ANNUAL REPORT

of the

DEPARTMENT OF PHYSICS

Boston University

1981 - 1982

Submitted to the Dean of the College of Liberal Arts

by

George O. Zimmerman

Chairman, Department of Physics

INEDEX

Chairman's Comments

This year marked several bench marks in the existence of the Department of Physics, all of which contributed to the extremely busy and at times chaotic atmosphere of the Department. Those were:

1. For the first time our external funding for research exceeded $1,000,000. The Center for Polymer Studies contributed more than half of that. (See graph, and table at end of the "Plan for the Future of the Department".)

2. We were overwhelmed by the large number of undergraduates enrolled in our physics classes, and had a hard time coping with that with our existing faculty and resources. (See enrolments and graph of credit hours taught.)

3. We are on the verge of moving to a new and hopefully improved location, the planning of which was one of the major activities of the Department.

4. In connection with 2 and 3, faculty recruitment and hiring as well as long range planning became a major task of the Department. (See "Plan for the Future of the Department".)

5. This year we have graduated more Ph.D.'s (most of whom are employed) than we had since the early 70's. This is a result of the increased research activity in the Department.

6. We have organized and hosted two extensive meetings. One was the Alumni meeting on December 5, organized by Prof. Booth with the assistance of faculty members. The other was the Joint New England American Physical Society and American Assoication of Physics Teachers meeting on May 21-22, organized by Prof. Franzen and a committee consisting of Profs. Brooks, Kirczenow and Redner.

7. For the first time in a long time a scientist, physicist, Prof. deGennes, received an honorary degree from Boston University. He was also one of the speakers at the NEAPS meeting mentioned in 6.

8. Two of our graduate students received honors, Steven E. Millman was a finalist in the Industrial Fellowship Award competition of the APS and Christopher Unger received an NSF Fellowship.

9. The Dean S. Edmonds second lecturer was an extremely prestigious physicist, William A. Fairbank. We have also established a fund for the Benson Chertok lecture, Chertok being one of our distinguished alumni, who died during the school year.

On the whole, we started building more substantial bridges to the scientific community as a whole. They seem to be paying off. The attitude of the University towards the sciences has changed from benign neglect to a somewhat more active interest with the advent of V.P. Jones and the realization of a science complex.

As the content of the Annual Report shows, our faculty has continued to be scientifically and academically productive and the hiring of new faculty has contributed significantly to the vitality of our Department. This year, we managed to hire one new faculty member, Dr. Pi, whose expertise is in theoretical elementary particle physics and to attract a number of research assistant professors in the Polymer Center, biophysics, solid state, low temperature physics and intermediate energy physics. Currently, the most active group is the Polymer-Biophysics followed by the rapidly developing Nuclear, and Low Temperature, Solid State and Surface groups not far behind. There has been a remarkable collaboration and vitality exhibited by members of the Department and the interconnections between the various groups as well as tentative plans for their development in the future are shown in the graphs right after the Chairman's comments. (The funding levels shown are only approximate and exact funding levels are given in the table at the end of the description of the Plans for the Future of the Department.)

The applications for our Graduate School admission in physics increased significantly this year over last and we have a nice contingent of incoming students, some of whom will be financing their own education.

The Summer School enrollment has been growing lately and this has continued this year. Connected with that was the program for high school students which was in the past few years sponsored by the NSF. This program was supervised by Dr. William Alston. This year the NSF discontinued funding the SST programs and the Summer

School decided to support it. About 10 of the applicants to the program requested forms for early admission to Boston University. Depending on how many wind up coming to Boston University, this may be a worthwhile vehicle for the recruitment of bright undergraduate science majors. Faculty members from the Physics, Chemistry, Biology and Astronomy Departments as well as the College of Engineering participated as preceptors in this program. Other faculty participating were from M.I.T. and Northeastern.

The Department has undergone substantial changes in the front office staff and at times our effectiveness was hampered by those changes. From January till April we were operating with temporary help and an incomplete staff and even now we are short of secretarial help. This was only one of the factors impeding our otherwise satisfactory progress.

At the beginning of the semester, there was anxiety about the status of the faculty union negotiations and after the resolution of that item, there was a delay in procedures to the point where the University seemed to be non functional. Thus salary increases were substantially delayed, especially those for merit and equity because of the formalities and disagreements centering on procedure, and the guidelines for Merit and Equity are still not in place at this time (August 25) for next year. New appointments are being delayed many weeks up to several months. Procedures for tenure and promotion are painfully slow and beaurocratic.

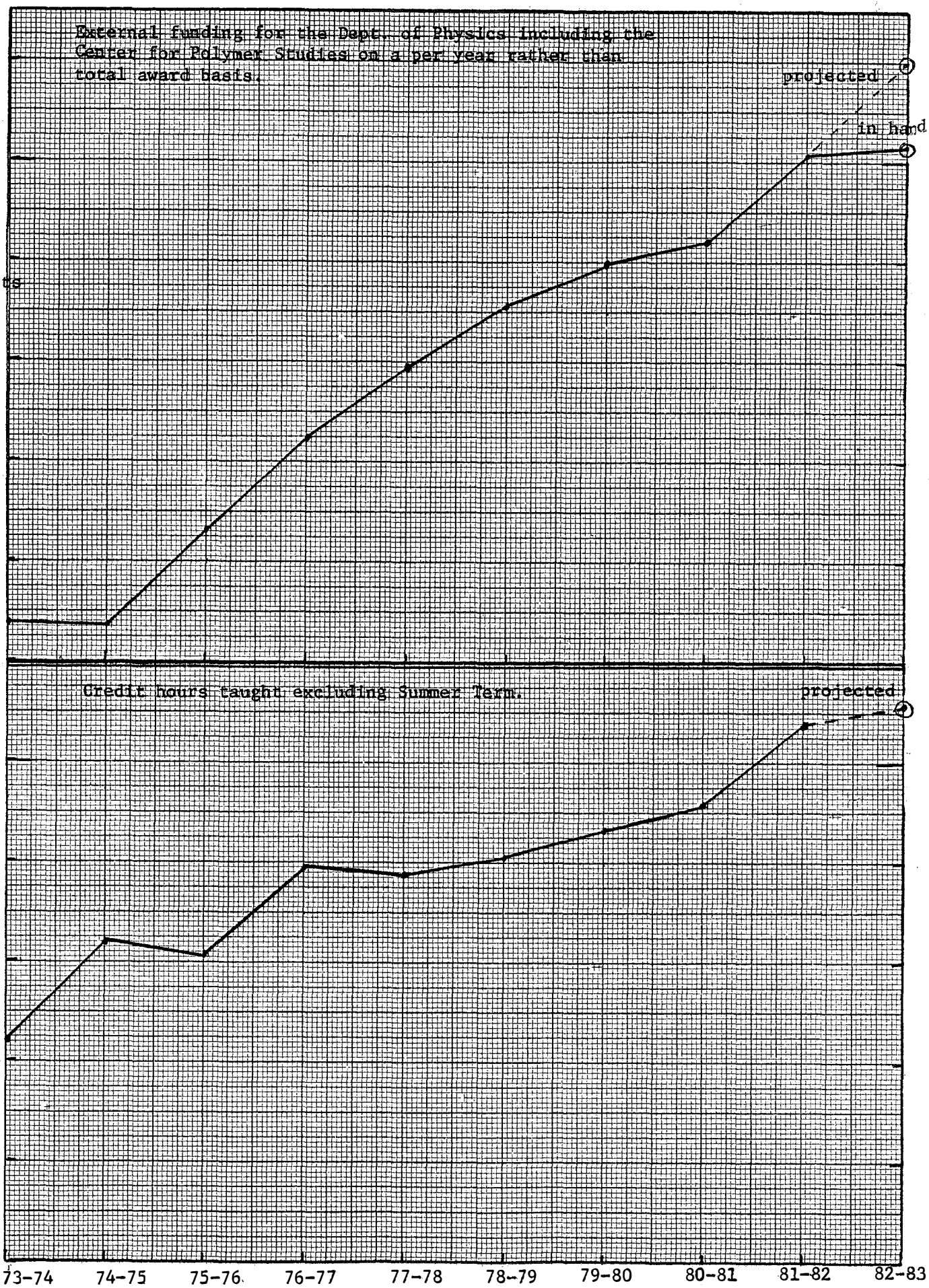
Last year we were successful in the promotion of two of our faculty members, Rothschild to Associate Professor with tenure and Chasan to Full Professor. A recommendation for a three year extension of contract for Berend Kolk was denied by the College and University APT Committees.

During the middle of the year we were surprised by a more than 50% increase in our overhead rate which was negotiated without the participation and knowledge of faculty as well as many academic types in the Administration. This applied in an unmodified manner would have severely impeded our ability to perform research and to obtain grants from government agencies. Thankfully, the Provost approved a modification whereby, if it can be justified, the University will contribute a substantial fraction of the overhead cost.

There are two academic programs which will hopefully be implemented during next year since they have received departmental approval during 82-83. Those are the Ph.D. program in Cellular Biophysics and the Ph.D. program in Applied Science and Engineering. The latter will create a new division in the Graduate School and give the College of Engineering a doctorate which they badly need to attract good faculty as well as enhance their research base.

On the whole this seemed to be a very busy and mostly successful year thanks to the work of all the members of the Department. Next year will probably be busier with the planned move of the Department to new quarters and possibly a new administrative structure for support services and library. It will be spent by trying to build bridges between us and industry as well as a greater research community as well as building bridges between the science departments, some of which have already spontaneously started (Physics and Chemistry). We hope we can continue the upward trend which we have been on for the last few years and that with the infusion of some attention from the University that trend will be easier to come by. Next year I'm looking forward to the appointment of an Associate Chairman to help me in the administration of this Department, which has grown to the point where its functions have become unmanageable by one person and to the assignment of one faculty member, half time, to devote his attention to the labs in our undergraduate courses. That should remedy some of the areas which were impacted last year and bring about a smoother and more efficient operation of the Department.

(P.S. Have you noticed that the Annual Reports are becoming bigger each year?)



10 Millimeters to the Centimeter

The Department and its future in brief.

BIOPHYSICS
POLYMER
STATISTICAL MECHANICS
CONDENSED MATTER

4 TENURED
3 UNTENURED

PRESENT FUNDING
500 K
NIH, DOD, NSF, INDUSTRY
P.C. PARIS, PRINCETON, JÜLICH, NIJMEGEN

PLAN: ADD 2

MACROMOLECULAR PHYSICS
(NEW MATERIALS, BIOPHYSICS, OIL EXTRACTION)

CONNECTIONS

MEDICAL CAMPUS — CHEMISTRY — BIOLOGY

SURFACE
SOLID STATE
MAGNETISM
CONDENSED MATTER

3 TENURED
4 UNTENURED

PRESENT FUNDING
200 K
NSF, DOD, DOE, INDUSTRY
BNL, SLAK, FBNML, GRÖNINGEN

PLAN: ADD 4

REGIONAL FACILITY

SURFACE AND LOW DIMENSIONAL PHYSICS
(NEW MATERIALS, CATALYSIS, QUANTUM PHENOMENA)

CONNECTIONS
|
CHEMISTRY

SEE PREVIOUS VIEWGRAPH

{ INTERMEDIATE ENERGY PHYSICS
NUCLEAR PHYSICS }

1 TENURED
3 UNTENURED

PRESENT FUNDING
200 K
NSF, DOE

PLAN: ADD 2

NEW ACCELERATOR DEVELOPMENT
BATES, BNL, FERMI LAB

RELATIVITY
FOUNDATIONS OF PHYSICS
FIELD THEORY

5 TENURED

PRESENT FUNDING
100 K –
NSF & FOUNDATIONS

PLAN: ADD 2

RELATIVITY & COSMOLOGY

CONNECTIONS
MATHEMATICS ASTRONOMY

NEW!!!

QUANTUM OPTICS

2 TENURED

PLAN: ADD 2

SUMMARY

NEW:

RESEARCH: MACROMOLECULAR PHYSICS

SURFACE & LOW DIMENSIONAL PHYSICS

REGIONAL FACILITY

ACCELERATOR DEVELOPMENT SUB-CONTRACTORS

RELATIVITY CENTER

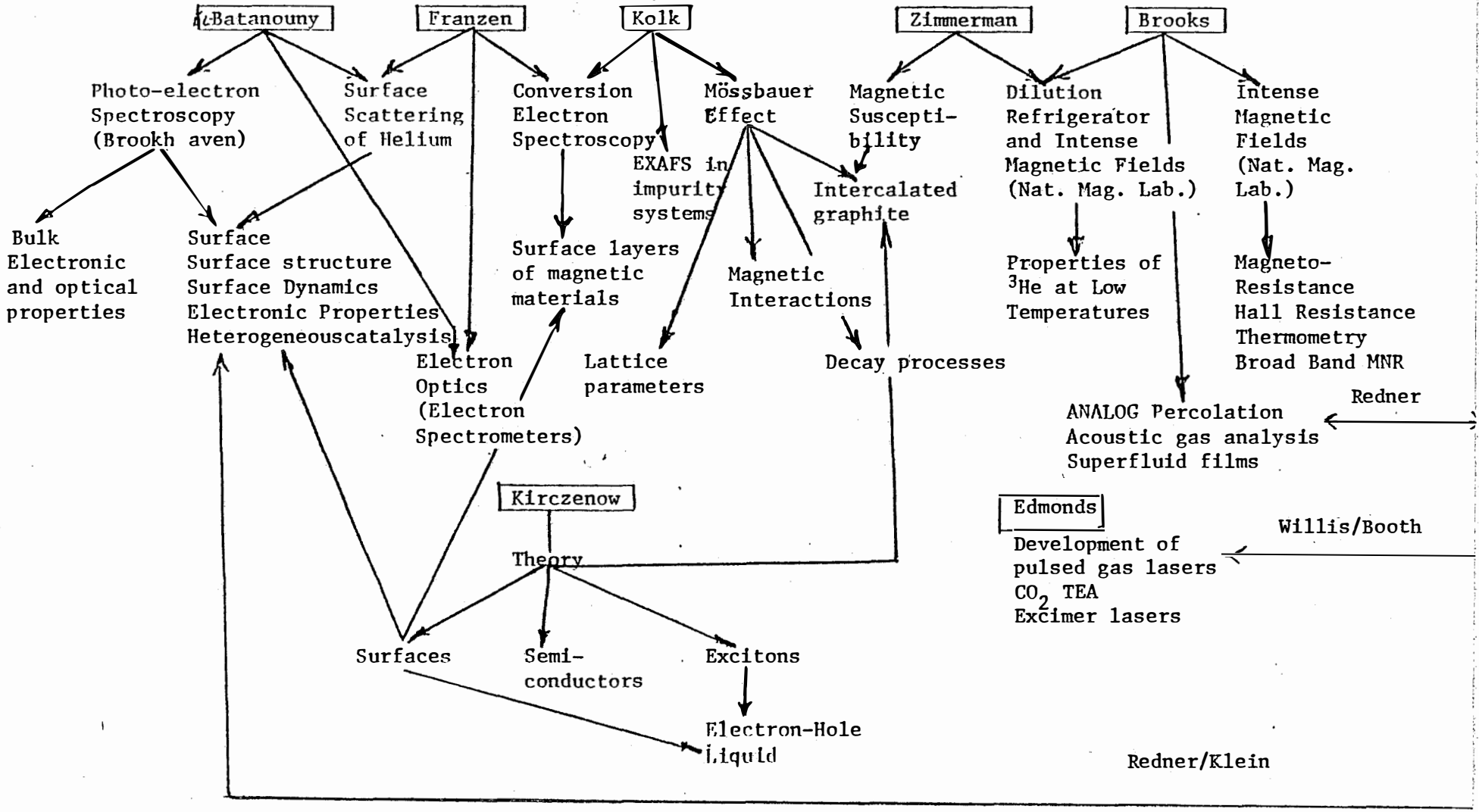
QUANTUM OPTICS

ACADEMIC: CELLULAR BIOPHYSICS { MED, PHYSIOLOGY, BIOPHYSICS }

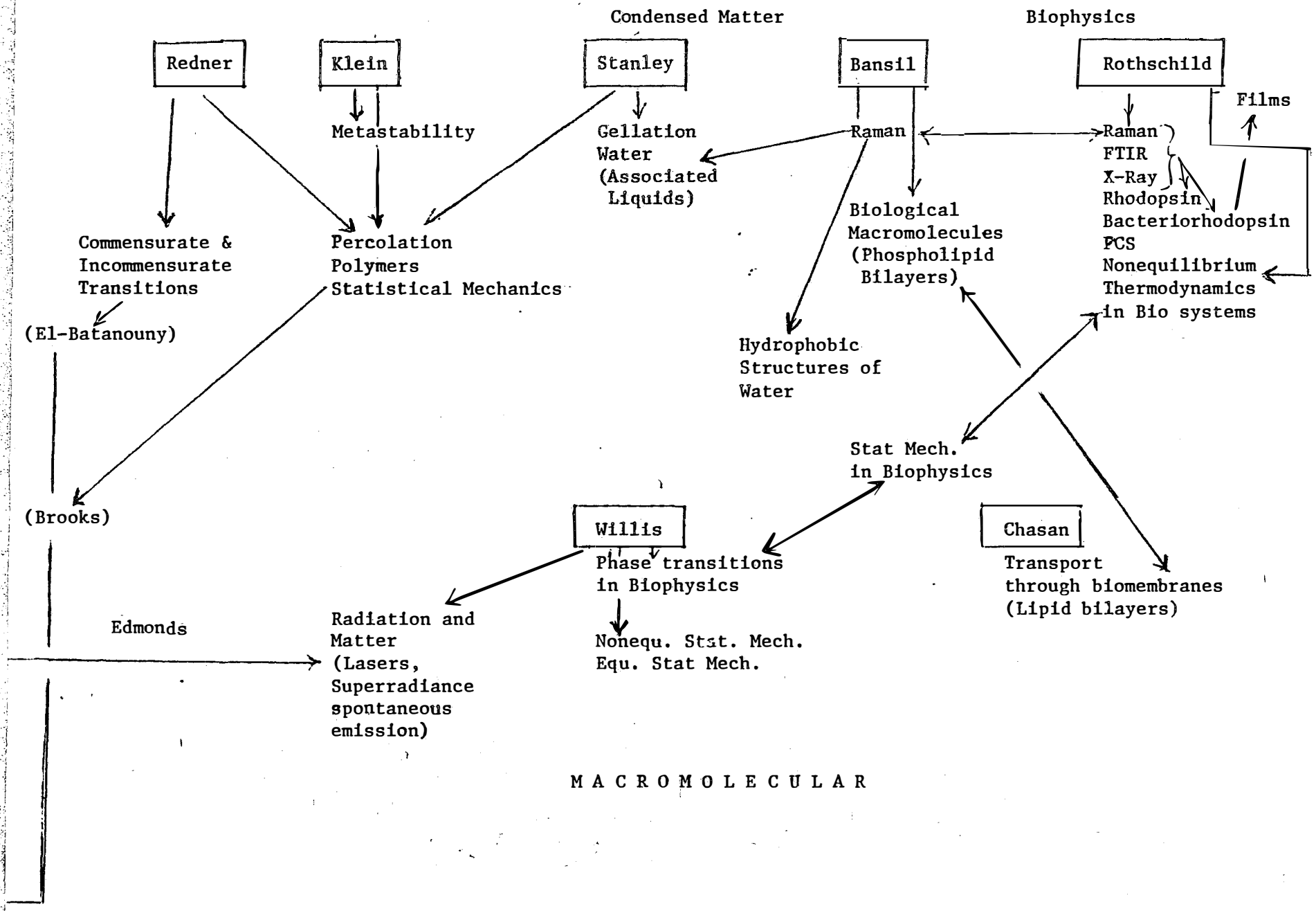
APPLIED PHYSICS { ENGINEERING

SUMMER HONORS PROGRAM IN PHYSICAL SCIENCES { CHEMISTRY, ASTRONOMY, MATH

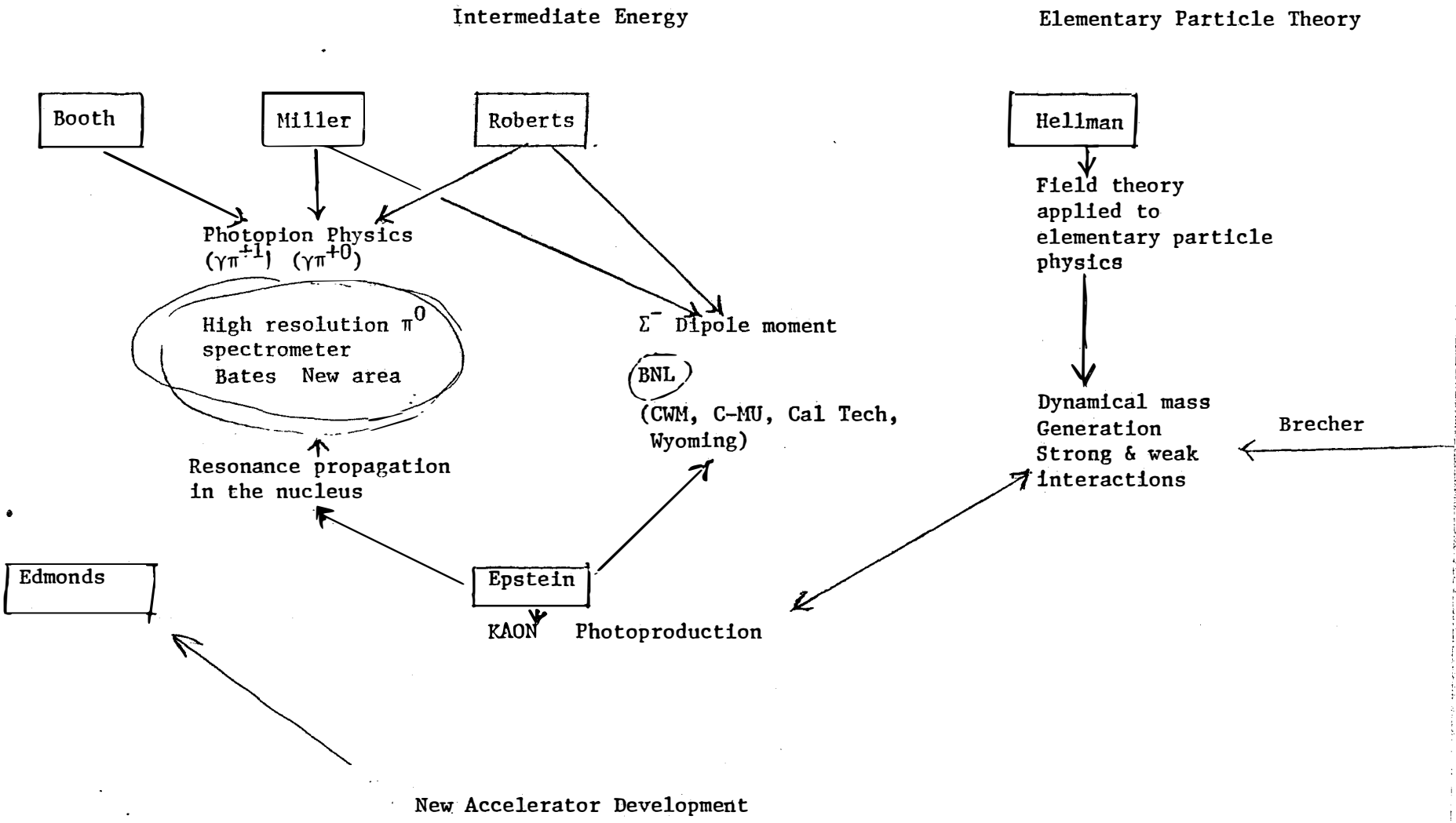
Solid State and Condensed Matter

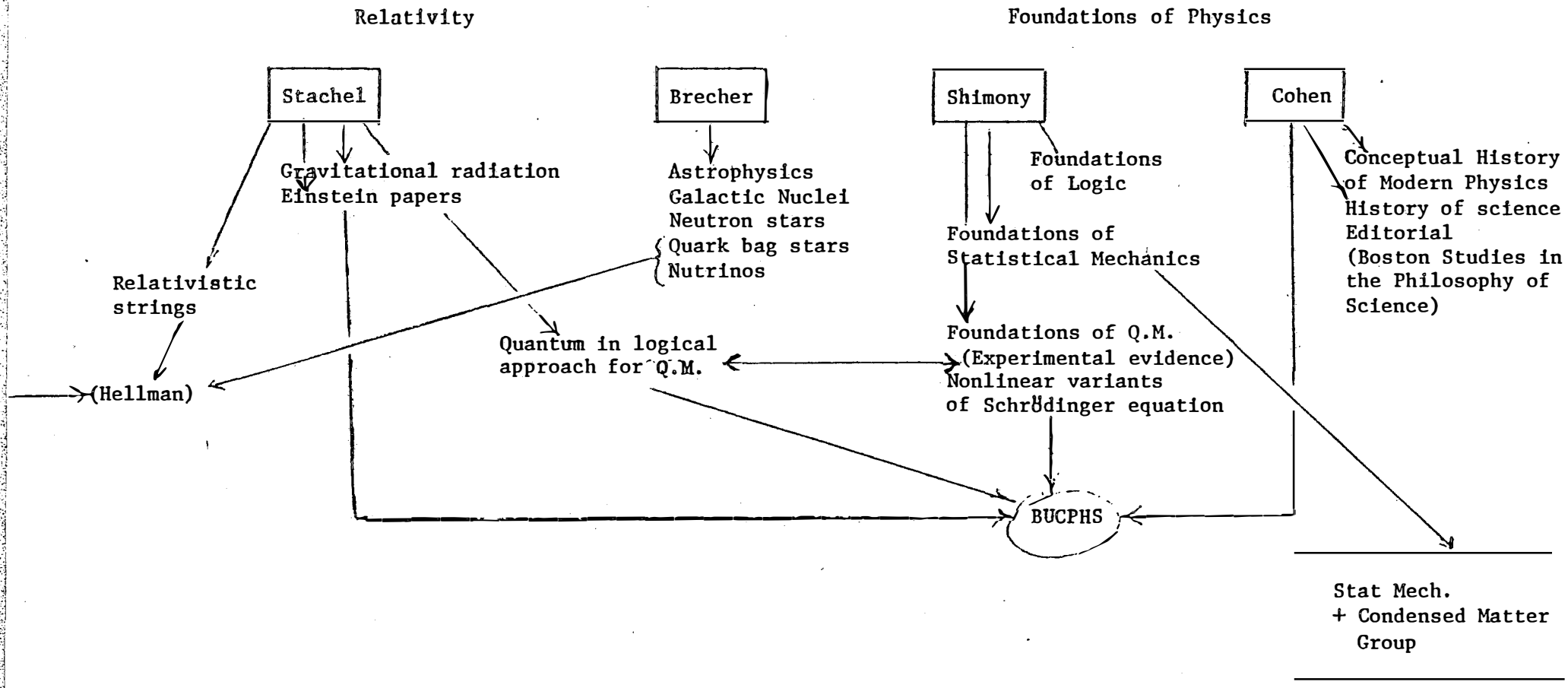


Polymer and Staticstical Mechanics



M A C R O M O L E C U L A R


Intermediate Energy
Elementary Particle Theory
Booth
Miller
Roberts
Hellman
Photopion Physics
$(\gamma\pi^{+1})$ $(\gamma\pi^{+0})$
Field theory applied to elementary particle physics
High resolution π^0 spectrometer
Bates New area
Σ^- Dipole moment
BNL
(CWM, C-MU, Cal Tech, Wyoming)
Dynamical mass Generation
Strong & weak interactions
Brecher
Resonance propagation in the nucleus
Edmonds
Epstein
KAON Photoproduction
New Accelerator Development


Relativity
Foundations of Physics
Stachel
Brecher
Shimony
Cohen
Gravitational radiation
Einstein papers
Astrophysics
Galactic Nuclei
Neutron stars
Quark bag stars
Nutrinos
Foundations
of Logic
Foundations of
Statistical Mechanics
Conceptual History
of Modern Physics
History of science
Editorial
(Boston Studies in
the Philosophy of
Science)
Relativistic
strings
Quantum in logical
approach for Q.M.
Foundations of Q.M.
(Experimental evidence)
Nonlinear variants
of Schrödinger equation
(Hellman)
BUCPHS
Stat Mech.
+ Condensed Matter
Group

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, 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, Associate Professor, Ph.D., Massachusetts Institute of Technology. Joined the Department of Physics in 1961.

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

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.

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 1950. Retired in 1980.

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

Center for Polymer Studies

Alan C. Brown, Research Associate, Ph.D., Brown University.
Antonio Coniglio, Research Professor, Ph.D., University of Naples.
Harvey A. Gould, Visiting Research Professor, Ph.D., University of Cal., Berkeley.
Manoj Kumar Gupta, Research Associate, Ph.D., Lucknow University.
Naeem Jan, Research Associate, Ph.D., University of London.
Subramanian Krishnamurthy, Research Associate, Ph.D., University of Pittsburgh.
Ikuo Ono, Research Associate, Ph.D., Tokyo University.
Izume Nishio, Research Associate, Ph.D., Tokyo University.

Dietrich Stauffer, Research Associate, Ph.D., University of Munich.
Fa-Yueh Wu, Research Associate, Ph.D., Northeastern University.
Zhan-ru Yang, Research Associate, Ph.D., Peking Normal University.
Wei-mo Zheng, Research Associate, Ph.D., Peking University.

Intermediate-High Energy

George Dodson, Research Associate, Ph.D., The College of William and Mary.

CENTER FOR THE PHILOSOPHY AND HISTORY OF SCIENCE--Visitors, 1981-1982

Judith Buber Agassi, sociology, University of New Hampshire and Tel-Aviv University (Israel)
Miriam Balaban, scientific communication, International Federation of Scientific Journal Editors and Weizmann Institute (Isreal)
Hanna Buczynska-Garewicz, philosophy, Polish Academy of Science, Institute of Philosophy and Sociology (Warsaw, Poland)
Vladimir Vasilievich Denisov, philosophy, Institute of Philosophy of the Academy of Sciences of the USSR (Moscow, USSR)
Martha Herbert, psychology and social theory, University of California at Santa Cruz
Philip V. Kargopoulos, philosophy, Brandeis University (Greek citizenship)
Kazimieras-Vatslovas Makarevitchius, philosophy of physics, Vilnius State Pedagogical Institute (Lithuanian SSR, USSR)
Richard M. Martin, philosophy and logic, Northwestern University (Illinois)
Debra Nails, philosophy, University of Kansas
John Norton, physics, University of New South Wales (Australia)
Horst Poldrack, philosophy, Karl Marx University of Leipzig (East Germany)
Wolf Schäfer, philosophy and sociology of science, Max-Planck-Institut for Sozialwissenschaften (Starnberg, West Germany)
Richard Sens, psychiatry/psychoanalytic theory, Boston Psychoanalytic Institute
Vardan Torosyan, philosophy, Yerevan Polytechnic Institute (Armenian SSR, USSR)
Joe D. VanZandt, philosophy, University of Kansas
Danilo Zolo, methodology of the social sciences, Istituto di Teoria e Storia del Diritto (Florence, Italy)

Physics Department Staff

Departmental Administrator	Alfred Stone
Administrative Assistant	Susan E. Savransky
Secretaries	Dorothy S. Duerr
	A. Helen Siegel (Administrative Senior)
	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.

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.

Graduate Committee	Booth (Chairman) Chasan Hellman Kirczenow Redner	Students Reed (Ast) Kellerman
Undergraduate Committee	Franzen (Chairman) Brooks Edmonds Epstein	
Graduate Admissions Committee	Rothschild (Chairman) Brooks Cohen Roberts	
Language	Corinaldesi Kirczenow (Co-Chairmen)	
Library	Corinaldesi	
Colloquium	Klein Miller (Co-Chairmen)	
Teaching Fellows	Chasan	
Comprehensive Committee	Hellman (Chairman) Miller Willis	
Photon Advisor	Epstein	
Honors	Franzen	
Bulletin Board	Corinaldesi	
Commonwealth Fund Representative	Chasan	

Faculty Search Committee	Stanley (Chairman) Booth Chasan Shimony Willis
Interdisciplinary Committee	Rothschild (Chairman) Cohen
Astronomy & Physics Representative	Willis
Science Curriculum Representative	Klein
Premedical Committee	Bansil Chasan (Co-Chairman)
International Student	Bansil
Safety	Miller
Research Facilities	Brooks Edmonds (Co-Chairmen)
New England APS Planning Committee	Franzen (Chairman) Brooks Kirczenow
Committee on Future of Theoretical Physics	Willis (Chairman) Epstein Hellman Klein Shimony
Dean S. Edmonds Sr. Lecture Com.	Cohen (Chairman) Booth Brooks Klein
Building Committee	Franzen (Chairman) Bansil Chasan Edmonds El-Batanouny Kolk Zimmerman Stone Miller
Merit/Equity Committee	Booth Shimony Willis
B. Chertok Lecture Committee	Booth Miller

COMMITTEE ASSIGNMENTS 1982--83

Graduate Com.

Booth, Chair
El-Batanouny
Epstein
Hellman
Klein

Liasion -- Astronomy and Physics - Chairman of Graduate Com.

Undergraduate Com.
Franzen, Chair
Chasan
Klein
Redner
Roberts

Photon Franzen

Honors Franzen

Interdisciplinary

Roberts, Chair
Brooks
Shimony
Willis

Science Curriculum
Klein

Admissions
Rothschild, Chair
Brooks
Cohen
Hellman

Language Corinaldesi, Kirczenow } Co-Chair

Library Corinaldesi

Bulletin Bd. Corinaldesi

Equity
Brooks
Chasan
Cohen
Epstein

Computer
El-Batanouny, Chair
Brooks
Kirczenow
Redner

Colloquium

Kirczenow, Miller } Co-Chair

Comprehensive

Hellman, Chair
Bansil
El-Batanouny
Kolk
Pi
Roberts
Redner
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

PHYSICS GRADUATE STUDENTS AND ADVISORS

STUDENTS	ADVISORS
Reina Wiafe-Akenten	Bansil
Iliopoulos Tieger	Booth
Kaprelian Naughton Samaratunga Szep Willings	Brooks
Huang Martini	El-Batanouny
Herlich Hoffman	Epstein
Austin Burdick	Franzen
Friedman Inabata Leonard Mustaki Schoenfeld	Hellman
Maithreyan	Kirczenow
Blue Heermann Lucena Unger	Klein
DiDonato Glinski Hall Quanrude	Kolk
Ma	Miller
deArcangelis	Redner
O'Brien	Roberts
Argarde Earnest Marrero Zagaeski	Rothschild
Fleming Kellerman Lenk Mirabelli	Shimony

STUDENTS	ADVISORS
Beland	Siegel
Chu	
Morrill	Stachel
Djordjevic	Stanley
Gawlinski	
Gonzalez-Flores	
Hong	
Majid	
Margolina	
Millman	Zimmerman
Solenberger	

Best Teaching Fellow Award

Kaprelian
Leonard

PHYSICS MAJORS AND ADVISORS

STUDENTS	ADVISORS
Gardner, Brian (Jr.) Walsh, Brian (Fr) Willson, Richard (Jr.)	Bansil
Beyer, David (Sr) Klaus, Michael (Sr) Phipps, David (Fr)	Brooks
Allen, David (Fr) deJesus, Stephen (So) Mosher, Robyn (So)	Chasan
Boesch, Rick (So) Reilly, Kevin (So) Williamson, Brent (Fr)	El-Batanouny
Monteiro, David (Fr) Summer, Lewis (Fr) Villareal, Jos. (Sr.)	Epstein
French, Paul (Jr.) Hakimi, Hosain (Sr) Herniter, Marc (Jr.) Kisler, Yana (Jr) Larrinese, Alfonso (So) Osterlund, Peter (So) Rettig, John (Jr) Richard, Jacques (So) Taitel, Janice (So)	Franzen
Braccio, Peter (Fr) Feldman, Geoffrey (So) Stafilakis, Stefanos (Fr)	Hellman
Adler, David (Sr) Davey, William (Fr) Longstaff, Thomas (Jr)	Kirczenow
Jessup, Kimberly (Fr) Lumetta, James (Jr) Russell, Donald (Fr)	Kolk
Dickinson, Suzanne (So) Palisca, Carl (Fr) Tharenos, Michael (Jr)	Miller

STUDENTS	ADVISORS
Bloom, Stephen (Sr)	Redner
Davis, Emery (Jr)	
Gata, Daramana (Sr)	
Hernandez, Margarita (Sr)	
Mueller, Paul (Sr)	
Melzak, Jeffrey (So)	Roberts
Rueth, Robert (Fr)	
Spence, Harlan (So)	
Wiggins, Graham (So)	Rothschild

List of Degree Recipients

Ph.D. Degree	Advisor
Pramod Argade	Rothschild
Augustin Gonzalez-Flores	Stanley
Rosemary Sanches	Rothschild
Robert Beland	Siegel
Byung Chu	Siegel
Andre Mirabelli	Shimony
Liacir Lucena	Klein

M.A. Degree in Physics	
Anthony DiDonato	Kolk
Dennis Fleming	Shimony
Hector Marrero	Rothschild
Mark Rebilas	Roberts
Francis O'Brien	Roberts
Joseph Szep	Brooks

B.A. Degree in Physics	
Steven Bloom	Redner
Hossain Hakimi	Franzen
Paul Mueller	Redner

B.A. Degree in Math. & Physics	
David Beyer	Brooks

B.A. Degree in Physics, Minor in Math	
Daramana Gata	Redner

B.A. Degree in Physics and Astronomy	
David S. Adler	Kirczenow

Courses Offered during the 1981--2 School Year

Semester I

Undergraduate

College	Course #	Course Title	Instructor	#Enrolled
CLA	PY 101	Physical Sciences	Edmonds	14
*CLA	PY 105	Elementary Physics	Booth	119
*MET	PY 105	Elementary Physics	Kirczenow	22
†CLA	PY 115	Phys. Life Science I	Hellman	107
*CLA	PY 181	Physics I (6Yr. Med)	Rothschild	47
*CLA	PY 211A1	General Physics I	Corinaldesi	212
*CLA	PY 211B1	General Physics I	Corinaldesi	126
*CLA	PY 212A1	General Physics II	Edmonds	134
*CLA	PY 212B1	General Physics II	Brooks	132
*CLA	PY 213	Elem. Modern Physics	El-Batanouny	69
CLA	PY 231	Physics in Musics	Roberts	21
CLA	PY 233	Energy	Chasan	11
*CLA	PY 251	Princ. of Physics I	Kolk	132
*CLA	PY 353	Vibration and Waves	Franzen	79
CLA	PY 403	Meth. Theor. Physics	Kirczenow	10
CLA	PY 405	El. Magn. Fld Waves	Redner	67
CLA	PY 421	Solid State	Brooks	16
CLA	PY 451	Quantum Physics I	Chasan	7
CLA	PY 491	D.S. for Srs.	Redner	3
				1328

* Lab + Disc. 1072

† Non Lab but Disc. 107

Graduate and Undergraduate

College	Course#	Course Title	Instructor	Enrolled
CLA	PY 503	Math. Physics I	Klein	18
CLA	PY 505	Class. Mechanics	Miller	11
CLA	PY 507	Quant. Mech. I	Epstein	11
CLA	PY 510	Electromag. II	Willis	7
CLA	PY 512	Stat. Phys.Therm. II	Bansil	4
CLA	PY 541	Adv. Lab	Franzen	13
UNI	LD 539	Science, Tech. & Soc.	Cohen	37
				101

Graduate

GRS	PY 705	Plasma Physics	Willis	7
GRS	PY 711	Adv. Quant. Theory I	Hellman	7
GRS	PY 713	Nucl. Physics	Epstein	9
GRS	PY 891	S. Ph. Found. Physics I	Cohen	2
GRS	PY 895H2	S. Sp. Top. Th. Physics I	Hellman	5
GRS	PY 901K2	Res. in Physics I	Kolk	1
GRS	PY 901R3	Res. in Physics I	Rothschild	1
GRS	PY 901Z1	Res. in Physics I	Zimmerman	1
GRS	PY 909B1	D.S. in Physics I	Bansil	1
GRS	PY 909K2	D.S. in Physics I	Kolk	2
GRS	PY 909R3	D.S. in Physics I	Rothschild	1
				37

Grand Total 1466

Courses Offered During the 1981-82 School Year

Semester II

Undergraduate

College	Course#	Course Title	Instructor	Enrolled
*CLA	PY 106	Elem. Physics II	Booth	98
*MET	PY 106	Elem. Physics II	Miller	20
†CLA	PY 118	Physics Life Science II	Hellman	85
CLA	PY 132	How Things Work	Edmonds	19
*CLA	PY 182	Physics II (6 Yr. Med)	Chasan	46
*CLA	PY 211A1	General Physics I	Brooks	223
*CLA	PY 211B1	General Physics I	Zimmerman	68
*CLA	PY 212A1	General Physics II	Corinaldesi	301
*CLA	PY 212B1	General Physics II	Corinaldesi	
*CLA	PY 213A1	Elem. Modern Physics	El-Batanouny	135
*CLA	PY 213B1	Elem. Modern Physics	El-Batanouny	
*CLA	PY 252	Principle of Physics II	Kolk	71
*CLA	PY 354	Modern Physics	Roberts	44
CLA	PY 402A1	Sr. Indep. Work	Redner	2
CLA	PY 406	Elem. Magn. Fld. & Waves	Redner	15
CLA	PY 408	Inter. Mech.	Franzen	13
CLA	PY 410	Therm/Stat. Phys.	Willis	8
CLA	PY 452	Quantum Physics II	Chasan	5
CLA	PY 492F1	D.S. Srs.	Franzen	1
CLA	PY 492B3	D.S. Srs.	Brooks	2
CLA	ID 124	Science and Religion	Cohen	38
				1194

* Lab & Disc. 1006

† Non Lab But Disc. 85

Graduate and Undergraduate

College	Course#	Course Title	Instructor	Enrolled
CLA	PY 504	Math. Physics II	Klein	4
CLA	PY 508	Quant. Mech. II	Epstein	8
CLA	PY 509	Electromagnetic I	Willis	11
CLA	PY 511	Stat. Physics/Therm. I	Bansil	7
CLA	PY 542	Adv. Lab	Franzen	4
				34

Graduate

GRS	PY 707	Stat. Mech.	Stanley	8
	712	Adv. Quant. Th.	Hellman	5
	714	Sol. St. Physics I	Kirczenow	8
	716	Intr. Energy Physics	Roberts/Miller/Epstein	5
	892S4	S. Ph. Found. Physics II	Shimony	2
	902K1	Res. in Physics	Klein	1
	902Z1	Res. in Physics	Zimmerman	1
	910B1	D.S. in Physics	Bansil	1
	910C1	D.S. in Physics	Chasan	1
	910H2	D.S. in Physics	Hellman	1
	910S4	D.S. in Physics	Shimony	1
				34

Grand Total 126

Summer Session Sem. I

CLA	PY 105S	Elem. Physics	Hellman	27
CLA	PY 211S	General Physics I	Corinaldesi	50
CLA	PY 213S	Elem. Modern Physics	El-Batanouny	9
				86

Summer Session Sem. II

CLA	PY 106S	Elem. Physics	Chasan	31
CLA	PY 212S	General Physics II	Chasan	56
				87

Publication List

Rama Bansil

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(with M. Gupta), "Effect of varying catalyst on polymerization of acrylamide", Polymer Preprints 22, [2] 375 (1981).

(with J. Wiafe-Akenten and J. Taaffe, "Raman Spectroscopy of Supercooled Water", J. Chem. Phys. 76, 2221 (1982).

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Edward C. Booth

(with J. Comuzzi, R. Becker, W.J. Burger, G.W. Dodson, J.P. Miller, R.P. Redwine, B.L. Roberts, D.R. Tieger), "Measurement of $^{12}C(\gamma,\pi^o)$ at E_γ=250MeV, Bull. Am. Phys. Soc. 27, 468 (1982).

(with J. Miller), "Nuclear Compton Scattering above the Pion Threshold", Future Directions in Electromagnetic Physics (1981).

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James S. Brooks

(with R. Meservey, P.M. Tedrow), "Tunneling Characteristics of Amorphous Si Barriers", J. Appl. Phys. 53, 1563 (1982).

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(with G.O. Zimmerman, J. Szep, R. Meservey and P.M. Tedrow) "Magnetic Resistance of Thin Bismuth Films", Bull. Am. Phys. Soc. 27, 218 (1982).

(with G.O. Zimmerman, R. Meservey and P.M. Tedrow) "Magnetic Force Measurements of Liquid Helium", Bull. Am. Phys. Soc., 27, 500 (1982).

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(with M. Klaus) "A Binary Gas Concentration Monitor" to be submitted to Rev. Sci. Instrum.

(with J. Szep) "An Interactive Computer Program Package for the Accurate Recording and Administration of Large Physical Science Classes", to be submitted.

(with D. Syphers and P.J. Stiles) "Observation of Non-Interger Hall Steps in Silicon MOSFET Devices at Low Temperatures and High Magnetic Fields" to be submitted.

(with M. Markiewicz) "Localization Effects in Ultra-thin Metallic Films", to be submitted.

(with G.O. Zimmerman, R. Meservey and P.M. Tedrow) "The High Field Magnetoresistance of Thin Bismuth Films at 4.2K to be submitted to Solid State Communications.

(with R.C. Samaratunga and G.O. Zimmerman) "High Field Nuclear Magnetic Resonance Measurements in Liquid Helium Three", to be submitted to Physics Letters. Paper to be presented at the May APS Meeting, Boston 1982.

(with S. Redner) "Experimental Tests of Predictions in Directed Percolation Networks", to be submitted. Paper to be presented at the May APS Meeting, Boston, 1982.

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(with N.R. Toon, and A.K. Solomon),"Effect of Thiourea on pCMBS Inhibition of Water Transport in Red Cells", Biophys J. 37 2 (1982) P 215a.

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Barbara Jensen

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Physics Colloquia

Organized by Profs. Klein and Miller

Sept. 16, 1981	J. Czerwonko: University of Wroclaw "Spin Polarized Fermi Liquids"
Oct. 7, 1981	M.H. Cohen: Exxon Laboratories "The Nature of the Glass Transition"
Oct. 14, 1981	F. Tabakin: University of Pittsburgh "Producing and Absorbing Pions in Nuclei"
Oct. 21, 1981	A. Litke: Stanford University and CERN "Are Free Quarks Produced in High Energy Electron Positron Collisions?"
Oct. 28, 1981	S.A. Safran: Exxon Laboratories "One Dimensional Super Lattices in Graphite Intercalation Compounds"
Nov. 4, 1981	M. Price: University of New Mexico "Physics of the Nuclei of Spiral Galaxies"
Nov. 18, 1981	D. Kleppner: M.I.T. "Inhibited Spontaneous Emission"
Dec. 2, 1981	Y. Yannas: M.I.T. "Design of an Artificial Skin"
Dec. 9, 1981	C.E. Carlson: William and Mary "Glueballs"
Dec. 16, 1981	P.Souder: Yale University "Parity Experiments Using Electron Accelerators"
Jan. 27, 1982	Prof. A. Shimony: Boston University "Status of Hidden Variable Theories"
Feb. 3, 1982	J. King: M.I.T. "New Views with the Molecule Microscope"
Feb. 10, 1982	Norman Mazer: M.I.T. "Sphere to Rod Transition in Micellar Systems"
Feb. 17, 1982	Dr. Jeeva Anandan: Dept. of Math., Univ. California, Berkeley "Testing General Relativity with Quantum Interference"
Feb. 24, 1982	Prof. A. Kleinfeld: Harvard University "Fluorescence Studies of Membrane Proteins"

Mar. 3, 1982 — Dr. S. Gottlieb: Fermilab
"Lattice Gauge Theories"

Mar. 17, 1982 — Prof. Walter Goldburg: Univ. of Pittsburgh
"Dynamics of Phase Separation Near the Critical Point"

Mar. 24, 1982 — Prof. Robert Savit, Inst. Theoretical Physics, Univ. California, Santa Barbara; University of Michigan
"Order and Chaos in Field Theory and Statistical Physics"

Apr. 21, 1982 — Prof. William M. Fairbank -- Dean S. Edmonds, Sr. Lecture
"The Experimental Observation of Charge 1/3 e on Matter"

June 23, 1981: seminar...E. T. Gawlinski
(Boston University)
"Continuum Percolation: Monte-Carlo and Renormalization Group Approaches"

July 8, 1981: seminar...Dr. Wolfgang Kinzel
(IFF KFA Julich, W. Germany)
"Directed Percolation"

July 22, 1981: seminar...Professor W. Klein
(Boston University)
"Percolation, Droplet Model and Spinodal Points"

July 27, 1981: seminar...Dr. George Williams
(Suny-Albany)
"Two Dimensional 'ANNNI' Model"

July 29, 1981: seminar...Professor S. Redner
(Boston University)
"Report on the 1981 Gordon Conference on Condensed Matter Theory"

July 29, 1981: seminar...A. Margolina
(Boston University)
"Report on the 1981 Gordon Conference on Condensed Matter Theory"

July 29, 1981: seminar...E. T. Gawlinski
(Boston University)
"Report on the 1981 Gordon Conference on Condensed Matter Theory"

July 29, 1981: seminar...Dr Alan Brown
(Boston University)
"Report on the 1981 Gordon Conference on Condensed Matter Theory"

August 5, 1981: seminar...Dr A. Gonzales
(Boston University)
"Report on the 1981 Gordon Conference on Ion-Containing Polymers"

August 6, 1981: seminar...Professor M. Gitterman
(Bar-Ilan University)
"Slow-Down of Chemical Reactions Near Critical Points"

August 7, 1981: seminar...Professor Ted Davis
(University of Minnesota)
"Transport and Mechanical Properties of Voronoi Random Composites"

August 12, 1981: seminar...Professor K. Binder
(Kernforschungsanlage in Julich, W. Germany)
"Dynamics of Dense Polymer Systems"

August 14, 1981: seminar...Professor J. Teixeira
(Laboratoire Physique Thermique, ESPCI Paris)
"Recent Research on Physics of Liquid Water"

August 17, 1981: seminar...Professor J. Wheeler
(University of California at San Diego)
"Equilibrium Polymerization as a Critical and Tricritical Phenomenon"

August 18, 1981: seminar...Professor J. Enderby
(University of Bristol)
"The Structure of Aqueous Solutions"

August 24, 1981: seminar...Professors J. Lajzerowicz and M. Vallade
(Laboratoire de Spectrometrie Physique, Grenoble)
"The Roughening Transition: Long Range Forces and Inhomogeneous Materials"

August 26, 1981: seminar...Z. Diordjevic
(Boston University)
"Report on the 1981 Gordon Conference on the Physics of Liquids"

September 11, 1981: seminar...Professor R. Hornreich
(Weizmann Institute, Rehovoth)
"The Blue Phase in Liquids Crystals"

September 14, 1981: seminar...Dr. R. B. Swendsen
(I.B.M. Zurich)
"Monte Carlo Renormalization Group in Momentum Space"

September 16, 1981: colloquim...Professor J. Czerwonko
(University of Warsaw)
"Spin Polarized Fermi Liquids"

September 25, 1981: seminar...Dr. A. Kretchmar
(Paris)
"Percolation and Porous Media with Applications to Soils"

September 28, 1981: seminar...Professor D. Abraham
(Oxford University)
"The Nature of the Roughening Transition: Some Exact Results"

October 9, 1981: seminar...Professor Antonio Coniglio
(Univ. Napoli)
"Pedagogical/Research Seminar"

October 5, 1981: colloquium...Professor Morrell Cohen
(EXXON Labs)
"Nature of the Glass Transition"

October 30, 1981: seminar...Dr. Dale Schaeffer
(Sandia Laboratories)
"Characterization of polymers and gels from intermediate angle x-ray scattering"

November 16, 1981: seminar...Professor Sidney Redner
(Center for Polymer Studies)
"Directed Percolation"

December 21, 1981: seminar...Professor Harry Frisch
(SUNY/Albany)
"Order-disorder transitions in DNA solutions studied by equilibrium sedimentation methods"

January 6, 1982: seminar...Professor Thomas Garel
(University of Paris, Orsay)
"2-fluid picture of spin glasses"

January 11, 1982: seminar...Professor Ikuo Ono
(Tokyo Institute of Technology)
"Recent work on the physics of random media"

January 22, 1982: seminar...Professor Per Bak
(University of Copenhagen)
"Devil's staircase and solitons"

February 26, 1982: seminar...Professor Gerry Manning
(Rutgers University)
"Polyelectrolyte theory with application to biopolymers"

March 1, 1982: seminar...Dr. Alan C. Brown
(Boston University)
"Operator algebra II (or, 'what Kadanoff meant')"

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)
"xxx"

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)
"xxx"

BUCPHS - Director, Robert S. Cohen

Boston Colloquium for the Philosophy of Science.
The following colloquia were of direct relevance to the Department of Physics.

Nov. 24, 1981 — C.F. v. Weizsacker, Physics & Philosophy, Max-Planck-Institut für Sozialwissenschaften, Starnberg
"The Unity of Physics"

Commentator: John Stachel, Physics B.U. and Institute for Advanced Study, Princeton

Chair: Marx W. Wartofsky

Dec. 15, 1981 — Cyril Stanley Smith, Metallurgy and History of Science, M.I.T.
"The Quincunxial Resolution of Lattice Imperfections: A Universal Metaphor?"

Commentator: F.J. Zucker, System Theory and Philosophy, KGHW Research and Development Associates, Belmont

Chair: Joseph Agassi

Jan. 19, 1982 — Thomas S. Kuhn, Philosophy & History of Science, M.I.T.
"What Are Scientific Revolutions?"

Commentator: Joe D. Van Zandt, Philosophy of Science, University of Kansas and B.U. Center

Chair: Robert S. Cohen

Feb. 9, 1982 — S.S. Schweber, Physics, Brandeis University
"Some Notes for a History of Quantum Field Theory: 1940-1950"

Commentator: Peter Galison, History of Physics, Harvard University

Chair: Abner Shimony

Feb. 16, 1982 — Derek De Solla Price, History of Science, Yale University
"Scientific Instruments As Artificial Revelation"

Commentator: Robert S. Cohen, Physics and Philosophy, B.U.

Chair: Marx W. Wartofsky

Feb. 23, 1982 — Henry Krips, History and Philosophy of Science, Univ. of Melbourne
"Is A Realist Interpretation of Quantum Theory Possible?"

Commentator: Abner Shimony, Physics & Philosophy, B.U.

Chair: Robert S. Cohen

Apr. 20, 1982 — Roberto Torretti, Philosophy, University of Puerto Rico
"Formal Versus Efficient Causation In General Relativity"

Commentator: John Stachel, Physics, B.U. and Inst. for Advanced Study, Princton

Chair: Kenneth Brecher

Apr. 23, 1982 — At the American Academy House, Cambridge
Symposium: Centenary of P.W. Bridgman (In association with the American Academy of Arts and Sciences)

"Thermodynamics, Geophysics, and Physics at High Pressures"

Chair: Gerald J. Holton

Apr. 24, 1982 At Boston University, GSU 314
Symposium: Centenary of P.W. Bridgman (In association with the American Academy of Arts and Sciences)

"Operationalism and Philosophy of Science"

Chair: Robert S. Cohen

Report of the Graduate Committee in Physics by E. Booth, Chair

The Graduate Committee consisted of Professors Hughes (Astronomy), Hellman, Redner, Chasan, Kirczenow and Booth (Chair). Students were Reed (Astronomy)and Kellerman .

1. Advanced Laboratory. This is a perennial topic. This year the question revolved about whether or not the Advanced Lab requirement should be strictly adhered to or whether we would continue to leave open other channels, ranging from an excuse from Advanced Lab because of previous work to a substitution of research with a Faculty member for the available experiments. This year the Advanced Lab is newly under the control of W. Franzen who presented a detailed report of its status to the Committee. Franzen felt that the experiments were badly in need of improvement, a task which would be largely completed by September 1982. In the 1981--82 school year he did not wish to undertake the partial supervision of students doing work in research laboratories. As a result, a number of students (3 or 4) were excused from Advanced Laboratories after presenting formal petitions to the Committee describing the work to be done.

   This leaves the question of Advanced Laboratory requirement for next Fall. A well run and well furnished laboratory should be available, warranting the requirement. On the other hand, early research experience may indeed be an appropriate substitute. It is a philosophical question which will be debated in the Fall.

2) Ph.D. in Cellular Biophysics. The program for a Ph.D. in cellular biophysics was presented by Ken Rothschild in two sessions. This new program involving the Departments of Physics, Physiology and the Biophysics Institute at the Medical School is now working its way through University committees. Our Committee tried to make constructive suggestions feeling that the program would have the benefit of strengthening the Biophysics component of our Department and might increase the number of students in our physics courses.

3) Extended Syllabi. An attempt was made to improve our program coherence and to provide "truth in advertising" by asking faculty to give extended descriptions of our 500 level courses. These courses are the core of our M.A. program and are prerequisites for the 700 level courses, where complaints are sometimes made about holes in the preparation of students. The response to this request was incomplete. We will try again next fall.

4) Graduate Committee Powers. The Faculty was asked by the Committee to give power to the Committee to approve petitions. This was granted.

5) Applied Physics Ph.D. The Committee reviewed the proposed Ph.D. in Applied Physics which had been written during the summer of 1981. Various revisions were made and incorporated. The final proposal was made available for comment to the Faculty, which had previously voted to accept it in principle. No comments were made, which the Committee took to be approval in detail. The fate of the Program is unclear, since it was not approved in the May meeting of the CLA Faculty, being held up by the APC for clarification.* (See letter from Dean Carroll at end of this report.) (Considerable work on the Ph.D. for Engineering was done by the Chairman. That program was approved.)

6) Ph.D. Data and Reunion. The Committee (via its Chairman) undertook to upgrade its information on former Ph.D. and M.A. graduates. This project is now complete after a two year period. The information is in the Computer File in the Alumni Office.

In that connection, a Reunion was held with about 18 graduates attending on December 5, 1981, despite a sudden snowstorm. Some of those present expressed interest in a directory of our graduates. The Newsletter and a set of abstracts from that reunion - conference have to be generated and distributed this Summer.

To: George Zimmerman, Chairman, Department of Physics May 21, 1982

From: William Carroll, Associate Dean *William Carroll*

The Academic Policy Committee asked me to relate its comments on the proposed Ph.D. in Applied Physics your department has submitted. The APC was totally supportive of the proposal in its broad outlines, but expressed concern over its inconsistency, in a few minor, technical areas, with the governance structure created within the Division of Engineering and Applied Science. Given the correction of these minor points, the APC will undoubtedly approve the Ph.D. in Applied Physics with dispatch.

In brief, the APC felt that your proposal did not everywhere reflect the real and bureaucratic difference between the department of Physics and the Division which would actually be granting the Ph.D. in Applied Physics. For example, on p. 2 of your proposal, under the heading "Committee," the phrasing is vague: "A committee will be established consisting of one person from each discipline etc." Not only does the passive verb construction conceal who will be doing the establishing and approving (it will necessarily be the Division, not the department, though the department's approval or disapproval would of course be paramount), but the entire description is slightly at odds with the formulation of dissertation committee approval as outlined in the Division of Engineering and Applied Science proposal. It is this kind of inconsistency which the APC noted. Since the Division proposal has been slightly re-written since you submitted the Applied Physics proposal, it may be that there are now other minor differences which the APC did not note originally. My suggestion, then, is simply that you compare the Division proposal which the CLA/GRS faculty passed with your Applied Physics proposal, and resolve whatever discrepancies there are. The Division language should take precedence in most cases.

There were no substantive criticisms of the Applied Physics Ph.D. proposal, but these questions of process and structure are nevertheless immensely important, as I know you'll recognize.

cc Professor Sidney Burrell, Chairman, Academic Policy Committee
Professor Ralph D'Agostino, Chairman of Engineering Ph.D. Committee

Report of the Comprehensive Examination Committee (W. Hellman, Chair)

The written comprehensive examination was given twice during the 1981-82 academic year. The first time on Jan. 22 and Jan. 25, the second time on May 5 and May 7.

Six physics students took the exam in January with the following results:

One received a pass with honors, three received a pass and two did not pass.

Six physics students took the exam in May with the following results:

Two received grades of pass with honors, two received a pass, two did not pass.

Thus out of a total of eleven distinct students taking the exam during the year we had three high passes, four passes and four failures. This goes on a percentage basis 27% High Pass, 36.5% Pass and 36.5% Failure.

Some features of interest are:

a) The high pass candidates were all students who have recently entered our program from other countries with advanced standing.

b) Most students who enter our program from the outside with no previous graduate training in physics are not successful in passing the examination with honors in an attempt before two years here at Boston University.

There is general agreement in the Physics Department that a serious discussion should take place with respect to our written comprehensive examination procedures such as advising students concerning when to take the examination and monitoring the student's preparation for the examination. I hope such discussions will take place without delay.

Minutes and Faculty Discussion and Actions (Graduate Affairs)

Sept. 8, 1981 Graduate Committee Meeting. Attending: Zimmerman, Hellman, Chasan, Redner, Booth.

The Com. considered a student petition to accept PY 895 "Methods of Quantum Field Theory in Statistical Mechanics" as counting toward the 16 course requirement. The general rule is that no courses above the 850 number are counted; but in this case PY 895 is merely the second term of a 700 level course. The petition was granted for the academic year 81-82.

The next meeting, to consider the Ph.D. in Applied Physics, is 4 P.M., Tuesday, Sept. 15 in Room 239.

As usual any Faculty member wishing to do so is invited to attend this meeting.

Sept. 3, 1981 To: Advisors of Incoming Graduate Students
From: Booth, Zimmerman
Re: Courses

In advising new students please keep in mind the following:

1. We now encourage 3 courses each semester under the guise of 4-2.
2. The Comp. exam is now given twice a year (Jan. & May). This incoming class is expected to take it for the first time in Jan. 1982. The comps may be taken in the first year without penalty.
3. A model of courses to take is

Sem. I		Sem. II	
Class Mech.	PY 505	E & M I	PY 509
Quant. Mech.I	PY 507	Quant. II	PY 508
Math Physics	PY 503	Stat Mech. & Therm.	PY 512

Sem. III		
E & M II	PY 510	C
2 electives eg.	PY 711	O
Adv. QM		M
The new Therm. course	PY 511	P
etc.		S

Sept. 8, 1981 Booth gave a report on the status of a committee and a tentative proposal from this department. The Committee is one appointed by Dean Mendillo to plan a division of ENG and Applied Science within the Graduate School so that ENG can offer a Ph.D. and the Science Departments can offer degrees in Applied Science. The proposal which was put together in haste without consultation with the entire Ph.D. Faculty for a degree in Applied Physics was distributed by Booth and although some of the particulars were discussed and objected to, the project itself received a unanimous vote of encouragement. The project is aimed at developing a quality Ph.D. in Applied Physics and the strengthening of this University's ties with industry. This matter will now go before the Graduate Com. of the Dept. and then brought back to the faculty.

A petition was submitted by several students requesting that the course GRS PY 895 H2 which is a course in Field Theory given by Hellman be counted as fulfilling the graduate 700 to 850 course requirement. After a brief debate, the faculty authorized the Graduate Com. to rule in this matter. Subsequent to the meeting, the Graduate Com. met with Kirczenow, Redner, Chasan, Booth, Hellman and Zimmerman attending and approved the request.

Oct. 30, 1981

To: Mr. Michael Naughton, Physics Graduate Representative
From: Prof. G.O. Zimmerman, Chairman

This is to officially inform you that the Physics Dept. voted to allow a student representative to attend our faculty meetings with the understanding that if some subjects come up for discussion, we may ask the representative to absent himself from the meetings. Since this is a first and we have to see how things work out, we shall do this on a trial basis for the present academic year to be continued if things work out satisfactorily. Please have one or two observers nominated by the students (only 1 should attend at a time because of lack of space). Our meetings take place on Tuesdays at 12:30 and faculty bring brown bag lunches.

Please let me know when and who will attend.

To: Prof. Booth, Chairman, Graduate Com.
From: G.O. Zimmerman, Chairman

This is to let you know that the Graduate Student Association has selected Juan Carlos Reina and Peter Kellerman to be representatives to the Graduate Com. Please notify them of any Grad. Com. meetings in the future.

Sept. 22, 1981

A discussion of a course to be given for our T.F.'s to improve their teaching skills took place. The faculty then approved the following:

"That it approves giving such a course in principle.

This course should be an average of one hour per week concentrated at the beginning of the semester. First year T.F.'s should be required to take the course. Other T.F.'s will be advised to take it on an individual basis."

Subsequently the faculty voted its sentiment to advise the Chairman to approach Prof. Haber-Schaim to organize such a course with faculty input.

See appendix for course description.

Sept. 15, 1981

Members of the Grad. Com. Meeting. Attending: Hellman, Chasan, Redner, Kirczenow, Booth

1. The application by L. Benes for a third try at the written comprehensives was discussed. The two previous attempts resulted in failures. Benes already has a M.A. degree from another University. The final vote was 3 for approval, 1 opposed, and 1 abstaining. The recommendation for approval is referred to the Faculty for action.

2. The Ph.D. program in Applied Physics was discussed. Concern was expressed that we write in safeguards against the possibility that we accept Ph.D. students who expect to work in areas where we have no expertise. A pre-test was suggested as part of the admissions procedure, especially for students returning to academic life after a long period of time. A high pass was recommended on the written comprehensives as a qualification for the program. The use of non-B.U. experts on thesis defense committees was suggested and is recommended as needed.

   The problem of proprietary secrecy in applied research linked to industry was raised. We must conform to University policy.

   A revised edition of the original "Catalogue Copy" written by Booth will be submitted to the Faculty within a week or two.

Sept. 22, 1981 Memo to Physics Faculty
From: Ed Booth, Grad. Com. Chairman
Subject: Grad. Com. Powers

The Grad. Com. normally acts as a committee empowered only to advise the Physics Faculty on a wide range of subjects from student morale through curriculum design and requirements for graduation.

There are some few items normally handled with power to act by the Grad. Com., or even by the Chairman of the Committee during vacation periods. These include petitions to extend the oral exam date, petitions to avoid course requirements when these are fulfilled in other ways (especially Adv. Lab) and petitions to substitute seminar coursesfor 700 level courses as part of the course requirements. Recently, a petition to permit a third try at the Comp. Exam was presented to the Department Chairman, who referred it to the Com. Without specific authorization to act in this case with power, the Com. could only vote and refer it back to the Faculty.

The Grad. Com. Chairman (Booth) respectfully requests authorization to act in the categories mentioned above and invites suggestions from the Faculty of other categories for action. This will relieve congestion at the full Faculty meetings.

Sept. 29, 1981 Report on Faculty meeting of Sept. 29.

The faculty approved the motion that the Grad. Com. and the Undergraduate Com. can act on petitions without bringing those back to the faculty. If the committee deems the petition extraordinary, they may invite the Dept. Chairman to participate in the deliberations and he may then bring the matter up at a faculty meeting. The vote was 12 for with two absentions. (The matter of Benes was then returned back to the Grad. Com.)

Oct. 13, 1981 It was decided to start the T.F. course in Jan.

Oct. 20, 1981 Minutes. Attending: Hellman, Zimmerman, Hughes, Reed, Redner, Brooks.

1. On a vote of 4--2, the petition of L. Benes to take the written comprehensive for the third time was approved. The necessary paper work is being done by Prof. Zimmerman.

2. Petitions were made by Naughton and Unger to work with Brooks and Bansil respectively in lieu of the Adv. Lab (PY 541,542) requirement. In view of the past lab experience and the proposed experimental work, the Com. approved both petitions. A directed study course will be substituted. A similar petition by Reina was presented but the decision was deferred awaiting a fuller description of the proposed work.

3. The perennial suggestion to create a regular coffee hour was made and apparently is doomed to founder on the usual three obstacles: no room, no coffee, and many schedule conflicts. (The last is only a problem if regular talks are planned.) Too bad.

4. The subject of the M.A. thesis requirement was discussed. In keeping with former practice, it is recommended by the Com. that there be an oral defense of the M.A. thesis before a committee of at least three faculty members. As usual, the committee chairperson must not be the first reader of the thesis. This recommendation will be brought to the faculty for a vote. If approved, the rule will be written into the Catalogue and Rules for Graduate Students, which now make no mention of such a practice.

5. It is hoped that by the next meeting there will be a graduate student representative from Physics. At this moment there are no agenda topics awaiting consideration.

11/3/81 Several items from the report of the Graduate Committee meeting of Oct. 20 were presented by Booth. The one requiring a vote was the reinstitution of an oral defense for the M.A. thesis. Item 4 of the Grad. Com. report - "The subject of the M.A. thesis requirement was discussed. In keeping with former practice, it is recommended by the Com. that there be an oral defense of the M.A. thesis before a committee of at least three faculty members. As usual, the committee chairperson must not be the first reader of the thesis. This recommendation will be brought to the faculty for a vote. If approved, the rule will be written into the Catalogue and Rules for Graduate Students, which now make no mention of such a practice." This was adopted unanimously by the Physics Dept. faculty.

11/16/81 Memo to Grad. Com. and Interested Faculty
From: E. Booth, Grad. Com. Chairman
Subject: Advanced Lab.

This year there are a considerable number of petitions from Graduate students to be excused from Advanced Lab. This lab is now taught by W. Franzen who is rebuilding it according to his concepts, as is usual with new management. The question arises as to whether we want to require the lab of graduate students in light of the rules now on the books, shown below. Do we still believe in these rules?

There are various options for Advanced Laboratory, PY 541,542:

1. The student carries out several experiments considered to be classical; that is, they have been done before. These include choices from Atomic, Nuclear, Low Temperature and Solid State Physics. In some cases, development of experiments is undertaken.
2. Work on a research project with one of the experimental groups either in Physics or Astronomy.
3. Development and redesign of experiments for undergraduate laboratories.
4. Projects in experimental Physics and Observational Astronomy which are not necessarily basic research.

In all of these cases the project is directed by a faculty member or research associate. It is undertaken on the approval of the Adv. Lab Instructor who assigns the grade in consultation with his/her colleague. A final oral exam is appropriate.

Nov. 17,1981

To: Ed Booth and Graduate Com.
From: Wolf Franzen
Subject: Advanced Laboratory

We have in our building a so-called Advanced Laboratory, a traditional part of the physics curriculum in most major Physics Departments. It was originally built up by me about 20 years ago with the aid of a sizeable grant from the NSF. (Another grant for the lab was obtained by George Zimmerman about 10 years ago.) The Lab had experiments, either set up or in the process of being set up (see comment below on Sept. '81 condition of Lab) on X-ray diffraction (powder or rotating crystal), NMR, angular correlatio of annihilation radiation, the black-body spectrum, Mössbauer Effect Superconductivity (Squid), Hall Effect, holography, Zeeman Effect in atomic Spectrum (mercury), Fourier transform spectroscopy and velocity of light. (Next year, we intend to revive an old mass spectrometer and set up an experiment on optical pumping of rubidium vapor.)

Now for the bad news: When I first walked into the Lab in Sept., I encountered a disaster scene. There were only 4 working experiments; the others were in various states of disrepair, or they had been cannibalized (pieces of apparatus had been moved into research labs). In one case (the Mössbauer experiment, that was set up ten years ago with NSF money) had been moved bodily into a research lab. (After a long argument, I was able to get it back. However, it is still not in working condition.) I found that the X-ray tube was broken; the holography experiment had pieces missing, the black body experiment was inoperative, etc.

Furthermore, the laboratory rooms themselves were filthy, there were two broken windows, two inoperative air conditioners, and the cabinet and floor space were filled with a lot of surplus junk. Many experiments had no instructions written up for them; no wonder that students in droves have been petitioning

to get out of the lab --both graduate and undergraduate students. The students that I talked to in the past told me that they were frustrated because the attitude of the instructor was to let them loose on a non-working experiment, without adequate guidance, and let them flounder for a semester in what they perceived as an educational slum. Since Sept., my T.F., Karl Martini, and I have cleaned up the lab and have been working hard to bring as many experiments as possible back into operation.

I believe that the condition of the lab as I found it in Sept. is a direct result of the educational philosophy reflected in the present lab requirement for graduate students, as written up in the Formal Requirements Pamphlet. We have been encouraging students not to take the Lab, substituting for the Lab requirement an entirely different pedagogical experience, valid for other reasons, but in no way equivalent to the experience of repeating some of the classical experiments in modern physics with well-working equipment.

11/17/81 Minutes of Graduate Committee Meeting. Attending: Reed (Astronomy), Chasan, Redner, Reina, Kellerman, Kirczenow, Booth.

1. M. Zagaeski, J. Reina, and F. O'Brien petitioned to have the Adv. Lab requirement waved. All petitions were approved.
2. The Format of the Adv. Lab was discussed, including the various options outlined in our Information for Graduate Students. No changes in the Format were recommended. A letter from W. Franzen was read describing the improvements in progress in the lab. The Com. believes that more students will be attracted to the Lab next year when it is in first class condition.
3. The problem of insuring a certain minimum course content in our 500 level courses was discussed. Since these have to be rather closely tailored to cover a broad range of physics before the student takes the Written Comprehensives, the program suffers if the course does not approximately follow the catalogue syllabus. The catalogue syllabus is very brief and sketchy, which gives some problems to the instructor, to the student, and to the person teaching the following course as they try to see what should be assumed as known. The Committee proposes to the Faculty that a set of course descriptions be written by interested people which describe a core which is necessary to cover, with possible additional topics, useful texts, and a list of prerequisites by topic (not just a course number). This would cover perhaps one page and should include a catalogue description. Such brief syllabi would serve as a guide to teachers and students, and might nudge instruction into greater coherence without damaging the academic freedom of the instructor. This will be proposed in the Tuesday lunch meeting.
4. In view of the Faculty interest in teaching loads, we would like to propose that some objective information be obtained on loads at other institutions. One of us will call the AIP but we suggest that a work-study student be given the title Research Assistant (someone who helps us do research) and that they be be asked to contact a long list of Dept. Secretaries in order to obtain some idea of the data or to find out how hard it is to get the data.

Nov. 24, 1981 Report of Faculty meeting.

1. The Graduate Com. report was given by Booth.

   a. Items 1 & 2 regarding petitions and the Adv. Lab format were accepted by the faculty.

   b. After a brief discussion of Item 3 which concerned the issuance of a questionnaire and the keeping of records of the course content of 500 level courses, the faculty voted to adopt such a questionnaire for both graduate and undergraduate courses. There was one abstention in that vote. The graduate part will be handled by the Graduate Com. while the undergraduate part will be handled by the Chairman's office. Any assignments and handouts in course will also be kept on file.

   c. In order to ascertain whether our teaching loads are excessive, the committee recommended that a survey be made of teaching loads in other physics departments. The Chairman volunteered to call other chairmen in order to get an honest estimate of teaching loads.

2. To: All Graduate students and faculty
   From: Prof. Hellman

   The written Comprehensive Exam will be given on:
   Friday, Jan. 22 Rm. 167 10:00 A.M. - 2:00 P.M.
   Monday, Jan. 25 Rm. 167 10:00 A.M. - 2:00 P.M.

Jan. 25, 1982 To: Faculty
From: G.O. Zimmerman

As discussed in a preliminary fashion at our last faculty meeting, the sentiment was to have a comprehensive committee made up of 6 to 8 faculty members. I would like to suggest the following as the Comprehensive Committee for the May exam.

Profs. Hellman, Chairman; Edmonds, El-Batanouny, Epstein, Kirczenow, Klein, Miller, Shimony.

Feb. 2, 1982 To: 1st and 2nd year Graduate Students
From: G.O. Zimmerman, Chairman

You are strongly urged to attend the course GRS PY 900 -- Teaching of Physics, which takes place every Monday 10--11 and every Tuesday 1—2 in PHY 232. There are some useful skills to be learned and we need to vastly improve our efficiency as well as our skills in the teaching of physics.

The course was scheduled so as not to coincide with any of your classes or lab or discussion sections.

March 16, 1982 To: All Physics Faculty and Students
From: E. Booth, Chairman, Graduate Committee
Subject: Proposed Ph.D.'s in Applied Physics, Engineering and Chemistry

A proposal has been generated to create a new division of the Graduate School which will give degrees named above.

The proposal will soon come to a vote in the CLA and Graduate Faculties.

A copy of the complete document is held by the secretaries and may be checked out for perusal. Please make any comment you like on the sheet attached to the proposal.

See appendix for detailed description.

April 20, 1982 To: Faculty and Graduate Students
From: Comprehensive Examination Committee

We have had a request from the Astronomy Department to amend the comprehensive examination schedule. The following dates supercede those announced earlier:

Wed. 5/5/82 10 A.M. — 2 P.M.
Fri. 5/7/82 10 A.M. -- 2 P.M.

May 4, 1982 After a brief discussion, the Ph.D. program in cellular biophysics was approved by a vote of 15 to 0.

See appendix for full description.

Things to do for next year

1. Collect all dissertations for availability in the library.
2. Make up rules for the satisfaction of Incomplete grades.
3. Obtain course syllabi.

Miscellaneous

2 of our graduate students received honors this year. Mr. Christopher Unger received a University Graduate Fellowship; Mr. Steven Millman received the A.I.P. Industrial Fellowship.

The co-winners of the Best Teaching Fellowship were Mr. Zaven Kaprelian and Mr. Charles Leonard.

Report of the Undergraduate Studies Committee (W. Franzen, Chair)

Several important issues came up during the year.

1) In the fall of 1981, the Astronomy Department proposed abolition of the joint major program in physics and astronomy.

   Their proposal was based on the observation that practically all straight astronomy concentrators tended to switch to the joint degree program, which they could do with relatively minor changes in their curriculum. As a result, the Astronomy Department was left devoid of majors at graduation time. In response to this proposal, the two Departments negotiated a new joint degree program, now to be called Astronomy and Physics, with considerably more stringent requirements than called for in the old program. The new program was approved by the CLA faculty in the fall of 1981.

2) Another concern was the joint program between Physics and Engineering under the rubric BUCOP. Although this program is described in the catalogue as involving simultaneous enrolment in the College of Engineering and the College of Liberal Arts, it is not in fact administered as a joint program. The students retain a "home-college", and they are not eligible for honors, awards, dean's list, distinction projects, etc., in the second college. Their names never appear in the second college's statistics.

   We were concerned about this situation because some of the best students in the College of Engineering (including several trustee scholars) have either entered BUCOP (with physics as the CLA field of concentration), or have expressed a desire to do so. They are usually not able to enrol in our Distinction program nor to participate in other ways in our activities, if their "home college" is Engineering. As a result of our expression of concern, the administration of BUCOP has been changed in a number of minor respects.

3) The Undergraduate Committee also became aware of problems connected with the laboratories in several of our large introductory courses, particularly PY 211, 212. These problems are a result of the explosive increase in enrolment in the College of Engineering, and therefore in our introductory courses, in recent years. We have not been able to digest the new population entirely and to make appropriate adjustments in our procedures, equipment, and so on. We intend to deal with these problems during the next academic year.

Photon (Undergraduate Physics Club) Report - G.N. Epstein

The Physics Club maintained its customary high level of activity this past academic year. Activities included evening lectures by Professors Chasan, Brooks and El-Batanouny on biophysics and solid state physics, a tour of AVCO Corporation facilities, film showings and the usual mix of social outings which included several dinners which were supported most generously by Professor Edmonds, in addition to the year end student-faculty dinner.

In the second year of the existence of the new Sigma Pi Sigma Chapter, three new members were elected: Yanina Kisler, James Lumetta and David Beyer.

Officers	1981--82	1982--83
President	P. Mueller	J. Rettig
Vice President	D. Gata	Y. Kisler
Treasurer	T. Longstaff	T. Longstaff
Secretary	J. Rettig	J. Taitel

Faculty Actions and Committee Reports (Undergraduate Affairs)

The Committee on Curriculum and Academic Policies of the Faculty Council requested a report on the status of the BA/MS program in Physics and Science Writing. Zimmerman and Franzen met with the Chairman of the Science Writing Program at SPC who expressed great interest in continuing the program. Subsequently there was no follow through and no students joined the program. The question as to whether to continue the program should be taken up next year.

9/15/81 The discussion on the Astronomy Department's request to abolish the Physics and Astronomy major was reviewed. It was concluded that the Physics Dept. would be opposed to such a move on various grounds including the deprivation of students of such a choice. The Department suggested that instead of Prof. Papagiannis talking to the whole faculty, Profs. Franzen, Willis and Zimmerman meet with the Astronomy faculty and in case there is still an impasse, one submit this to a higher arbitration board, either the Dean or the Curriculum Committee.

Joint Concentration in Physics and Astronomy (1955) (Present description)
Advisers Booth (Physics), Kamp (Astronomy)

Principal Courses: CLA AS 201, 311, 312, two 500--level astronomy courses from CLA AS 500, 501, 503, 507, 509; CLA PY 251, 252, 353, 354, 403, 405, 406, 408; CLA MA 123, 124 (or both replaced by CLA MA 127), CLA MA 225 and 226.

The grade point average in the principal courses should be at least 2.0.

Recommended: CLA AS 403, 410, and any additional astronomy courses from CLA AS 500, 501, 503, 507, 509; CLA PY 451, 452, 541; CLA MA 561, 562. Students who plan to enter graduate school should take at least three of the recommended courses.

9/25/81 To: Members of the Undergraduate Committee
From: Prof. Franzen
Subject: New Physics/Astronomy Concentration: Meeting Tues. 9/29 noon.

After a long debate, the Astronomy Dept. has agreed to a new joint concentration with Physics. George Zimmerman has asked us to have a meeting to approve the new requirement, so that we can present them to the Dept. next Tuesday. Since the Astronomy Dept. will not have their proposal ready before 10 AM Tuesday, our only recourse is to have a brief meeting just before the Faculty meeting, at 12:00 noon, Tues., Sept. 29. Please come on time.

9/29/81 Report on Faculty meeting. The faculty approved the motion that the Graduate Committee and the Undergraduate Committee can act on petitions without bring those back to the faculty. If the committee deems the petition extraordinary, they may invite the Departmental Chairman to participate in the deliberations and he may then bring the matter up at a faculty meeting. The vote was 12 for with two abstentions. (The matter of Benes was then returned back to the Graduate Committee.)

The modification of the Physics and Astronomy major as discussed at a joint committee of Physics and Astronomy and then approved by the Astronomy Dept.,was approved by the Physics Dept. The new major will be called Astronomy and Physics with the following requirements:

MA 123, 124 (or both replaced by 127), 225, 226
AS 201, 204, 311, 312, 500
AS 541 or PY 541 (lab course)
PY 251, 252, 353, 354, 403, 405, 408, 410, 451

Recommended:

AS 503, 507, 509
PY 406, 452
MA 561, 562
Approved by CLA Faculty 11/18/81.

10/30/81 To: All Teaching Fellows
From: Prof. G.O. Zimmerman, Chairman

We would like to launch the course for Teaching Fellows to improve their teaching methods and skills at the beginning of the second semester. Prof. Haber--Schaim will be in charge of this course. In preparation, he would like to be able to observe some of your discussion sections and labs.

This is to notify you that he might be visiting your classes sometime during this semester.

11/2/81 To: Faculty
From: G.O. Zimmerman

Those of you who teach courses with laboratories might see a need for further equipment for the labs. If you see any needs for undergraduate labs, equipment to either add to existing experiments or else to start new experiments, please give a list of the equipment and prices to Al Stone since there might be again some money available for new purchases.

11/10/81 It was suggested at the Faculty meeting that our populous courses, CLA PY 105, 106, 211, 212, 213, 251, 252, 353, 354, 181, 182 change their registration procedures so that students sign up only for lecture and unassigned discussion and laboratory sections and faculty then assigning the particular discussions and laboratories. Since this is the current practice, this proposal received universal acclaim. (PY 115, 118 is also included in above courses.)

12/8/81 George Zimmerman announced that he has received from the Dean's office detailed set of enrollment and cross registration trends for CLA and for the Physics Dept. Those trends show a decrease of approximately 900 credit hours taught to CLA students taking physics from 1974-75 to 1980--81. Similar percentage decreases took place in physics enrollments from other colleges. Those decreases were more than made up by the increases in the enrollments from ENG.

The Undergraduate Com. should now start considering strategies by means of which we can attract CLA students into our courses. Also, any reasons the faculty can think of for the decline should be communicated to the Chairman so that he can transmit them to the Dean. Some of the reasons already stated were the decline in the premed population, shifting of resources to staff the increases in enrollments of Engineering students and thus neglecting some of our physics courses for liberal arts students such as "How Things Work", "Energy" and others. Another reason is that some of the ID courses taught by our faculty do not appear in our accounting.

Please communicate any other ideas to the Chairman.

12/11/81 To: Faculty
From: G.O. Zimmerman

This is to follow up our resolution of Nov. 29 that the faculty submit an extended syllabus for courses, so that they can be kept on file and used when needed. Enclosed is a questionnaire which you should fill out for each of the courses you teach. Any material you care to include with this, i.e., tests, assignments, etc. will also be appreciated.

The Grad. Com. through E.C. Booth will handle courses on the 500 level and above. This is for courses numbered lower than 500.

4/6/82 Report of Faculty meeting.

1. The meeting was held despite a blizzard raging outside. A report of an Ad Hoc Com. consisting of Booth, Franzen, Klein, Cohen and Zimmerman, concerning the drop in CLA enrollment in physics courses was given. The report concluded that the subcommittee decided not to do anything about the decline in enrollments from CLA since that decline was more than offset by the increase in enrollment from the College of Engineering and thus we had our hands full to keep up with that demand. Moreover, it was the view of that committee that any courses we would offer to attract CLA students would only marginally improve our enrollment and that the results might not be worth the effort.

   On a subsequent discussion, it became clear that this does not reflect the view of the entire faculty. Courses such as Arms Control, Hi-Fi, Biomedical physics, science fiction, and the Bermuda Triangle were proposed. Although some remarks were made that we should teach students in those courses how to think qualitatively.

   A new committee was then appointed to deal with the question of inter-disciplinary courses or courses to attract CLA students to the Physics Dept. The Committee consists of Brooks, Klein, Roberts and Shimony.

2. During the above discussion and subsequent discussions, there was an intensive search for Prof. Franzen since it was the Department's desire to celebrate his 60th birthday. Happy Birthday Wolf.

5/4/82 After a brief discussion the course on nuclear weapons, CLA PY 238, was approved by a vote of 20 to 0.

Note: See appendix for description.

Undated To: G.O. Zimmerman
From: B. Chasan
Exam for PY 251

The dramatic exodus from PY 251 to PY 211 halfway (almost!) into the semester convinces me that a placement examination for freshmen wishing to enroll in calculus level physics courses should be very seriously considered. It cannot be a good experience for students to switch gears this late, particularly if it is possible to direct these students into the right course before the semester begins. Placement exams for this purpose are of course commonplace: the Chemistry Department uses such an exam for Chem 111, which is much more vigorous than Chem 101.

Administratively such an examination would allow us to control enrollments and assign teaching fellows in a more accurate and intelligent manner. But the administrative advantages are not as important as the educational ones.

I see no reason why Dean Padulo would object to the suggested procedure if it were emphasized that good performance in PY 211, 212 would qualify students to take PY 353, 354.

Report of the Language Committee, (E. Corinaldesi and G. Kirczenow Co-Chair)

The proficiency in English of the foreign students Lucilla de Arcangelis, Liacir S. Lucena, and Karl M. Martini was certified. Andre Mirabelli passed the examination in French on Dec. 11, 1981.

The Astronomy students Gregory Laquadra and Ann Tyler passed the examination in French. The examination was proctored by Corinaldesi using a text provided by the Astronomy Professor Jeffrey Hughes, who also graded the examination books. These were not returned to Corinaldesi as on previous occasions, and the grade report was submitted to the Graduate School by Professor Hughes with the signature of the Chairman of the Astronomy Department. This constituted a departure from previous practice. In order to avoid misunderstanding, we feel that in the future there should be an Astronomy faculty member on the Language Committee, and that all examination books should be stored by the Chairman of the Committee. Alternately, the Astronomy Department might run their language examination independently.

Bulletin Board Committee, (E. Corinaldesi)

See last year's report.

Library Committee Report, (E. Corinaldesi)

Cost of periodical subscribed		$35,265
Cost of standing orders (series)		867
Amount spent on monographs (books)	3,919	
Amount encumbered for books not yet received	1,329	
Total Book expenditure	5,248	5,248
Total allocation		41,380
Assuming all books now on order arrive before fiscal 1982, 1981 budget overspent by		380

Number of monographs purchased: approximately 175

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 the journals Optics Letters and Surface Science.

Standing Orders: The library has added the series Progress in Physics (Birkhauser)

Other purchases: During this year we received the back years of INIS Atomindex and we have ordered the missing years of the Mössbauer Effect Data Index to complete both sets.

A browsing shelf in memory of Jerry Shlifer was set up by Professor Armand Siegel.

We are still fortunate in having Ms Paula Carey in charge of purchases of physics books. Ms Hazel Wornum resigned and, after a few weeks of panic, was replaced in the post of Physics Librarian by Mr. Luther Skeete. Corinaldesi respectfully asks the Physics Faculty not to exaggerate in their complaints on the running of the Physics Library. The Chairman of the (Physics Department) Library Committee has no authority over the librarians, to whom tasks are assigned by their supervisors. Journals often remain piled up in the library for the simple reason that the schedule of their being sent to the binders is decided by the Serials Department. Corinaldesi's offer to personally carry the waiting piles to Mugar was refused. Corinaldesi feels that complaints about the library are often made without sufficient grounds for the only purpose of backbiting.

Search Committee Report - Profs.Stanley (Chair); Booth, Chasan, Shimony, Willis

The Search Committee functioned as a coherent committee in which every member worked extremely hard and consistently. We met every Monday afternoon in order to prepare recommendations for the Tuesday faculty meeting. Minutes of every meeting were distributed to the entire department, and the entire department was invited to attend any meeting they wished. This system worked to advantage, as the candidate who was hired was suggested when a member of the faculty attended the Search Committee .

In all, roughly 400 applications were received. Of these, roughly 200 were solicited for outside reference letters, and a "short list" of 99 candidates was compiled. The decision concerning which candidates to bring to Boston University for an interview was made in consultation with the entire department, and 14 candidates were interviewed.

Each interview consisted of an opportunity for private discussions between every member of the department and the candidate, as well as a seminar that was not open to the public (so as to permit careful questioning). After the interview trip, the Search Committee gave each faculty member a form for confidential comments on the interviewee, which was returned to the Chairman's box for discussion by the Search Committee. After a significant number of interviews had been conducted, a straw vote was conducted by secret ballot, and the results of this straw vote were useful in focussing the discussion at faculty meetings concerning to whom offers should be made.

Recommendations for the future searches include the following:

a) Place the ad in Physics Today earlier, so that the applications begin coming in to the Department in September instead of December.

b) Use more initiative of faculty in calling up friends (the "old boy" idea, suitably generalized to include all ages and sexes). For example, the best candidate in condensed matter, Paul Heiney, was solicited in this fashion by the Chair of the Search Committee in his phoning around the country.

c) Minimize the hostility shown by some faculty to some interviewees.

d) Recognize that the pendulum in hiring has now swung strongly in the other direction, and that there are relatively few candidates now for the many jobs.

Graduate Admissions Report -- Kenneth Rothschild, Chair

This year we have had a significant increase in the number of applications to our program. The number applying this year was 82 as compared to last year 64.

	1982	1981	
Department copies received	82	64	
Completed applications	73	57	
Accepted T.F.'s	10	10	
Accepted G.A.'s	-	1	
Admission - -No aid	1	1	(1 other withdrew)
Cancelled Offers	3		
Refused offers of aid	9+1 no reply	13	
Rejected	22	17	
Offered admission with no aid	25	14	
Applications incomplete, action deferred	11	9	

The following have been offered financial aid and are coming:

Leao, Jao	Foundations of Physics
Kang, Kho	Condensed Matter
Meyer, John	Undecided
Soi, Man-Kei	High Energy
Tugare, Ashish	Theoretical Physics
Mahanta, Uma	Particle Physics (Theoretical)
Stanciof, Paul	Undecided
Huang, Xudong	Biophysics
Van Riper, William	Stat/Thermo

The following is a partial list of those accepted without financial aid.

Park, S.	Experimental Solid--State
Subramanian, S.	Solid State / Low Temp.
Kondo, M.	Biophysics
Kovanis, V.	Theoretical
Narayan, C.	Solid State
Neofotistio, G.	History of Physics
Chowdhury, A.	Solid State
Sarker, S.	Nuclear
Lamas, A.	Undecided
Cai, J.	Condensed Matter
May, Nathan	Undecided
Gall, K.	Undecided (computer experience)

Report of Faculty Meetings (General)

9/8/81 There were a number of announcements which were:

1. Faculty who want to make research assistant appointments have to do so through Al Stone by the end of this week.
2. Faculty was asked to announce whether their lab and discussion sections will be meeting this week. Only 2 courses announced that students show up, ~~in~~ PY 251 discussion and lab and PY 105 discussion only.
3. Drops and adds will be handled by the main office, Rm. 165, with the instructors straightening out sections and labs in their courses.
4. Faculty was asked to bring any items which should be on the meeting agenda to the attention of the Chairman.
5. The faculty meetings will take place every Tuesday at 12:30 P.M. as long as there are enough agenda items. Thereafter, we will revert to the 2 meetings per month, 1st and 3rd week of each month, format with the Chairman being free to call meetings at any of the intermediate weeks.
6. A brief report on the status of T.F.'s and their assignments was given by Chasan. The gist was that if enrollments keep up as projected, we might not have any graders and the T.F. pool might be tight. Chasan and GOZ are therefore soliciting names of qualified undergraduates who may serve as graders in some of our classes.

9/15/81 The Chairman gave a report of a recent Chairmen's meeting, the main points of which were:

1. There is no certainty when faculty salary increases will be decided upon.
2. The CLA Dean has written an annual report which will be distributed to faculty.
3. There will be long term planning as far as budget and curriculum is concerned.
4. There was talk about the challenge grant which was a grant to develop the humanities at CLA. We can reap some benefits from that through our "interdisciplinary" courses such as Physics in Music and others.
5. Academic V.P. Jones was present and he stated that he was brought in to develop the Science Center to be involved in the budgeting process and institute at least a two year planning cycle. He is very anxious to start outreach programs such as courses through electronic media, i.e., cable T.V., packaged video discs etc.
6. Announcements (some of which were not made at the meeting for lack of time).
   a. Each faculty member should make an appointment with the Photo Center to have his picture taken so that it will be on file in case it is needed for publicity purposes.
   b. Helen Siegel has a set of "Faculty Tip Sheets" which should be filled out by faculty for publicity purposes. Publicity items are:
      1. Writing a paper and having it published.
      2. Obtaining a grant on fellowships.
      3. Giving an invited talk.
      4. Attending a conference.
      5. Having visitors.
      etc.

      RETURN TO HELEN SIEGEL and we'll forward it on.

c. The Computing Center has acquired some graphic facilities which could replace the need of draftsmen. The faculty was asked to acquaint itself with those facilities both for research, publication, as well as teaching purposes.

d. A committee to choose one or two distinguished speakers per year for the Dean S. Edmonds Sr. lecture was appointed with R.S. Cohen, Chairman, Booth, Brooks, Klein, members.

e. Miller is replacing Kolk as the Co-Chairman of the Colloquium Com.

4. The faculty was asked to fill out space need projections as a preparation for the beginning of planning for the new Science Center. In connection with that there was a request that a space planning committee be convened so that there is sufficient faculty input into the process. The faculty voted that such a committee should be appointed by the Chairman and negotiations are under way to appoint such.

5. The announcement of a colloquium by Prof. Czerwonko was made. The colloquium Com. is looking for suggestions of speakers for the fall and spring term. Those suggestions have to come from the faculty.

6. Prof. Kirczenow brought up the question of the "research booklet" which is being put together by Rothschild regarding the change in rules that only 5 publications indicative of current research be listed for each faculty member rather than the two year publication output. After a debate, it was voted, with several members abstaining, that the 5 publication ruling stand for this year.

7. The question as to whether to request the Dean for new faculty members in view of the fact that a budget submission is necessary by Sept. 25 was discussed. The faculty agreed that one should request several new faculty members in view of the sabbaticals which will occur in the next few years and the need for faculty to staff courses as well as the enhanced research and grant output of this department.

There will be a meeting on Tuesday, Sept. 22, 1981 at 12:30 P.M.

9/22/81 Because of the budget proposals for 82-83 the faculty was asked to let the the Chairman know about any sabbatical plans during that year.

Announcements were read.

a. The Faculty Research Project applications are due on Oct. 21, Jan. 27 and April 7. They have to be received at least one week before that in the Chairman's office.

b. Any new courses which need approval have to be in the Dean's office by Oct. 14. Prior to that they have to be approved by the Dept.

c. The mileage reimbursement rate for travel has gone up from 18.5¢ to 21¢ per mile.

The faculty was asked to hand in the schedule of Teaching Fellow assignments for labs and discussion sections in their courses to Helen Siegel.

The faculty voted to allow Roberts to invite a physicist who is an expert in the field of Physics and Music, Benade, for a colloquium for the 82--83 season.

A radiation safety talk was announced by Roberts.

10/13/82 Permission was given to have Dean Padulo of ENG attend the faculty meeting of Nov. 3 re the electrical engineering accreditation.

The staff situation was discussed with Al Stone on vacation for two weeks, Joe Gonsalves out this week, Helen Siegel out on Wednesday and G.O. Zimmerman out on Thursday and Friday. We now have full secretarial staffing with Dorothy Duerr. The matter of policy for vacations will be brought up at a future meeting.

Edmonds complimented our PY 212 T.F.'s on their initiative and diligence.

It was voted to extend library hours until 6:30 P.M. Mondays through Thursdays.

10/20/82 The Chairman gave a report of the APS Corporate Associates meeting in Washington Oct. 15 and 16.

Some courses in Physical Chemistry need cognate approval from our Dept.. Booth, the Chairman of the Graduate Studies Com. will distribute the catalog description of those courses to the faculty and faculty teaching courses which might overlap with the Chemistry courses, or other interested faculty members are asked to respond. This is important. If Chemistry courses overlap too broadly with Physics courses, Physics should give them, if not, Chemistry should.

Dr. Dodson was proposed for the appointment of Research Assistant Prof. in the Dept. of Physics. The recommendation that such an appointment should be recommended to the Dean was approved by a vote of 17 for, 0 no's and 2 abstentions.

A discussion of whether to reserve colloquium time for prospective faculty members resulted in a decision that approximately one half of the colloquium dates during Feb., March and/or the beginning of April, be reserved for that function.

Faculty members were urged to attend colloquia since colloquia are both an educational experience for the students as well as a way of visitors getting to know us. We should give the best possible impression, that of the vibrant department which we are rather than a dormant one.

Prof. Haber-Schaim asked permission of some of the large course instructors to visit some lab and discussion classes and possibly film them in preparation for the course beginning Jan. for T.F.'s on how to teach.

10/27/82 An announcement was made about the speaker at Wednesday colloquium.

Zimmerman reported on his meetings with graduate students. One of the requests which came out of that meeting was that graduate students be allowed to send an observer to the Faculty meetings. After a discussion and several suggestions, the Faculty voted to allow such an observer to attend our faculty meetings. There should be at most two students designated as observers and the period for this should be a trial period and the observers will be allowed to attend meetings on a trial basis until the end of the school year. If things work out, this might be permanently instituted. Students will be asked to leave whenever the faculty decides that a topic is a sensitive one.

Zimmerman gave a brief report of a meeting of the Chairmen's Caucus which concerned itself with union/administration negotiations. After some discussion a straw poll took place on various issues so as to inform the Chairmen at the Chairmen's Caucus meeting, Wed., Oct. 28, of the sentiments within departments concerning items under negotiation.

11/3/81 Dean Padulo with Associate Deans Henry D'Angelo and Eugene Smithberg took up the first part of the meeting with Dean Padulo holding forth about relations between Engineering and the Physics Dept. which are generally good. Several complaints on both sides were voiced regarding students and transfers from one class to another. These should be taken up at a future meeting with a more select group.

A brief report of status of union negotiations was given by Zimmerman and Cohen.

A request for comprehensive exam questions was made by Hellman.

Booth mentioned the alumni reunion on Dec. 5.

11/6/81 To: Faculty, Chemistry Dept.
From: N. Lichtin, Chairman, Chemistry Dept.
Subject: Visit of Representative of Dow Chemical Co. to Dept. on Thurs., Nov. 19 to discuss potential areas of support of research.

Dr. Theodore E. Tabor, who represents Dow's Technology Acquisition Program, is scheduled to spend Thursday, Nov. 19, from 8:30 A.M. to 3 P.M. in the Dept. He wishes to meet with faculty members who are interested in Dow funding of their research in connection with Dow's Technology Acquisition Program. He will meet with me first thing in the morning and will describe the program at a general meeting with members of the Dept. to be held in Rm. 230 at 9:00 A.M. The rest of his time will be spent in meeting with faculty members either one at a time or with two or more at a time if they have a collaborative project in mind. Funding via this program is more abundant than funding under Dow's other programs for support of academic research but, as the name implies it is focused on research which is either applied or relevant to applied areas. It can support graduate students and/or post--docs, faculty time and research costs. Please return the enclosed quesionnaire ASAP so that we can arrange Dr. Tabor's itinerary.

11/10/81 Prof. Franzen brought up the fact that the teaching evaluations which are now run by Photon in the Physics Dept. have not been made public to the faculty. After a brief discussion where some of the faculty members expressed outrage at this fact, the faculty agreed on a compromise where we would send a secretary to copy the comments of the teaching evaluations and then present them to the appropriate faculty member. We subsequently voted that those faculty members who want to participate in the teaching evaluation process should do so.

A discussion of our graduate courses which was subsequently relegated to the Graduate Com. took place. It centered on the CLA PY 511, 512 sequence but at time was much more general. There is a disagreement among the faculty as to whether to teach the courses at a high level, risking the loss of some of our graduate students who have not been as well prepared during their undergraduate studies as we would like them to or do we include in those courses introductory material (at the risk of leaving out some more advanced matters) and thus waste time of some of our better prepared students.

Prof. Booth reported that only a dozen or so alumni have signed up for the alumni reunion on Dec. 5.

The Com. on the New England meetings of the APS was congratulated on its program after a report on that meeting by W. Franzen.

It was reported that the Com. on the Future of the Dept. has met and will draft a proposal in the near future.

A brief discussion of how one should attract graduate students to their research fields occurred with the decision of following the current practice (whatever that may be) being made.

A brief report on faculty recruiting urged current faculty to write to their professional colleagues in order to canvass as wide a field of candidates as possible.

12/8/81 The Chairman of the Comprehensive Committee, Hellman, stated that because of the fact that very few faculty members have handed in the comprehensive problems requested of them, the examination cannot take place at the beginning of the term. After a brief debate, faculty promised to hand in their problems by Friday, Dec. 11 and a tentative date was set for Jan. 29 and Feb. 1 for the comprehensives to take place. Some members expressed the desire to be asked to hand in their comprehensive problems at the beginning of the school year because at the time one is into the semester, one is extremely busy with courses and research.

Announcements

1. The Chairman of the Library Com. (Corinaldesi) was pleased to receive so many replies to his inquiry about suggestions for library purchase. He ascribes it to the fact that he distributed the book requests with a relatively detailed description of the book from Physics Today and other sources.
2. George Zimmerman pointed out that Helen Siegel has provided a sign-outsheet for those who need to copy or take out prospective faculty files.
3. The colloquium speaker and lunch at the Cabot Rm. was announced by Roberts.
4. A brief discussion of the "New Faculty Contract" took place.

No meeting December 15, 1981.

There will be a meeting on Dec. 22. Main topic will be arrangements for the Xmas closing.

Other items will be taken up as they come.

12/22/81 Details of arrangement for the Xmas vaction closing was discussed.

Prof. Haber-Schaim described the course for T.F.'s on How to Teach Physics. He asked for some exam papers and lab reports to use as examples. The times determined for that course were Mon. 10-11 and Tues. 1-2 P.M.

The Chairman asked if the functions of some of the committees should be more intensive in supervision and improvement of the curricula. There was a brief debate with a result that the descriptions of courses be they graduate or undergraduate, be given to the Chairman's office.

A description about prospective faculty visiting our department took place in view of the visit of Brower. As it turned out, this was only a preliminary visit with anyone in the department interested in hiring a faculty member having to bring that person to the department for a vote on whether to invite him for a formal visit.

It was decided that for any person to be formally invited, his/her name will have to come up before the department meeting and the faculty will have to invite that person to give a colloquium or seminar as well as talk privately to faculty members who want to see that person.

Announcement. 4/12 of the fixed salary increase will come in a single check which will be available in the CLA office on Jan. 8, 1982. I will ask that those checks be distributed in our mailboxes unless someone objects.

1/19/82 An announcement was made about Jan Kelley leaving the Department with Department members expressing regret at her leaving.

The beginning of the teaching course for GRS PY 900, Teaching of Physics, was announced with first and second year T.F.'s required to attend. First class will be on Jan. 26.

The faculty having problems with theirT.F. staffing should take their complaints to Chasan or Zimmerman.

A report on the Science Center Planning Com. was given by Zimmerman. The magnitude and time tables were discussed. The Science Center will encompass both buildings and faculty development as well as facilities. One of the most troubling aspects is the search for a theme for the Center.

There was a report of the Faculty Search Com. with the faculty giving permission to the Search Com. to contact the applicants whose names appear on the Search Com. report of Jan. 18. Batanouny suggested that Fuggle's name be added to that list and it was. The prospective faculty members will be invited to come and either give a colloquium or a seminar. Seminar times were agreed upon as Thursdays 12:30—2 as well as times for regular seminars such as the Solid State Seminar. Subsequently, key appointments were discussed with Overhauser seeming to be the most prestigious. As before, a hunting license was issued to the faculty. Right now Overhauser seems to be the front runner.

Senior Faculty meeting next Tuesday, Jan. 26, 1982.

2/2/82 There was a brief report of the Faculty Search Com. which dealt with the large number of applications coming in and the schedule of visits of prospective faculty members to our Department.

The report of the Building Com. written up by Prof. Franzen dated Jan. 28, was accepted with the Chairman apologizing for not having attended the meeting.

A discussion of T.F. loads brought out the fact that those loads are vastly different for different courses and students and that something should be done to equalize those loads among students. The cooperation of the faculty was requested.

After a brief discussion of Merit/Equity guidelines, a M/E Com. was elected by secret ballot with each faculty voting for three individuals and the three individuals having the highest number of votes being designated to serve on the Committee. Members of the 1980-81 Com., Chasan, Klein and Franzen, were excluded from candidacy as well as Zimmerman and Cohen, who would notbe present during the deliberations. The members elected were Booth, Shimony and Willis.

One of the Department members remarked that no non tenured faculty were on the Committee. None of the non tenured faculty objected to that fact.

Edmonds announced the colloquium speaker, John King, and asked for volunteers to take him to dinner.

2/12/82 To: Physics Faculty
From: G.O. Zimmerman

There will be a faculty meeting on Tuesday, Feb. 16.

There will be a Seminar at 2:00 P.M. in Chemistry, Room 230 by Gerald Manning who is actually a chemical biophysicist - he is a candidate for a Chemistry position. His vita is on file at my office.

Special Seminar — Faculty Candidate — Tuesday, Feb. 16, 1982 2:00 P.M. Room 230 — Gerald S. Manning.

2/16/82 A report was given by the Faculty Search Com. and the Chairman gave a report of his talk with the Dean regarding the faculty appointments.

a. The need for focusing our search on a particular field was discussed with no particular conclusion except that it would have to be discussed again.

b. The Faculty Search Com. was empowered by the faculty to invite prospective faculty candidates.

c. Two of the candidates who have visited the Department were discussed.

d. On the subject of key appointments, Overhauser's name stood out both as far as the Dean's approval was concerned as well as the faculty's enthusiasm. After a brief discussion, it was decided to make a case for an endowed chair for Overhauser. This Chairman asked faculty members to help him make this case by writing statements regarding the usefulness and function of Overhauser in this Department.

G.O. Zimmerman reported on the Science Center Planning Com. which in the near future will enter a phase of concrete planning for both faculty and buildings.

A report of the CLA Faculty meeting was made where it was voted to elect a new Faculty Salary Merit/Equity Guidelines Committee.

2/23/82 A schedule of future visits of prospective faculty members to this Department was presented by H.E. Stanley.

The March CLA Faculty meeting will be concerned with the humanities million dollar matching grant and the proposed Science and Engineering Center. It will be a joint CLA and Engineering Faculty meeting.

A Space Com. meeting to which everybody was invited took place. Individual Space Com. members were assigned tasks to plan various aspects of a new Science Center, this preliminary planning to be completed by Tuesday, March 2, for a visit of an architect to this Department on Thursday, March 4.

There will be a faculty meeting on Tuesday, March 2. The main order of business will be future space needs of the Department.

3/2/82 The meeting was a preparation for the meeting of March 4 with the architect and a confirmation of the future plans of the Physics Dept.

Announcement 1. There will be a meeting of the Physics faculty 12:30 P.M. Tuesday March 23 at which the Dean will be present to talk about the chairmanship of the Physics Dept.

Announcement 2. The CLA March faculty meeting will have the Science Center as one of its main topics. The Physics faculty is urged to attend that meeting.

3/18/82 The meeting was primarily concerned with the discussion of candidates and fields. Decisions as to fields were made. It was decided that a field theorist and an experimental solid state physicist should be the priority for this year with a third field being decided on Tuesday, 3/23. At that time we may make decisions regarding the hiring of faculty next year.

3/30/82 The faculty was presented a list of candidates who have visited us with their ratings "Straw Vote Poll".

It is not clear whether we can hire two or three faculty. After a brief discussion, the faculty decided to offer the positions to Drs. Pi and Heiney.

Discussion on further candidates took place and it was decided that that should be carried over to the meeting of April 6.

Near the end of the meeting the Chairman announced that the Dean will consult the faculty on the Chairmanship on April 6 with the Chairman's suggestion that he remain Chairman an additional year because of the difficulty at this time of the year of choosing a Chairman and that an Associate Chairman be appointed for next year.

4/6/82 A discussion of further prospects for the hiring of faculty took place. One name was brought up prominently by one of our faculty members. However, the problem with hiring that particular person was that tenure would have to be given soon after his arrival. After other faculty members brought the desirability of hiring in other fields, the discussion was terminated, to be carried over to the meeting of April 13.

4/15/82 To: Faculty
From: G.O. Zimmerman

There will be a faculty meeting on Tuesday, April 20.

There will be a special faculty meeting to consider the Chairmanship on Thursday, April 22.

There will be a distinguished visitor, William Fairbank, on Wednesday, April 21. He will give the Dean S. Edmonds Sr. lecture. Dean Bannister, V.P. Jones and possibly President Silber and Metcalf might also attend. It is important that there be a good faculty and student turnout for this event.

After the lecture, Dr. Dean Edmonds will sponsor a dinner at the Chardas Restaurant.

a. Please indicate if you would like to come to the dinner.

b. Please indicate if you would like to see Fairbank anytime during the day on Wednesday.

c. Would you like to join the speaker for lunch at the G.S.U..

5/4/82 The meeting started with several announcements.

a. Pictures of Stipe's sculptures were distributed.

b. Faculty was notified that they will be approached in the near future to be preceptors for the high school students we will host in the summer.

c. The Comprehensives Exam meeting day was set for Thursday, May 13.

d. The latest plan for the Science Center was announced in which the Physics Dept. would remain in the old building with the building being renovated 1/3 at a time. We would share the building with Mathematics.

Several worries were expressed regarding this plan. They were that

1. The University will run out of money to renovate the building and thus we would be in no better position than before.
2. That we will be on the periphery, away from the library, machine shop or lecture halls.
3. That the building has to be completely gutted in order to be liveable and that a lecture hall should be incorporated.

The faculty decided in view of the latest development in our hiring situation to invite more candidates. Accordingly, Dr. Roger Hoyt from Ohio State Univ. was invited for Tuesday, May 11.

We will have to continue meeting on departmental business for at least another two weeks which will bring us past graduation.

Items to be settled are: Hiring situation; Review of graduate students; Committee chairmanships; Other business.

5/18/82 The faculty discussed the candidacy of Dr. Hoyt for Asst. Prof. position and voted to offer the position to him by a vote of 16 for and 3 abstentions. If the appointment does not materialize, the Chairman was asked to call the faculty together again to consider further actions. It is realized that it will be hard to get all the faculty together during the summer but the meeting will be held with the faculty available.

A review of graduate students' progress was started and appropriate actions recommended by the faculty to the students' advisors and the Chairman.

5/25/82 A letter from the Editor of Bostonia requesting information about important graduates from the sciences was read to the faculty and several names were suggested by the faculty for Bostonia stories.

The evaluation of graduate students' progress was completed.

The faculty, after having examined the dossiers of Dr. Nishio and Dr. Niccolini voted to appoint them as Research Assistant Professors in the Department. No tenure or financial obligations except for grant support are involved in these appointments.

A set of committee assignments was circulated among the faculty. Although in the past the faculty elected chairmen of these committees by a vote, this time the faculty voted to have the Departmental Chairman appoint committee chairmen.

6/15/82 The faculty was convened because Roger Hoyt to whom the Department offered a position as Assistant Professor, declined our offer. After a brief discussion, it was agreed that the Low Temperature group be allowed to hire a Post Doc/Lecturer for the funds available who would teach one or two courses depending on the availability of grant funds. The appointment on University funds will be for at most, one year with the rest of the funds being used for remuneration of other post docs and additional T.F.'s as teaching duties require.

It was also decided to put an ad in Physics Today immediately.

MISCELLANEOUS

Boston University

111 Cummington Street
Boston, Massachusetts 02215

Department of Physics

April 9, 1981

To: Mr. Kenneth Condon, Assoc. V.P. Finance and Business Affairs

From: Prof. George O. Zimmerman, Chairman

Subject: Change in the overhead return rate.

Although I still do not have a copy of the notice which you allegedly sent to Deans, Department Chairs and Principal Investigators, about the change in the overhead rate, I have heard about it from the Dean's office and other department chairmen and consider such a large change to be disasterous for our immediate future goals, i.e., to bring in more money into the University through grants and contracts. I also believe that this overhead rate will act as a disincentive to the principal investigators to apply for further grants.

Generally, in our department, the agency to which the grant is submitted gives us a fixed figure for the grant if the grant application is successful. The increase in overhead from 54.7% to 79.6% will have the effect of reducing the funds to be used for research to the point where no research can be performed. The research performed is part of a faculty member's scholarly activity. Under the contract, a faculty member is allowed to use one of the five week days for consulting on research. That 20% (1 out of 5) of time can be used whether a faculty member has or does not have a grant. The reward which accrues to the faculty member getting a grant is that more scholarly work can be done during the academic year by hiring a graduate student and by "buying" more released time so as to obtain a lighter teaching load. The benefit to the University is in the reputation of its faculty for research and teaching which will attract better and more students as well as the overhead return from the grants. As stated before the overhead return will negate any incentives for the faculty obtaining grants because of a lack of funds to perform the actual research. Let me illustrate:

A faculty member is given a fixed sum by an agency. From that he would like to support a graduate student and obtain his summer salary, i.e., for two months. An example is given. Under the old rate and the new one, the budget would look as follows:

Minimum	Old	New
2 Months salary base 25,000/ 9 mo.	5,555 - direct	5,555
Fringe benefits	994	1,005
Overhead	3,582	5,222
Student stipend for 11 months	7,425 - direct	7,425
Overhead on student stipend	4,061	5,910
Tuition for student	5,387 - direct	5,387
Overhead on tuition	2,947	4,288
	29,951	34,792

Direct costs in each case are $18,367.

Whereas previously it was possible to obtain the minimum direct costs for research out of a grant of $30,000 presently a grant of $35,000 is required. That is a 17% increase at a time when direct costs are increasing and granting agencies are cutting back on grant budgets. From now on, I will advise any investigator who receives an offer from a granting agency of $30,000 or less to refuse it since it is impossible to perform research on such a budget. The above leaves out funds for supplies, travel, publication and computer usage, all necessary and adding another $10,000 in direct costs.

Under the present overhead rate, it is impossible to obtain the minimum within a grant under $35,000 and thus if the faculty member does not get any benefit out of it either due to an increased research output or due to some financial reward, there will be no incentive for him to spend at least one month in the preparation of a research proposal. Moreover, if the research output of the faculty drops because of lack of funds, the prospects for renewal of any grant becomes extremely unlikely. The above example was for theoretical research. Experimentalists work with equipment and that is usually 10 or more years old. In order to continue research, one needs to build in moneys into the grant which allow for equipment and under the present rates, this again will be impossible. Thus, I believe instead of raising money for the University, the new rate will lose those funds, in addition to lowering the research output which, in turn, will lower the reputation of its faculty and the University as a whole.

I believe that the figures which go into the computation of the overhead rates include expenditures which would have to be incurred by the University even if no research or scholarly activity were to take place on campus. Thus, we would still need the President of the University and administration, department chairmen, departmental administrators, a purchasing department, and accounting department and buildings. We would still have to maintain those buildings. If it turns out to be impossible to change the overhead rate immediately, I would propose as a short term solution the cost sharing of the additional overhead by the University so that the same amount of funds are available for research as before. We want to make Boston University attractive to the funding agencies and ultimately we should try and lower our rates to the point where research can be done. The fact that whether a faculty member has a grant or not, 20% of his time is paid for by the University for him/her to engage in scholarly activity and a grant is just an add on to that which benefits the University.

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cc: Dean Bannister
V.P. Jones
Provost Mayfield
Joan Kirkendall

Boston University

111 Cummington Street
Boston, Massachusetts 02215

Department of Physics

February 4, 1982

To: Faculty

From: George O. Zimmerman

Subject: Merit/Equity (M/E) Guidelines

The faculty elected M/E Committee. The members are Booth, Shimony, Willis.

Faculty members requesting either Merit or Equity salary increases have to fill out an annual report.

The first round increases for 81-82 will be based on performance from July 1, 1980 to June 30, 1981, and is due in my mailbox by Monday, 5 P.M. February 8.

Faculty requesting Merit or Equity increases should indicate which and in a one page statement indicate which two areas they want to be considered for superior performance. Those areas are teaching, service and scholarship.

M/E increases will be awarded in shares of $500 but in order to compete with other units in CLA, it is recommended that increases should be awarded in shares greater than one.

It is anticipated that a number of CLA faculty will get no M/E salary increase.

At a Chairman's meeting I attended on Wednesday, Feb. 3, the following guidelines were clarified:

A unit may designate the Chairman as the M/E Committee. However, since the faculty already elected a committee, we will keep the committee structure this year.

Any faculty member may elect that he/she be evaluated by the Chairman only.

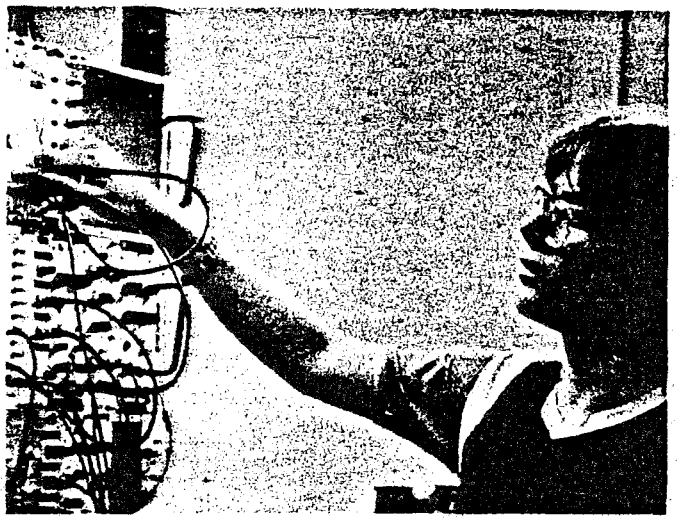
Faculty not applying for M/E salary increase can be recommended for such by either the committee or the Chairman. In that case, the same documentation has to be provided as for faculty requesting such increase.

The recommendation of the committee and the Chairman has to be made in terms of Merit or Equity only regardless of the percentage salary increase due to the fixed increases of any individual faculty members.

If a salary increase is required due to promotion then that increase will come out of the Equity pool.

About 3/4 of the total pool is designated as Merit and 1/4 designated for Equity.

hs



Boston University Research Internship Program in the Physical Sciences and Mathematics for Gifted High School Students

Boston University will offer a *summer program for gifted high school students* patterned after a program previously sponsored by the National Science Foundation. Thirty students, who demonstrate high ability in Physical Science, will be invited to Boston University for six weeks during the summer to participate in research and take college level courses. The Physics, Astronomy, Chemistry, and Mathematics departments will conduct the program with research in Physics, Chemistry, and Astronomy and courses in Chemistry and Mathematics. Early admission to Boston University is an option.

Students who have completed the eleventh grade by the time they join the program should have demonstrated high ability, maturity, and independent activity in a physical science.

The program is designed to introduce young people to the physical sciences as a vibrant, exciting, and meaningful profession by having them participate in research at the college level. Our goal is to develop in talented high school students an awareness of the substance, the spirit, and the methodology of current scientific research. Through participation in research with active research groups, the students will come to recognize the values held by the scientific community. They will become sensitive to the process of inquiry and will share in the evaluation of research data and, in doing so, experience the cutting edge of scientific discovery. Being forced to explain one's notions and to justify one's conclusions, to argue with oneself, will encourage each student to develop the capacity to look at things from a different point of view. Through those experiences students will come to appreciate alternative points of view and will become more comfortable with the scientific ambiguities confronting them.

Objectives

1. To advance the student's intimate knowledge in a specific region of physical science.
2. To encourage students to pursue careers in the physical sciences.
3. To help students decide about their suitability for careers in physical sciences.
4. To show students that research scientists possess "human" traits (a notion often contrary to the popular image of scientists).
5. To have students interact with research scientists as members of a team where they are treated as adults and are "talked with," as opposed to the common experience of being "talked at."
6. To expose the students to a situation where there are no answers to some questions (as opposed to the high school experience) and where the answers, if they come, have to be carefully scrutinized. This is an exposure to the frontiers of knowledge.
7. To teach the student skills and habits, both manual and analytic, practiced in a research setting.
8. To expose the student to a unique experience.
9. To provide a peer group for the truly exceptional student.

When and What

The program will start on June 27 and run through August 7, 1982. The program is a resident one, and students will be housed in a small dormitory on the Boston University campus, supervised by counselors and the program director. The research internships will be supplemented by weekly seminars where the participants will learn of the "state of the art" in a wide variety of research areas from eminent scientists. The cultural, natural, and entertainment resources of the Boston area will provide a rich non-research dimension to the program.

Cost

The cost to the student will be $1500 plus pocket money, as well as round-trip transportation to Boston. Scholarships are available for qualified students in need of financial aid.

We would appreciate your aid in reaching outstanding students who would benefit from this program. For a student who is outstanding in the physical sciences and mathematics and is ready to appreciate what motivates scientists and what constitutes the elements of research, this could be an enriching experience. Students should be mature enough to handle the responsibility of living away from home, among equals, in the intellectually stimulating Boston community.

On the enclosed form please furnish us with names and addresses of those students you feel might benefit from this program.

Send to: Prof. G. O. Zimmerman
Physics Department
Boston University
111 Cummington Street
Boston, MA 02215

Undated

To: Physics Department Faculty and Graduate Students

From: Armand Siegel

The Browsing Collection in memory of Gerald M. Shlifer has finally been set up, thanks to your donations.

It consists of the better part of one shelf's worth (books are expensive nowadays) of one of our familiar pinewood office bookcases, and is set up in a conspicuous place in the Physics library.

To fulfill the concept of a browsing collection, books should not circulate. Please respect this rule.

Attached is a catalogue of books in the collection, with brief commentary.

Your suggestions for further purchases will be welcome. Also contributions. to pay for them. (These need not be coupled with one another.) Contributions in cash or check, payable to G.O. Zimmerman.

Jan. 25, 1982

Dear Physics Department People:

My announcement last month of inauguration of the Browsing Shelves in the Physics Library was premature -work--study students were not available to set it up.

It has now been set up and is ready for your use and enjoyment. If you have mislaid your copy of the book list in the interim or want another copy for any reason, please let me know.

Oct 19, 1981

Dear Dr. Zimmerman and Physics Faculty:

On behalf of my two children and myself I want to thank you all for establishing at Boston University "The Chertok Memorial Colloquium" in memory of Benson.

You have chosen to honor him in a very meaningful way, and we sincerely appreciate your kindness. Best regards to each of you.

Sincerely, Barbara Chertok

Individual Faculty Profiles

Bansil

Professional Presentations

1. Invited Seminar: "Phase Transitions in Biological Membranes", Northeastern University, Boston, MA (1981).
2. Contributed Paper, APS, Dallas, Texas (March 1982).
3. Contributed Paper, American Chemical Society Meeting, New York, N.Y. (August 1981).
4. Invited Speaker, FRENCH--ITALIAN MEETING ON ASSOCIATED LIQUIDS, Pisa, Italy (March 31—April 1, 1982).
5. Contributed Paper, CONFERENCE ON LASERS AS REACTANTS AND PROBES IN CHEMISTRY, Howard Univ., Washington DC, May 1982.

Prizes, Awards, Grants, Fellowships etc.

1. Junior Faculty Research Award, American Cancer Society (continued for third year).
2. NSF US/France Exchange Program Grant (jointly with H.E. Stanley and W. Klein).
3. NIH--NEI Grant (jointly with H.E. Stanley and K.J. Rothschild) April 1979-March 1982.
4. NSF, "Statistical Mechanics of Polymers" (jointly with S. Redner and H.E. Stanley).
5. NSF, US/Italy Exchange Program (jointly with W. Klein, S. Redner and H.E. Stanley).
6. ONR, "Physics of Gels with Short Bond Lifetimes" (jointly with H.E.Stanley).
7. Considerable effort was devoted to developing a grant from Hooker Chemical Company, Buffalo, NY. This involved a trip to Hooker and many visits to Boston University by the scientists at Hooker. A proposal was submitted and is pending funding.

Membership on Advisory Panels

1. Served on NIH study--section to review NIGMS shared instrumentation grants, Sept. 1981.
2. Member of NIH Special Study Section and Site Visit team to evaluate proposal for regional FTIR Laboratory at Battelle, Columbus, Ohio (Nov.1981).
3. NIH Study section to review Division of Research Sources --BRS Shared Instrumentation Grants, April 1982.

Booth

Annual Meeting APS, Washington, April 1982.
"Physics with a Stretcher Ring", Presented Conf. on New Horizons in Electromagnetic Physics, Charlottesville, Vt., April 1982.

Prizes, Awards, Grants, Fellowships
2nd year of "Coherent Photo Production and Nuclear Comptor Scattering in $\Delta(1232)$ Region 1982, NSF $117,000 Principal Investigator.

Member (National Nuclear Advisory Committee for APS).
Member of Program Advisory Committee — Bates Linear Accelerator (M.I.T.)

Brooks

International Conference Low Temperature Physics, Aug. 1981

APS Meetings: March 1981 Dallas
April 1981 Washington D.C.
May 1981 Boston, Ma.

NSF Grant # DMR 8113456 renewed at $60,000.

Digital Eq. Corp. Education grant $50,000.

Visiting Scientist, Francis Bitter National Magnet Lab.
Responsible for Low Temperature (High Magnetic Field activity.
At least 10 Boston University students have been or are being trained under my supervision at this facility.

Chasan

Attended Biophysical Society Meeting -- senior author on poster. (b).

NIH proposal "approved for funding", but not funded.

Retains research affiliation with the Biophysical Laboratory at Harvard Medical School.

Cohen

1. Commentator on Derek Price 'Scientific Instruments as Artificial Revelation' Boston Colloquium for Philosophy of Science, Feb. 16, 1982.

2. 'Einstein and Popper' International Symposium on K.R. Popper (invited lecture) Cerisy--la-Salle, Normandy, July 3, 1981.

3. 'Popper and Marx on the history of science' (Cerisy-la-Salle symposium) July 4.

4. 'The sociological roots of science, critical exposition of the work of Edgar Zilsel' Harvard History of Science Colloquium, Oct. 2, 1981.

5. 'Critique of humanist Marxism' in Symposium at Bryn Mawr/Temple/Pennsylvania series, Temple University, Oct. 3, 1982.

6. 'The Dangers of Religion' and 'The Great Potentiality of Religion and of Science' (with Langdon Gilkey) Lehigh Conference on Science, Religion & the Future, Bethlehem, Nov. 5—6, 1981

7. Commentary on George Rupp, 'Commitment in a Pleuralistic World' B.U. Institute for Philosophy and Religion, Nov. 18, 1981.

8. Lecture 'Marxism and Democracy' (invited symposium lecture), Inter-American Congress of Philosophy, Florida State University, Tallahassee, Oct. 22, 1981.

9. Symposium lectures at Conference on social aspects of the development of modern science (invited) Kings College, University of London, Feb. 11-13, 1982.

10. Symposium lectures at Conference on the History of Vienna Circle (invited) Zentrum für interdisziplinäre Forschung, University of Bielefeld, Germany, Feb. 25-26, series of three lectures, (1) Vienna Circle in America, (2) Vienna Circle and Frankfurt School, (3) Social functions of logical empiricism in Europe and in America.

11. 'Science in the Life-World' (invited lecture), Marvin Farber Memorial Symposium, SUNY-Buffalo March 11--12, 1982.

12. 'Reflections on the Vienna Circle' (invited lecture) Joint Symposia on History of 20th Century Science, Harvard University, March 19, 1982.

13. 'God, sex and money; or, the history of science', Wesleyan University College of Science in Society and College of Letters, April 15, 1982.

14. 'Vienna Circle and Harvard Square', Joint American Academy, Harvard Dept. of Physics and Boston University Center for Phil. Sci., Symposium for Centennial of P.W. Bridgman, April 24, 1982.

15. 'Felix Kaufmann and Otto Neurath, Critical Issues in the Methodology of the Social Sciences' (invited lecture) International Philosophischen Symposion für Centennial von Moritz Schlick und Otto Neurath, Vienna, June 19, 1982.

16. 'Comparative historical sociology of science: a summary' (invited lecture) Wissenschaftskolleg: Institute for Advanced Study at Berlin, June 22, 1982.

17. Serve as President—Elect,Philosophy of Science Association.

18. Serve as Trustee, Wesleyan University (and as Chairman of the Board of Trustees' Education Committee).

19. Serve as Chairman, American Institute for Marxist Studies.

20. Serve as Secretary--Treasurer and Vice--President, Boston Philosophy of Science Association.

Prizes, awards, grants, fellowships, etc.:

Samuel Rubin Foundation (to support philosophy of science from a 3rd world country at B.U. Center for Phil. History.Science)

IREX fellowship grants, 2 academic year fellowships in philosophy of science for professors from USSR, plus 3 short-term visitors on travel grants.

ACLS American Studies Fellowship grant for post--doctoral research associate from the German Democratic Republic for academic year 1981—82.

Travel grants from Reimer Stiftung, Volkswagen Stiftung, Austrian Government, John Latsis Foundation, University of London, Boston Philosophy of Science Association.

Edmonds

AAPT/APS Meeting, Jan. 1982, 'An Experiment with Operational Amplifiers for the Undergraduate Laboratory'.

Member, American Physical Society, Institute of Electrical and Electronic Engineers, American Association of Physics Teachers, American Radio Relay League, Aero Club of New England

Director, Tachisto Inc., a manufacturer of TEA Lasers.

Director, General Ionex, Inc., a manufacturer of ion sources and acclerators.

Director and President, Aero Club of New England.

Epstein

Membership: American Physical Society.

Prizes, awards, grants, fellowships, etc.

U.S. Dept. of Energy Grant No. DE—AC02-81ER40040 Theoretical Study of Pion and Kaon Photoproduction off Nuclei $65,000 (7/1/81 -- 6/30/83).

Invited Talk: Kaon Photoproduction off Nuclei, U. Mass, Amherst (Oct. 20, 1981).

Franzen

Member, Exec. Com. of the New England Section, American Physical Society (till 12/81).

Member, Committee on Education, Am. Phys. Soc.

Fellow, Am. Physical Society.

Attended meetings of New England Section, Am. Phys. Soci. in April, 1981 (W.P.I.) and Oct. 1981 (Univ. of Maine).

Washington Meeting of Am. Phys. Soc. April 1982.

Editorial Consultant to Birkhäuser Verlag, Zürich (Switzerland).

Member, Board of Editors, ZAMP (Zeitschrift für Angewandte Physik und Mathematik).

Chairman, Local Committee for the Spring 1982 Meeting of the New England Section, Am. Phys. Society at Boston University.

Hellman

Member of American Physical Society.

Elected to membership in Who's Who in Technology Today.

Appointed to Board of Examiners for Ph.D. Thesis Examination, Patua University Bihan India. (External examiner).

Jensen

Conference Paper at Boulder Damage Symposium "Laser Induced Damage in Optical Materials: 1981" at National Bureau of Standards, Boulder, Colorado 11/15/81.

American Physical Society Meeting -- Washington D.C., April 1982.

Member: American Physical Society; IEEE; American Vacuum Society; AAAS; Materials Research Society; Elected member - New York Academy of Science (1981); Invited to give paper — U.S. Workshop on the Physics and Chemistry of HgCdTe -1983 (at Honeywell-Bloomington, MN).

Prizes, awards, grants, fellowships, etc.

Grant -- Dept. of Energy 1982-83 ($70,700) (June 30, 1981--June 30, 1983)

Elected member - New York Academy of Sciences 1981

Grant - Dept. of Energy, June 1981 — June 30, 1982 (51,700).

Consulted on research contract for Air Force at Hanscom Air Force Base-Aug. 1981.

Kirczenow

Research supported by 3—year grant from NSF. Work was on electron-hole liquids and their surfaces on intercalated graphite, and on solid surfaces.

Member of American Physical Society.

Presented contributed papers at March 1982 meeting of APS in Dallas, Texas and New England Meeting of APS held in Boston, May 1982.

Klein

Invited Talks.

1. Kernforschungsanlage Jülich, June 1981.
2. Universität Köln, June 1981.
3. IBM Zurich, June 1981.
4. Technische Hochschule Delft, June 1981,
5. Clark University, Oct. 1981.
6. Kernforschungsanlage, Jülich, May 1982.

Prizes, Award, Grants, Fellowships

1. Grant for Theoretical Irvestigation of Percolation with S. Redner and H.E. Stanley. $120,000/year. Army Research Office.
2. Grant for Research in Polymer Physics with R. Bansil, S. Redner and H.E. Stanley. $70,000/year, Nat'l. Science Foundation.
3. Grant for cooperative research with a group in Naples, Italy in Percolation Phenomena with R. Bansil, S. Redner and H.E. Stanley, $14,000/year. NSF.
4. Awarded a one-month position as visiting scientist at the Kernforschungsanlage, Jülich, Germany, June 1981 and May 1982.
5. Grant for cooperative research with group at CNRS in France with R. Bansil and H.E. Stanley. $34,000/year. NSF.

Kolk

"Mössbauer Studies at the Curie Temperature of Iron", Vth Northeast Hyperfine Interactions Conference, Stony Brook, June, 1982, with D. Hall, Y. Zheng and J.Lumetta.

"The Current Status of Theory of Magnetic Hyperfine Fields", Vth Northeast Hyperfine Interactions Conference, Stony Brook, June, 1982.

"A Simple Method for Determining the Time Resolution in ^{57}Fe Mössbauer Coincidence Spectroscopy", Vth Northeast Hyperfine Interactions Conference, Stony Brook, June, 1982, with R. Quanrude.

"Study of the Electronic Structure and Lattice Dynamics of Iron at the Curie Temperature", APS--New England Section, May, 1982, with D. Hall, Y. Zheng, and J. Lumetta.

"A Method for Obtaining an Effective 100% Recoilless-Gamma-Ray Emitting Source", APS-New England Section, May, 1982, with A. DiDonato.

"Study of Spontaneous Decay with the Mössbauer Effect", APS--New England Section, May, 1982, with R. Quanrude.

"Spherical Electrostatic Electron Spectrometer", IVth Northeast Hyperfine Interactions Conference, Boston, May, 1981, with T. Yang, N. Benczer--Koller, T. Kachnowski, and J. Trooster.

Grants:

"Mössbauer Effect Studies on Lattice Dynamics and Hyperfine Fields", NSF, DMR-8026539.

"EXAFS Studies on Dilute Diamagnetic Impurities in Magnetic 3d Metals" (with Eisenberger Stanford Synchrotron Radiation Laboratory.

Consulting: Andover Medical Laboratories and Sylvania.

Miller

Presented paper, Versailles Conference, 1981.

Prizes, awards, grants, fellowships:

NSF (with Booth/Roberts) $116,000

NSF (with Roberts) $52,000

Redner

1. Two seminars at University of Massachusetts, Amherst, MA Oct. 5 & 6, 1981.
2. Seminar at Schlumberger-Doll Research Center, Ridgefield, CT, Oct. 13, 1981. Title: Percolation in Random—Resistor Diode Networks.
3. Talk at 1st Biannual Conference of Physics Graduates at Boston University, Dec. 5, 1981. Title: Percolation and Conduction in Random Systems.
4. Informal Seminar, Center for Polymer Studies at Boston University, Jan. 1982. Title: New results for directed percolation.
5. Banquet speaker for Hamilton-Wenham High School, March 6, 1982. Title: Scaling: A New Symmetry Principle in Physics.
6. Solid State Seminar Series at the University of Toronto, April 12, 1982. Title: Conductivity of Random Resistor-Diode Networks.
7. Semi--annual Statistical Mechanics Meeting, Rutgers University, May 1982. Title: Flory theory for directed lattice animals and directed percolation.

Prizes, awards, grants, fellowships. .

Co—principal investigator on 3 grants:

ARO: "Application of modern methods of statistical mechanics to the percolation problem" (with W. Klein and H.E. Stanley); approximate amount of the award: $400,000.

NSF: "Statistical mechanics of polymers" (with R. Bansil and H. E. Stanley) approximate amount of the award: $210,000

NSF/CNR (US-Italy co—operative program):
"New theoretical and experimental approaches to polymer materials" (with R. Bansil, A. Coniglio, W. Klein and H.E. Stanley); approximate amount of the award: $40,000.

Roberts

Attended the 9th International Conference on High Energy Physics and Nuclear Structure, 6-10 July 1981, Versailles.

Attended the Spring meeting of the American Physical Society, Washington 26-29 April.

Attended Brookhaven National Lab High Energy Discussion Group annual meeting, 17 May.

Invited Talk: "Kaonic and Σ^- Atoms: Present Status and Future Directions". LAMPF II Workshop, Los Alamos Meson Physics Facility, 1-4 Feb. 82.

Invited to speak at the 5th International Symposium on High Energy Spin Physics to be held at Brookhaven Nat. Lab. 16-22 Sept. 1982 on "Measurement of the Σ^- Moment using Exotic Atoms at BNL".

Prizes, awards, grants, fellowships

2nd year award of NSF grant PHY 8007967 with Booth and Miller, $117,496.

3rd year award of NSF grant PHY 7923778 with Miller, $60,000.

Rothschild

1. EMBO Conference on Purple Membrane
"Quantitative Resonance Raman Spectroscopy of Purple Membrane"--Invited talk
Iscia, Italy 7/81.
2. Battelle Conference on Spectroscopic Methods in Biology
"Resonance Raman and FTIR Studies of Purple Membrane"--Invited talk
Battelle Institute, Columbus, Ohio (10/81)
3. Biophysical Society Conference
"Recent Results Using FTIR-Spectroscopy"- Poster, Boston, MA 2/82.
4. Physics Colloquium at McGill University
"How does an Active Transport Pump Work?" 3/82, Montreal, Canada
5. International Biochemistry Conference
"Probing Rhodopsin and Bacteriorhodopsin with FTIR Spectroscopy"--Invited Talk
Perth, Australia 8/15/82

Grants and Fellowships

1. Established Investigator of the American Heart Association 10/79--9/84
This award is given to 25 scientists each year across the country and provides 75% salary support.
2. Principal Investigator "Biophysical Study of Oriented Photoreceptor Membranes"
NSF 9/80-8/82.
3. Co--Principal Investigator "Raman and FTIR Study of Lipid Flexibility" ,
National Institutes of Health 4/1/80-3/31/83.
4. Whitalker Health Science Fund, MIT--Award Jointly with Prof. A. Rich 7/1/80-7/82.

Grants Awarded Since 6/1/82 - Total Award $270,000

5. Principal Investigator "FTIR Study of Ca-ATPase" American Heart Association
9/1/82—8/31/85.
6. Principal Investigator "FTIR Study of Purple Membrane" - NSF 9/1/82-8/31/85,

Shimony

5 lectures on foundations of quantum mechanics and statistical mechanics -- University of South Carolina, August 1981.

7 lectures at Mt. Holyoke College, "Dialogue with Nature", fall 1981.

lecture at Smith College, December 1981, on Maximum Entropy Principle.

lecture at U. Mass., Amherst ---Probability Theory, December 1981.

2 lectures at University of Pittsburgh, one in Philosophy Dept. "An Adamite Proof of the Axioms of Probability and other Reconsiderations on Induction", and one in Physics Dept. on experiments in quantum mechanics, Jan. 12--13, 1982.

lecture at Westinghouse Research Center —Jan. 14, 1982, on hidden variable theories.

lecture at Clark University, Feb. 1982, on experiments in quantum mechanics.

3 lectures at U. of Texas, March 1982 --one in Philosophy Dept. on foundations of induction, two in Physics Dept. on Jaynes's maximum entropy principle and on nonlinear variants of the wave equation.

Coordinator of the Wellesley Committee for a Nuclear Weapons Freeze.

Consulting Editor of The Philosopher's Annual.

Member on the panel on Philosophy of the Physical Sciences, planning for the 1983 International Congress on Logic, Methodology, and Philosophy of Science (in Salzburg).

Prizes, awards, grants, fellowships.

NSF Grant for summer research on Inductive Logic, summer of 1981.

Luce Professor of Cosmology at Mt. Hoyoke College -- fall, 1981.

Stanley

1. Invited speaker, NSF Workshop on New Directions in Polymer Physics, NSF Institute for Theor. Physics, University of California, Santa Barbara, California.
2. Invited speaker, IUPAP International Conference on Statistical Mechanics (STATPHY 15), Edmonton, Alberta, Canada.
3. Opening talk, International Workshop on Water Structure, Rome, Italy.
4. Invited Speaker, International Conference on Disordered Systems and Localization, Rome.
5. Polymers and Random Systems (a series of talks), Peking University and Nanking University.
6. Invited lectures, NATO International Summer Institute on Theoretical Physics, Freiburg, West Germany.
7. Invited Talk, EUROPEAN MEETING ON WATER AND ASSOCIATED LIQUIDS, Pisa, Italy.
8. Invited talk, INTERNATIONAL CONFERENCE ON TWO-DIMENSIONAL MEMBRANE PHENOMENA, Nova Scotia.
9. Invited Talk, INTERNATIONAL CONFERENCE ON MAGNETISM SATELLITE MEETING, Tokyo, Japan.
10. Invited Talk, American Physical Society, Philadelphia PA.

In addition to the above invited talks, the following invited seminars and colloquia were given during 1981-1982:

October 1981	Yale University: Chemistry Colloquium
November 1981	Harvard University: Condensed Matter Physics Colloquium
January 1982	Columbia University: Physics Colloquium
November 1981	New York Polytechnic: Physics Colloquium
May 1982	Bell Telephone Laboratories: Physics Colloquium
May 1982	Courant Institute, N.Y.U., Physics Colloquium

Prizes, Awards, Grants, Fellowships

Guggenheim Fellowship, 1981

New grants: $1,000,000
[ARO, $400,000; ONR, $330,000; NSF, $210,000; NIH, $80,000]

Renewals: $152,000
[NSF-France $113,000; NSF--Italy, $39,000]

Willis

Attended two Quantum Optics conferences at M.I.T.

Attended regularly the M.I.T. Quantum Optics Colloquium.

Attended New England Section of the APS.

Membership in APS

Applied for an NIH grant and received a priority score of 233. This score two years ago would have received a grant. This summer will resubmit an improved grant proposal to NIH.

Zimmerman

Professional Presentations

International Conference on Low Temperature Physics - Aug. 19-25, 1981 UCLA.
AIP Associates meeting Oct. 15, 1981, Washington,D.C., National Academy of Sciences.
APS - meeting Washington D.C., April 26-29, 1982.
AIMMPE meeting Tufts University - Feb. 8, 1982.

Awards

$56,400 - NSF grant held jointly with Brooks for Investigation of Helium 3.

$50,000 — Subcontract from the Air Force for Investigation of Intercalated Graphite.

Computer Access Allocation Board
Member of Chairmen's Search Com. for the Systems Computer and Electrical Engineering Department at College of Engineering
Science Chairmen's Caucus

Reunion of Graduate Alumni held December 5, 1981

A successful reunion took place on Dec. 5, 1981 and despite the inclement weather, many alumni showed up. It was impressive to see that the Physics Department and its alumni could fill a rather busy day of colloquia with their talks, some of which were impressive. The Dean joined us for lunch. Graduate students, alumni and faculty found this a very rewarding experience.

1st BI-ANNUAL CONFERENCE

OF PHYSICS GRADUATES AT BOSTON UNIVERSITY

ROOM 314 - GEORGE SHERMAN UNION

DEC. 5, 1981

PROGRAM

Registration	8:45 - 9:15
Welcoming Remarks	9:15 - 9:30
Berend Kolk (Mössbauer studies)	9:30 - 9:50
John Day (Acoustic Surface Waves, Raytheon, Bedford, MA	9:50 - 10:10
Coffee Break	10:10 - 10:30
Sidney Redner (Percolation)	10:30 - 10:50
Dennis Hamill 3M, St. Paul, Minn. (R&D in Tape)	10:50 - 11:10
Robert Cohen (History)	11:10 - 11:30
Glenn Plimpton (Radome design) MSD Raytheon, Bedford, MA	11:30 - 11:50
George Zimmerman (B.U.) Physics Overview)	11:50 - 12:10
Lunch (Terrace Room)	12:10 - 1:30
Kenneth Janes (B.U. Astronomy Overview)	1:30 - 1:50
Richard Picard (Laser Frequency Standard) Solid State Div., Hanscom AFB, Bedford, MA	1:50 - 2:10
Edward Booth (Int. Energy Physics)	2:10 - 2:30
Lawrence Rothman (Atmos. Transmission) Air Force Geophysic Lab, Hanscom, AFB, Bedford, MA	2:30 - 2:50
Bernard Chasan (Biophysics)	2:50 - 3:10
Coffee Break	3:10 - 3:40
Maged El-Batanouny (Surface Physics)	3:40 - 4:10
Abner Shimony (Foundations of Quantum & Stat. Mech.)	4:10 - 4:30
Dean Edmonds (Commercial Lasers)	4:30 - 4:50
Social Hour	4:50 - 6:30

10/14/81

To: Physics Faculty
From: E. Booth, Grad. Com. Chair
Subject: Grad Reunion & Seminar

The first bi-annual reunion of MA and PhD graduates from Boston University will occur on Saturday Dec. 5. It will be a one day affair featuring a series of "show-and-tell" type talks by the Physics Faculty and incumbent grad students, plus talks by the returning graduates telling about some aspect of their work. It is a good opportunity to hear what's going on both in the Department and "out-there", as well as a chance to meet the old grads or renew acquaintance.

Please save the date. Please expect to come.

Please volunteer to give a 20 min. talk and give me the title.

Undated

To: Physics Faculty
From: E. Booth, Reunion Chairman (new title)
Subject: Speakers and plans for Dec. 5 (Sat.) Reunion.

We now have 11 acceptances for the reunion. After a second mailing and some phone calls I hope for 20 or more in all. We need to make a good showing on our part, and I expect my loyal colleagues to devote that day to the affair - or else we will look <u>real</u> <u>bad</u>!

The program starts at 9AM, alternating with in-house and out-house talks, (after administrators welcome us and tell of the great new future). There will be free lunch and a party from 5-6PM. All graduate students should come for the day. Certainly no one should miss the party. (Friends are invited to the party.)

I suggest the following speakers:

Shimony: Philosophy	Stanley: Polymer Ctr.
Zimmerman: Low Temp.	Willis: Rad. & Matter
Booth: Int. Energy	Franzen: Atomic
Chasan: Bio Phys.	Edmonds: Industrial Lasers
	Hellman: Fund. Particles

You will note that the speakers are mainly persons who might be expected to be recognized by the graduates. (The talks should be 20 minutes long including questions.) These speakers should give a review of what's going on in their area of research. The speakers should refer to the work of the new faculty and point them out to the returning students. Someone should also review the teaching situation, though perhaps this would be done with a hand-out. The total time for these talks is about 4 hours. We expect 2 hours of talks by ex-students with 2 hours for lunch and coffee breaks, that does it for the 9 - 5 day. I would like to have the new faculty on hand especially for the lunch hour when they should be available to answer questions from graduates. Poster sessions would be nice at lunch hour.

I strongly urge you to encourage your graduate students to attend the meeting. They will make some good contacts, learn more about what goes on here (and "outside") and perhaps make some useful contacts.

Let us discuss this further at a luncheon meeting.

12/8/81 Report of Faculty Meeting

A report of the alumni reunion was given by Booth and others who were present at that reunion. About 12 alumni showed up as well as many faculty and some graduate students. The program was a worthwhile one and regrets were expressed that not more graduate students came since the presentations gave a rather good picture of what the Department is doing as well as what some of our alumni are doing. The desire was expressed to make this a biannual event and having a party for our alumni in the year when no symposium is held. The symposium was an impressive affair and the words of the Dean regarding the future of our Department were quite encouraging.

Joint Spring meeting of the New England Section of the APS and American Association of Physics Teachers May 21-22, 1982.

Prof. Franzen and the local committee consisting of Profs. James Brooks, Kirczenow, and Redner, organized an impressive meeting with excellent speakers. Notices of the meeting as well as its program follow:

5/4/82 Prof. Franzen announced that he has about 10 abstracts as of that date for the New England APS meeting. Other details of the meeting were discussed.

5/18/82 The APS meeting committee reported on the progress of preparation for this May 21 and 22 NEAPS meetings. A lunch was scheduled for our visitors on Friday at 1:15 and hosts were responsible for faculty talking to visitors. The hosts were: Stanley for DeGennes and Stockmeyer; Batanouny for Overhauser; Brooks for Richardson; and Kirczenow for Singwi.

The May 1982 Meeting of the New England Section of the American Physical Society at Boston University

The New England Section is one of several regional associations of the American Physical Society (APS). Meetings of the Section take place twice a year, and wander about from one college or university campus to another. Traditionally, these meetings attract audiences of moderate size, consisting largely of physics teachers and professors, some industrial scientists and physics students in the New England region. The Section is run by an Executive Committee. This year, Professor Stanley of our department became Chairman of the Committee; Professor Franzen has been serving as a member of the Committee for the past two years.

A few years ago, a sentiment began to grow in the Executive Committee that the major academic institutions in New England should participate to a greater extent than had been customary in the affairs of the Section, and in particular should be encouraged to become hosts of future meetings. This sentiment found a partial realization when M.I.T. served as host in the Fall of 1980, and Boston University was chosen as host of the Spring 1982 meeting.

Another pertinent development in the affairs of the Section was a concern on the part of the Council (the governing body) of the APS that attendance at general (national) meetings has been declining steadily for several years. This decline has been accompanied by a substantial growth of more specialized meetings. In view of the fact that the decline of the general meetings undoubtedly has been provoked to some extent by sharp increases in travel and hotel costs in recent years, the regional sections of the APS were encouraged by the Council to upgrade the technical level of the Section meetings. (This sentiment was conveyed to us by Bill Havens, Executive Secretary of the APS.)

For these reasons, the Local Committee charged with planning the May 1982 meeting at Boston University has decided to follow an ambitious

tack in planning the technical program.. We chose two important current topics in condensed-matter physics and have invited outstanding speakers on each subject. The two principal topics are "Degenerate Fermi Fluids" and "Polymer Physics and Statistical Mechanics". Three speakers, Singwi, Overhauser and Robert Richardson have agreed to deliver invited talks on different aspects of the first principal topic, and two, deGennes and Michael Fisher will deliver invited talks on the second subject. (Titles of the talks to be delivered and brief biographical sketches of the speakers are listed below.)

The Local Committee has also proposed two further innovations: The Section meeting is to be held on May 21 and 22, 1982, the weekend after our Commencement, instead of in late April, the traditional meeting time, and instead of the customary contributed papers, we plan to have a poster session. Meeting after Commencement assures us of more university space than would be available earlier. We hope that the poster session will allow better communication than has been the case in the contributed paper sessions at other sectional meetings.

TENTATIVE PROGRAM

I. Degenerate Fermi Fluids

(a) K.S. Singwi
"The Properties of the Two-Component Electron-Hole Liquid in Semiconductors"

(b) Albert W. Overhauser
"Charge-Density Waves in Simple Metals."

(c) Robert Richardson
"Liquid Helium-Three: A Degenerate Fermi Fluid."

II. Statistical Mechanics and Polymer Physics

(a) P.G. deGennes
"Physics of Reactions in which the Constituents are Constrained to be on Polymer Chains."

(b) Michael Fisher
"Recent Work in Phase Transitions"

BIOGRAPHICAL SKETCHES OF INVITED SPEAKERS

P.G. deGennes

Professor at the École Supérieure de Physique et Chimie in Paris, France. Internationally-known expert on statistical mechanical applied to polymer chains, liquid crystals and superconductivity. He won the gold medal of the French Academy of Science last year, and will receive an honorary degree from Boston University in May 1982.

Michael Fisher

Professor of Physics, Chemistry and Mathematics at Cornell University. Loeb Lecturer at Harvard University in 1979. Best known for his work on the statistical mechanics of phase transitions and critical phenomeana. He won the Irving Langmuir Prize for his work on phase transitions, and shared the Wolf Prize in 1981.

K.S. Singwi

Professor at Northwestern University. A prominent many-body theorist, best known for his contribution to the theory of interacting electron systems. Expert on the electron-hole liquid in semi-conductors.

Robert Richardson

Professor at Cornell University. Well-known experimenter in low-temperature physics. He shared the Oliver Buckley Prize in condensed-matter physics in March 1981 for "his discovery and pioneering research on the superfluid phases of liquid Helium-Three".

Albert Overhauser

Professor at Purdue University. An internationally prominent expert on solid-state physics, magnetic resonance and basic quantum phenomena. Well known for his invention of the 'Overhauser Effect', a dynamic method for aligning nuclear spins at low temperatures. He is co-inventor of the neutron-spin interferometer. He is the proponent of a controversial theory of charge-density waves in simple metals. Member of the National Academy of Science.

Submitted by the Local Committee for the May 1982 Meeting: James Brooks
Wolfgang Franzen/Chairman
George Kirczenow
Sidney Redner

JOINT SPRING MEETING

NEW ENGLAND SECTION, AMERICAN PHYSICAL SOCIETY

NEW ENGLAND SECTION, AMERICAN ASSOCIATION OF PHYSICS TEACHERS

SOCIETY OF PHYSICS STUDENTS
Boston University
May 21-22, 1982

Note to participants:

This envelope contains the announcements for the spring 1982 meetings of the New England Sections of the American Physical Society and the American Association of Physics Teachers, as well as a map of the Boston University campus, instructions for preparing posters of contributed papers, and four separate folded sheets:

1. The registration and luncheon reservation blank for both meetings;

2. A parking place entitlement form (with instructions);

3. A form for reserving overnight accommodations;

4. A registration form for the AAPT workshops.

Note that the accommodations and luncheon reservation forms should be sent to the address indicated on the forms. If you wish to be certain of your accommodation and your place at the luncheon, the reservation forms should be mailed in time for delivery on or before April 21, 1982 (4 weeks prior to the meeting).

NEW ENGLAND SECTION, AMERICAN PHYSICAL SOCIETY

CALL FOR CONTRIBUTED PAPERS:

There will be a poster session of contributed papers from 9:00 to 10:00 AM in the lobby of the Boston University Law School Auditorium. If you wish to present a poster, please send an abstract to Prof. Wolfgang Franzen, Chairman of Local Committee, NES/APS, Department of Physics, Boston University, Boston, Ma. 02215. The deadline for receipt of abstract is May 3, 1982. The abstract must be accompanied by the filled-out registration form and the registration fee of $5.00.

Instructions for preparing the posters are included in the material attached to this sheet. If you wish to have your abstract printed in the APS Bulletin, please enclose a signed request and an additional check for $30.00 made out to Local Committee, NES/APS. All abstracts received by May 3, regardless of whether the $30.00 fee and signed request are included, will appear in the final program available on the day of the meeting at the registration desk located in the lobby of the Law School auditorium.

NES/APS MEETING PROGRAM

Friday, May 21

1:00 - 6:00 PM: Registration (Lobby of Law School Auditorium)
3:00 - 6:00 PM: Tutorial session on Degenerate Fermi Fluids (Law School Auditorium)

Robert C. Richardson, Cornell University "Helium-Three: The Magnetic Superconductor Without Charge."

Albert W. Overhauser, Purdue University "Many-Electron Theory in Broken-Symmetry Potassium."

K. S. Singwi, Northwestern University "On a New Phase Separation in an Electron-Hole Liquid: Theory and Experiment."

Friday Evening: Open

Saturday, May 22

8:00 - 8:45 AM: Meeting of NES/APS Executive Committee (Howard Johnson's Motor Hotel, 575 Commonwealth Avenue, Boston. A complimentary breakfast will be served.)
8:30 - 9:00 AM: Coffee and Doughnuts (Lobby of Law School Auditorium)
9:00 - 10:00 AM: Poster session of Contributed Papers (Lobby of Law School Auditorium)
9:30 - 10:00 AM: Business Meeting of the New England Section(Law School Auditorium)
10:00 AM - 12:00 Noon: Tutorial Session on Polymer Physics and Statistical Mechanics (Law School Auditorium)

P. G. De Gennes, École Supérieure de Physique et Chimie, Paris, France: "Physics, Chemistry and Statistics of Micro-Emulsions."

Walter Stockmayer, Dartmouth College: "Problems in Chain Dynamics."

12:00 - 1:30 PM: Catered Luncheon (Ballroom on 2nd floor of Sherman Union)

SOCIETY OF PHYSICS STUDENTS

For information concerning the program planned by the Society of Physics Students, please write or call:

Prof. C. Daniel Cole
Department of Physics and Applied Physics
University of Lowell
Lowell, MA 01854

Tel. No. 617-452-5000, ext. 2530 (Information concerning this program was not received at Boston University in time for inclusion in this mailing)

AMERICAN ASSOCIATION OF PHYSICS TEACHERS
NEW ENGLAND SECTION

JOINT MEETING WITH APS-NES
May 21-22 BOSTON UNIVERSITY

CALL FOR PAPERS:

There will be a poster session for contributed papers on Saturday morning, from 9:00 to 10:00 am in the lobby of the Boston University Law School Auditorium. Papers should be on some subject relevant to the teaching of physics. Physics teachers should take advantage of this opportunity to share ideas they have found helpful in their own teaching experience, including equipment demonstrations. Teachers and students at all levels (high school, two-year college, and four-year college or university) are encouraged to submit posters to this session. (See separate sheet of instructions for format.)

Abstracts should be mailed by May 7 to: Dr. Ken Flowers
Program Chairman AAPT-NES
Castleton State College
Castleton, VT 05735

INVITED PANEL DISCUSSION:

One of the highlights of the meeting will be a panel discussion on "The Teaching of Physics" from 10:00 am to 12:00 noon in the Terrace Lounge of the George Sherman Union (2nd floor). The discussions will cover education from the high school level on up through the advanced undergraduate level. Several distinguished physics teachers from the New England area have been invited to give us their insights on various aspects of physics education and to take part in discussion both among themselves and with the audience.

The panel will consist of: Moderator: Eric Sheldon, Lowell University
Panelists: Paul Bamberg, Harvard University
Anthony P. French, MIT
June Matthews, MIT
Judah Schwartz, MIT

WORKSHOPS: See the separate description and registration forms for the Workshops being offered at this meeting.

PROGRAM OF EVENTS: Fri, May 21 3:00 pm - 6:00 pm - Microcomputer Workshop

Sat., May 22
8:00 am - 9:00 Registration/Coffee (Law School Auditorium Lobby)
8:30 am - 9:00 Business Meeting AAPT-NES-All are invited (Terrace Lounge-Sherman Union)
9:00 am - 10:00 Poster Session of Contributed Papers (Law School Auditorium Lobby)
10:00 am - 12:00 noon: Panel Discussion on "The Teaching of Physics" (Terrace Lounge-Sherman Union)
12:00 - 1:30 pm Catered Luncheon (Ballroom-Sherman Union)
1:30 - 4:30 pm Workshops, Hot Air Solar Panel
Hot Water Solar Panel
AAPT Microcomputers--Second Half
(For location see separate sheet on these events)

AAPT-NES OFFICERS:

President-Peter Glanz, Rhode Island College, Providence, RI 02908
Vice-President/Program Chairman, Ken Flowers, Castleton State College, Castleton, VT 05735
Secretary-Jack Willis, URI, Kingston, RI 02881
Treasurer-Claire Anderes, 61 Champlin Road, Saunderstown, RI 02874
National AAPT Representative: Donald Kirwan, URI, Kingston, RI 02881

ACKNOWLEDGEMENTS: NES-AAPT gratefully acknowledges the support of NES/APS and their local program chairman Wolfgang Franzen. Special thanks also go to Janey Guernsey for her assistance in planning the meeting and lining up speakers.

AAPT WORKSHOPS: DESCRIPTION

May 22, 1:30 - 4:30 PM (Room 232, Physics Building, 2nd floor)
Workshop: Construction of Hot Water Solar Panel.
Workshop Leaders: Marie Joost - Cox URI
Don Kirwan - URI

Build a Hot Water Solar Panel - A "hands-on" construction workshop. Each participant will construct and take home an 18" x 24" solar panel in a thermo-syphon hot water system. All materials will be pre-cut and construction materials provided. Lesson plans will be included for classroom use in addition to typical efficiency data. A registration fee of $40 is required.

May 22, 1:30 - 4:30 PM (Room 232, Physics Building, 2nd floor)
Workshop: Construction of Hot Air Solar Panel.
Workshop Leaders: Jack Willis - URI
Don Kirwan - URI

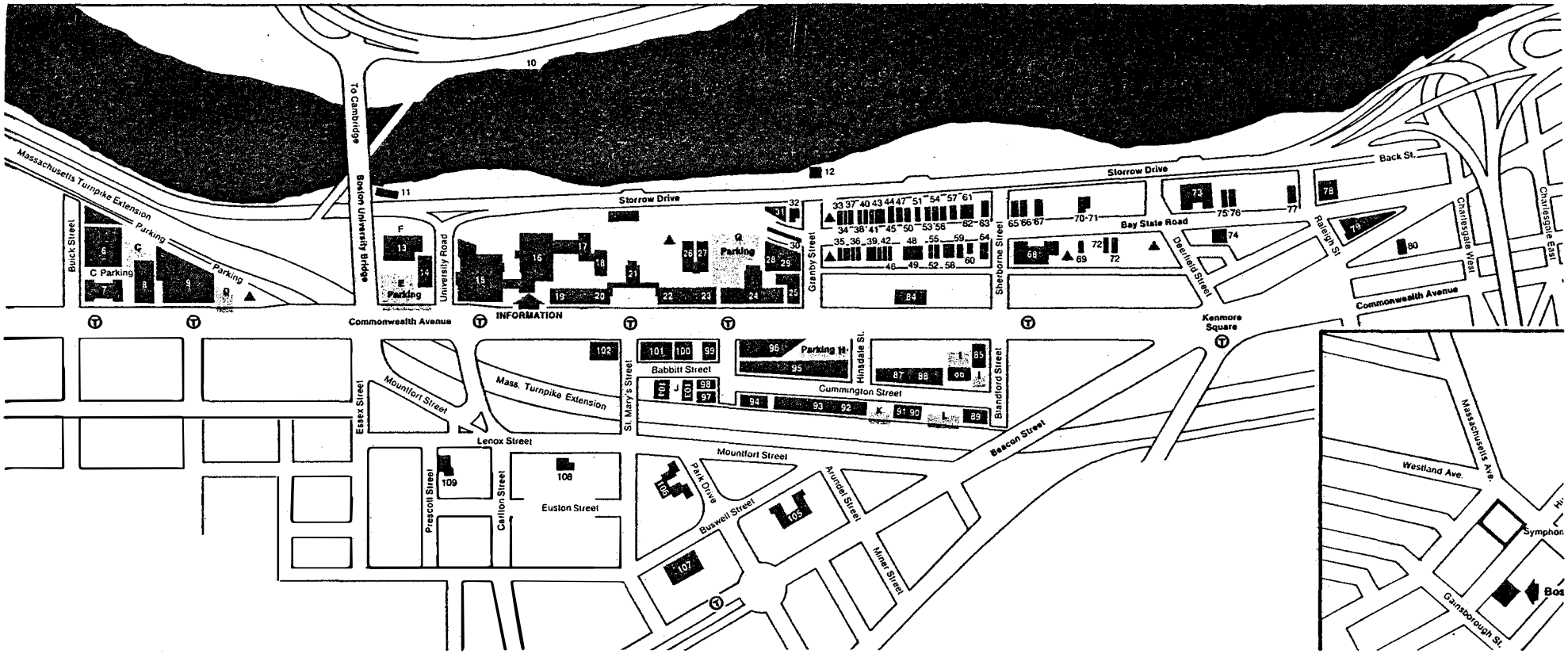
Build a Hot Air Solar Panel - Construct and take home a solar panel to fit into a south-side window to heat a room. All materials will be pre-cut and construction tools provided. A registration fee of $25 is required.

May 21, 3:00 - 6:00 PM
May 22, 1:30 - 4:30 PM (A 6-hour workshop - Room 167, Physics Building, 1st floor)
Workshop: An Introduction to Microcomputers as Laboratory Instruments.
Workshop Leader: Ken Flowers-Castleton State College.

A product of nearly two years of effort, these materials, designed to introduce the physics teacher to applications of inexpensive microcomputers in the laboratory, are now available for nationwide distribution. However, in order to qualify to lead a presentation in your area, you must have attended a previous offering of the workshop. The workshop emphasizes applications of the microcomputer as a general-purpose laboratory instrument. The style of instruction is highly interactive, with emphasis on "hands-on" use of the microcomputer. No previous experience with microcomputers is assumed. The workshop activities will include:

I. Introduction--Workshop Procedures
II. Application: Solar Energy Experiment
III. Microcomputer Basics
  A. Number Systems
  B. Architecture
  C. Introduction to Programming
  D. Digital Input/Output
  E. Analog Input/Output
IV. Applications
  A. Function Generator
  B. Pendulum/Timer
  C. Signal Processing (Fast Fourier Transforms)
  D. Diffraction Intensity Measurements
  E. Heat Flow

A registration fee of $40 is required.



Map of Boston University

G	SMG Parking Lot
96	700 Commonwealth Avenue Dormitory Towers (Take escalator to 3rd floor)
18	Law School Auditorium
15	Sherman Union Bldg. (Ballroom on 2nd floor)
95	Physics Bldg.

POSTER INFORMATION

As you prepare your poster for the NES/APS and NES/APPT Meetings, please observe the following rules:

1. Boards available for posters are 32" x 48" display boards. Double-sided tape will be available to attach your posters to the boards.

2. Boards have two sides. Use one side for one poster. Allow the other side to be used by another person.

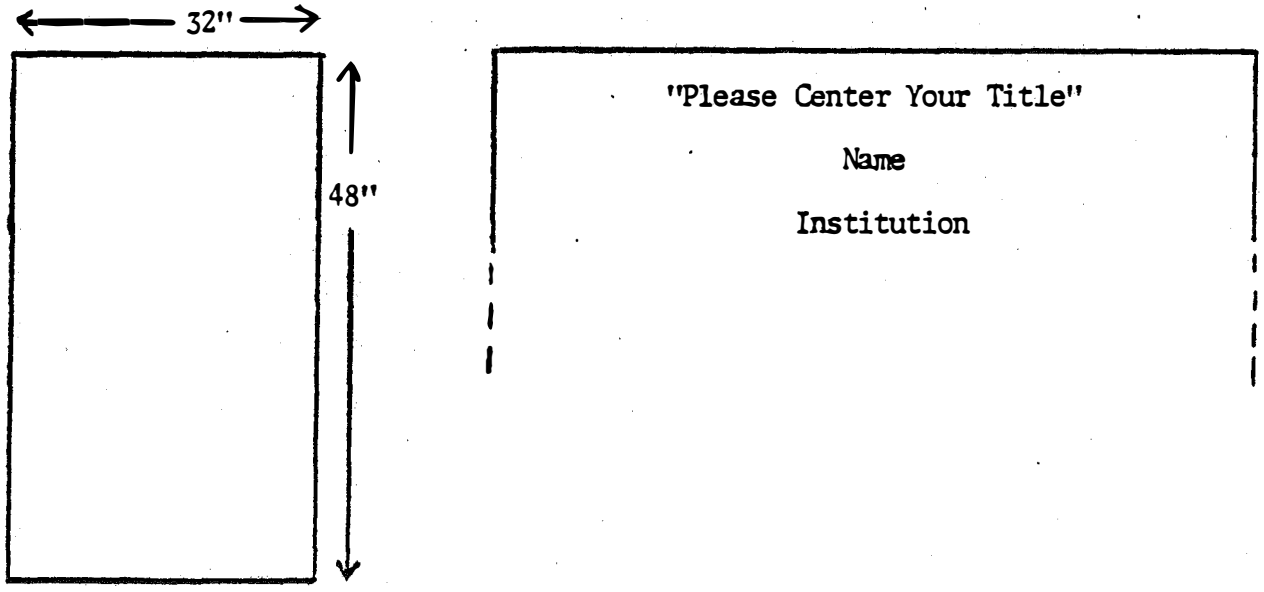
3. Please do not allow your poster to exceed the size of the board.

4. Posters may be lettered by hand or mechanically BUT LETTERS SHOULD IN NO CASE BE SMALLER THAN THESE (IBM ORATOR TYPE BALL, 10).

5. For uniformity of posters, please center your title, name(s) and institution in the first 1' of board. Letters of the title should be at least 1" high.

6. Posters should be set up between 8:00 and 9:00 AM on the morning of Saturday, May 22, 1982 in the lobby of the Law School Auditorium (directly behind Marsh Chapel).

7. The POSTER SESSION of the two meetings will be held from 9 to 10 AM on Saturday morning in the same lobby.



JOINT SPRING MEETING

NEW ENGLAND SECTION, AMERICAN PHYSICAL SOCIETY

NEW ENGLAND SECTION, AMERICAN ASSOCIATION OF PHYSICS TEACHERS

Boston University
May 21-22, 1982

FINAL PROGRAM OF EVENTS

Friday, May 21

1:00 - 6:00 PM: Registration (Lobby of Law School Auditorium) (Registration fee $5.00)

1:00 - 4:30 PM: AAPT Workshop: "An Introduction to Micro-computers as Laboratory Instruments, Part I" (Room 232, Physics Building, Ken Flowers, Leader) (Open to prior registrants only)

3:00 - 6:00 PM: Tutorial session on "Degenerate Fermi Fluids" (Law School Auditorium)
G.O. Zimmerman, Chair

Robert C. Richardson, Cornell University "Helium-Three: The Magnetic Superconductor Without Charge."

Albert W. Overhauser, Purdue University "Many-Electron Theory in Light of the Broken-Symmetry of Potassium."

K.S. Singwi, Northwestern University "On a New Phase Separation in an Electron-Hole Liquid: Theory and Experiment."

Friday Evening: Open

Saturday, May 22

8:00 - 8:45 AM: Meeting of NES/APS Executive Committee (Howard Johnson's Motor Hotel, 575 Commonwealth Avenue, Boston) (A continental breakfast will be served.)

8:30 - 9:00 AM: Coffee and Doughnuts (Lobby of Law School Auditorium)

9:00 AM - 12:00 Noon: Registration (Lobby of Law School Auditorium)

9:00 - 10:00 AM: Poster Session of Contributed Papers (Abstracts of Papers Attached) (Lobby of Law School Auditorium)

9:30 - 10:00 AM: Business Meeting of the New England Section, APS (Law School Auditorium)

10:00 AM - 12:00 Noon: Tutorial Session on Polymer Physics and Statistical Mechanics (Law School Auditorium)

H,E. Stanley, Chair

P.G. De Gennes, École Supérieure de Physique et Chimie, Paris, France: "Physics, Chemistry and Statistics of Micro-Emulsions."

Walter Stockmayer, Dartmouth College: "Problems in Chain Dynamics."

10:00 AM - 12:00 Noon: AAPT Panel Discussion: "The Teaching of Physics" (Terrace Lounge, George Sherman Union, 2nd floor)

Moderator: Eric Sheldon, Lowell University
Panelists: Paul Bamberg, Harvard University
Anthony P. French, MIT
June Matthews, MIT
Judah Schwartz, MIT

12:00 - 1:30 PM: Catered Luncheon (Ballroom on 2nd floor of Sherman Union) (Luncheon tickets at $6.00 may be bought at the registration desk)

1:00 - 4:30 PM: AAPT Workshops:

"An Introduction to Microcomputers as Laboratory Instrument, Part II"
(Room 232, Physics Building; Ken Flowers, Leader)
(open to prior registrants only)

"Construction of a Hot Water Solar Panel"

"Construction of a Hot Air Solar Panel"
(Room 167, Physics Building; Jack Willis, Marie Joost, Don Kirwan, Leaders)

Local Committee for NES/APS Meeting:

James Brooks
Wolfgang Franzen (Chairman)
George Kirczenow
Sidney Redner

ABSTRACTS OF CONTRIBUTED PAPERS

A. Semiconductors

Angular Scan Spectrum of a Surface Plasma Excitation on a Schottky Diode. JOHN DEROV, YE-YUNG TENG and ARAM S. KARAKASHIAN, U. Lowell*.--A gold on n-type silicon Schottky diode has been used as a sample in an attenuated total reflection experiment. The photovoltage and reflectivity were measured simultaneously as a function of the angle of incidence on the base of the prism coupler. An air gap and a sodium fluoride coating on the gold contact were used as the spacer layer between the diode and the prism coupler in the Otto configuration. A linearly polarized helium-neon laser was used in both the S and P-polarization configuration as the source in the angular scan experiment for angles of incidence on the prism base above and below the critical angle. The evanescent wave that was generated in the spacer layer by the P-polarized light above the critical angle excited the surface plasma mode on the gold surface. The excitation of this mode was observed by a peak in the photovoltage and minimum in the reflectivity which occurred at the same angle. In addition, the excitation of a mode associated with S-polarized radiation above and below the critical angle was also observed in both the photovoltage and reflectivity. These spectra were compared to theoretical results calculated from the optical constants of the media. *Supported by NSF grant ENG-7901641

The Role of Surface Structure in the Phase Separation of the Binary Electron-Hole Liquid. G. KIRCZENOW, Boston U.*--Microscopic calculations are presented of the surface and interface structure of the binary electron-hole liquid in <111>-stressed Ge at T = 0. The separation of the electron-hole droplet into two coexisting phases[1] is found to have a surface precursor. The phase separation is predicted to occur without any nucleation process or hysteresis effects even though the phase transition is first order. Perfect wetting between the two liquid phases is predicted. Experimental implications are discussed.

*Work supported by the National Science Foundation Grant No. DMR-8023739

[1]G. Kirczenow and K.S. Singwi, Phys. Rev. Lett. 41, 326 (1978); J. Bajaj, F.M. Tong and G.K. Wong, Phys. Rev. Lett. 46, 61 (1981).

Radiation Damage to CdTe Crystals.* R. DEVITO, C. DEVANEY, ** Suffolk University. The effect of Co^{60} gamma radiation on cadmium telluride crystals is studied. Results are presented for the behavior of bulk crystal and crystal detectors before and after irradiation using a Lecroy multichannel analyzer in a CAMAC data acquisition system and a Perkin-Elmer optical absorbance spectrophotometer. Absorbed radiation dosesge in the samples are calculated based on Fricke dosimetry measurements in the Suffolk University Gammacell 220 source.

* Submitted by Walter Johnson
** Supported by a Sendix Award from the Society of Physics Students

Resonant Electronic Raman Scattering from Semiconductor Donors, R. ZEIGENBLATT,* R.L. AGGARWAL and B. LAX, M.I.T. Francis Bitter National Magnet Laboratory†--We present the results of a quantitative theory which shows that bandgap resonant light scattering is an effective tool for studying the energy level structure of shallow donors, particularly in polar materials where infrared absorption experiments are not practical. Our high (200 kG) magnetic field experiments on CdS demonstrate substantial deviation from the predictions of effective mass theory, giving evidence for the breakdown of the Born-Oppenheimer approximation when vibrational and magnetically tuned electronic levels approach degeneracy. The ability to probe the important resonance region follows from the use of visible spectroscopy to circumvent the Reststrahl blindspot. Quantitative analysis of the results provides an excellent test of the applicability of the Fröhlich hamiltonian, which forms the basis for our understanding of electron-phonon coupling in polar semiconductors.

*Also Department of Electrical Engineering and Computer Science.
†Supported by the National Science Foundation.

Nonlinear screening of positive and negative point charges in GaAs. P. CSAVINSZKY and K. R. BROWNSTEIN, Univ. of Maine.--We have used our variational approach[1,2] for approximately solving Resta's nonlinear Thomas-Fermi equation[3] for the potential of (point) charges in GaAs. We have considered the cases of charges (in atomic units) Z = ± 0.16, ± 1.16, ± 0.84. The charges Z = + 0.16 and Z = - 0.16 are the effective charges due to the partial ionicity of the chemical bonds on a Ga and As site[4], respectively. The charge Z = + 0.84 corresponds to a Column VI donor on an As site, while that of Z = + 1.16 to a Column IV donor on a Ga site. Similarly, the charge of Z = -1.16 corresponds to a Column IV acceptor on an As site, while that of Z = -0.84 to a Column II acceptor on a Ga site. As a result of our calculations, we have obtained site-dependent and charge-dependent spatial dielectric functions that describe the screening of the (point) charges by the valence electrons of (pure) GaAs.

1. P. Csavinszky and K.R. Brownstein, Phys. Rev. B 24, 4566 (1981).
2. P. Csavinszky and K.R. Brownstein, Phys. Rev. B 25, 1382 (1982).
3. R. Resta, Phys. Rev. B 16, 2717 (1977).
4. R. M. Martin and K. Kunc, Phys. Rev. B 24, 2081 (1981).

Some Calculations of Methane Adsorption on Graphite at Low Coverage. J.S. Brown, Univ. of Vermont **Calculations of the isosteric heat of adsorption q_{st} of methane molecules adsorbed on the basal plane of a graphite lattice are presented, using both WKB integral and quasiharmonic approximations. The CH_4-C interaction potential is chosen to be of Lennard-Jones 6-12 form with parameters fitted to recent gas phase virial coefficient data. The results, which agree well with each other, are compared to empirical estimates of q_{st} taken from adsorption isotherm and gas chromatography studies.

B. Dielectrics

Dielectric Anomalies in Eu_2IrO_7 and Eu_2RuO_7. L.C. KUPFERBERG, and M.V. BALAKRISHNAN, Worcester Polytechnic Institute. S.O. MOYER and R. LINDSAY, Trinity College. - The complex dielectric response of Eu_2IrO_7 and Eu_2RuO_7 has to be measured as a function of temperature, $1K \leq T \leq 300K$. Anomalies in both Re ε and Im ε are seen in the neighborhood of T = 140K in both compounds. Anomalies are also seen in both the real and imaginary parts of the dielectric response of Eu_2RuO_7 at $T \sim 90K$. We discuss a model relating the tunneling of F^- ions, between sites in the lattice, to the dielectric response. The possibility of an order-disorder transition involving the configuration of the F^- ions is explored.

Dielectric Response of Hindered Dipoles. L.C. KUPFERBERG and M.W. KLEIN, Worcester Polytechnic Institute. - We model the response of a dipole, constrained to point along one of six possible directions, $\pm x$, $\pm y$, $\pm z$. We discuss how tunneling, between orientations, partially lifts the degeneracy of the six original states. The interaction of the dipole with an electric field is treated, first as a perturbation and then exactly. The partition function, free energy and the d.c. dielectric response are calculated. Interactions between dipoles and ordering are considered in the mean field limit. Our results are compared with measurements of the dielectric response of Eu_2IrO_7 and Eu_2RuO_7.

C. Mössbauer Spectroscopy

A Method for Obtaining an Effective 100% Recoilless-γ-Ray Emitting Source. A. DIDONATO, B. KOLK, Boston University. A method is presented which permits the precise determination of the recoilless fraction of a sample by using an additional correction absorber in a conventional transmission-geometry, constant-acceleration arrangement. With the aid of the correction absorber, the non-recoilless γ-rays and the background can be eliminated so that the source can be considered as having an effective recoilless fraction of one. The particular motion of the correction absorber with respect to the source is controlled by a microprocessor. The velocities of the correction absorber and source are monitored by two separate Michelson-interferometers.

Study of the Electronic Structure and Lattice Dynamics of Iron at the Curie Temperature. D. HALL, B. KOLK, Y. ZHENG, J. LIMPERIS, Boston University. We measured the isomer shift and recoilless fraction of ^{57}Fe atoms in metallic iron from 300 K to 1200 K employing the Mössbauer effect. From the isomer shift measurements we determined the variation of the electron density $|\psi(0)|^2$ at the nuclear iron site, and from the recoilless fraction measurements the mean square displacement of the iron atoms. Previous isomer shift measurements[1] indicated that $|\psi(0)|^2$ undergoes a jump at the Curie temperature. Various theoretical attempts have been made to give a satisfactory explanation for this effect. In recent measurements[2] no discontinuity of $|\psi(0)|^2$ at the Curie temperature has been observed; similarly, our measurements of various samples show no such discontinuity.

[1] R.S. Preston, Phys. Rev. Letters 19, 75 (1967).

[2] M.A. Kobeissi, et al. Hyperfine Interactions 4, 485 (1975).

Study of Spontaneous Decay with the Mössbauer Effect. R. QUAMRUDE, B. KOLK, Boston University. The probability for spontaneous decay of a nuclear state as a function of time t is, except for extremely small or large values of t, rather well described by an exponential function, $P(t) = \exp(-t/\tau)$, where τ is the mean life of the transition. The energy of a spontaneously emitted γ-ray is not sharply defined but determined by a Lorentzian distribution centered around an average energy E_0 and with a natural width $\Gamma = \hbar/\tau$. The probability that a γ-ray with energy E is emitted during a time t is no longer purely exponential, according to theory, but given by $P(E,t) = f(E,t)\exp(-t/\tau)$ where $f(t)$ is an oscillating function. To study $f(E,t)$ experimentally, a detector with an energy resolution of the order of the linewidth Γ is required. The energy resolution of conventional detectors is orders of magnitude too small. However, with the help of the Mössbauer effect a "detector" can be made with the required energy resolution. Experiments[1,2] which confirm the oscillating behavior of $f(E,t)$ do not agree well with the theoretical predictions. To shed some light on this discrepancy between experiment and theory, we have built a γ-ray coincidence Mössbauer spectrometer for studying the spontaneous decay of the 14.4 keV state of ^{57}Fe. This spectrometer, its time resolution, and other properties are discussed here.

[1] R.E. Holland, F.J. Lynch, G.T. Perlow, and S.S. Hanna, Phys. Rev. Letters 4, 181 (1960).

[2] H. Drost, K. Palow, and G. Weyer, J. de Phys. C6, 679 (1974).

D. Liquid Helium

Effective Viscosity of Liquid He^4 with minute He^3 Impurity.* R. C. Pandorf,** C. S. Draper Laboratory, Cambridge, MA -- Measurements were taken with a Couette viscometer between 0.05K and 2K for three different fluid gaps (.05, .12, .15cm) and surface materials. The velocity independent viscosity measurements were in agreement with the work by Woods and Hallett[1] made to 0.8K. Near 0.65K the observed viscosity reached a maximum between 220 to 300 μP, depending upon the fluid gap and then for the purest He^4 samples fell at a rate somewhat greater than T^4 to values below the sensitivity of the viscometer of 0.1μP. With the presence of minute amounts of He^3 impurity the observed viscosity approximated a T^4 dependence below about 0.2K. Using the excitation collision times computed by Zharkov[2] and Khalatnikov and a simple two parameter surface model for the excitation to surface interactions, an analytic expression for the effective viscosity for the case of parallel surface geometry was developed. By fitting the two (constant) surface parameters, this theoretical expression well represents the experimental data.

*Work supported by U. S. Navy, Draper's IR&D and ONR.
**Present address: 139 Winchester St. Newton Highlands MA 02161

[1]Woods, A.D.B. and Hallet, A.C.H., Can. J. Phys., 41, 596 (1962)
[2]Zharkov, V.N., Soviet Phys, JETP 6, 714 (1958)

The Effective Mass of Helium 3 at SVP. G.O. ZIMMERMAN, Boston University. --Because of disagreements in the measurement of the specific heat of He3, a compilation of the data taken by various investigators since 1959 was made. The data falls into two categories, one having an effective mass higher than the other. In general, the higher effective mass is obtained in cells with small pores. It is suggested that the high effective mass is due to long range excitations in He3 induced by walls. In many cases a paramagnetic salt, CMN was present. The CMN He3 coupling may be an effective way of inducing the long range excitations.

Measurement of the Total Magnetic Susceptibility of Pressurized Helium at Low Temperatures. J.S. Brooks, G.O. Zimmerman†, Boston University and R. Meservey, Francis Bitter National Magnet Laboratory*, M.I.T.-We have constructed and tested a new apparatus to investigate the total magnetic susceptibility of pressurized helium at low temperatures and high magnetic fields. Details of this design and recent results will be presented.

†Work supported by the NSF Grant DMR-8113456
*Supported by the NSF

E. Magnetic Resonance

Spin Resonance Frequencies in Spin-Glasses with Random Anisotropies - CHRISTOPHER L. HENLEY, H. SOMPOLINSKY, and B. I. HALPERIN, Harvard U. -- In Heisenberg spin-glasses with weak Dzyaloshinskii-Moriya anisotropic interactions, the macroscopic anisotropy energy E_{an} is proportional to $\cos\theta$ where θ is the angle by which the spins are rotated from their frozen metastable directions. Incorporating E_{an} into a "hydrodynamic" free energy the uniform spin wave spectrum of the system is calculated as a function of the remanent magnetization $\vec{M}_r$ and an applied field H at arbitrary angles. The resulting three modes are mixed longitudinal and transverse unless $\vec{H} \parallel \pm \vec{M}_r$. In the latter case, the longitudinal frequency is proportional to $\cos\theta_r$ where θ_r is the angle between $\vec{H}_r$ and the cooling field. The predicted field for resonance has a rich angular dependence and is consistent with recent ESR measurements on CuMn. The results are generalized to anisotropy energies including a term in $\cos^4$, which is necessary for describing hysteresis jumps.

High Magnetic Field Measurements of Nuclear Spin Relaxation in Liquid Helium Three.* R.C. Samaratunga, J.S. Brooks, and G.O. Zimmerman, Boston University-A magnetic field dependence of the nuclear spin relaxation in liquid helium three at ∿ 1.3K has been observed using a wide band NMR spectrometer. The spectrometer, which allows convenient measurements over a frequency range of 30 to 540 Mhz (1 to 16.5 Tesla) will be described, and the possible origin of the field dependence of our results will be discussed.

*Supported by NSF Grant DMR-8113436

F. Percolation

Conductivity of Random Resistor-Diode Networks. J.S. Brooks, P.R. Mueller, and S. Redner, Boston University. We have used computer simulations and built model networks to study the critical behavior of the conductivity of random resistor-diode networks. Theoretically we developed a novel numerical relaxation scheme which predicts that the conductivity should vanish near the percolation threshold with an exponent of $t \approx 1.35$. Experimentally we find the threshold to be in agreement with theory. However, as a function of concentration, the conductivity exhibits large discontinuities which as of yet remain unexplained.

Correction to Scaling for Percolation. A. Margolina, H.E. Stanley, D. Stauffer, and Z. Djorjevic, Boston University. By analysis of the series expansion polynomials for percolation cluster numbers we found that there is a difference between the correction-to-scaling exponent right at the percolation threshold and slightly below it. In order to explain this difference we suggest a new three-exponent form of the scaling assumption for the correction term.

G. Atomic Physics

Close Quasi-Permanent Electric Confinement in Vacuum of Individual $^{24}Mg^+$ Ion.* W. NAGOURNEY, G. JANIK, and H. DEHMELT, U. of Washington (206) 543-2770.—With the previously described[1] apparatus, but now 30 μW laser power at the 280 nm resonance line, we are able to catch and isolate an individual $^{24}Mg^+$ ion in ~1 min. Once the ion is caught the power may be reduced and the low-frequency half of the resonance curve recorded in ~4 min. EWHM widths are 23 MHz at 0.6 μW, 22±2 MHz zero power, 21.5 MHz natural. This and the small heating of ~1 eV/min estimated from the >40 min uncooled storage time suggest a temperature given by $\langle v^2 \rangle_{min} = (\omega_0+\omega_-)/(\omega_+-\omega_-)$, ~2 mK. Obviously the effective potential in the rf trap is as real as the interatomic potential in a molecule and rf heating is negligible. The closest magnetic (Penning) confinement[3] reported is ~25 μm. Our <<1 μm localization now makes it practical to focus[2] the laser beam to ~1 μm. This, and precooling of the ion by a tuned circuit,[2] should reduce the laser power necessary to catch and cool it to ONE WAVELENGTH, easing laser frequency synthesis.

*Supported by ONR and the Murdock Charitable Trust.

[1] W. Nagourney and H. Dehmelt, Bull. A.P.S. 26, 797 (1981).
[2] H. Dehmelt, Bull. A.P.S. 18, 1321 (1973).
[3] For comparison Wineland and Itano, Physics Letters 82A, 75 (1981) give T_c=10±10 mK, T_c=0.6 K.

Atomic Model Potentials via an Intersecting Electron Green's Function. B.J. LAURENZI, State University of New York at Albany. Having obtained a Green's function for a spherical, atomic core containing interacting electrons, an ab initio model potential for that core has been computed. The effect of the repulsions on the model potential is described and its importance assessed.

H. Theoretical Physics

Hidden Variable η and Factor G.

HAROLD P. SCHWEER, Retired. Experimental applications of quantized orbits to outer satellites of Saturn yield periods of $1.719 \times 10^{-3} (\eta+\frac{1}{2})^{3/2}$ hours, speeds of $\bar{v} = \sigma(\eta+\frac{1}{2})^{-1/2}$ where σ = 337.60 kms/sec in the orbital plane and semi-major axes of $R_0(\eta+\frac{1}{2})$ with R_0 as 332.51 kms. The integer η is 1134 and 38942 for Dione and Phoebe respectively for their first order deferents. With $P^2 = K a^3$ in earth's solar units, K = 3501.84 which number is regarded as the reciprocal solar mass ratio for Saturn. Note that the terms for η have dropped out. If $M_\odot = 1.988 \times 10^{33}$ gms then M_η becomes 5.677×10^{-4} gms. Designating $R_0\sigma^2$ in cgs units as the product GM_η, factor G becomes 6.6756×10^{-8} dyne cm^2 gm^{-2}. G and M_η were unnecessary for orbital data. Contemplate $N R_0\sigma^2$ as proportional to the product $h\sigma$ (a De Broglie relation!). Is h the same everywhere?

Unitarity and Invariant Lagrangian under Yang-Mills-Weyl Transformations. J.P. HSU, T.Y. SHI,* Southeastern Massachusetts University. Simultaneous phase change and scale change (the Yang-Mills-Weyl transformations) of a fermion field ψ are investigated. We find that the invariance of the Lagrangian $\mathcal{L}$ requires the presence of Yang-Mills type phase fields $B_\mu(x)$, genuine gauge fields $C_\mu(x)$ and new scalar gauge fields $S(x)$. The Lagrangian $\mathcal{L}$ is very much different from the usual Yang-Mills type Lagrangian because $\mathcal{L}$ is much more involved. However, we show that complicated source terms in equations for the unphysical scalar parts of B_μ and C_μ (i.e. $\partial^\mu B_\mu$ and $\partial^\mu C_\mu$) cancel completely because of the Yang-Mills-Weyl invariance in the case of GL(1,C) group. Such a generalized gauge theory is unitary. The violation of unitarity in the SL(2,C) theory discussed in Wu-Yang's and Hsu-Xin's work is clarified.

* On leave of absence from the Beijing Normal University, Beijing, China

I. The Teaching of Physics

Physics for Elementary School Teachers. E.A. WOLF, Southern Conn. State Coll. The negative attitude towards physics common among elementary school teachers contributes significantly to the scientific illiteracy of future generations since it can be transmitted from the earliest stages of the educational process. To combat this attitude, a physics course for education majors is introduced to the students as a way of helping them encourage and teach the scientifically gifted children that will be passing through their classrooms. Each student is required to design and complete a 'Home Project' of his or her own choice, and copies of imaginative projects from previous courses are circulated to show how others have done it. Extra credit is given if children are involved. The sequence of laboratory experiments is designed to build confidence and pride as well as skill. Grading is reasonably strict but generous extra credit is available to motivated students for additional home projects, careful experiments or signs of original thought.

Although few students taking this course are scientifically gifted the response has been good and, in some cases, surprisingly enthusiastic.

Spinoffs from a High School Solar Observatory. LAURENCE MCCOWAN, Marlboro High School, Marlboro, MA. An inexpensive solar observatory not only supports the study of solar physics but also reinforces energy education in many ways.* Students learn to base their energy values on solid physical evidence, and to sort their energy options in terms of long range effects, as well as immediate gains. The influence on teachers may be even greater.

* Color photos of projects and activities will be displayed on poster.

J. Solar and Space Physics

Measurement and Calculation of Efficiency of the Suffolk University Sun-Tracking Solar Collector.* IRWAN THE, BILL MANN,** Suffolk University. LM335 temperature sensors on the solar panel plate and storage tank were used to determine heat flow in a sun-tracking flat plate collector. The collector was designed and built by students and is located at Suffolk University's research field station near Cobscook Bay in Maine. Solar insolation was determined by use of a flux meter based on a calibrated photocell. The fraction of incoming energy deposited in the storage tank is determined.

* Submitted by Walter Johnson
** Supported by a Marsh White Award from the Society of Physics Students

Potentials and Charges on Conducting Rocket Sections.* C. W. DUBS, AF Geophysics Lab.--Insight is presented for the potentials measured by Cohen et al. of three conductors of a rocket emitting an ion or electron beam. Approximate values of coefficients of potential, capacity, and induction are calculated. The potential of the rear section is shown to be close to zero so is assumed zero. Approximate sheath potentials are calculated assuming constant sheath charge density. The charge on each of the three conductors is calculated for each beam current. The (extended) probe is shown to be inside the sheath, even in the 1μa beam current case. Explanations are given for 1. the charge on the rear section always having the same sign as that of the beam particles, 2. the potential of the probe being negative for ion emission, 3. the potential difference of the probe and forward section being less than that of the rear section and forward section, 4. how to determine the potential that the position of the probe would have if the probe were removed. The probe to forward section voltmeter resistance is low enough to affect the probe potential appreciably. Increasing the beam current effectively makes this resistance more nearly infinite. The measurements in Cohen et al. bear this out.
*Submitted by Robert C. Filz

MEMBERSHIP FORM

NEW ENGLAND SECTION OF THE AMERICAN PHYSICAL SOCIETY

Section membership this year is free to APS members who declare their wish to join the Section on the annual APS bill and/or declare to the Section that they wish to be members. The APS will donate to the Section $2 for each such member. Section dues for non-APS members are the traditional $3 for regular members and $1 for students. Please fill out the form below and leave it with a Section representative.

Gerald E. Holmberg
Secretary-Treasurer NES-APS

Name_____ Member APS Yes /__/ No /__/

Address_____ Previous Member NES-APS Yes /__/ No /__/

_____

Membership in APS Not Required for Membership in NES-APS

1982 Dues: $3.00 ($1.00 Students) if not a member of APS

Please make checks payable to NES-APS

Building and Plans for the Future

This year much time was spent on the planning of the future development of the Department. That included both faculty and staff development as well as the development of space. The following are notices and faculty actions taken with regard to our future plans, as well as a plan submitted to Dean Bannister on December 15.

9/15/81 It was announced that V.P. Jones and the Dean will visit our Department on Oct. 6 and who would like to meet with some faculty and staff members as well as the Department.

9/122/81 The composition of a Building, Space Committee was announced. It is Franzen (Chairman), Bansil, Batanouny, Chasan, Edmonds, Kolk, Miller, Stone and Zimmerman.

9/29/81 At a discussion of the impending visit by V.P. Jones and the Dean to our Department, it was decided that the Chairman will designate groups and the groups should get together prior to the meeting with V.P. Jones.

Discussion of the visit by V.P. Jones on Oct. 6.

For that we should start thinking about a modified version of a Plan for the Future of the Department of Physics.

Old copy enclosed.

Boston University

111 Cummington Street
Boston, Massachusetts 02215

Department of Physics

SCHEDULE FOR THE VISIT OF V.P. JONES

TUESDAY, OCTOBER 6, 1981

9:00 - 9:45 A.M.	G.O. Zimmerman	GOZ office - Rm. 149
9:45 - 10:15	Al Stone	Al Stone's office - Rm. 155
10:15-10:45	Batanouny Brooks Franzen Kirczenow Kolk	Prof. Franzen's office - Rm. 161
10:45-11:05	Chasan Cohen Hellman Willis	Prof. Cohen's office - Rm. 220A
11:05-11:35	Bansil Klein Redner Rothschild Stanley	Prof. Stanley's Center Rm. 234C
11:35-11:55	Booth Epstein Miller Roberts	High Energy Suite Rm. 239

10/13/81 A discussion of the visit of V.P. Jones took place. There were several suggestions for the future development of this Department.

a. That Senior faculty should be considered as well as Junior, and that an ad should be put into Physics Today mentioning Senior Faculty explicitly.

b. That support staff be hired with an adequate salary and sufficient in number so as to serve the needs of this expanding Department.

c. That the Administrative structure of the Department should be rethought.

The Chairman has currently a shopping list for 11 faculty members. The discussion concluded with faculty members being requested to

a. hand any plans they have for the future of this Department or their particular field to the Chairman by Oct. 16, Friday, to serve as the initial planning stage for a subcommittee.

b. to let the Chairman know if they would like to serve on a subcommittee to plan the future of the Department. This subcommittee will come up with a plan which will then be presented to the whole faculty.

The Committee on the Future of the Department was constituted and it consists of: Booth, Hellman and Stanley.

11/24/81 A report of the Committee on the Future of the Department was discussed with the comment that the report deals with a four year program and the question as to senior or junior faculty was not addressed. Several comments were made and those will be incorporated in future versions.

12/8/81 A discussion of Draft 3 of the Plan for the Future of the Department of Physics took place and was adopted in principle with the wording to be polished and changed in the final draft. The realistic opinion was expressed that the payoff to the University cannot be realized in full within the first few years of the inception of the plan and that a realistic period be accepted by the University for a payoff. That period would range from 5 to 10 years.

12/16/81 To: Faculty
From: G.O. Zimmerman

Because of the meeting for the Science Center yesterday, I would like to call a meeting of the faculty, Thursday, Dec. 17, at 12:30 P.M. I have to make a report on the Physics Dept. on the 23rd.

Please come prepared to think of the following:

1. Any programmatic changes if our plans are realized, i.e., we get the faculty support services and space and equipment, both educational and research.
2. Any projects for common or group grants or contracts, i.e., contracts for Centers.
3. Anything we can do better than anyone else.

I shall give a full report to the faculty tomorrow.

Plan for the Future of the Department -- See Appendix.

TO: PHYSICS DEPARTMENT FACULTY

FROM: WOLF FRANZEN

SUBJECT: MEETING OF BUILDING COMMITTEE/THURSDAY, JANUARY 28, 1982

present: Bansil, Batanouny, Chasan, Franzen, Miller

absent: Al Stone*, Dean Edmonds, Berend Kolk*, George Zimmerman*

We held a brief meeting but could not proceed very far because of George Zimmerman's absence. George was going to give us an exposition of what he has presented to the Administration in the way of a building request.

In his absence, we held a bull session on what the people present thought should be included in the new building. Below is a direct copy of my notes.

*Absent without notification to Wolf.

IDEAS

1. Classrooms and research labs on different floors, but not separated completely.
2. Science library--good concept

   Advantages: better staffing
   overlap in fields
   separate reading rooms for different sciences, but contiguous to main library

   Disadvantages:
   loss of intimacy
3. Centralized physics stockroom that has direct access to all the physics labs
4. Present layout of general physics labs is adequate, but we should look over Wellesley and Harvard Science Center labs as models for new features
5. Present room 224 good example for graduate student office: not more than 3-4 students/office
6. Advanced laboratory--bigger, divided (movable partitions?)
7. Large lecture hall--250 seats

   lots of blackboards
   audio-visual stuff
   large stockroom
   -small shop
   steep ampitheater
8. Smaller lecture hall--100 seats
9. Faculty offices--large enough to allow meetings with groups of 6-8 students.

   walls covered with bookshelves
   thermostat in each room

10. Undergraduate study space needed.

11. General research space
clean room
hot lab
cold room
Liq. N plant
helium liquifier (?)
some terminal space for physics alone
videoscreen with hard copy option
electronics shop (common facility?)
machine shop (common)
student shop (common)
research stockroom for physics alone
glass blowing shop (common)

SUBCOMMITTEES

1. Rama Bansil, Michael Batanouny and Jim Miller agreed to form a subcommittee to review the research space request already made, or that should be made in the future.

2. Bernie Chasan and Wolf Franzen will think over the teaching lab and lecture hall situation.

5/27/82

To: Faculty
From: G.O. Zimmerman
Subject: Science Complex

The architects will meet with us on June 7 to go over detailed room plans for our move into the Nicolodeon Building schedules for next year.

In order to be able to do the planning in a coherent way, we will need as detailed sketches as possible of research labs. I therefore ask all those who have currently research labs to give a sketch of the proposed lab, nominally 1000 sq. ft., including the utilities, i.e. water, air, electricity and their location to Wolf Franzen, Chairman of the Building Com. by June 1.

The time table is that Franzen will compile all the information by June 3. We will have the first conference with the architects by June 7. The architects will come back to us with plans by the 14th and plans will have to be finalized by the 21st.

Boston University

111 Cummington Street
Boston, Massachusetts 02215

Department of Physics

December 15, 1981

To: Dean Geoffrey Bannister, CLA

From: Prof. George O. Zimmerman, Chairman

Subject: Plan for the Future of the Department

During the fall of 1981, the Department of Physics appointed a subcommittee consisting of Profs. Booth, Hellman, Stanley and Zimmerman to examine the future direction for the Department. After an examination of the Department and its needs, the Committee came to the conclusion that although we are now a good department, several ingredients are missing to bring this Department to excellence where it would be comparable to some of the best in the country. This plan, with a prospective time of four years would require a relatively modest increase in annual expenditures by the University, those expenditures being offset by overhead income to the University. Although the Department has made some striking advances in the recent past, those advances need to be shored up and consolidated. The Department,as planned for in this document,will have the ability to take advantage of all the opportunities which come along, a situation which under the present conditions is hard to achieve. If carried out, the Department will become one which all of Boston University can be proud of.

I am thus requesting that we proceed to implement this plan.

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enc.

A Four-Year Plan for the Future of the Department of Physics

The Department of Physics of Boston University has made striking progress in recent years (see graphics in the appendix) despite the lack of basic support services and facilities. We have progressed from a condition of fighting for our continued existence to our present state as a good functional department. Further progress in the direction of making us a center of physics on a national scale, in the direction of making us competitive with other leading physics departments, will require improvement in our housing, our facilities and equipment, and our support staff. Furthermore, additional faculty positions must be created in order to deepen and broaden our involvement in the frontiers of physics research.

We have demonstrated in the past that a relatively minimal investment in, the form of giving us discretion in the use of leave money in the Department budget, can yield striking dividends, as demonstrated in the form of student enrollment, research output and quality, award of grants and quality of students and faculty candidates attracted to our program. These accomplishments rest on a potentially unstable foundation, however, unless they are shored up with better services, facilities and staff. In its present role, the faculty considers itself "stretched thin"; a small perturbation could undo some of the gains of the last few years.

The present plan is designed to make our department nationally and internationally competitive. For that purpose we must acquire the necessities present in all other respectable physics departments which allow them to function effectively as part of a teaching and research institution. We have to bring our support services and physical facilities up to par, to acquire equipment that will allow us to perform our teaching and research competitively, and to hire new faculty to remove weaknesses and to raise our endeavors to the level of excellence.

In the year 1976 and later when several young and very active faculty members were hired, some of the older faculty responded by increasing their own efforts.

We are now competing with other institutions. Sometimes we obtain research results before others, but many times the results of our investigations lag and complement others because of lack of personnel and adequate support services. This is also a consequence of our heavy teaching loads (in comparison to other physics departments). Because of the quality of our faculty and the ideas put forth in their research proposals, our research is well funded this year. By the beginning of this school year we had about $1,000,000 in grants (in hand or promised)(see appendix for list), up from ~~$100,000~~ in 1974. All the faculty hired since 1976 are either principal investigators or coinvestigators on grants. However, now we have to deliver on the research we promised to perform in our proposals, or the proposals will not be renewed. This will be hard to do under the present circumstances.

Our present environment exudes an image of poverty and shabbiness, characterized by dirt, a poor physical plant, poor maintenance and poor labs, a state which is damaging in many ways. Good students leave the University for this reason, colloquium speakers carry away a picture of poverty and neglect, and site visitors from granting agencies wonder whether Boston University is a good place to invest their money. Our surroundings are not conducive to work and thus our faculty tend to stay at home or go to M.I.T. rather than work in their labs or offices. This, in turn, cuts down on faculty-student contact and makes the department a less productive place.

It is now time for the department to move forward: We want to be in the forefront of research, and bring an excitement to teaching. We must have the time and facilities to take advantage of opportunities as they develop, whether in fundamental research or research done in collaboration with industry, or in applied science programs in biophysics, or in the excellence of our graduate and undergraduate programs. Such a department will extend the current recognition of our faculty members by the physics community and consequently lead to increased funding and to a larger and better graduate and undergraduate student body. It will contribute to better education and an improved reputation for the University. At a relatively small additional cost, the University can have a competitive, professional physics department. We have shown what we can do with no additional

cost; now we want to show what one can do with only a modest addition.

In order to provide the Boston University Department of Physics with the conditions already existing in many physics departments both in the Boston vicinity and around the country, and in order to preserve the Department's productivity and prevent the deterioration of its faculty by loss to other universities (or to industry) and to preserve its present momentum, changes and additions will be necessary in the next few years. Assuming no increase in student enrollment beyond the 1981-82 level but a significant increase in research and research funding, we shall need:

(in thousands)	Additional Cost to Univ.	Additional Cost to Grants	Additional Grant Support Expected	Additional Overhead Expected
		ANNUAL EXPENDITURES		
General Research Support including F.B.				
Shop Foreman	12	12		
Electronics technician	11	11		
Draftsman	11	11		
Technical Staff Supervisor	26			
Computer Programmer	10	5		
Two secretaries (scientific typing)	18	10		
Accounting & Purchase person	8	6		
Yearly	96	55		
Group Research Support				
2 Res. Asst. Prof.		50		
Electrical Engineer		35		
Accelerator Physicist		40		
3 Technicians for Solid State & Polymer Physics		75		
Yearly		200		

	Additional Cost to Univ.	Additional Cost to Grants	Additional Grant Support Expected	Additional Overhead Expected
Professors				
12 at a 9 month salary of $28	336	75	720	240
	432 (addt'l annual exp.)	330 (addt'l annual exp.)		
Increased Grant Activity due to better research support services & space, an increase by a factor of 2/3 from present or an additional				
	Additional annual grant income	675		225
			1,395	465
	ONE TIME EXPENDITURES			
Start up costs for 7 of the 12 at $60 per prof.	420			
Upgrading Machine Shop & setting up Electronics Shop	100			
Computer (VAX)	250			
	770 (one time expense)			
	NEW BUILDING			

One should note that the additional annual expenses are less than the increased overhead brought in. All the categories except "Group Research Support", "Professors", and "Increased Grant Activity" are self explanatory and serve to upgrade the present inadequate research and teaching services to an acceptable level.

The "Group Research Support" contains one Research Assistant Professor, an Electrical Engineer and Accelerator physicist who would assist the Intermediate Energy Group in the development of a new resarch site and the upgrading of the Bates accelerator. This would significantly increase the group's ability to do development work. The 3 Technicians and remaining Research Assistant Professor would assist the various solid state and polymer experimental groups in their experiments and maintenance of apparatus.

The "Professors" are the vital ingredient required to carry out the plan. We will grow in stature in proportion to the quality and number of the people appointed. The Professors will enable us to add additional lecture sections in courses which are overcrowded and to offer courses not presently offered due to staff shortage. We could use some faculty to teach (as we already are) discussion and labs as well as reduce the teaching load of faculty to a point already achieved in most university physics departments creating a situation where a vigorous research effort is possible. We propose to hire a mixture of junior faculty at the assistant professor's level who show a promise of becoming leaders in their fields, and those more senior faculty who are currently active in research, leaders in their fields, well funded, and capable of attracting first rate junior faculty as well as graduate students. A further requirement would be the compatibility of that new faculty member with the professional goals of the Physics Department. In this expansion we do not want to lose sight of our primary msision, to provide an academic climate where effective teaching and fundamental research can take place. Each new junior faculty member is expected to either obtain a grant or add to an existing effort so that the average funding per new faculty member is $60,000 of which an average of $20,000 comes to the University as overhead. We expect that a portion of the academic year salary for some of the new faculty will be paid directly by grants, thus reducing the University's contribution. This new

faculty coupled with an overall expansion of facilities and support staff will also enhance our capability of carrying out large scale research and interacting with industry.

We propose to hire 12 people, 5 of whom would be theoreticians and 7 experimentalists, in the fields of Nuclear Physics, Solid State Physics, Field Theory, Quantum Optics, Relativity, Polymer Physics, Hyperfine Interactions and Biophysics. This would strengthen the teaching and research in the already existing fields as well as fill gaps now present in our department.

The new faculty will be hired on the basis of being able to carry out a vigorous research program, teaching ability and funding possibilities. The detailed chronology will be determined by the availability of highly qualified candidates in any one field.

A two-third increase of the present grant support by current faculty is expected from the enhanced research support facility in addition to the funds brought in by the new members.

It is expected that this plan, if carried out within four years will create a Physics Department which the University can be proud of, with excellence in teaching and research comparable to the best in the country.

Appendix

Grants held during 81-82

(Amount per year)

		1981-82	1982-83
Franzen	National Science Foundation	$ 7,838	
Stanley/Bansil	Office of Naval Research—Equipment	59,550	-
Rothschild	National Science Foundation	47,500	57,000
Stanley/Bansil	National Science Foundation- France	37,822	37,822
Bansil/Rothschild/Stanley	PHS/NIH — Eye Institute	85,000	85,000
Miller/Roberts	National Science Foundation	52,500	60,000
Stanley et al	National Science Foundation -- Italy	13,000	13,000
Kolk	National Science Foundation	30,000	—
Shimony	National Science Foundation	12,000	6,000
Kirczenow	National Science Foundation	12,500	12,500
Epstein	Department of Energy	30,550	30,550
Booth/Roberts/Miller	National Science Foundation	117,496	130,000
Brooks/Zimmerman	National Science Foundation	56,400	60,000
Jensen	Department of Energy	51,700	70,000
Klein/Redner/Stanley	United States Army	120,454	132,000
Zimmerman	National Science Foundation	23,270	-
Stanley/Bansil	ONR	110,000	115,000
Bansil/Redner/Stanley	National Science Foundation	70,000	80,000
Zimmerman	AFOSR	50,400	85,000
Rothschild	American Heart Association	28,000	61,000
		$ 1,015,980	$1,034,872

Another $692,000 worth of grant proposals is outstanding with a probability of 40% to be granted.

Next year's current grants are expected to increase by 15% in addition to those submitted by new faculty.

Pending:

Klein/Coniglio	National Science Foundation	$ 40,000/yr
El-Batanouny	Research Corporation	20,000
	Gas Research Inst.	85,000
Pi	NSF, DOE	59,000
Willis	NIH	45,000
Chasan	NIH	61,000
Rothschild	NIH	65,000
	NSF	117,000
		$492,000

Other applications not listed here currently are in process.

Uri Haber-Schaim
September 8, 1981

Physics Teaching Practicum for Teaching Assistants

This proposed course aims at improving the skills needed by Teaching Assistants in carrying out their duties in handling problem sessions, teaching in the laboratory, grading quizzes, and helping students individually. The course will consist of lectures and practical work using multiple copies of actual student papers. Some video taping might be considered.

The course may be taught at two hours per week for one semester or four hours per week for half a semester.

Outline

Homework Problems and Quizzes

Dimensional Analysis and Systems of Units.

Diagnosing difficulties and helping individual students.

Grading homework and quizzes.

Laboratory Work

Motivating laboratory work.

Check on the T A's proficiency in use of common laboratory tools and equipment.

Diagnosing difficulties and helping individual students in the laboratory.

Teaching to calculate with measured numbers.

Grading laboratory reports.

General Teaching Skills

Organizing short presentations.

Anticipating difficulties.

Boston University

111 Cummington Street
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Department of Physics

January 6, 1982

To: Prof. Ralph D'Agostino, Chairman of Engineering Ph.D. Committee

From: Prof. George O. Zimmerman

Subject: Cognate comments regarding the establishment of the Division of Engineering and Applied Science.

The Department of Physics supports the establishment of the Division of Engineering and Applied Science as proposed in the description dated October 8, 1981. The general outline in that description is laudable and we have been overdue in the establishment of such a division. This Chairman and the Department would, however, like to be able to comment on the particulars of the final version once it is determined. The Division will enable the College of Engineering to establish a more vigorous research component as well as allow other science departments including our own to offer degrees in areas so far inaccessible to us but where we do have expertise. It will put the engineering and science divisions at Boston University on a more professional footing and might further the collaboration between the sciences and engineering. It will also serve to attract and further relations between the sciences, engineering and industrial concerns. The Department of Physics intends to participate in the Division and has proposed a program leading to a Ph.D. degree in Applied Physics.

As far as the proposal for a new degree program of a Ph.D. in Engineering is concerned, the program looks sound as proposed and although each department at the College might not be up to the venture, the combined resources of that College warrant the establishment of such a degree. Within the College, there is a core of faculty who are research oriented and who have a combined strength which is sufficient to offer such a degree. Care will have to be exercised regarding the appointments of graduate school faculty from that college especially with respect to the adjunct faculty. Such a degree will help attract better faculty to the College as well as launch it in the direction of more research being done. It should attract funding both from industry and governmental agencies. My only qualms are that our College of Engineering doesn't have many research areas which concern themselves with hardware. It is a mainly theoretical engineering college.

On the whole, however, both the proposal and resources appear to be sound and thus worthy of the endorsement of this Chairman and the Physics Department.

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Boston University

111 Cummington Street
Boston, Massachusetts 02215

Department of Physics

January 7, 1982

To: Prof. Ralph D'Agostino, Chairman of Engineering Ph.D. Committee

From: Prof. George O. Zimmerman, Chairman

The enclosed proposal for a Ph.D. in Applied Physics was written in response to the initiative by the Dean of CLA and Engineering to obtain approval for Ph.D. programs in Engineering and in Applied Science. The two programs are linked by certain common themes and interest, although they could, in principle, be carried out separately. This proposal from Physics is meant to stand as a serious proposal in its own right and may be taken as a possible model for other science departments which may wish to follow suit. The proposal is one which preserves most of the machinery of our regular Ph.D. program and is designed to give a large measure of autonomy to the Department, subject to some outside review and control by the proposed Division. It will allow a certain freedom of action, now unavailable, to undertake research and development activities which might be subject to the criticism that although it is very good R and D, it is not a pure basic research topic and hence inappropriate as a thesis project.

The Physics Faculty has no intention of diluting the standard and quality of its research work, but wants the flexibility to move into certain fields or projects with a greater applied and/or interdisciplinary component than has been hitherto deemed proper for basic Physics research. The Ph.D. in Engineering program by itself does not seem to satisfy the need. A graduate with such a label would need to be well versed in Engineering, rather than someone with a Physics point of view who might have taken an engineering course or two to strengthen his background for the work in question.

The anticipated number of graduates is small, perhaps one a year at most, but the possible benefits to the Department, outlined under the "motivation" section of the proposal, suggest that this modest excursion into Applied areas will have a healthy influence on the Department.

We anticipate no extra demands on faculty, facilities, or space occasioned by the functioning of this program beyond what we already have, or expect to have in the next few years.

The proposed program is new to us and as such must be viewed as an experiment, but one with a good chance of success. We would expect to have it on the books for

ten years, and to give it timely reviews to measure its success. The success of the program will be measured in terms of the quantity and quality of the work done, the number of students attracted, their eventual success in their profession, and in terms of the interest shown in it by our faculty, by faculty in other disciplines, and by outside scientists in industry and in other laboratories.

The Physics Faculty approves, in principle, the program as outlined below, is optimistic about its chances for reasonable growth.

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PROPOSAL FOR THE Ph.D. IN APPLIED PHYSICS

Motivation

The Boston University Department of Physics now awards a Ph.D. in Physics at the rate of approximately three 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 explore in depth the areas of Physics 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 the student 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 mutually beneficial ways. It should increase the flexibility of the students 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, collaboration with industry and encouraging the creation of patented processes or devices. Moreover, the Applied Physics degree may have appeal to students interested in returning for a time 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.

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 on the present basic Physics Ph.D. program. We will require the same M.A. level physics program and the same high level of performance on the Comprehensive Examinations which is required of all Physics Ph.D. candidates at the thesis level. The quality of the thesis project will be insured by the requirement of publication in appropriate journals, by a Thesis Defense attended by the representatives of the appropriate disciplines, and by a representative of the Ph.D. Applied Science Program. From time to time it may be appropriate to appoint an external examiner to insure the quality of the thesis research. In such cases a visiting faculty appointment can be made if necessary. 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 not only take undergraduate and especially graduate level courses in these fields, but 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 thesis Committee.

Admission to the Program

The requirement for admission to the Ph.D. program in Applied Physics is the completion of the Written Comprehensive Examination with distinction. An M.A. degree in Physics is conferred on the completion of the Written Comprehensive, if in addition course and language requirements are satisfied. Students entering the program with an M.A. in Physics are also required to take the examination. 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 Program has the competence in that area. Students holding the B.A. in Physics wishing to enter the program will enroll in the regular M.A. Physics program and can transfer to the Ph.D. in Applied Physics program on completing the normal requirements.

Course Work

M.A. level physics courses taken by the student in preparation for the examination are not counted for Ph.D. credit. Three courses beyond the M.A. level in physics are required to insure the appropriate level of physics sophistication.

In addition, 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. These count toward the degree requirement. The difficult issue of the appropriate credit to be given to undergraduate level courses is met by counting them at half value.

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.

University Commitment

In order to have a program of this type work, there must be the serious commitment of one or two Professors to the work being done, and a minor commitment by one or two additional Professors in related fields. There must be an incentive for this group of 2 - 4 individuals to follow the student's progress and to put in a large total number of hours of dialogue, supervision, proposal writing, etc. It is a contact sport, and if a Committee with no particular vested interest is appointed to supervise the thesis, then failure is very likely. It is essential that one person, normally a faculty member or visiting Professor in physics, act as the student's official supervisor and bear the primary responsibility for the student's program. The vested interest for the 1st and 2nd readers may be a particular piece of work to be done which is part of their research plan. For those persons who are essentially providing skills or acting as resource persons a reward mechanism must be found. The natural mechanism is to take this work as a serious part of the teaching load for the faculty members involved. A program like this one cannot be handled at no cost to the University, but it is expected that a successful program will generate sufficient income from outside sources to cover the costs.

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.

Admissions Tests and Prerequisites. The general requirements of the Graduate School apply. The candidate must have completed the requirements for the master's degree or its equivalent with a major in physics. Unusually well-prepared candidates may be accepted as Ph.D. candidates directly after graduation from college.

Course Requirements. Among the total of eight courses beyond the M.A. level, three must be selected from the advanced (700 - 850) level. Undergraduate level courses in non-physics disciplines required for the thesis can be included on the basis that two such courses count as one required course. 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 or committee 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 in the Applied Physics program will take the written comprehensive examination required of students in the Physics program. The written comprehensive examination covers the following topics: general physics, classical mechanics, modern 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.

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 approach a faculty member or members active in a research field of interest to the student 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 concentration 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 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 supervisory committee will be formed at the request of the student who has passed the Oral Comprehensive examination with distinction. At that time, the student in consultation with his Physics advisor, will outline a Thesis program which will specify the non-Physics disciplines believed necessary to complete the work. A committee will be established consisting of one person from each discipline, or in the case where only Physics is involved, the usual 1st and 2nd readers will be the committee.

The committee will meet with the student at least twice a year to review progress. The committee members are expected to be available to the student for consultation. A 1st and 2nd reader will be appointed for the thesis, but the entire committee is expected to sign the thesis and will be present at the thesis defense. The defense also will be attended by a representative of the Applied Science Program as a voting member.

Residence Requirement. See Academic Regulations in the front section of this bulletin.

Prospectus. See Academic Regulations in the front section of this bulletin.

Final Oral Examination. See Academic Regulations in the front section of this bulletin.

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 denfense 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 interdisciplinary format, but the emphasis on the application of

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 Departments of Physics, Physiology and the Biophysics Institute offer a joint program in cellular biophysics. The program is designed for students with a strong background in the physical sciences 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, membrane biophysics, nonequilibrium thermodynamics, cooperative phenomena in living systems, visual transduction, ionic transport and specificity, muscle contraction, and biological gels.

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 members of the Departments of Physics, Physiology, the Biophysics Institute and other appropriate faculty.

Admissions

Applicants for admission normally have completed an undergraduate major in physics or have a strong background in physical science. Applicants with undergraduate majors other than physics, biophysics or astronomy may be required to complete prerequisite courses in physical science. Joint application to the Department of Physics for a M.A. in Physics and to this program will be considered. Applicants with a Master's degree in physics, biophysics or the the equivalent can enter the program with advanced standing.

Course Requirements

A total of 16 graduate level courses are required. At least one graduate level courses 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, biochemistry and molecular biology. A minimum of 3 courses must be 500 level or higher and 5 courses 700 level or higher. (see Curriculum, for more details)

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

1) All candidates must pass a written comprehensive examination to be taken within two years of starting the program.

2) An outline of the proposed Ph.D research project will be presented within a reasonable time after passing the written comprehensive examination. The student will be examined on specific details of the research project including background, rationale, techniques, significance and possible pitfalls.

3) A doctoral thesis examination will be taken prior to completion of the Ph.D in Cellular Biophysics.

Curriculum

Stage I

Four graduate level courses in the physical sciences must be selected. Allowed courses in each are listed below (alternative appropriate courses in the categories below can be substituted with the appropval of the cellular biophysics program committee).

		Semester	Credits
Electromagnetism			
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**	**	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:			
PY 721,722**	Concepts and Techniques in Biophysics	1,2	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	1	4

Stage II: Courses must be taken in the following areas.

Physiology:		Semester	Credits
ME 843	Cellular Physiology	1	4(required)
ME 540	Human Physiology	1	4
ME 841,842	Physiology Seminar	1,2	2
ME 745,746	Special topics in Phys.	1,2	variable
ME 840	Neurobiology	1	2
BI 528*	Introduction to Human Physiology	2	4
BI 545	Neurobiology	1	4
BI 552	Molecular Biology	1	4
Biophysics:			
PY 721	Concepts in Biophysics	1	4(required)
PH 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
Biochemistry: (at least one course required)			
CH 535,536	Biochemistry I & II	1,2	4
CH 537	Biochemistry Lab	1	4
MS 551-4	Biochemistry A-D	1,2	4
ME 753	Cell Biochemistry I,II	1,2	4
CH 506*	Elementary Biochemistry	2	4

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 interdisciplainary training needed in biophysics. The Ph.D. Program in Cellular Biophysics is designed to provide a broad based interdisciplanary training while still allowing specialization in a particular subfield of biophyshics.

There are a number of specific needs at this time for a comprehensive biophysics program which include:

1) The increasing emergence of biophysics as a key field in the sciences.
2) The importance of physical and mathematical sciences in biological research.
3) The growing biophysics job market in acedemic, commercial and government sectors.
4) The existence at Boston University of excellent resources for the

*This course can be taken with the permission of the biophysics committe by students with insuffucient background in physics or cell physiology
** to be added

formation of a comprehensive biophysics program. This includes the availability of complete biophysics facilities in the area of X-ray scattering, nuclear magnetic resonance, Fourier transform infrared spectroscopy, Raman spectroscopy, quasi-elastic light scattering, low temperature spectroscopy, and Mossbauer spectroscopy (cf. Appendix for more complete list).

5) The increasing number of students who wish to enroll in a graduate level biophysics 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 have been contacted and letters of consultation attached. A task committe consisting of representatives of the Departments of Physics, Physiology, Chemistry, Biology and Bioengineering were invovled in the initial planning of this program and provided a feedback mechanisms 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. 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 Director of the Biophysics Institute. The biophysics program committee will be responsible for admissions, arranging Ph.D qualifying exams, deciding internal academic policy, curriculum including the proposal of new courses, coordinating student seminars, and evaluating student performances. Appropriate student advisors will be designated by the committee.

6. COMPARISON WITH SIMILAR PROGRAMS AT OTHER INSTITUTIONS

Data is provided below about the structure of biophysics programs offered at 7 other Universities.
Schools Surveyed: Harvard, MIT, Yale, Univ. of Chicago, Brandeis, Rochester, 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 (Havard 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: there 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 liturature. 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 submitts 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 liturature review and a second oral on research proposal.

7. EXTERNAL ACCREDITATION - NONE REQUIRED

8. CATALOGUE COPY - SEE ATTACHED

C. ACADEMIC RESOURCES

1. Existing Faculty

The core faculty listed in the Appendix is expected to participate directly in the cellular biophysics program by providing research facilities and participation in biophysics related courses.

2. New Faculty and Staff Requirement

No additional faculty is anticipated. A secretary will be necessary for approximately 20 hrs/week in order 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.

Scenario I

Undergraduate with B.S. in Physics
one course in basic biology, chemistry, organic chemistry

YEAR 1

E & M (PY509)	E & M (PY510)
Statistical Phys. (PY511)	Statistical Phys. (PY512)
Biophys. Concepts (PY721)	Biochemistry (Ch506)

YEAR 2

Quantum (PY507)	Quantum (PY508)
Molecular Structure (CH715)	Molecular Structure (CH716)
Biophys. of Macromol. (ME771)	Research Credit

Take Comprehensive Exam
Receives M.S. in Physics

YEAR 3

Cellular Physiology (ME843)	Biophys. Techniques (PY722)
Molec. Biology (BI552)	Research Credit
Research Credit	

Research Presentation

YEAR 4

Neurophysiology (ME840)	Biological Transport Mech. (BI771)
Research Credit	Research Credit

Doctoral Thesis Examination
Receives Ph.D. in Cellular Biophysics

BIOPHYSICS INSTITUTE
FACULTY

Donald M. Small, M.D.
Professor of Medicine and Biochemistry

David Atkinson, Ph.D.
Assistant Research Professor of Medicine and Physiology

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

James A. Hamilton, M.D.
Assistant Research Professor of Medicine and Physiology

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

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

BIOPHYSICS INSTITUTE
EQUIPMENT

Centrifuges	Beckman Spinco Model E - analytical centrifuge
Density Meter	Paar DMA 02C (precision)
Differential Scanning Calorimeter	Perkin Elmer DSC-2
Differential Thermal Analyzer	Dupont 900 with scanning calorimetry attachment
Langmuir Surface Microbalance	Designed for (a) multilayer dipping experiments and, (b) transfer of surface monolayer to different subphases
Microscopes	1. Zeiss, phase contrast 2. Zeiss, polarizing with hot/cold stage 3. Leitz Diavert (phase contrast for tissue culture w/heating stage)

Nuclear Magnetic Resonance Spectrometer - 200 MHz Bruker WP 200 with ^{13}C, ^{1}H and 31p probes, computer and temperature controls

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

Light Scattering Brice-Phoenix Photometer 2000-25

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. Totoidal mirror focussing
3. Luzzati-Baro small angle with single mirror focussing
4. Debye-Scherrer powder diffraction

All focussing cameras are equipped with variable temperature (Haake, Heta ultrathermostats) facilities ($-10^{o}C$ - $150^{o}C$).

x-ray detection and analysis:
1. Tennelec PSD 100 position sensistive proportional counter/electronics
2. Tracor Northern TN1710 multichannel analysis system with 64K LSI-11 (Digital Equipment Corp.) computer with dual floppy disk, point plotter, data calibrator, data processor, programmable under Tracor O/S or Digital Equip. Corp. RT-100/S Languages - Flextran, Fortran, Macro 11

COURSE APPROVAL FORM

Faculty of Arts and Sciences

Submission to:
(XXX) CLA
( ) GRS
( ) CLA/GRS
( ) MET
( ) SUM
( ) STH

From (Dept.): Physics

( ) New course, first offering Sem II Year 1982-83

(XX) Revision of ( ) number
(XXX) title
( ) description
( ) prerequisite
( ) other (describe at bottom of page)

NUMBER: CLA / PY / 238 INSTRUCTOR: Prof. Abner Shimony

TITLE: NUCLEAR WEAPONS (WAS PHYSICS OF NUCLEAR WEAPONS)

SHORT TITLE (15 spaces or less); N U C L E A R _ W E A P O N S

DESCRIPTION (40 words or less):

A survey of the basic physical facts about the operation, delivery and control of nuclear weapons. Aim is to provide background of information needed for assessment of proposals on airms control.

PREREQUISITES (Specify AND or OR):

( ) Class standing (CLA Only): _____
( ) Courses: _____
( ) Consent of Instructor
( ) Other: Open to all CLA students

CREDITS:

( ) Half course - 2
( ) Full course - 4
( ) Year course - 6
( ) Variable

Not for Natural Science distribution credit.

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

Information Required from Chairman:

1. How frequently will the course be offered? One semester per year.
2. Enrollment Limit — Anticipated Actual Enrollment 40
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?

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?)

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 enclosed the teaching assignments of that instructor for the last two years and his or her enrollments.)

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

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? Please submit reviews from relevant faculty or chairpeople of the affected departments. No

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Requested by: Department Chairperson 'G.O. Zimmerman Date 4/29/82

Approved by: Curriculum Committee William Klein Date 4/30/82

Faculty Meeting Date 5/12/82

( ) Not approved for the following reasons: _____

Department notified by: J. Kuder Date 5/21/82

Please submit yellow and white copies to Curriculum Committees, Room 302, CLA. The blue copy is for your department file and should be kept when submitting the proposal. The white copy will be returned to the department when full approval is received.

Review periodically.

Proposal for a Physics Department Course on Nuclear Weapons

The purpose of the course is to teach the basic physical facts about the operation, delivery, and control of nuclear weapons. The course will be non technical, with no presuppositions of training in physics or in college level mathematics. The background of physical theory will be summarized in a qualitative manner. Political and military considerations will not be central to the course, though they will be discussed. The aim is to provide enough reliable information about nuclear weapons that the student will be able to make intelligent assessments of proposals concerning military strategy and arms control. The course will try both to be completely objective and to convey a sense of great urgency.

A tentative list of topics is the following:

1. Nuclei as sources of energy.

2. Nuclear devices: reactors, fission bombs (uranium and plutonium), fusion (hydrogen) bombs.

3. History of the development of nuclear weapons from the 1930's to the present.

4. The physical effects of nuclear explosions: blast, radiation and heat, radioactivity.

5. Delivery systems: bombers, land and submarine based ballistic missiles. cruise missiles. Questions of accuracy, control, and protection of delivery systems.

6. Systems for detecting and combatting nuclear weapons: radar networks,anti-missile missiles, lasers. Questions of reliability.

7. The possibility of civil defense: physical and biological factors.

8. How a nuclear war might start: deliberate first strike, escalation from conventional warfare, human or instrument error.

9. Arms control: questions of parity and stability.

10. The possibility of verification of arms control agreements: seismic devi satellites, inspection.

11. Nuclear weapons proliferation: acquisition of nuclear weapons by more countries: the conversion of nuclear power plants into weapons.

Readings to be decided. Among the possibilities are:

Nigel Calder, Nuclear Nightmares: An Investigation into Possible Wars.

Mary Kaldor, The Baroque Arsenal

uclear Weapons: The Secretary-General's Report