requested is also provided in the current draft proposal of the Cellular Biophysics Program, and thus we refer you in some cases to that draft.

1. The director of the program will be selected by a committee consisting of the Chairmen of the Departments of Physics, Physiology and the Director of the Biophysics Institute (refer to page 4). The director will chair the biophysics program committee which will consist of representatives from each participating unit as well as from affiliated departments.

2. The core faculty for this program as presently planned is listed on pages 7 and 8 of the proposal. Once the program is approved, additional faculty can be added with the approval of the Biophysics Program Committee.

3. The program would not require the hiring of new faculty.

4. The Biophysics Institute represents one of the three major units offering the program.

5. The division between stage I and stage II curriculum is mainly to stress the emphasis of the program on a fundamental core of physical science courses. This division does not necessarily require the student to complete the stage I requirements before stage II. Actual course requirements as stated on page 1 of the proposal can be satisfied in any order as long as the prerequisites for a specific course are met. We do, however, anticipate that many students who have B.A.'s in physics will complete the stage I requirements in the first two years. This will have the advantage of initially allowing them to compete for teaching assistantships by simultaneously enrolling in the M.A. program in physics. We will encourage, however, that courses be taken in biophysics, biochemistry and physiology in the first two

years. This should in general be possible since the actual physical science requirements for the program is only 4 courses. In addition, the students will be encouraged to take courses at the Medical School in the first two years.

6. Research credits can be taken in the departments where the Ph.D. research is carried out or a new research course in cellular biophysics will be added for research credit. The faculty advisers will be drawn from the core faculty list.

7. Applications to the program will be made to the Graduate School which will refer it to the Admissions Committee of the Cellular Biophysics Committee (refer to page 1). This committee will consist of representatives from each affiliated department.

8. See Appendix VI of proposal.

Thank you again for your continued help with this proposal and especially for your early suggestions which have now been incorporated into the proposal.

Best Regards,

George O. Zimmerman
Chairman, Department of Physics

Kenneth J. Rothschild
Associate Professor of
Department of Physics &
Department of Physiology

hs
enc.

Boston University

Department of Chemistry
685 Commonwealth Avenue
Boston, Massachusetts 02215
617/353-2493

Chairman's Office

M E M O R A N D U M

TO: Professors B. Kaminer, D. Small and G.O. Zimmerman

DATE: June 14, 1983

FROM: Norman N. Lichtin, Chairman
Department of Chemistry

Norman N. Lichtin

RE: Support for revised proposal for a Program in Biophysics

This memorandum supersedes my comments of October 15, 1983 on the Program in Biophysics. My support for the program remains strong. The latest plan, which does not include members of the faculty of the Department of Chemistry in the core faculty of the Program but does allow for their participation in its activities, is acceptable to me. I agree that this format does not call for inclusion of the chair of chemistry in the executive committee of the program.

Boston University

Biological Science Center
2 Cummington Street
Boston, Massachusetts 02215
(617) 353-2432

October 28, 1982

Dr. George Zimmerman
Chairman
Physics Department
Boston University
111 Cummington Street
Boston, Massachusetts 02215

Dear George:

Thanks for a chance to look over the Cellular Biophysics program. This Department does not have any problem with the program except to suggest addition of BI 547 (Vascular Physiology) to the list of courses.

Sincerely,

Ian P. Callard
Chairman
Department of Biology

IPC/acm

Boston University

Department of Physics
111 Cummington Street
Boston, Massachusetts 02215

February 8, 1983

To Whom It May Concern,

We, the Chairmen and Heads of the Physics Department, the Physiology Department and the Biophysics Institute, have collaborated with our faculties in the planning of the Cellular Biophysics program and support the program as stated.

George O. Zimmerman
Chairman, Physics Dept.CLA

Benjamin Kaminer
Chairperson, MED Physiology

Donald M. Small
Chief, Biophysics Inst.
Boston Univ. Med. Ctr

Kenneth Rothschild
Program Proposal Coordinator
Depts. of Physics and Physiology

April 5, 1983

To: All Physics Faculty

From: E. Booth, Grad. Com. Chair

Subject: Thesis Defense

The style and content of the Final Oral Examination (Thesis Defense) is described below. I first quote from the "Formal Requirements for Graduate Study in Physics".

> "When the first draft of the dissertation has been approved, the student should proceed to complete a final draft. When this is completed, the student should approach the Chairman of the Departmental Graduate Studies Committee who will help him in making arrangements for a Final Oral Examination. The Examination Committee consists of the First and Second Reader and (normally) three (3) additional Faculty Members, one of whom serves as formal committee chairman. This examination must be held not later than the last Friday in April. At the final examination, the student will be asked to defend his dissertation; he may be questioned on the background scope and limits of his work, the completeness of any data or calculations in the dissertation, and the validity of its conclusions. The Final Oral Examination is a public examination; any member of the Graduate Faculty of any Department of Boston University, including the Dean of the Graduate School, may attend the examination, but only members of the Examination Committee have questioning and voting rights."

In a recent letter from Dean Mendillo, we are reminded that all of the members of the Examination Committee are expected to have read the thesis before the examination.

The format is as follows: the candidate presents the thesis with emphasis on the physics motivation, the results and conclusions, clearly identifying the candidate's contributions. Forty-five minutes should be relegated for the presentation. During the presentation, questions are restricted to major problems and are very brief. The Chairperson may, in fact, rule that no questions be asked during the presentation. After the presentation, the Chairperson calls on the Committee members in sequence for questions. Other Committee members should await their turn without getting involved out of sequence. It is important that the thesis supervisors do not attempt to answer the questions themselves. The Chairperson allows five or ten minutes to each questioner, then moves on. After the first round of questions, a second round is usually made, at the wish of the Committee. The usual length of the affair is two hours. At the end, the candidate is excused. The content of the the thesis and the adequacy of the defense are discussed. Recommendations for changes, if any, are made. A vote is taken with majority-rule on pass or fail (subject to changes in the thesis). The form is filled out, signed by those present and given to the Chairman. (Forms are obtained before the exam from the Graduate Committee Chairman.)

The Graduate School office should be notified two weeks before the exam of the time, place, and title. Copies of the thesis should be in the hands of the Committee two weeks before the exam. The constitution of the Committee is as follows: the 1st and 2nd readers, with three others, and with at least one experimentalist for a theory type exam and vice versa. The Chairperson is appointed by the Graduate Committee or Department Chairman, and is not one of the 1st or 2nd readers.

Note that these examinations are open to the public. The faculty is not unanimous on the desireability of a large graduate student audience, but students cannot be excluded. Non-Committee members are there as observers and not as examiners.

INFORMATION PROCESSING IN THE B.U. PHYSICS DEPARTMENT

A FIVE-YEAR PLAN

August, 1982

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I. Introduction

The Department of Physics is a department which within the next five years will have 35 faculty members, 100 graduate students and will teach 1,500 students per semester. The department publishes approximately 100 papers per year in professional refereed journals and receives grants and contracts amounting to over a million dollars per year. It graduates approximately 7 Ph.D.'s per year, and an equivalent number of M.A.'s. This should increase to approximately 10 to 15 per year.

A summary of the department's research activities and the projected grant support is given in Table 1.

The current substantial activity level of the department has been achieved with a very small amount of support equipment. In fact, it is remarkable that this department, which has no VAX's or PDP-11's, has been able, through sheer effort and enterprise, to keep a coherent research effort afloat and attract external funding amounting to more than a million dollars annually. In such a difficult equipment-shortage situation, acquisition of the necessary VAX and PDP information processing equipment is absolutely vital to a consolidation and expansion of our current projects and will enable us to reach the point where not only do we increase the student flow into physics and engineering and ultimately to industry, but we also maintain and enhance our current excellence in a broad range of research fields. This is our goal and we intend to make the most strenuous efforts to achieve it. The necessary support will ensure our ultimate success.

Our plan calls for information processing facilities which will be distributed but which can be interfaced with each other. These facilities will provide a comprehensive, integrated solution to the research, teaching and administrative needs of the department. It should be noted, however, that facility usage will be carefully monitored to ensure that less than 20% of the total capacity requested from DEC will be used for non-research purposes.

The next section briefly outlines the five-year plan. The details of computational needs and computer configurational organization, as envisaged by individual research groups, are presented in the appendix.

TABLE 1

SUMMARY OF RESEARCH ACTIVITIES AND CURRENT OR PROJECTED GRANT SUPPORT

I. Theoretical Research

	Field	Faculty	Current or Projected Grant Support in $
A	• Elementary Particle Theory	• Hellman, Pi	• 50,000
	• Quantum Mechanics	• Corinaldesi	
	• Medical Physics	• Siegel	
B	• Interaction of Radiation with Matter	• Willis	• 50,000
C	• Relativity, Foundation of Relativistic Space-Time Theories	• Stachel	• 300,000
D	• Theoretical Nuclear Physics	• Epstein	• 50,000
E	• Philosophical & Historical Foundations of Physics	• Cohen, Shimony	• 40,000
F	• Statistical Physics	• Stanley, Klein, Redner	• 250,000
G	• Solid State Physics	• Kirczenow	• 100,000

II. Experimental Research

H	• Solid State Physics: Mössbauer Effect	• Kolk	• 50,000
I	• Surface and Atomic Physics	• El-Batanouny, Franzen	• 150,000
J	• Low Temperature Physics	• Zimmerman, Brooks	• 200,000
K	• Intermediate Energy Nuclear Physics	• Booth, Roberts, Miller	• 250,000
L	• Biophysics	• Bansil, Rothschild, Chasan	• 300,000
	TOTAL		$ 1,790,000

II. Integrated Computer Configuration Plan

The Physics Department computer system plan has been based on standardization and the maintenance of compatibility within the department's network and with other departments, in order to enhance the system's efficiency and cost effectiveness. For clarity we shall break down the systems into the following components together with a schematic diagram which illustrates the operation and interconnection among these components as well as its integration with the university computer system network (see Fig. 1).

1. Research: The overall projection for research needs include 8(PDP-11/23+) and 1 VAX 750 for "stand alone" operations of the various experimental stations. The demands dictated by larger computation codes, however, are to be met with a central computer comparable to the VAX-11/782 buffered with a PDP-11/34 to regulate users' traffic.

2. Administrative Needs: The administration computer needs involve budget management, grants management, course regulation, data and records base management, mailing lists manipulation and storage. These needs will be handled by a dedicated PDP-11/23+.

3. General Services Facilities (Manuscript Reproduction and Graphics): In planning computer related service facilities we have adopted the "distribution" concept where editing and processing is to be completed on text editing terminals associated with each group's computer station and where the finalized version is, subsequently, transmitted to a high quality central reproduction facility. This scheme provides quality, efficiency, and cost effectiveness; its implementation involves a set of VAXstation 100's to be distributed among the various groups and are directly linked to the VAX 782 central computer via optical fibre cables (the length of which will conform with specifications). The central reproduction facility will be interfaced with the VAX 782 via the PDP-11/34 buffer computer through the University's broad band communications cable as explained below. The central reproduction facility itself will probably include LASER printers for high quality output of manuscripts and high resolution advanced graphics (capable of producing 2- and 3-dimensional figures). Until the advent of such devices, however, we shall invoke the contingent scheme of a combination of high resolution graphics capability via tektronix terminals interfaced with high resolution digital plotter ( ) and a hard copier.

4. Computer-Aided Teaching and Instructional Facilities:

   A. Lecture Demonstrations

      Intelligent terminals (equivalent to VT103 systems) will be installed in lecture rooms and interfaced with television projection facilities to provide instantaneous demonstrations of physics concepts and to elucidate and illustrate mathematical procedures and solutions.

B. Laboratory Instructions

A simpler version of these dedicated intelligent terminals (possibly 8-bit machines) will be associated with each experimental station in the teaching laboratories to enhance the students' basic programming skill and to introduce them to the concept of "computer-aided experiments" for both control and data acquisition and analysis. These microcomputers are to be equipped with the appropriate interfaces.

5. Communications Network: The Physics Department's computer planning is build around the University's broad band digital communications coaxial cable (19.2 K baude) with CYTEK or alternate hardware which can simulate an RS232 connections for both terminals and computers and is, therefore, compatible with serial asynchronous ports. This cable system will be used to connect terminals to computers; in addition, the department plans direct hard-wiring network between its small computers and the central VAX 782 (through the PDP-11/34) which employs a 1Mb/s synchronous cable system for fast data transfer. Furthermore, the VAXstation 100's are to be directly connected to the VAX 782 via optical fibre cables. The plan provides for a video terminal in each faculty member's office (35 VT100 terminals); and another 20 terminals for administration and graduate students' use. These terminals will be connected to the broad band coax via wall outlets provided in every office.

6. The Final Configuration: The final computing configuration is shown in Fig. 1.

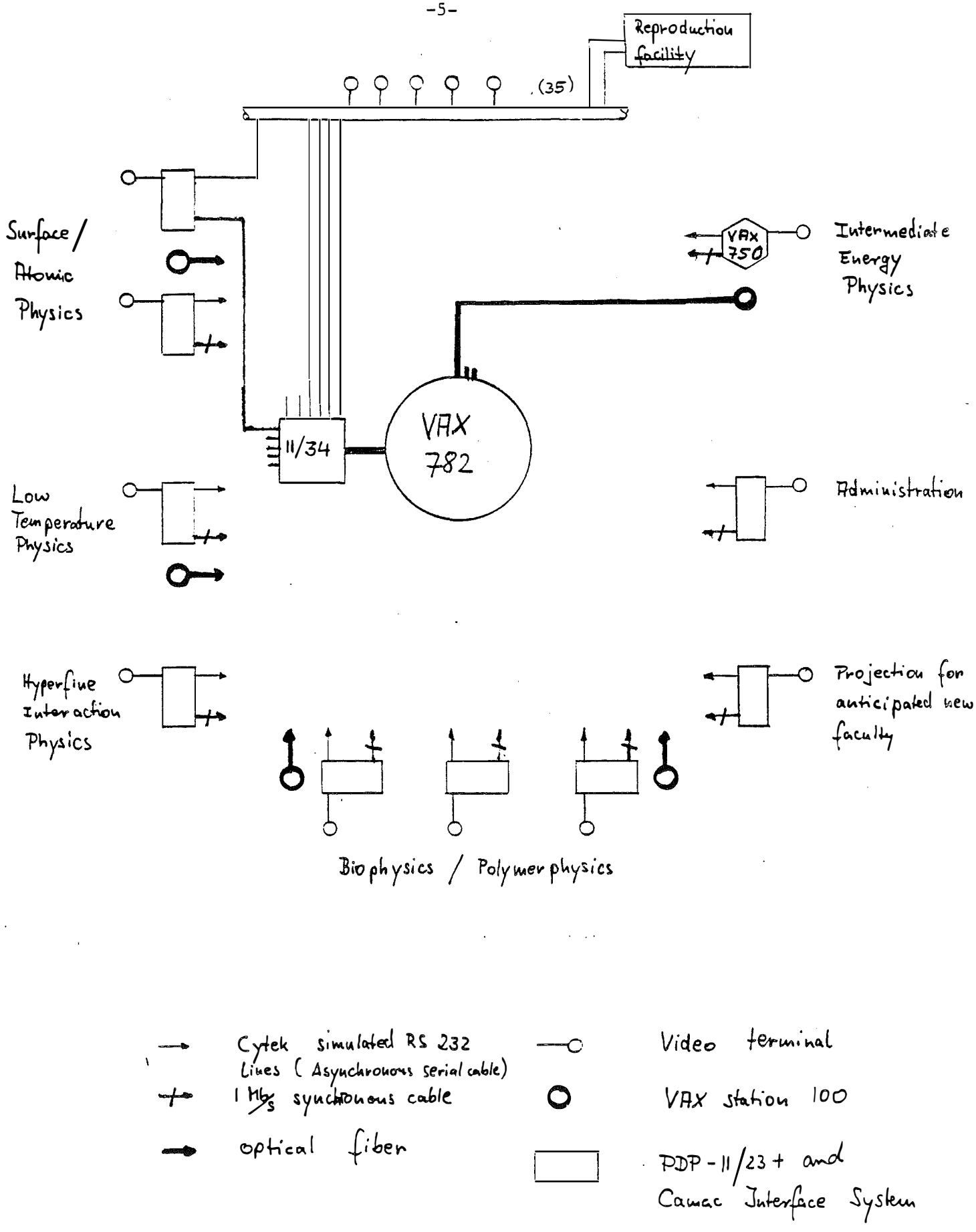

Reproduction facility
(35)
Surface / Atomic Physics
VAX 750
Intermediate Energy Physics
11/34
VAX 782
Low Temperature Physics
Administration
Hyperfine Interaction Physics
Projection for anticipated new faculty
Biophysics / Polymer physics
Cytek simulated RS 232 Lines (Asynchronous serial cable)
1 Mb/s synchronous cable
optical fiber
Video terminal
VAX station 100
PDP-11/23+ and Camac Interface System

Fig. 1

III. Time Frame and Projected Support

The time frame is five years and support costs will be shared by Boston University, the individual research groups and DEC:

Table 2 shows the DEC equipment requested broken down by group;

Table 3 shows projected University central administration and Departmental support;

Table 4 shows the contributions from individual research groups.

In Year 1†: The department acquires: a VAX-11/780 buffered with a PDP-11/34 to regulate users' traffic; 4 PDP-11/23's, 1 PDP 11/44 and a VAX-11/750.

In Year 2: The central VAX-11/780 is upgraded with more main and disc storage; 3 PDP-11/23's are added.

In Year 3: Another VAX-11/780 upgrade and 1 PDP-11/23 is added.

In Year 4: VAX-11/780 upgraded to VAX-11/782 and 1 PDP-11/23 is added.

In Year 5: VAX-11/782 upgraded.

In each of these years money provided by the individual research groups, the department and the central administration is used to acquire video terminals (e.g. VT 100's), hard copy terminals (e.g. LA 120's), graphics terminals, additional disc drives, magnetic tape drives, etc. to provide a complete, quality computing environment.

†Calendar year 1983

TABLE 2

SUMMARY OF DEC EQUIPMENT REQUESTED

Group	1 (1983)	2	3	4	5
Department	VAX-11/780 PDP-11/34 ($500,000)	Upgrade ($100,000)	Upgrade ($100,000)	Upgrade to VAX-11/782 ($250,000)	Upgrade ($100,000)
Surface/Atomic	PDP-11/23 ($ 40,000)	----	PDP-11/23 ($ 40,000)	----	----
Low Temp	PDP-11/23 ($ 40,000)	----	----	----	----
Hyperfine Int^{n}s	----	PDP-11/23 ($ 40,000)	----	----	----
Biophysics/Polymer	PDP-11/23 ($ 40,000)	PDP-11/23 ($ 40,000)	----	PDP-11/23 ($ 40,000)	----
Intermediate Energy	VAX-11/750 PDP-11/44 ($250,000)	----	----	----	----
New Faculty	----	PDP-11/23 ($ 40,000)	----	----	----
Administration	PDP-11/23 ($ 40,000)	----	----	----	----
TOTAL	$ 910,000	$ 220,000	$ 140,000	$ 290,000	$ 100,000

Note: All costs approximate

TABLE 3

UNIVERSITY AND DEPARTMENTAL SUPPORT*†

	Year				
	1	2	3	4	5
Departmental	6,000	6,000	6,000	6,000	6,000
University	24,000	24,000	24,000	24,000	24,000
TOTAL	30,000	30,000	30,000	30,000	30,000

*Projected

†Funds represent additional DEC equipment acquisition and maintenance contracts

TABLE 4

SUMMARY OF CONTRIBUTIONS FROM THE RESEARCH GROUPS*

Group	Year 1	2	3	4	5
A†	---	3,000	3,000	---	---
B	---	---	4,000	---	---
C	4,000	3,000	3,000	3,000	3,000
D	3,000	---	2,000	---	---
E	---	3,000	---	---	---
F	6,000	6,000	6,000	6,000	6,000
G	---	3,000	---	3,000	---
H	2,000	---	---	---	---
I	---	5,000	4,000	4,000	4,000
J	3,000	3,000	3,000	3,000	3,000
K	3,000	3,000	3,000	3,000	3,000
L	5,000	5,000	5,000	5,000	5,000
TOTAL	26,000	34,000	33,000	27,000	24,000

*All figures are estimates and represent purchases of terminals, disc drives, tapedrives, etc.

†Labels A,...,L correspond to groups as defined in Table 1

IV. APPENDICES

COMPUTATIONAL NEEDS AND COMPUTER CONFIGURATIONAL ORGANIZATION AS ENVISAGED BY INDIVIDUAL RESEARCH GROUPS

-11-

Computer Facility Plans for the Surface Physics/Atomic Physics Laboratories

Activities and Needs:

The research efforts in Surface/Atomic Physics encompass a variety of topics which are currently of foremost interest:

1. Electronic properties of clean and adsorbate covered surface.
2. Photo ionization cross sections, core level spectroscopy and many electron effects such as fans resonances and Auger processes.
3. Conversion electrons spectroscopy.
4. Dynamical properties of surfaces and adsorbates (phonons and vibrations) and related structural phase transitions.
5. Heterogeneous catalysis and photo-assisted catalytic process.

The adequate implementation of Photoelectron related research requires the use of tunable synchrotron sources and we have planned to conduct the actual related experiments at the national synchrotron light source at Brookhaven National Laboratory, while exploratory experiments will be conducted at the Surface/Atomic Physics Lab at B.U.

The investigations of heterogeneous and photo-assisted catalytic process has found common ground with the Chemistry Department at B.U. and has led to the initiation of collaborative research work which has already resulted in the submission of a joint proposal to the Gas Research Institute and similar endeavors are anticipated soon.

In deciding upon the primary experimental apparatus to be set up at B.U. we have chosen to build a Neutral Atomic Beam/Surface Scattering (NASS) facility because of its great potential in providing information about the dynamics and structures of surfaces which neutron scattering has been providing for solids over the last 25 years. While its ability has been proven recently, the potential of NASS has yet to be exploited.

The research effort in the Surface/Atomic Physics Labs involves several state of the art experimental techniques, as well as pioneering ones. Among the former we mention Angle Resolved Photoelectron Spectroscopy, and Auger Electron Spectroscopy. The pioneering techniques include the scattering of monoenergetic atomic beams (at thermal energies) from surfaces, and conversion electron spectroscopy. The implementation of these research activities requires multi-faceted use of computers in: control of experiments, data acquisition, data processing and analysis, and in the design of new equipment and instrumentation. Some of this equipment can be considered as new generations of existing ones while others are novel and are intended for use in pioneering experiments. The

main areas of design are electron optics (electron spectrometers), and rarefied gas dynamics and supersonic nozzle flow for the development of atomic beam systems. Currently, we are in the process of patenting a new electron energy analyzer for use in Angle Resolved Photoelectron Spectroscopy and in Low Energy Electron Loss Spectroscopy. We are also designing and building a special high-resolution double-pan cylindrical-mirror electron spectrometer to be used in high energy electron experiments (approximately 15 KeV).

Besides aiding in equipment design and development efforts, computers play an essential role in the control of our experiments, in data acquisition and analysis, as dictated by the nature of these experiments: considerable complexity, large amounts of data handling, sophisticated data analysis (which require computational techniques such as FFT, computer modelling, data fitting) and ultimately advanced graphics displays and plotting capabilities.

Computer Configuration and Planning:

To meet the needs outlined above we must have the ability to incorporate a wide range of computer interfaces according to the needs of individual experiments and computational power. Further guidelines for the configuration of the system include:

- Standardization
- Compatibility between the computer systems and the interfacing systems (both hardware and software)
- Flexibility: the ability to restructure and update the computer/interface system
- Minimizing systems obsolescence
- Economy and reliability.

With the above guidelines and previous experience in mind, we have decided to adopt the DEC PDP 11 Computer Systems as the basic computer (11/23+, to be specific) because of its potential for system expansion and the availability of efficient, well-developed software. Equally powerful, flexible and compatible with the PDP 11 systems is the CAMAC interfacing system. We have already acquired a CAMAC system which includes a CAMAC crate, crate controller, ADC Module (16 input channels) and DAC module (8 12-bit DACS) which is interfaced with an LSI-11/23 system that is borrowed from the department. In order to meet the needs of the surface physics lab it is imperative to have a dedicated LSI-11/23 system which can be readily interfaced to the available CAMAC system.

P.S. The surface physics research effort now involves 2 graduate students (both of them have already passed their comprehensive exam) and 3 undergraduates.

Computational Needs for Theoretical Solid State and Surface Physics

-- G. Kirczenow

My current research program is in the areas of:

(1) Excitonic Systems in Semiconductors
(2) Intercalated Graphite
(3) Dynamical Properties of Surfaces and Structural Transition.

The work is theoretical and requires relatively large amounts of CPU time (200 hours/year on the VPS) so that a fast large machine is needed. Project (1) is currently being funded by the NSF with a small grant. The work in areas (2) and (3) is expected to expand greatly in the next 5 years and is expected to generate my main source of funding on that time scale. A student is working with me in area (2) and we expect to produce about 5 papers in that area this year. Research in area (3) is being pursued in collaboration with Professor Batanouny and a graduate student. This research is expected to develop into a joint theoretical-experimental project and attract funding from DOE and military research agencies as well as NSF. Apart from the mainframe capability mentioned above this research will require ready access to a graphics terminal, to a high quality graphics plotter with the capability of producing publication-ready drawings and to terminals having word processing and equation writing capability for the production of papers, proposals, etc.

COMPUTER REQUIREMENTS FOR LOW TEMPERATURE PHYSICS GROUP

The properties of materials at low temperatures are of interest because one is able to observe phenomena which are intrinsic to the substance under investigation free of the "thermal noise" present at ordinary temperatures. At these temperatures various magnetic and electrical phase transitions are observed which exhibit properties due to the quantum nature of the systems. The particular systems studies at the Low Temperature Laboratory at Boston University are the helium isotopes He^3 and He^4, superconducting systems, weakly magnetic systems,intercalated graphites thin metallic and semimetallic films as well as the behavior of glass systems.

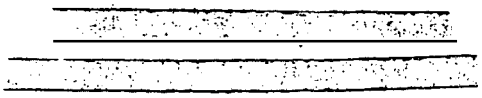
In order to achieve low temperatures one needs a variety of cryostats ranging from simple liquid nitrogen immersion crystals for relatively high temperatures to He^3-He^4 dilution refrigerators for ultralow temperatures. In each of those, a prescribed number of steps has to be performed, each one guided by the temperature sensors, in order to achieve a desired temperature. Each of those steps, as well as the reading of the sensors can be computerized if a suitable computer with AD and DA capabilities is available. Once the proper temperature range is achieved the temperature regulation can also be computerized.

Measurement of different properties of systems such as resistivity, magnetic susceptibility, specific heat, nuclear magnetic resonance and others involves the eventual reading of dc voltages from measuring instruments such as phase sensitive detectors, boxcar integrators, frequency-voltage converters, etc. Thus, once a temperature is established, one can read the various instruments by means of AD converters and thus use the computer as a data acquisition device. For the above a PDP 11/23 with CAMAC modules would be necessary.

For data analysis one would use either the RT 11/23 or the VAX depending on the sophistication of the analysis and a graphics and word processing facility to put the work into publishing form.

The low temperature effort at Boston University now involves 3 faculty members, 2 postdoctoral fellows, 5 graduate students and 5 undergraduate students and is currently funded at $150,000 per year by external agencies. It will be graduating one Ph.D. in physics per year and it publishes approximately 10 scientific papers per year.

The proposed computerization of the facilities will enhance the productivity of the group and its sophistication with regard to data acquisition and data analysis. It will also enable one to correlate many more parameters than currently feasible thus leading to new and significant discoveries.



Boston University

111 Cummington Street
Boston, Massachusetts 02215

Department of Physics

To: Michael Batanouny

July 15, 1982

From: Berend Kolk

Re: Computer Use

HYPERFINE INTERACTION GROUP

Professor B. Kolk

Visiting Professor Zheng Yufang

The research briefly described below involves the following students: David Hall, Andy Didonato, Ron Quanrude, and Peter Glinski (graduate students); Jim Lumetta and Peter Braccio (undergraduates).

1. A high temperature Mössbauer facility has been built which allows us to perform Mössbauer effect (ME) measurements from room temperature up to 1000 K or more. This temperature range is considerably higher than that of most conventional or commercial ME ovens. A unique feature of this facility is the temperature stability of 0.05 K at 1000 K and the fact that we can apply a magnetic field of about 1.5 KG across the sample while it is kept at a temperature of 1000 K or more. This feature is of interest in our studies of magnetic properties of solids. [CPU hours, 40 per year]

2. A special technique for measuring recoilless fractions of solids has been developed by our group. With this technique, lattice dynamical properties of solids are investigated. These studies involve the determination of force constants of dilute solutes in solids and the effect of lattice vibrations on electronic properties of solids such as magnetic or superconductive behavior. These experiments are controlled by a 64 k micro-computer. [CPU hours, 30 per year]

3. Our group performs time-dependent Mössbauer measurements in which events in solids on a time scale of 10^{-8} to 10^{-6} seconds can be studied. The major goal of these experiments is to investigate so-called "aftereffects".

These are effects induced by radioactive decay. [CPU hours, 30 per year]

Half of our computation time (about 50 CPU hours per year) involves rather large sophisticated programs requiring a large computer. The other 50% involves smaller programs which can be run easily on smaller computers.

Finally, typing the articles which report the data presently takes some 10-15 hours per week. This could be converted to word-processing time.

Computational Needs for Statistical Mechanics

In statistical mechanics, we are generally interested in systems with a macroscopic number ($\sim 10^{23}$) of degrees of freedom. In particular, much of our attention is focused on second-order phase transitions where cooperative behavior (critical phenomena) occurs due to the spread of long-range correlations. This gives rise to non-analytic behavior of thermo-dynamic functions, whose calculation is one of the primary goals in our research. Some examples include the conformation of polymer chains and gels, electrical conductivity of inhomogeneous materials, and studies of nucleation and spinodal decomposition in metastable and unstable systems.

Our calculations of critical phenomena are generally based on two types of approximation schemes:
(1) exact calculations for a sequence of small systems of increasing size in conjunction with extrapolations to infer the properties in the thermodynamic limit, and (2) approximate simulations (either Monte Carlo or Molecular Dynamics) of very large systems in order to obtain information about the thermodynamic limit. In the first method, computation time grows exponentially with system size, while in the second, very long simulations are needed in order to achieve sufficient accuracy for meaningful results.

For these applications, our computer requirements are twofold: One is appropriate facilities for program development. Often, this development hinges on construction of subtle algorithms which reduce global network problems. A typical example is the calculation of the resistance in a random resistor network. In the most extreme cases, different algorithms can differ by as much as 10^5 in computation time and 10^2 in computer memory. Thus it is important to have the proper resources for this preliminary stage of work. This means a local work setting, i.e. an office terminal and computer, with rapid turnaround time for programs requiring up to several minutes of IBM 370/168 cpu time. Presently the VPS system in periods of low usage only provides such a setting. In light of increasing demands on a central facility, a department machine is needed to meet program development needs in the future.

The second resource requirement is the availability of high speed computing power to complete our calculations. This presumably means using the main-frame B.U. computer or tying in to a state-of-the-art computer through a network.

I am currently studying problems of red cell permeability by the stop flow method. Cells are suddenly subjected to an osmotic gradient and the shrinking (and subsequent reswelling) of the red cells is monitored by light scattering at 90°. The entire transition from the initial to the final transition state is over in less than a second. THe intensity-time curve (in reality the cell size time curve) contains information from which the red cell permeability for the compound producing the density gradient across the cell membrane may be derived.

Data collection and analysis are carried out by means of a PDP 11 computer. The time dependent scattered light intensity is fed on line to an ADC and the digitized data placed in a computer file. Digitization time is typically 4 milliseconds and 1024 points are collected.

After data collection the digitized intensity curves are averaged, background-subtracted and finally analyzed. Analysis is carried out by fitting to the Kedem-Katchalsky Equations of non-equilibrium thermodynamics.

Although this experiment is being performed off campus, similar experiments will play an important part in the biophysics program at Boston University. It is an example of a relaxation experiment in which a system is subjected to a perturbation (light flash, temperature jump, osmolic shock) and the relaxation to equilibrium studied by light scattering, fluorescence or some similar probe of the system. The requirements for data collection and analysis of such experiments would be roughly equivalent to the capabilities typically supplied by a PDP 11.

-- B. Chasan

Biophysics

USE OF COMPUTERS IN POLYMER LIGHT SCATTERING EXPERIMENTS

R. Bansil, S. Krishnamurthy, J. Wiafe-Akenten and J. Carlos Reina

* * * * *

Our research involves the application of the techniques of quasi-elastic light scattering and Raman scattering to study the structure and dyanamics of polymer solutions, polymer networks and supercooled water. The Raman scattering experiment is presently controlled with a minicomputer (Nicolett 1180) that drives the spectrometer gratings and stores data on a hard disk (Diablo MODEL 31). However, this minicomputer cannot simultaneously run two or more experiments and hence we need another computer for our light scattering experiments described below.

[1] Small-angle light scattering. Measurements of small-angle light scattering provides information on the molecular weight and sizes of aggregates in polymer solutions or gels. For such experiments we would use the computer interface to send pulses to a stepping moter which rotates a mirror for small-angle light scattering. The output of the scattered light is measured by a photomultiplier. The digitized signal of the photomultiplier would be input to the computer, which would then be used to signal average and manipulate the data for further analysis. At present we are using a chart recorder to record the signal of the photomultiplier and this prevents us from signal averaging. Since the signals are quite weak, signal averaging techniques would be extremely useful in these studies.

[2] Dynamics of spinodal decomposition in polymers. When a binary mixture of two polymers or a polymer and solvent is suddenly quenched into the unstable region of the phase diagram, the evolution of two separate phases is governed by the process of spinodal decomposition. This process can be

identified by the occurrence of diffraction rings which shrink or grow in size as the phase separation process goes to completion. Thus one can measure the dynamics of spinodal decomposition by measuring the scattered light intensity from a series of fixed photo-diodes mounted at various angles with respect to the incident laser beam. We have observed spinodal decomposition in gelatin gels made in a mixture of water and alchohol. At present we are using photographic methods for these experiments and this greatly limits our data analysis capabilities. The minicomputer could be used to monitor the output of several photodiodes as a function of time and correlate these outputs.

* * * * *

For all these experiments a PDP 11/23 or equivalent minicomputer with appropriate interfaces would be adequate. In addition to these "on-line" computer needs we make extensive use of the mainframe computer with its word-processor and graphics facilities. We would be major users of any departmental computer facility that might be set up.

Boston University

111 Cummington Street
Boston, Massachusetts 02215

Department of Physics

To: Michael Batanouny July 15, 1982

From: Debra Nails

Re: Computer Use

In plans for future use of computer time, it should be borne in mind that Professor John Stachel, presently on leave from Boston University, will have a very large word-processing demand on the facility. Professor Stachel is the (sole) editor of the Einstein papers for Princeton University Press. He will certainly need at least eight hours per day, five days per week, fifty-two weeks per year, of word-processing access.

Boston University

111 Cummington Street
Boston, Massachusetts 02215

Department of Physics

To: Michael Batanouny Bastille Day, 1982

From: Debra Nails

Re: Computer Use by the Center for Philosophy and History of Science

During 1981-1982, CPHS employed a work-study student to "computerize" certain aspects of our operation. For this purpose, both Bob and I arranged for computer accounts with the Boston University Computer Center. The student used the VPS system to record: a mailing list of several hundred entries, a curriculum vitae, a list of books for series of which Bob is an editor, and an account of books on hand and sold by CPHS. Another work-study student used our programmable IBM electronic typewriter to generate dinner invitations, letters of recommendation, repetitious correspondence and forms, and announcements. I estimate that the amount of time spent in these projects by the two students combined was about 6 hours per week.

CPHS contracts with persons outside the university to type manuscripts because we have no one on the staff to do so. Speculatively speaking, if someone were hired to type, there would be some small amount of manuscript typing involving foreign languages (including foreign alphabets), symbolic logic, and other technical formatting challenges. To use this year as a sample, about 150 pp. were typed.

However, CPHS has some fifteen or so visiting scholars (usually Research Associates) each year. Two or three of these scholars arranged for computer accounts for themselves during 1981-1982, but of course the number could vary radically from year to year. We have been informed that one such Research Associate who will visit CPHS during 1982-1983 for eight months will use the computer extensively for a catastrophe theory project.

For our present and anticipated needs, existing Computer Center policies and practices are adequate.

COMPUTATIONAL NEEDS OF THE INTERMEDIATE ENERGY NUCLEAR AND PARTICLE PHYSICS GROUPS

1. Background

At present the group carries out research in photonuclear reactions (experimental and theoretical), muon capture and exotic atoms (experimental). In the former, we are interested in understanding in detail what happens when a nucleus is struck by a photon of energy 100 MeV up to 2 GeV. In such photonuclear reactions important information may be extracted about nuclear dynamics and structure at high excitation energy -- an area which only now is beginning to be explored. Of special interest are:

(a) Reactions in which an isobar, or excited state of a neutron or proton, is produced and propagates through the nuclear medium

(b) Production of hypernuclei which are nuclei which contain a strange particle such as a lambda or sigma. In such nuclei the strange particle acts as a probe of the nuclear medium in which it is embedded, and promises to be a key tool in unravelling the microscopic structure of the nucleus.

In exotic atom experiments, we are studying x-rays from atoms formed from negative subatomic particles such as the pion, kaon, anti-proton and sigma orbiting nuclei of elements in the periodic table. We use these x-ray data to deduce particle properties such as mass and magnetic moment, and to learn about the strong interaction between these particles and the atomic nucleus. The muon capture experiments are designed to study the nature of the weak interaction between the negative muon and Helium-3. These experiments will be the most sensitive to date to the pseudoscalar part of the weak interaction.

2. Computational Aspects

(a) Theoretical Physics

In studying photonuclear reactions at high excitation energy, photon-nucleus interactions have to be included for a very large range of angular momentum. Extensive numerical computation is required and a machine such as the VAX 780 or 782 is very suitable for the major part of such work in terms of both flexibility for large code development and CPU time. In fact, so far all code development has proceeded on DEC systems (at first DEC-10 and now the VAX 780 at Bates Linear Accelerator). However, the future availability of the Bates VAX is not assured and it is an urgent priority to now acquire a suitable VAX sys-

tem for in-house use. We estimate with a high degree of certainty that in order to complete current contract research work which involves photonuclear calculations for most nuclei smaller than Calcium-40, we will need 3000 hours (VAX 780 CPU time) per year.

(b) Experimental Physics

We are involved in experiments at the MIT Bates Linear Accelerator, the Brookhaven National Laboratory (BNL) Alternating Gradient Synchrotron and the Los Alamos Meson Physics Facility (LAMPF). In all of our experiments we use PDP 11 computers. Bates provides the users with an 11/44 and off-line analysis is carried out on a VAX 780. Our collaborators have provided 11/34's for use at BNL and LAMPF, but we find serious limitations to what can be done. On a PDP 11 there is always the trade-off between speed and space optimization. A VAX 750 for our own use at BNL and LAMPF would eliminate this difficulty and allow us to concentrate on speed optimization in data acquisition. Also, much more information would be able to be stored as the data is accumulated, thus improving the number of parameters which can be monitored as the data are taken. The data acquisition would include CAMAC connected to a R1-RA Microprogrammed Branch Driver (MBD) (or equivalent) which is connected to the UNIBUS of the VAX 750. The MBD is a standard UNIBUS device so no new hardware need be developed.

Such a system would be able to maintain speed and still be programmable in a more "user friendly" language such as FORTRAN rather than MACRO-11 which is required for maximum speed in the PDP 11's. In addition such a system would provide adequate computing power to perform most if not all of the off line analysis as well. It could easily be upgraded to one of the "smart" high speed systems such as FASTBUS.

In addition to the taking and processing of data, we use a large number of CPU hours doing Monte-Carlo calculations in order to design our experiments and also to help interpret the experimental results. Experimental Proposals also involve these kinds of calculations. We estimate that in addition to time used on our VAX 750, we need on the order of 2000 hours (VAX 780 CPU time) per year for Monte-Carlo and other calculations necessary for planning and interpreting experiments.

(c) National Perspective

The current thinking in the U.S. nuclear physics community is that a national computing network should be set up to achieve the following:

(i) facilitate access to data bases

(ii) provide a code resource

(iii) prevent duplication of effort in numerical work

(iv) allow geographically distant parties to collaborate effectively on projects which involve serious numerical work.

In this scheme the VAX 780 is a proposed typical nodal machine. It is clear that acquisition of a VAX 780 or 782 by the Physics Department would tie in well with this projected national network.

COMPUTER NEEDS OF BIOPHYSICAL STUDIES

BIOPHYSICAL STUDIES OF MEMBRANE PROTEINS: RHODOPSIN AND BACTERIORHODOPSIN

Kenneth Rothschild, Patrick Ahl, Hector Marrero, Thomas N. Earnest

* * * * * * * * * *

Our laboratories are involved in the study of the structure and function of the photo-excitable membrane proteins rhodopsin and bacteriorhodopsin which are responsible for the visual process and bacterial proton pumping respectively. We use the techniques of computer-based Fourier transform infrared spectroscopy (FTIR), resonance Raman spectroscopy, and visible absorption spectroscopy. Our recent work has led to fundamental insights into the molecular mechanisms of vision. Our research entails on-line computer control, extensive processing of data (including signal averaging, spectral addition, deconvolution, and integration), as well as graphical output of the data. One important need is for increased graphics capabilities -- video editing as well as a Raster printer.

Students in our labs have extensive experience in interfacing computers to spectroscopic equipment; however, we lack the small dedicated minicomputer that we need for data acquisition, data analysis and high resolution graphics. For this reason, we are in great need of improved computer capabilities.

Report on Senior Faculty meeting of November 2, 1982

Present: Profs. Booth, Chasan, Cohen, Corinaldesi, Edmonds, Franzen, Hellman, Klein, Rothschild, Shimony, Stanley, Willis, Zimmerman

1. A discussion about the procedure for the hiring of faculty who would be hired either with or with a presumption of tenure shortly after they arrive at Boston University, was discussed, and a procedure was adopted by a vote of 9 to 3. That procedure is that the candidates will be discussed with the whole faculty but no formal vote will be taken. The formal vote to hire with tenure or with the presumption of tenure will be made at a separate meeting of the Senior Faculty only, the reason being that only the Senior Faculty can vote on tenure.

2. Reappointment of El-Batanouny for three years was voted unanimously.

3. The question of promotion of our Junior Faculty was discussed in view of the fact that during the 83--84 school year, four of our Junior Faculty will have to be considered for tenure. The four are: Redner, Brooks, Kirczenow and Miller. It was not clear whether Redner will have to come up for a tenure recommendation this year or next because he was appointed a Visiting Assistant Professor for one semester in 1978. The Chairman will check this point as soon as the replacement for Ms. Knecht comes on line November 15. It was decided that each of the Junior Faculty should be contacted by letter and made aware of this fact and the fact that they can request to come up for promotion at an earlier time if they feel that their dossiers are sufficiently strong. There was a brief discussion about the desirability of coming up for promotion if there are only two people coming up for promotion from a single department vs that of having four people promoted from the same department. No specific conclusion or advice could be given.

4. Two committees to examine the credentials of Junior Faculty were formed.

   a) for Bansil - Chasan, Hellman, Stanley

   b) for Brooks - Booth, Shimony, Willis

Boston University

Department of Physics
111 Cummington Street
Boston, Massachusetts 02215

November 12, 1982

To: Full Professors Booth, Cohen, Corinaldesi, Franzen, Shimony, Stanley, Willis

From: Prof. George O. Zimmerman, Chairman George

This summer anticipating an outside offer to Associate Prof. Edmonds, I consulted all the Full Professors on their desire of the promotion of Dean to the rank of Full Professor. Corinaldesi was not available at that time and thus was not consulted.

Dean has received an outside offer and although there are no monetary considerations, i.e., no salary increase, he made it a condition he would like a promotion to the rank of Full Professor. I have accordingly recommended to the Dean that such a promotion should be made based on the consultation with you this summer.

If you have any questions or would like to discuss this further, please let me know.

hs

Report of Senior Faculty Meeting of November 30, 1982

Present: Profs. Booth, Chasan, Corinaldesi, Edmonds, Hellman, Klein, Rothschild, Shimony, Stanley, Willis, Zimmerman

The matter of several of our Assistant Professors wanting to come up for early promotion was discussed.

1. The Brooks Committee consisting of Willis (Chairman), Booth, Shimony was given the charge of a full rather than preliminary evaluation of Brooks.

   Because there is a possibility that Brooks will not be teaching next semester, it is necessary for the subcommittee to observe his teaching within the next two weeks.

2. Committee to examine Redner's credentials was constituted. Consists of Klein (Chairman), Edmonds, Franzen, Rothschild.

3. In view of the fact that Kirczenow has applied for a position at Simon Fraser University, the Senior faculty decided to prepare itself in case recommendation for a counter offer is required. A subcommittee was set up consisting of Zimmerman (Chairman), Cohen, Franzen, Stanley.

4. The Committees were given the freedom to interact with the person being evaluated as long as it was done in a discrete way and the names of individual referees were not revealed.

Boston University

Department of Physics
111 Cummington Street
Boston, Massachusetts 02215

December 14, 1982

To: Full Professors

From: Prof. George O. Zimmerman, Chairman

Subject: Report on Meeting of November 23, 1982

Present: Profs. Booth, Cohen, Chasan, Corinaldesi, Franzen, Stanley, Willis, Zimmerman and (Haber-Schaim).

After a debate, the Full Professors voted to go along with the recommendation made to the Dean by the Department Chairman that Dean Edmonds Jr. be promoted to the rank of Full Professor.

hs

Report of Senior Faculty Meeting of January 11, 1983

Present: Profs. Siegel, Booth, Hellman, Chasan, Klein, Haber-Schaim, Franzen, Stanley, Rothschild, Willis, Shimony and Zimmerman

A discussion of the possibility of Prof. Glashow from Harvard University spending the sabbatical at Boston University took place. The senior faculty agreed that this would be quite desirable if there were no coupling between the expenditures for Glashow and the departmental budget, i.e., that those expenditures not come out of the department. The interaction of Glashow with the department could be manifod such as teaching a core course, a lecture series as well as scientific discussions of various faculty members with him and his students.

FOR FULL PROFESSORS ONLY

After the Associate Professors had retired, a Full Professors meeting took place to consider the request of Prof. Klein for a recommendation for promotion. A subcommittee consisting of Profs. Shimony, Siegel and Zimmerman was appointed to examine the credentials of Prof. Klein.

Boston University

Department of Physics
111 Cummington Street
Boston, Massachusetts 02215

To: Senior Faculty

From: Prof. George O. Zimmerman

Subject: Report of Senior Faculty Meeting, March 22, 1983

Present: Profs. Booth, Chasan, Corinaldesi, Edmonds, Franzen, Hellman, Klein (arrived too late to participate in vote), Rothschild, Shimony, Siegel, Stanley, Willis, Zimmerman

1. The faculty voted to recommend Rama Bansil for promotion and tenure. The vote was unanimous.

2. A discussion of the cases of Redner and Brooks took place with a decision to postpone the discussion until more extensive information is circulated to the faculty.

3. The case of Kirczenow was also discussed in view of a possible offer or counteroffer by the University. This again was postponed for a later meeting which will take place soon.

Boston University

Department of Physics
111 Cummington Street
Boston, Massachusetts 02215

SENIOR FACULTY MEETING

THURSDAY, 1:30-2:30 P.M. Seminar Room (March 31, 1983)

To: Profs. Booth
Chasan
Cohen
Corinaldesi
Edmonds
Franzen
Hellman
Klein
Rothschild
Shimony
Stanley
Willis

From: Prof. George O. Zimmerman

Subject: Matching Offer

Report of Senior Faculty Meeting of March 31, 1983

Present: Profs. Booth, Chasan, Corinaldesi, Edmonds, Franzen, Hellman, Klein, Rothschild, Shimony, Willis, Zimmerman, Stanley. Cohen left his vote.

The Senior Faculty debated the possibility that both Kirczenow and Redner could receive offers from Simon Frazer University, and contingencies as to what counter offers to make. The conditions of the offers were conjectured, and the following was voted on by secret ballot: that a counter offer should not be made without written offer from another university.

For Kirczenow - that promotion with tenure be made as a counter offer by a vote of 7 to 3 with 2 abstentions; in addition 1 more pro vote for Cohen.

That a salary counter offer be made not in excess of 10% of the salary which the person would get in 83-84 by a vote of 8 to 3, 1 abstention plus 1 for Cohen. A negative vote might mean either a disproval of any salary counter offer or a disproval of a ceiling to the counter offer.

For Redner - same terms were voted in both cases by a vote of 7 to 3 with 1 abstention.

Boston University

Department of Physics
111 Cummington Street
Boston, Massachusetts 02215

April 6, 1983

To: Senior Faculty

From: Prof. George O. Zimmerman, Chairman

Subject: Report of the Senior Faculty meeting of April 5, 1983

Present: Profs. Chasan, Willis, Stanley, Edmonds, Siegel, Haber-Schaim, Klein, Shimony, Hellman, Corinaldesi, Booth, Zimmerman

The subcommittee on Prof. Sidney Redner presented a recommendation that the faculty recommend him for promotion to Associate Professor with tenure. After an examination of the papers and a discussion, the Senior Faculty, in a secret ballot, voted unanimously to recommend the promotion with tenure to the Dean.

hs

cc: Dean Blaustein
Vivian Ouellette

To: Full Professors

From: George O. Zimmerman

Report of Meeting of Full Professors April 24, 1983

Present: Profs. Booth, Chasan, Cohen, Corinaldesi, Edmonds, Shimony, Willis, Zimmerman

After a lengthy discussion, the following votes were taken in a secret ballot.

For the recommendation of Klein to the rank of Full Professor

Yes - 3
No - 3
Abstention - 2
Absentee votes 1 yes, 1 no.

For the recommendation of Hellman to Full Professor with a suggestion that he wait a year in order to get more papers published

Yes - 7
No - 0
Abstention - 1
Absentee votes 2 yes

To: Profs. Franzen, Stachel, Stanley

From: George O. Zimmerman

Enclosed is the report of the Full Professors meeting for which you were absent. At this time, if you so wish, add your vote. I have subsequently talked to Klein and Hellman,and Klein is willing to apply for the promotion while Hellman is willing to wait a year. I would like any comments which you might have or want included in Klein's papers at this time.

Report of Senior Faculty meeting of Tuesday, April 26, 1983

Present: Booth, Chasan, Cohen, Corinaldesi, Hellman, Klein, Rothschild, Shimony, Willis, Zimmerman

After a brief discussion about the quality of the persons and strategy for promotion, the Senior Faculty present voted unanimously,in a secret ballot, to recommend both Kirczenow and Brooks for promotion to Associate Professors with tenure.

Copy to Brooks Koczela Klein Hellman

Boston University

111 Cummington Street
Boston, Massachusetts 02215

Center for Polymer Studies
617/353-2617

2 May 1983

Prof. GOZimmerman
Chair

Dear George:

Thanks for the minutes of the sr. fac.meetings that I missed while fund-raising last week.

I'd like to cast my affirmative votes for all the motions:

Tenure for Brooks & Geo.K

Full Prof. for Klein & Hellman

Since I participated in most of the discussion on these cases, I feel my votes should be counted (it is not as if I were on sabbatical).

Thank you for your consideration in this matter.

Yours sincerely,

H.E.Stanley

Sr. Fac. Meeting
Annual Report

Report of Faculty meeting of May 3, 1983

1. A report from members of the Chairman's Search Com. and the announcement of its membership engendered a discussion which resulted in a suggestion to the Dean voted on 10 for, 1 against, with 5 abstentions, that a member be appointed to the committee who is outside of the sciences and technical fields so as to benefit from the input of people from the humanities and social sciences or arts. The constitution of the committee is Booth, Epstein, El-Batanouny, Rothschild from Physics, Dill from Chemistry and Colburn from Biomedical Engineering.

2. This Chairman announced the rumor that Prof. Chasan has been approached by the Dean and asked to become the Interim Chairman starting July 1. Prof. Chasan acknowledged the rumor and his acceptance of the Interim Chairmanship to the applause of the Physics faculty.

3. A report of the Stockroom Committee was given by El-Batanouny with the current plan to integrate any material needs in hardware and electronics into the Chemistry Stockroom. Al Stone is the Chairman of that subcommittee.

4. It was announced that the Department received $175,000 from the Administration and the Dean for the purchase of undergraduate laboratory equipment (the request was for over $500,000).

5. A discussion of the appointment of Prof. Asim Yildiz took place in view of the fact that the ENG is willing to appoint him for a two year term as a regular faculty member. The Physics Dept. was asked to pick up 1/4 of his salary. After a discussion, 3 options were brought forth:

   1. To support the 1/4 salary request and give Yildiz a parallel 2 year appointment in Physics.

   2. To offer Yildiz an adjunct or research appointment.

   3. Not to offer Yildiz any appointment.

   On a secret ballot the Junior faculty cast 3 votes for option 2 and 2 votes for option 3.

   At a subsequent Senior faculty meeting, the Senior Faculty voted in a secret ballot 3 votes option 1; 6 votes option 2; and 1 vote option 3.