Master Annotated

ANNUAL REPORT

of the

DEPARTMENT OF PHYSICS

Boston University

1983-1984

Submitted to the Dean of the College of Liberal Arts

by

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Interim Chair, Department of Physics

INDEX

Chairman's Comments

Anyone reading this hot off the presses will know that the department moved to the Science Center in late August, 1983. Twenty years from now a yellowed copy of this report may settle a bet or at least jog a memory.

The constantly changing moving dates of August 1983 are now just a memory. Whatever the imperfections of the Science Center we are at last free of the constraints of 111 Cummington Street, well described by Al Stone as a three-story basement. One of the imperfections is a humidity problem which is currently under intense study.

The academic year started with the Great Move and has ended with what appears to be the selection of a new chairman, Larry Sulak. Apparently Sulak will assume the chairmanship for the academic year 1985-6.

While it is no scandal that as of August 1 the Sulak appointment is not completely settled, it is a scandal that as of August 1 the tenure and promotion decisions affecting the entire university, and including four members of the Physics Department are not completely settled and formally announced. The tenure-promotion procedures followed at this university are long and arduous, and start very early. The faculty has the right to expect that these procedures will lead to final decision which are announed in early summer or before.

Between new building and likely new chairman several other noteworthy events deserve mention.

1) We recruited Vijay Murgai, a surface-solid state experimentalist who came to us from the Synchrotron Laboratory at Brookhaven. The recruitment of experimentalists in this field has proven difficult - in fact it took two years to fill this slot. We are fortunate to have him because it was not a simple matter to raise the start-up funds for his research. Boston University has got to do better in the matter of start-up funds.

2) Other recruiting news was less pleasant. Two other theorists, Epstein and Kirczenow, resigned more or less at the last minute. Epstein resigned in August, Kirczenow in January, as he left for Simon Fraser University. Neither

was replaced, a piece of inaction with serious consequences to the department since each was sole theoretical representative in his field. Kirczenow in particular was very productive and worked well with experimentalists. A particularly irritating circumstance: we made an offer to a young solid state theorist and when he turned it down newly developed budgetary conditions caused the Dean to cancel the position. This is no way to improve or even preserve a physics department.

3) After many years of effort largely on the part of Rothschild (but with essential support from Zimmerman) a Ph.D. program in Cellular Biophysics is now in place. Appropriately Rothschild will serve as first Director.

4) Intermediate Energy Physics, Rothschild's Membrane Biophysics effort and Low Temperature Physics did particularly well in obtaining enhanced grant support.

5) The department was active in high school related activities. The participation of a few selected Boston Latin students in some of our laboratory exercises was successful, as was departmental participation in a program of tutorial lectures and demonstrations for high school science teachers. See Zimmerman's report for the Committee.

6) Professor Sheldon Glashow of Harvard University, a Nobel Laureate in Elementary Particle Physics, spent his sabbatical affiliated with our department. In addition to his physics activities he participated in the high school teachers' program and was instrumental in finding the resources for a pleasant series of Friday afternoon departmental beer parties which unhappily were terminated when the Campus Police judged them to be too public. They will be started up again in a more private location in the Science Center. Professor Glashow will continue an affiliation with the department as Distinguished Scholar and Physicist.

7) There were two new developments in computers. The network is now in place. It allows communication with the main home computer much faster than by modem and eventually will let any two computers talk to each other. The departmental Vax 750 has been purchased and Room 121 will be renovated

to accomodate it as well as the Intermediate Energy Group. The Vax 750 package bought for the department includes ten terminals and a Laser printer and undoubtedly the first use will be for word processing. The precise role which this computer will fill is not precisely defined, but it is safe to predict that we will be using it for a variety of purposes, scientific and managerial, by 1986.

An Agenda

It is perhaps a meaningless exercise for an interim chairman to outline an agenda for the future. Still certain problems will have to be confronted no matter who is chairman, and this essay may hold some interest for the next chairman.

This department has always been future oriented, always interested in improving itself ever since a few survivors started to rebuild it after the Applied Optics Laboratory left the University to become Itek Corporation. Seen over the last twenty plus years the department has evolved in a much more continuous manner than might be imagined by some of its younger members. The evolution has been from the idiosyncratic to the professional, or as Bill Klein likes to describe it, from the amateur to the professional, where "amateur" is used free (more or less) of its perjorative meaning. An instructive fantasy: suppose that the Ghost of Physics Departments Past took one of our younger ($t \leq 40$ years) members back to our department in the mid-to-late sixties. He or she would, I believe, see a lot of good work and a lot of vitality in theoretical physics (particles, quantum optics, statistical mechanics, particles, relativity) and in laboratories devoted to nuclear physics, Mössbauer studies, atomic and low temperature physics. But our time traveling colleague would also sense a rather quaint (in retrospect) ideology against group research which, in retrospect, kept us from developing in certain directions. This is why we never had a high energy group, never participated in the Cambridge Electron Accelerator. As Ed Booth said at the time, the Boston University physics ethos called for one person in each field, but that person prominent enough to chair an APS session.

Things have changed. When I came to Boston University in 1962 the nuclear effort I found here consisted of one faculty member and one student using a low energy Van der Graaf on the MIT campus available only on weekends because during the week it was used mainly for radiation therapy. Now the group involves three professors, one research associate and several students working at three different national accelerators. Quite a change but evolutionary, not revolutionary. One of the present three was the weekend researcher of 1962 and the transition to accelerator physics was made by two professors (Booth and Chasan) who were at Boston University ten years and more when the Bates Linear Accelerator came on line.

If, as seems likely, Larry Sulak comes to Boston University, this evolution will continue dramatically, because Sulak will, I believe, come here with the specific mandate to move the department from its middle level, middle size status to something grander. He will come as I understand it, with a commitment from the administration with six new positions over a time period of under five years. But there is no sense in going on about Sulak's plans because he himself will have to make them known and consult with the department about them in some detail if indeed he comes. I am beginning to feel like a character in "Waiting for Godot". On to the agenda..

1) The administration must gets its house in order on the matter of the machine shop and the projected electronics and digital repair facilities. The main machine shop which should be viewed as a campus facility, needs new tools and the student shop needs a significant build-up as well. At present it is suffering from extreme neglect. We need a second machinist immediately because then the second machinist can take the student shop as part of his/her job. Once in operation these facilities will be supported at least in part from grants. But start-up funds can only come from the administration.

2) Support services for physics teaching are grossly inadequate, a point strongly made by John Schiffer on his visit for the Dean and the Search Committee. We have one person to set up demonstrations and he is on a relatively low salary scale. In other universities it is not at all uncommon to hire a Ph.D. physicist for the demonstrator job. Schiffer suggests that we use paid student help here. That would work if we had the budget, and someone who could supervise the students. We have only one stockroom person as well - he has to make sure that laboratories for half a dozen courses are properly set up and he has to service all equipment. We have gained no new staff positions in these areas since we first hired a demonstrator sixteen or so years ago, yet our introductory teaching obligations have expanded enormously. We can no longer do an acceptable job of teaching on a shoe-string. An expansion in these areas from a total of two to four positions would be completely reasonable, and even modest, if Boston University wants to be competitive with other universities. The University has recognized the need for an infusion of equipment money for teaching purposes, but a support staff is needed to put this equipment to best use.

3) We must recruit solid state and intermediate energy theorists to replace Kirczenow and Epstein. They served very important functions in the department because they overlapped with experimentalists in rather direct fashion. Why in fact were we not permitted to replace them? Basically because the continuity of departmental needs is not, perhaps cannot, given due consideration when scarce CLA resources are allocated.

4) Introductory physics courses should carry four credits without laboratory, with an additional two credits for laboratory. At present science courses are sold far too cheaply at Boston University and I suspect that this has a bad effect on the allocation of resources for science teaching. An enterprising science chairman could have a little innocent fun and possibly do some good just by submitting to the appropriate committees new course descriptions for all our introductory courses, no lab, 4 hours, and for separate laboratory courses carrying 2 hours of credit.

5) The department should continue to grow - our research aspirations combined with our teaching obligations justify a larger faculty and lighter teaching loads for active researchers. Both these issues have long been on the agenda. One approach is outlined in the Four-Year Plan for the Future of the Department which appears in this report, prepared by E.C. Booth in consultation with the department. This is in no sense an "official" plan, but does represent a rough consensus, particularly in its consideration of faculty expansion and teaching loads.

6) Lighter loads for some may mean heavier loads for others despite expansion. This is a good time for our department and the administrations of both college and university to reaffirm that man and woman does not live by overhead alone, that good teaching is important, and that time spent on teaching is time well spent professionally. At present teaching has been devalued in the sciences. Not coincidentally teaching in this department has suffered, and although the causes of any decline are complex, a contributing factor is surely the low esteem in which science teaching is held at present.

7) What precisely should the relationship be between the department and the Polymer Center? The Center is not just another group. The departmental chairman doesn't sign off on its grants, and its graduate students, even its first year students, all have second floor rather than basement offices because the Center controls a great amount of real estate. The Center returns no overhead to the department, but on the other hand it doesn't use departmental resources for typing papers and proposals or even for ordering supplies and equipment.

But of course the Center participates fully in the life of the department. Center members go through the usual departmental procedures for tenure and promotion, they teach physics courses, and they supervise a disproportionately large number of physics Ph.D. students.

The Center has on occasion claimed special status and a special entitlement to resources. Yet in his report Schiffer says that the Center in effect should be a model for the rest of the department, and in fact there is much to emulate in its refusal to go second class, in its high level of grant activity, in its determination to keep a high profile in the physics community. The relationship between Center and department needs a close reexamination and renegotiation even granting that some tension and ambiguity will always, perhaps should always, be present.

REVISED 5/1.84

(New Revised Plan- April 27, 1984)
(Please read and comment- E. Booth)

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. Further progress in making us a center of physics on a national scale, and competitive with other leading physics departments, will require major improvements in our research and equipment and our support staff. Additional faculty positions must be created in order to deepen and broaden our involvement at the frontiers of physics research, and to improve, simultaneously, the quality of our teaching.

In 1976 and afterwards, when several young and very active faculty members were hired, some of the older faculty responded by increasing their own efforts. Since then, research productivity has climbed sharply. The addition of several young and active faculty members has greatly strengthened our research position, and has also provided us with teaching staff for increased enrollments. Only one or two of the older faculty are entirely committed to teaching, and they have maintained or increased their efforts in that important area. Nevertheless, teaching loads are higher than at most research-oriented physics departments, and the faculty feels stretched very thin.

We have demonstrated in the past that a relatively minimal investment, such as 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 support services, facilities and staff, and lower teaching loads.

In the following pages are listed the present faculty, visiting faculty, research professors, research associates, and the teaching and research support staff. In addition, there are 15 Research Assistants and 28 Teaching Assistants, all graduate students.

Bernard Chasan, Interim Chairman (Ph.D., Cornell University, 1961)

Professors: Edward C.Booth (Ph.D., John Hopkins University, 1955), Kenneth Brecher (Ph.D., Massachusetts Institute of Technology, 1969; Professor Brecher is a member of the Astronomy Department.), Robert S.Cohen, (Ph.D., Yale University, 1948), Ernesto Corinaldesi (Ph.D., University of Manchester, England, 1951), Dean S.Edmonds, Jr. (Ph.D., Massachusetts Institute of Technology, 1958), Wolfgang Franzen (Ph.D., University of Pennsylvania, 1949), Abner Shimony (Ph.D., Physics, Princeton University,

1962; Ph.D., Philosophy, Yale University, 1963), Armand Siegel, Emeritus (Ph.D., Massachusetts Institute of Technology, 1940), John J.Stachel (Ph.D., Stevens Institute of Technology, 1962), H.Eugene Stanley (Ph.D., Harvard University, 1967), Charles R.Willis (Ph.D., Syracuse University, 1957), George O.Zimmerman (Ph.D., Yale University, 1963).

Associate Professors: William S.Hellman (Ph.D., Syracuse University, 1961), William Klein (Ph.D., Temple University, 1972), Sidney Redner (Ph.D., Massachusetts Institute of Technology, 1977), B.Lee Roberts (Ph.D., William and Mary, 1974), Kenneth Rothschild (Ph.D., Massachusetts Institute of Technology, 1973).

Assistant Professors: Rama Bansil (Ph.D., University of Rochester, 1974), James Brooks (Ph.D., University of Oregon, 1973), Maged El-Batanouny (Ph.D., University of California at Davis, 1977), James P.Miller (Ph.D., Carnegie-Mellon University, 1974), So-Young Pi (Ph.D., SUNY, Stony Brook, 1974). Vijay Murgai (Ph.D., University of Rochester, 1982).

Visiting Professors and Research Associates: Patrick Ahl (Ph.D., John Hopkins University, 1981), Mark Braiman (Ph.D., University of California at Berkeley, 1983), George Ciangaru (Ph.D., SUNY, Stony Brook, 1974), Victor Chukanov (Ph.D., Moscow State University, 1968), Antonio Coniglio (Ph.D., Kings College, University of London, 1966), Kenneth Douglas (Ph.D., University of Colorado at Boulder, 1983), Shlomo Havlin (Ph.D., Tel Aviv University, 1967), Hans Herrman (Ph.D., University of Cologne, 1980), Richard Higgins (Ph.D., Northwestern University, 1965), Abdo Ibrahim (Ph.D., Northeastern University, 1984), Barbara Jensen (Ph.D., Columbia University, 1973), Kevin Martin (Ph.D., Ohio University, 1983), Izumi Nishio (Ph.D., University of Tokyo, 1978), Robin Speedy, (Ph.D., Cambridge University, 1973), Michael Stephen (Ph.D., Yale University, 1965), Ahmad Torabi (Ph.D., Clark University, 1980), Asim Yildiz (Ph.D., Harvard University, 1972).

Staff: Alfred Stone (Departmental Administrator), Flora Greenan (Administrative Assistant), A. Helen Siegel (Senior Administrative Secretary), Susan Wiard (Secretary), Sally Flint (Secretary), Joseph M.Gonsalves (Laboratory Assistant), John Sousa (Instrument Maker), Richard A.Johns (Physics Demonstration Assistant).

Research Facilities and Laboratories

1. Facilities at the New Science Center, Boston University

   a. Surface physics
   b. Low temperature physics
   c. Raman spectroscopy for biological and polymer studies
   d. Infrared experiments in biophysics

d. Infrared experiments in biophysics
e. Light scattering experiments for polymer studies

In addition there is an Intermediate Energy Laboratory used for an assembly and testing area, and a machine shop for departmental and interdepartmental use.

2. Outside Facilities

Extensive use is made of the National Magnet Laboratory in Cambridge by the Low Temperature Group.

The Intermediate Energy Group is involved in experiments at the Bates Linear Accelerator in Middleton, Mass., and are users at the AGS in Brookhaven and at LAMPF at Los Alamos.

Surface physics experiments are underway or planned at the Brookhaven National Light Source.

The Biophysics Group is involved in collaborative work at the MIT Biology Department laboratories.

3. Computer Facilities

Departmental VAX 11/750 connected to University Network plus various group computers such as PDP 11/23; VAX 750.

Proposed Expansion of Faculty, Staff and Facilities

In the table below we present additions to our faculty and research support staff which are needed to bring our department to a position where we are competitive with good departments around the country. These improvements are needed to preserve the momentum now enjoyed by the department and to curtail the loss of good faculty to other institutions. The changes are intended to maintain and improve both teaching quality and research volume and quality. The increased cost to the University is accompanied by an expected major increase in research funding from external sources. The goal is to nearly double our research funding over a four year period. The increase in acquisition of external money is to be shared between the incumbent faculty and the proposed six new faculty appointees in experimental physics.

(in thousands)

General Research Support Personnel (including F.B.)	Cost to University	Cost to Grant
Machine Shop Foreman-Draftsman	14	14
Electronics Tech[1]	(11)	(11)
Machinist[2]	(11)	(11)
Secretary (Scientific)	8	8
Secretary (Acct.; Purchasing) (half time)	4	4
	26	26
Group Research Support		
3 Research Asst. Prof.	0	75
3 Technicians	0	75
		150
Professors (Experimental)		
6 (all ranks)	180	40(summer)
Net Cost to University	206	
Net Cost to Grants		216
Additional Grant Income		
New Faculty	360 (represents $60/faculty)	
Old Faculty	400 (represents 30% increase)	
	760	
Additional Overhead(50%)	380	

Footnotes

1) The electronic technician is anticipated in the 1984-85 budget as a part of the University sponsored research services. Approximately $11,000/year is anticipated as support from physics.

2) A machinist is already employed; largely supported by the Physics Department out of Departmental and Research Funds, but also used by other Departments.

One-time costs:

Faculty start-up $60 each	360
Machine shop equipment	100
TOTAL	$460

(Note that in making the estimates shown above, it was assumed that no contribution to academic nine months' salary would come directly from grants or contracts. This is consistent with NSF and DOE policy for the funding of basic research. Nevertheless, it is expected that in some cases new grants will contribute to the nine months' salary, as is already the practice of our department.)

Support personnel and services for research are an important component of research, now largely missing at Boston University. Some steps are underway to rectify this problem at the University level, as in the case of the proposed electronics support system. However, a vigorous Physics Department will need its own dedicated research support staff, largely funded from research grants. Traditionally, research has been carried on at Boston University by avoiding projects requiring substantial research support, or by depending on outside sources such as the Magnet Laboratory or the M.I.T. Laboratory for Nuclear Science. The University and the Department will do well to decrease this dependence and expand its ability to undertake large scale experimental projects supported by its own people. The salaries of the Research Support personnel will be obtained as much as possible from charges against grants, as is now done for work done in our machine shop. Nevertheless, job security requires that the University provide the funds to carry personnel through funding cycles at an estimated 50% of salary averaged over time. Some of shop and drafting time shown in the budget is expected to be paid for by other Departments in the University, which may lower the University contribution from the 50% level. Note however, that a certain level of support is an appropriate charge against grant overhead and should be provided by the University.

One should note that the expected additional annual cost to the University ($206) is appreciably less than the increased overhead brought in ($380). This is an important argument for Departmental expansion. The goal is to provide sufficient increase in overhead money received from basic research grants to largely defray the cost of added faculty. We believe that the goal can be reached without substantial deviation from our traditional commitment to basic research as opposed to applied or developmental work.

The categories "Group Research Support," "Professors," and "Increased Grant Activity," are discussed below. The other categories serve to upgrade the present inadequate research services to an acceptable level.

"Group Research Support" contains three Research Assistant Professors, and three technicians, shared among the various experimental groups. It is the responsibility of the various groups or individuals to recruit and support these people on grants or contracts.

"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. 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 will use some faculty to teach (as we already do) small classes as well as to 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. More contact hours, better teaching, and more course development is needed in our service courses, our undergraduate major courses, and in our graduate courses. Special programs such as the applied Physics Ph.D. and the M.A.T. (Masters of Art in Teaching) degree for high school physics teachers require increased faculty attention. Recruiting in the high schools to strengthen our major program, recruiting in the colleges for able graduate students, fund raising, and proposal writing; all will benefit from the expansion of our faculty.

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 the new faculty member with the professional goals of the Physics Department. In this expansion we do not want to lose sight of our primary mission, to provide an academic climate where effective teaching and fundamental research can take place. Each new faculty member is reasonably expected to either obtain a new grant or add to an existing effort so that the average external funding per new faculty member is about $60,000 with an average of $30,000 coming to the University as overhead.

A strong effort will be made to attract highly qualified Research Professors to the department. These professors will be encouraged to use their talents not only to further the basic research in the various groups, but to seek additional research funds on their own, that is, to eventually go into business for themselves.

The increased experimental faculty combined with an overall expansion of research support facilities and the creation of a research support staff will greatly increase our capability to carry out large scale basic research projects. While it is a fact that large scale funding in physics is overwhelmingly federal support for basic research as opposed to industrial support, we will not hesitate to take advantage of industrial funding which is consistent with our joint mission of fundamental research and first rate education.

We propose to hire six experimental physicists in the general areas in which we already have some strength: namely, Condensed Matter, including Solid State, Surface, Low Temperature Physics, and Polymer Physics; Intermediate Energy Physics, including Nuclear and High Energy Physics; and Biophysics. The addition of six uew faculty members would strengthen our existing groups past the point of "critical mass" to where they can be viewed as significant contributors on an international level. In adding new faculty an effort should be made to create internal consistency and

coherence which will provide a synergistic effect throughout the whole department. One aspect of increasing group size and strength is the decreasing need for the start-up money required when an experimental program in a particular area is just beginning.

The new faculty members will be hired for their potential of carrying out vigorous research programs and for their potential (or proven) teaching abilities. No theoretical physicists are shown in the list above. We assume that after replacing our recent losses in Solid State and Intermediate Energy Theory, we will have adequate coverage in all our experimental fields plus additional strength elsewhere. The goal of adding six experimental physicists over a four year period is fairly ambitious, but can be done. The chief reason for hiring experimental physicists is to obtain a more normal balance of experiment and theory in a department which is historically heavy on the theoretical side. An exception would be made if some highly favorable opportunity to obtain a truly outstanding theorist presented itself.

Attention will be given to the long range growth capabilities of junior faculty. It is clear, however, that in the future there will be turnover in the junior ranks; tenure will be possible for some but not all of the appointees. In this way a healthy component of younger faculty is obtained without the premise of continued expansion of the tenured ranks.

The success of the undertaking depends not only on new faculty, but requires a 40% increase in the grant support level for the present faculty. This increase is expected to be produced by the present faculty in response to the enhanced research support staff and facilities. In order to unleash the research oriented professors, it is expected that the teaching load objective should be two courses per year. One substantial course per year is to be set as a minimum teaching load for all faculty; that is, every voting faculty member is expected to teach one course per year regardless of "soft money" available. (The standard policy is two courses per year at MIT for example, where most professors have the ability to buy out of teaching completely if they choose.) Faculty who do little or no basic research are are normally expected to make their contribution by an increased commitment to teaching and other academic affairs. Good teaching, especially of large service courses, is seen as vital to the health of the department and will be approporiately rewarded. Faculty duties must take into account such matters as heavy committee assignments, the undertaking of new courses, the necessity to lighten the load on newly appointed faculty, or to encourage faculty engaged in major proposal writing.

It may be advantageous to create new Research Centers within the department for the purposes of improved visibility, group identification, and to facilitate external funding possibilities. Faculty members who belong to such centers are expected to recognize that their primary allegiance is to the department as a whole and to see the Center as a subdivision of the Physics Department. The creation of such centers with the appropriate use of new and old faculty will be considered during the recruitment of the six new professors.

It is seen as absolutely essential that the Department provide first

class service courses at the elementary level, maintain the level of excellence and expand the numbers of the undergraduate Physics Major, and offer graduate level courses that will attract and hold the increasing number of the high quality graduate students needed to achieve our research goals. They are needed to help with the research. They keep the faculty alert and competitive, and they leave Boston University carrying our reputation with them. They are in large measure our most important research product. They are the source of our future strength.

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

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

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

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

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

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

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

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

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.

Peter Kellerman, Lecturer, Ph.D., Boston University. Joined the Department of Physics in 1984.

William Klein, Associate Professor, Ph.D. Temple University. Joined the Department of Physics in 1977. (Sabbatical - Sem. II)

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

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

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

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

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

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

John Stachel, Professor, Ph.D., Steven Institute of Technology. Joined the Department of Physics in 1964. 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, Ph.D., Yale University. Joined the Department of Physics in 1963.

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

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

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

CENTER FOR THE PHILOSOPHY AND HISTORY OF SCIENCE

Research Appointments, 1983-1984

Joseph Agassi (York University, Ontario and Tel-Aviv University): working on a numerous issues in the philosophy and history of the natural and social sciences.

Miriam Balaban: Editor of Desalination, a monthly international journal on the science and technology of water desalting and purification. First elected president of the International Federation of Editors' Association (IFSEA).

Kevin Brien, PhD Boston University, 1978: explores as a long term aim the possibility of conceptual revolution in the philosophical and methodological foundations of science which would modify the conceptual interplay among the physical, social, and life sciences, and cultivate the emergence of a humanistic, non-mechanistic, non-reductionistic stage in the evolution of science

Jean Eisenstadt (Institut Henri Poincaré, Paris): working on the history of general relativity theory.

Jost Halfmann (University of Osnabrück and the Center for European Studies, Harvard University): working on the emergence of microelectronics, specifically the conditions of resistance by social movements and industrial unions against the introduction of high-impact technologies.

Alex Kozulin (Ben-Gurion University of the Negev), PhD Institute of General and Pedagogical Psychology, Moscow, USSR, 1978: working on the history of psychology in the Soviet Union with concentration on the work of Vygotsky and his disciples.

Zhen Li (Peking University): working on contemporary philosophical approaches to the history of western philosophy.

Richard M. Martin (Northwestern University), PhD Yale University, 1941: working on a wide range of issues in philosophy and logic. Reviving the Boston University Logic Forum with Paul Shiman.

Debra Nails, (University of the Witwaterstrand), M.A. Louisiana State University, 1975,: projects include one on Spinoza and the Sciences, an edition with Abner Shimony on Naturalistic Epistemology, and a monograph on Plato's philosophy of education.

John Norton (University of New South Wales and University of Pittsburgh, Fulbright Scholarship) PhD University of New South Wales, 1982: working on the history of relativity theory.

Asher Peres, October-December, 1983 (Technion, Haifa): working on problems in theoretical physics.

Katherine Platt (London School of Economics): working on roles, ritual and social structure and social anthropological theory.

Santiago Ramirez (National University of Mexico): working on a book on the mathematical philosophy of Jean Cavaillès.

Zha Ruquiang (Institute of Philosophy, Chinese Academy of Science, Beijing): working on the history of the western philosophy of science.

Richard Sens: examines the epistemological foundations of psychoanalytic theory and the relation of such critical evaluations to clinical practice. Sens explores the question of differences, or alleged differences, between the natural and human sciences, focusing on the philosophical critiques of Freudian psychoanalytic theory.

Wolf Schäfer (J. W. Goethe-Universität, Frankfurt): continues work on the idea of "Social Natural Science," shifting the earlier concern with the relation of science and society to the new focus on the relation of science, society, and nature.

Paul Shiman, PhD, Columbia University, 1970: working on the philosophical foundations of logic and semantics and co-organizing the Logic Forum.

Marx W. Wartofsky, (Baruch College of C.U.N.Y.): PhD, Columbia University working on historical epistemology, theories of representation, and a broad range of issues in aesthetics, the philosophy of medicine, and epistemology.

Irene Portis Winner (Brown University, Em.): PhD, University of North Carolina, co-founder of the Semiotics Research Group.

Thomas Winner (Brown University, Em.): PhD, Columbia University, co-founder of the Semiotics Research Group.

Wu Zhong (Shaanxi Teachers University, People's Republic of China) studies modern American philosophy and the history of science, and is writing on why science did not develop in China.

CENTER FOR POLYMER STUDIES

Research Associates

Mark Braiman, Univ. of California, Berkeley, Ph.D. (Biophysics)
Patrick Ahl, Johns Hopkins University, Ph.D. (Biophysics)

Visiting Scholars

Armin Bunde,
Victor Chukanov, Ural Polytechnical Institute, Ph.D.
John Cardy, Cambridge University, Ph.D.
Michael Stephen, Oxford University, Ph.D.
F.Y. Wu, Northeastern University, Ph.D.
Harvey Gould, Univ. of California, Berkeley, Ph.D.
Paul Meakin, Univ. of California, Santa Barbara, Ph.D.
Hans Herrmann, Univ. of Köln, Ph.D.
Shlomo Havlin, Hebrew University, Ph.D.
Alla Margolina, Boston University, Ph.D.
Francois Leyvraz, Swiss Fed. Inst. of Technology, Ph.D.
Naeem Jan, University of the West Indies, Ph.D.

Izumi Nishio, Tokyo University, Ph.D; Assistant Research Professor
Antonio Coniglio, University of Naples, Ph.D: Research Professor

Intermediate Energy Group

George Ciangaru - Visiting Assistant Professor, Ph.D., University of New York, Stony Brook

Low Temperature Physics

Claudio Niccolini - Research Assistant Professor, Ph.D., Brandeis

Abdo Ibrahim - Research Associate, Ph.D., Northeastern

Kevin Martin - Ressearch Associate, Ph.D., Ohio State University

Physics Department Staff

Departmental Administrator	- Alfred Stone
Administrative Assistant	- Flora Greenan
Secretaries	- A. Helen Siegel (Administrative Senior)
	- Sally Flint
	- Susan Wiard
Laboratory Assistant	- Joseph M. Gonsalves
Instrument Maker	- John Sousa
Physics Demonstation Asst.	- Richard A. Johns

Administrative Organization of the Department of Physics

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

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

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

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

Michael Naughton and Kennth Gall, Graduate Student Representatives and Conveners.

Graduate Committee	Zimmerman (Chair) El-Batanouny Hellman Roberts Willis Hughes (Astronomy) Daly (Student - Ast.) Hoffman (Student)
Liaison - Astronomy & Physics	Zimmerman
Undergraduate	Redner (Chair) Brooks Edmonds Franzen Roberts
Photon	Redner
Honors	Edmonds
Science Curriculum	Roberts
Admissions	Rothschild (Chair) Hellman Miller Willis
Language	Corinaldesi
Library	Corinaldesi (Co-Chair) Redner

Bulletin Board

Corinaldesi

Liaison Committee with ENG

Chasan
Booth
Brooks
Eisenstein (ENG)
Eisenberg (ENG)

Physical Education

Franzen (Co-Chair)
Zimmerman

Colloquium

Bansil

Comprehensive

Franzen (Chair)
Bansil
Hellman
Miller
Pi
Shimony

Faculty Search

El-Batanouny (Chair)
Booth
Brooks
Stanley

Premedical

Edmonds (Co-Chair)
Franzen

International Student

Bansil

Safety

Miller

Info. Proc.

Miller (Chair)
El-Batanouny
Redner
Zimmerman

Ad Hoc Com. to Design a New Brochure

Pi
Rothschild
Zimmerman

Chair Search

Booth
El-Batanouny
Rothschild
Dill (Chemistry)
Coburn (ENG)

Physics Education Committee - Zimmerman (Chair)
Glashow
Hellman
Bansil
Booth
Rothschild
Abegg (SED)

COMMITTEES - 1983-84

Graduate

Zimmerman (Chair
El-Batanouny
Hellman
Roberts
Willis
Hughes - Astronomy
Hoffman - Grad. Stud.
Daly Grad. Stud. (Ast)

Liaison - Astronomy & Physics

Zimmerman

Undergraduate

Redner (Chair)
Brooks
Edmonds
Franzen
Roberts

Photon

Redner

Honors

Edmonds

Science Curriculum

Roberts

Admissions

Rothschild (Chair)
Miller
Hellman
Willis

Language

Corinaldesi

Library

Corinaldesi (Co-Chair)
Redner

Bulletin Board

Corinaldesi

Physics Education

Franzen (Co-Chair)
Zimmerman

Colloquium

Bansil

Comprehensive

Franzen (Chair)
Bansil
Hellman
Miller
Pi
Shimony

Search

El-Batanouny (Chair)
Booth
Brooks
Stanley

Premedical

Edmonds (Co-Chair)
Franzen

International Student

Bansil

Safety

Miller

Info. Proc.

Miller (Chair)
El-Batanouny
Redner
Zimmerman

Ad Hoc Com. to Design a New Brochure

Pi
Rothschild
Zimmerman

Liaison Com. with ENG

Chasan
Booth
Brooks
Eisenstein (ENG)
Eisenberg (ENG)

COMMITTEES - 1984-85

Graduate

Zimmerman (Chair)
Hellman
Klein
Roberts
Willis

Liaison - Astronomy & Physics

Zimmerman

Undergraduate

Edmonds (Chair)
Bansil
Brooks
Franzen

Photon

Edmonds

Honors

Edmonds

Science Curriculum (A Com. of the College)

El-Batanouny

Admissions

Willis (Chair)
Hellman
Miller

Language

Corinaldesi
Edmonds

Library

Corinaldesi

Bulletin Board

Corinaldesi

Physics Education

Franzen
Zimmerman (Co-Chair)

Colloquium

Klein
Pi

Comprehensive

Franzen (Chair)
Brooks
Murgai
Pi
Roberts

Search

Stanley (Chair)
Booth
Brooks

Premedical

Edmonds

International Student

Bansil

Safety

Miller

Info. Proc.

Miller (Chair)
Redner (Sem. II)
Zimmerman
El-Batanouny

Liaison with Engineering

Chasan
Brooks
Booth

Physics Graduate Students and Advisors 1983-84

STUDENTS	ADVISORS
Reina	Bansil
Fortune Tapper	Booth
Ma Naughton Samaratunga	Brooks
Leao Zagaeski	Chasan
Burdick Martini	El-Batanouny
Tufillaro Willings	Edmonds
Inabata Leonard Mustaki	Hellman
Given Samiullah Unger	Klein
Austin Fleming Folkerts Ray	Miller
Hoffman Stancioff	Pi
DeArcangelis Kang Van Riper	Redner

STUDENTS	ADVISORS
O'Brien Whitehouse	Roberts
Earnest Hao Huang, X Marrero	Rothschild
Maithreyan Morley	Shimony
Morrill	Stachel
Amitrano Djordjevic Hong Majid	Stanley
Gall Mattingly Meyer	Willis
Galuszewski Hartnett Lees Lerner Papaconstantinou	Zimmerman

Best Teaching Fellow Award

Willings

Physics Majors and Advisors

STUDENTS		ADVISORS
Allor, B.	(FR)	Bansil
Murphy, K.	(SR)	
Russel, P.	(JR)	
Brunell, T.	(FR)	Booth
LaRosa, F.	(FR)	
Warner, D.		
Connelly, P.	(JR)	Brooks
Dickinson, S.	(SR)	
Melzak, J.	(SR)	
Beisweiger, J.	(SO)	Chasan
Larcinesse, A.	(SR)	
Osovski, L.	(SO)	
Mandel, R.	(FR)	Edmonds
Milliman, J.	(SR)	
Berger		El-Batanouny
Boesch, R.	(SR)	
Brodbar, D.	(SO)	
Kondis, D.	(FR)	Franzen
Msaddi, J.	(SR)	
Sheehan, J.	(SO)	
Braccio, P.	(JR)	Hellman
DerTorossian, E.	(JR)	
Feldman, G.	(SR)	
Bronson		Miller
Duke		
Freihet, K	(FR)	
Armstrong, E.	(SO)	Redner
Kachoria, V.	(SR)	
Sarris, A.	(SR)	
Silber, L.		

Students		Advisors
Ashby, S.	(FR)	Roberts
Laukien, D.	(FR)	
Nisenzon, A.	(SR)	
Glass, S.	(JR)	Rothschild
Naegele, S.	(SR)	
Ramirez, C.	(SR)	Zimmerman
Valley, G.	(SR)	

List of Graduate Recipients

Ph.D. Degrees	Advisors
Edward T. Gawlinski	Redner
Peter L. Kellerman	Shimony
Imtiaz Majid	Stanley
Daniel R. Tieger	Booth
Christopher D. Unger	Klein
John Wiafe-Akenten	Bansil

M.A. Degree in Physics

Thomas N. Earnest	Rothschild
Kenneth P. Gall	Willis
Young-sea Huang	Hellman
Zaven Kaprelian Jr.	Redner
Ionnis Ilipoulos	Booth
Diane T. Solenberger	Zimmerman

B.A. Degree in Physics

Cum Laude

Suzanne Dickinson (With Distinction in Physics)	Brooks
Geoffrey Brien Feldman (Cum Laude)	Hellman

Mathematics and Physics

Richard John Boesch	El-Batanouny
Jeffrey Mark Melzak (With Distinction in Physics) (Summa Cum Laude)	Brooks

Mathematics with a Minor in Physics

Mary Hito (Magna Cum Laude)	
Vikram Kumar Kachoria	Redner

Astronomy & Physics

Stephen Tobias DeJesus
James Williams Guinn

Physics Department Award for Outstanding Physics Major

Jeffrey Mark Melzak

Courses Offered During the 1983-84 School Year
Semester I

Undergraduate

College	Course #	Course Title	Instructor	# Enrolled
*CLA	PY 105	Elem. Physics I	Booth	110
*MET	PY 105	Elem. Physics I	Miller	28
†CLA	PY 115	Py Life Science I	Hellman	92
*CLA	PY 181	Physics I	Rothschild	46
*CLA	PY 211A1	Gen. Physics I	Bansil	265
*CLA	PY 211B1	Gen. Physics I	Kellerman	144
*CLA	PY 211C1	Gen. Physics I	Brooks	169
*CLA	PY 212A1	Gen. Physics II	Edmonds	89
*CLA	PY 212B1	Gen. Physics II	Booth	45
CLA	PY 231	Py in Music	Roberts	8
*CLA	PY 251	Princ. Phys. I	Edmonds	150
*CLA	PY 313A1	Elem. Mod. Physics	Corinaldesi	63
*CLA	PY 313B1	Elem. Mod. Physics	Kellerman	49
CLA	PY 353	Vibration, Waves	Chasan	134
CLA	PY 401 B3	Sr. Indep. Work	Brooks	1
CLA	PY 401 R3	Sr. Indep. Work	Rothschild	1
CLA	PY 403	Meth Theor Phys	Redner	7
†CLA	PY 405A1	El Mag Fld Wav I	Zimmerman	93
†CLA	PY 405B1	El Mag Fld Wav I	Corinaldesi	25
CLA	PY 421	Solid State	Brooks	5
CLA	PY 451	Quantum Phys. I	El-Batanouny	8
CLA	PY 491 B1	D.S.	Roberts	1
CLA	PY 491 S4	D.S.	Shimony	1
				1534

*Lab + Disc.	1158
†Non Lab but Disc.	210

Graduate and Undergraduate

College	Course#	Course Title	Instructor	#Enrolled
CLA	PY 503	Math Physics I	Klein /Shimony	14
CLA	PY 505	Class Mechanics	Miller	11
CLA	PY 507	Quantum Mech I	Hellman	20
CLA	PY 510	Elecgromag II	Willis	5
CLA	PY 511	Stat Phy/Therm I	Willis	9
CLA	PY 541	Adv. Lab I	Franzen	8
				67

Graduate

GRS	PY 711	Adv. Quan. Thy I	Hellman	1
GRS	PY 805	Elem. Quan Field	Pi	10
GRS	PY 817	Sym Sol St Phys	El-Batanouny	7
GRS	PY 901C1	Res in Phys I	Chasan	1
GRS	PY 909B3	D.S. in Physics I	Brooks	1
GRS	PY 981M X1	Certified FT St		(27)
GRS	PY 983M X1	Cont Study PT		(1)
GRS	PY 985M B2	Cont Study CFT	Booth	1
GRS	PY 985M E3	Cont Study CFT	El-Batanouny	1
GRS	PY 985M H2	Cont Study CFT	Hellman	1
GRS	PY 985M K1	Cont Study CFT	Klein	1
GRS	PY 985M R4	Cont Study CFT	Redner	1
GRS	PY 985M S2	Cont Study CFT	Stanley	1
GRS	PY 985M X1	Cont Study CFT		(3)
				26

Grand Total 1627

Courses Offered During the 1983-84 Semester

Semester II

Undergraduates

College	Course#	Course Title	Instructor	#Enrolled
*CLA	PY 106	Elem. Physics II	Booth	78
*MET	PY 106	Elem. Physics II	Miller	36
†CLA	PY 118	Phys Life Sci II	Hellman	69
CLA	PY 136	Hi Fi Physics	Roberts	18
*CLA	PY 182	Physics II	Bansil	46
*CLA	PY 211A1	Gen. Physics I	Edmonds	99
*CLA	PY 211B1	Gen. Physics I	Zimmerman	50
*CLA	PY 212A1	Gen. Physics II	Brooks	251
*CLA	PY 212B1	Gen. Physics II	Kellerman	58
*CLA	PY 212C1	Gen. Physics II	Kellerman	199
CLA	PY 238	Nuclear Weapons	Shimony	11
*CLA	PY 252	Princ. Phys. II	Edmonds	90
*CLA	PY 313	Elem. Modern Physics	Corinaldesi	113
*CLA	PY 354	Modern Physics	Roberts	41
CLA	PY 401B3	Sr. Indep. Work	Brooks	1
CLA	PY 402R3	Sr. Indep. Work	Rothschild	1
†CLA	PY 405	El Mag Fld Wav I	Nishio	17
†CLA	PY 406	El Mag Fld Wav II	Corinaldesi	6
CLA	PY 408	Intermed. Mechan.	Franzen	9
CLA	PY 410	Therm /Stat Phys	Redner	8
CLA	PY 452	Quantum Phys. II	Chasan	7
CLA	PY 491C1	D.S.	Chasan	1
CLA	PY 492B1	D.S.	Booth	1
CLA	PY 492E1	D.S.	Edmonds	1
CLA	PY 492R1	D.S.	Roberts	1
				1212

*Lab + Disc. 1061

†Non Lab but Disc. 92

Courses Offered During the 1983-84 School Year

Semester II

Graduate and Undergraduate

College	Course#	Course Title	Instructor	#Enrolled
CLA	PY 508	Quantum Mech. II	Hellman	17
CLA	PY 509	Electromag I	Willis	13
CLA	PY 512	Stat Phy/Thrm II	Willis	8
				38

Graduate

GRS	PY 707	Stat Mechanics	Stanley	6
GRS	PY 714	Solid St Phy I	El-Batanouny	6
GRS	PY 820	Adv Quan Fld Th	Pi	7
GRS	PY 902M1	Res in Phys II	Miller	1
GRS	PY 902R1	Res in Phys II	Roberts	1
GRS	PY 902S2	Res in Phys II	Stanley	1
GRS	PY 902W1	Res in Phys II	Willis	1
GRS	PY 908S2	Res in Phy & Phil II	Stanley	1
GRS	PY 910F1	D.S.	Franzen	1
GRS	PY 910M1	D.S.	Miller	1
				26

Grand Total 1276

Summer Session Sem. I

CLA	PY 105S	Elem. Physics I	Hellman	26
CLA	PY 211S	Gen. Physics I	Hellman	30
CLA	PY 313S	Elem. Modern Physics	Willis	31
CLA	PY 491S	D.S.	Chasan	4
				91

Summer Session Sem. II

CLA	PY 106S	Elem. Physics II	Wellenstein	18
CLA	PY 211S	Gen. Physics I	Ciangaru	9
CLA	PY 212S	Gen. Physics II	Abou-Aly	36
GRS	PY 900S	Teaching of Physics	Haber-Schaim	228
				291

Grants

Bansil

1. NSF, "Statistical Mechanics of Polymers" [jointly with S. Redner and H. E. Stanley].
2. NSF, US/Italy Exchange Program [jointly with W. Klein, S. Redner and H. E. Stanley].
3. ONR, "Physics of Gels with Short Bond Lifetimes" [jointly with H. E. Stanley].
4. Gillette Corp., "Raman Spectroscopy of Disulfides in Hair"

Booth

Prizes, awards, grants, fellowships, etc. since last June:
NSF; 3rd year; $130,000 (PI)

Brooks

NSF Grant - $58,000
Community Tech. Foundations Grant - $8,000
Graduate Student Stipend - Sub contract (MIT) $12,000

Chasan

Contributed section to successful NSF grant application, "Acquisition of FTIR Facility". I get 20% of time on this facility.

El-Batanouny

DEO Grant No. DE-AC02-83ER45019
(February 1984) ($30,000)

Franzen

Awarded a visiting professorship at the Swiss Federal Institute of Technology (Eidgenössische Technische Hochschule), Zürich, Switzerland, from the end of April to the beginning of September 1983.

Miller

1. NSF Grant $205,000/yr., with Booth and Roberts, 1st year of a three year contract.
2. NSF Grant, $59,000, toward the purchase of a NaI detector.
3. NSF Grant, $80,000, toward the purchase of a computer.

Pi

Department of Energy (DOE)
Outstanding Junior Faculty Grant (July 1, 1983 -)

Redner

ARO: "Application of modern methods of statistical mechanics to the percolation problem" (with W. Klein and H. E. Stanley) $80K/year
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 80K/year
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

NSF Grant PHY - 8311277 (three-year award with Miller and Booth)
$205,000 + 59,000 supplied for first year.

NSF Computer Grant to be awarded June '84

Rothschild

In the past month I have received a new grant from the National Institute of Health for $365,000. This is in addition to a total of $408,000 in continuing grants received in the prior year. All of these grants have been received with me as sole Principal Investigator and no other co-Principal Investigator*. An additional grant on "Molecular Electronics" has recently been submitted to the ONR for $850,000. Details of these grants and my continuing 5 year carrer award from the American Heart Association are listed below.

*With the exception of grant #4 listed below

1. National Institute of Health, "FTIR Study of Photoreceptor Membrane"
   Amount-$350,000/3 Role: P.I. (no- Co-P.I.) $117
   duration: 8/84-7/87

2. American Heart Association, "Biophysical Study of Calcium ATPase Structure"
   Amount- $109,560/5 Role: Principal Investigator (No Co-PI's) $21k

3. National Science Foundation "FTIR Study of Bacteriorhodopsin"
   Amount-$170,000/3 Role: Principal Investigator (No Co-PI's) $57k

4. National Science Foundation "Acquisition of FTIR Facility"
   Amount-$123,317*/3 Role: Principal Investigator for group proposal $41k
   *Note-Boston University has agreed to provide $31,317 cost sharing

List of Continuing Fellowships Received Since 7/1/82

1. American Heart Association "Rotational Mobility in Bacteriorhodopsin"
   Amount-$15,000 Role: Supervisor to Dr. Patrick Ahl

2. Helen Hayes Whitney Foundation "Resonance Raman Study of Mutant BR"
   Amount-$15,000 Role: Supervisor to Dr. Mark Braiman

List of Continuing Grants Received Prior to 7/1/82

1. American Heart Association Established Investigator of AHA
   Amount-75% salary for 5 years

Stachel

Joseph Henry Lecturer, Princeton Unive

Grant from National Science Foundatio

Continuation of Grant from British Sc
Profs. Felix Pirani and R.A. D

Stanley

New grants: $1,000,000

ARO, $400,000 [with Redner/Klei
ONR, $330,000 [with Bansil]
NSF, $210,000 [with Bansil/Redn
NIH, $80,000 [with Rothschild/B

Renewals: $152,000

NSF-France $113,000
NSF-Italy, $39,000 420/2 = 10 actual

Zimmerman

Air Force Scientific Research: Study of Intercalated Graphites, $117,000 an

NSF with J.S. Brooks: Study of Liquid He $58,000

NSF: was instrumental in starting program Abegg of SED for pre-college teachers in sc will be funded at $142.000 over three years. /3 = 47

130• + papers, 1984-1989 $56K/yr
58• + uncil to work with
8• + n general relativity.
12• +
30• +
205• +
59• +
80• +
80• +
80• +
40• +
117• +
21• +
57• +
41• +
15• +
15• +
56• +
81•5 +
80• +
10• +
25• +
47• +
1347•5 *

... which

Publication List

Bansil

1. J. Wiafe-Akenten and R. Bansil, "Intermolecular coupling in HOD solutions" J. Chem. Phys. 78, 7321 (1983).

2. S. Krishnamurthy and R. Bansil, "Nucleation and growth in a polymer solution," Phys. Rev. Lett. 50, 2010 (1983).

3. M. K. Gupta and R. Bansil, "Raman spectroscopic and thermal studies of polyacrylamide gels with varying monomer-co-monomer ratios," Polymer Letters 21, 969 (1983).

4. R. Bansil, H. J. Herrmann and D. Stauffer, "Kinetic percolation of a mixture of 2- and 4-functional monomers in a mobile solvent as a model for gelation," J. Polymer Sci. (Physics Ed.) 1983, in the PROCEEDINGS OF THE WORKSHOP ON DYNAMICS OF POLYMERS, Santa Barbara, December 1982.

5. S. Krishnamurthy, R. Bansil and J. Wiafe-Akenten, "Low-frequency Raman spectrum of supercooled water," J. Chem. Phys. 79, 5863 (1983).

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

7. M. K. Gupta and R. Bansil, "Differential scanning calorimetry of acrylamide-bisacrylamide copolymer gels" PROCEEDINGS OF THE 12TH NATAS MEETING (1983).

8. S. Krishnamurthy and R. Bansil, "Nucleation, growth and gelation in gelatin solution," (submitted).

9. R. Bansil, B. Cravalho and H. J. Herrmann, "Cluster-size distribution in 3-dimensional kinetic gelation in the presence of a mobile solvent" J. Phys. A (submitted).

Booth

See Roberts

Brooks

1. (with D.A. Syphers, and P.J. Stiles), "Quantum Hall Studies in Si MOSFETs for $\nu<1$", Solid State Commun. 46, 243 (1983).

2. (with R.B. Hallock), "A Simple Apparatus for Concentration Determinations in Binary Gas Mixtures", Rev. Sci. Instrum. 54, 1199 (1983).

3. (with D. New, T.G. Castner, and M.J. Naughton), "Magnetocapacitance Measurements on n-Type Silicon", Proc. of Application of High Magnetic Fields in Semiconductor Physics Conf., Grenoble 1982, ed. by G. Landwehr (Springer-Verlag, Berlin, 1983), p. 475.

4. (with D.C. Tsui, H.L. Stormer, J.C.M. Hwang, and M.J. Naughton), "Observation of a Fractional Quantum Number", Phys. Rev. B28, 2274 (1983).

5. (with R.C. Samaratunga, K.P. Martin, and G.O. Zimmerman), "Boundary Limited Nuclear Spin Relaxation of 3He Liquid and Vapor in High Magnetic Fields", J. Appl. Phys. 54, 6421 (1983).

6. (with M. J. Naughton, S. Dickinson, R.C. Samaratunga, and K.P. Martin), "Thermometry at Low Temperatures and High Magnetic Fields", Rev. Sci. Instrum. 54, 1529 (1983).

7. (with R.S. Markiewicz, and C.J. Rollins), "Dimensionality Crossover of Spin-Orbit Scattering Observed via Localization", 5th Int'l. Conf. on Two Dimensional Systems, Oxford, England, 1983, p. 675.

8. P. M. Chaikin, M.-Y. Choi, J.F. Kwak, J.S. Brooks, K.P. Martin, M.J. Naughton, E.M. Engler, and R.L. Greene, Phys. Rev. Lett., 51, 2333 (1983).

9. F.M. Ellis, J.S. Brooks, and R.B. Hallock, Third Sound in 3He-4He Mixture Films, accepted for publication in J. Low Temp. Phys., Vol. 56, 1984.

10. J. S. Brooks, M.J. Naughton, Y.P. Ma, K.P. Martin, M.P. Sarachik, "High Field Magnetization Measurements of Boron-Doped Silicon Near the Metal Insulator Transition", Accepted for publication in the Proc. of the 17th Int'l. Conf. Low Temp. Phys. Karlsruhe, 1984.

11. R. Meservey, J.S. Brooks, and G.O. Zimmerman, "Non-Resonance Measurement of the Nuclear Susceptibility and Relaxation Time of Liquid ^{3}He", Accepted for publication in the Proc. of the 17th Int'l Conf. Low Temp. Phys., Karlsruhe, 1984.

Chasan

Solomon, A.K., Chasan, B. Dix, J. A., Lukacovic, MF, Toon, MR, and Vakman, A. S., "The Aqueous Pore in the Red Cell Membrane: Band 3 As a Channel for Anions, Calions, Non-Electrolytes and Water" Ann NY ACAD Sci. 414 p. 97 (1983).

Chasan, B. Lukacovic, MF Toon, MR, and Solomon, A. K. "Effects of thiorea on pCMBS Inhibition of Osmotic Water Transport in Red Cells" Biochim. Biophys. Acta (to be published).

Cohen

BOSTON CENTER FOR THE PHILOSOPHY AND HISTORY OF SCIENCE--Books Published, 1983-84

Boston Studies in the Philosophy and History of Science (Robert S. Cohen and Marx W. Wartofsky, editors)

64. Cohen, R.S. and M.W. Wartofsky (eds.). Hegel and the Sciences

74. Zinov'ev, A.A. Logical Physics.

75. Granger, G.G. Formal Thought and the Sciences of Man.

76. Cohen, R.S. and L. Laudan (eds.). Physics, Philosophy and Psychoanalysis.

77. Schäfer, Wolf (ed.). Finalization in Science.

78. Shapere, Dudley Reason and the Search for Knowledge.

80. Durbin, Paul and Rapp, F. (eds.). Philosophy and Technology.

82. Cohen, R.S. and M.W. Wartofsky (eds.). Physical Science and the History of Physics.

Studies in the History of Modern Science (Robert S. Cohen, Erwin Hiebert and Everett Mendelsohn, editors)

14. Hendry, John The Creation of Quantum Mechanics and the Bohr - Pauli Dialogue.

9

Edmonds

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El-Batanouny

1. "Structure and Electronic Trends in the Growth of Cu overlayers on the Nb(110) Surface", M. El-Batanouny and Myron Strongin, Phys. Rev. B to be published.

2. "Molecular Dynamics Study of Collective Modes and Dislocation Ordering in Mismatched Overlayers", K.M. Martini, S. Burdick, M. El-Batanouny and G. Kirczenow, Phys. Rev. B to be published.

3. "A Compact and Hish Resolution He-Atom Velocity Analyser", K.M. Martini, W. Franzen, M. El-Batanouny and S. Burdick to be published.

4. "Structure and Dynamics of Mismatched Orerlayers", K.M. Martini, M. El-Batanouny, S. Burdick and G. Kirczenow to be published.

5. "Molecular Dynamics Study of Collective Modes and Dislocation Ordering in Mismatched Overlayers", K.M. Martini, S. Burdick, M. El-Batanouny and G. Kirczenow, Bulletin of the American Physical Society to be published.

6. "Molecular Dynamics Investigations of Dislocation Depinning Transition in Mismatched Overlayers". First International Conference on the Structure of Surfaces.

Franzen

"Theory and Operation of Space-Charge-Limited Diode Radiation Detector," Journal of Scientific Instruments (in press) (with V.L. Telegdi, J. Hoffnagle and N. Schlumpt)

"'Weighing' Electric and Magnetic Forces," Am. Journal of Physics (submitted for publication).

Hellman

Finite Temperature Corrections To Field Theory
with Paul H. Cox and Assim Yildiz Annals of Physics (June 1984 approximate). The paper has been accepted for publication.

Klein

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Miller

1. "Precision Measurement of the Magnetic Moment of the Σ^- Hyperon," D. W. Hertzog, et. al., Phys. Rev. Lett. 51 (1983)1131.
2. "^{4}He(r,π^0) Coherent Differential Cross Sections at 300MeV," D. Tieger, et. al., submitted to Phys. Rev. Lett.
3. "Two Pion Correlations in Heavy Ion Collisions," W. A. Zajc, et. al., LBL Preprint 16930, Jan. 1984, to be submitted to Phys. Rev. C.
4. "Pion Source Parameters in Heavy Ion Collisions," W. A. Zajc, et. al., LBL preprint 17171, Jan. 1984, to be submitted to Phys. Rev. Lett.

Pi

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"Effective Potential for Chiral Symmetry Breaking in QCD" (with P. Castorina) MIT preprint (1984)

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Redner

1. S. Redner "Percolation and conduction in random resistor-diode networks" in Percolation Structures and Processes, Annals of the Israel Physical Society, Vol. 5, eds. G. Deutscher, R. Zallen, and J. Adler (A. Hilger: Bristol) Chap. 19 (1983)

2. C. Tsallis, A. Coniglio and S. Redner "Break-collapse method for resistor networks and renormalization group applications" J. Phys. C 16 4339 (1983)

3. S. Redner and I. Majid "Critical properties of directed self-avoiding walks" J. Phys. A 16, L307 (1983).

4. C. Tsallis and S. Redner "A new approach for multicriticality in directed and diode percolation" Phys. Rev. B 28, 6603 (1983)

5. H. E. Stanley, K. Kang, S. Redner and R. L. Blumberg, "Novel superuniversal behavior of a random-walk model" Phys. Rev. Lett. 51, 1223 (1983).

6. S. Redner and K. Kang, "Asymptotic solution of interacting walks in one dimension" Phys. Rev. Lett. 51, 1729 (1983).

7. S. Redner "Recent progress and puzzles in percolation", invited talk from a workshop on the Physics and Mathematics of Disordered Media, Univ. of Minnesota, published in the Springer Lecture Notes on Mathematics 1035 (1983).

8. S. Redner "Directionality effects in percolation ", ibid.

9. K. Kang and S. Redner, "Novel behavior of biased correlated walks in one dimension" J. Chem. Phys. 80, 2752 (1984).

10. S. Redner and L. de Arcangelis, "Asymptotic properties of spiral self-avoiding walks" J. Phys. A 17, L203 (1984).

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

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

14. K. Kang, P. Meakin, J. H. Oh, and S. Redner, "Universal decays in multiparticle reactions", J. Phys. A (to be submitted)

15. S. Redner, "Exact results and series expansions for 2-tolerant random walks" J. Stat. Phys. (to be submitted)

Roberts

"Precision Measurement of the Magnetic Moment of the Sigma-minus Hyperon", D.W. Hertzog, M. Eckhause, K.L. Giovanette, J.R. Kane, W.C. Phillips, W.F. Vulcan, R.E. Welsh, R.J. Whyley, R.G. Winter, G.W. Dodson, J.P. Miller, F. O'Brien, B.L. Roberts, D.R. Tieger, R.J. Powers, N.J. Colella, R.B. Sutton, A.R. Kunselman, Phys. Rev. Lett. 51, 1131 (1983).

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"Coherent π° Photoproduction from ^4He at 300 MeV," D.R. Tieger, E.C. Booth, J.P. Miller, B.L. Roberts, J. Comuzzi, G.W. Dodson, S. Gilad, R.P. Redwine, submitted to Rhys. Rev. Lett.

"Experimental Studies of Antiprotonic Atoms in Gaseous H_2 and He and in Liquid H_2", J.R. Lindemuth, P.D. Barnes, J.N. Craig, M. Eckhause, R.A. Eisenstein, K.L. Giovanetti, J.R. Kane, A.R. Kunselman, J.P. Miller, M.S. Pandey, R.J. Powers, A.M. Rushton, B.L. Roberts, J.D. Sherman, R.B. Sutton, W.F. Vulcan, R.E. Welsh, W.R. Wharton, submitted to Phys. Rev. C.

Rothschild

1. K.J. Rothschild, W.A. Cantore and H. Marrero "Fourier Transform Infrared Difference Spectra of Intermediates in Rhodopsin Bleaching" Science 219, 1333-1335 (1983)

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

3. P.V. Argade and K.J. Rothschild "Qualitative Analysis of L550 Intermediate of Bacteriorhodopsin using Resonance Raman Spectroscopy" Biochemistry 22,3460 (1983)

4. K. J. Rothschild, P. Roepe, J. Lugtenburg and J. A. Pardoen "FTIR Evidence for Schiff Base Alteration in the First Step of The Bacteriorhodopsin Photocycle" Biochemistry (1984) In press

5. K.J. Rothschild "FTIR Methods for Measuring Proton Translocation in Bacteriorhodopsin" Methods in Enzymology (ed. L. Packer) Academic Press, N.Y. (1984, to appear)

6. K.J. Rothschild and P. Roepe "Two forms of the Bacteriorhodopsin K Intermediate Revealed by Fourier Transform Infrared Spectroscopy" J. Biomolecular Structure and Dynamics (to appear, 1984).

7. S.M. Gruner, K.J. Rothschild, W.J. DeGrip and N.A. Clark "Co-existing Lyotropic Liquid Crystals: Commensurate, Faceted and Co-planar Single Hexagonal (HII) Domains in Lamellar Photoreceptor Membranes (submitted)

Abstracts

8. W. J. DeGrip, J. Gillespie and K.J. Rothschild "FTIR Studies of Reconstituted Rhodopsin: The Rhodopsin to Bathorhodopsin Transition" ARVO Meeting on Vision, Bristol England (1983)

9. K.J. Rothschild and J. Lugtenburg "FTIR Evidence for Charge Separation at the Bacteriorhodopsin Schiff Base" Biophys. J. 45 209a (1984)

10. T.N. Earnest and K.J. Rothschild "Fourier Transform Infrared Spectroscopy of the Nicotinic Acetylcholine Receptor from Torpedo Californica Biophysical J. 45, 311a (1984)

Recent Publications on Research of K.J. Rothschild

1. F. Parker "Appications of Infrared, Raman and Resonance Raman Spectroscopy in Biochemistry" Pelenum Press, New York, 1983 (Chapters 4 & 11)

2. S.R. Caplan and A. Essig "Bioenergetics and Linear Nonequilibrium Thermodynamics: The steady State" Harvard University Press, 1983

Shimony

"Some Proposals concerning Parts and Wholes," in Parts and Wholes, vol.1, ed. P. Sällström (Forskningsrådsnämnden, Stockholm, Sweden, 1983).

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Review of H. Primas, Chemistry, Quantum Mechanics, and Reductionism, American Journal of Physics 51, 1159-1160 (1983).

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In the same volume there is a reprint of "Proposed experiment to test local hidden-variable theories," with J.Clauser, M. Horne, and R. Holt, previously published in Physical Review Letters 1969.

"Contextual Hidden Variables Theories and Bell's Inequalities," British Journal for the Philosophy of Science 35, 25-45 (1984.

"Controllable and Uncontrollable Nonlocality," Journal of the Japan Physical Society, to appear spring 1984.

Typescript of Naturalistic Epistemology: A Symposium of Two Decades (co-edited with Debra Nails), submitted to Reidel Publishing Co.

Stachel

"The Generally Covariant Form of Maxwell's Equations,"in M.S. Berger (ed.), J.C. Maxwell, the Sesquicentennial Symposium (Elsevier Science Pubs., 1983).

"The Gravitational Fields of Some Rotating and Nonrotating Cylindrical Shells of Matter," J.Math Phys. 25, 338 (1984)

"Do Quanta Need a New Logic?," to appear in R. Colodny (ed.) From Quarks to Quasars: Philosophical Problems of Modern Physics (U. of Pittsburgh Press, 1984)

"Einstein and the Quantum,"to appear in R. Colodny (ed.) From Quarks to Quasars: Philosophical Problems of Modern Physics (U. of Pittsburgh Press, 1984)

Editor of: Collected Papers of Albert Einstein. Vol.I: The Student Years (1879-1901), typescript, to be published in 1985 by Princeton University Press

Review of Bruce Wheaton's "The Tiger and the Shark," to appear in Nature, May 1984

6

Stanley

1. Z. V. Djordjevic, I. Majid, H. E. Stanley and R. J. dos Santos, "Correction-to-scaling exponents and amplitudes for the correlation length of linear polymers in two dimensions" J. Phys. A Lett. 16, L519-L524 (1983).

2. H. Gould, F. Family and H. E. Stanley, "Kinetics of formation of randomly branched aggregates" Phys. Rev. Lett. 50, 686-689 (1983).

3. H. J. Herrmann, F. Family and H. E. Stanley, "Position-space renormalization group for directed branched polymers" J. Phys. A Lett. 16, L375-L379 (1983).

4. D. C. Hong and H. E. Stanley, "Exact enumeration approach to fractal properties of the percolation backbone and 1/(sigma) expansion" J. Phys. A 16, L475-L481 (1983).

5. D. C. Hong and H. E. Stanley, "Cumulant renormalization group and its application to the incipient infinite cluster in percolation" J. Phys. A 16, L525-L530 (1983).

6. F. Leyvraz and H. E. Stanley, "To what class of fractals does the Alexander-Orbach conjecture apply?" Phys. Rev. Lett. 51, 2048-2051 (1983).

7. I. Majid, Z. V. Djordjević and H. E. Stanley, "Correlation length exponent for the O(n) model in two dimensions for n=0" Phys. Rev. Lett. 51, 143 (1983) [Comments section].

8. I. Majid, Z. V. Djordjević and H. E. Stanley, "Scaling and correction-to-scaling exponents for the three-dimensional linear polymer problem" Phys. Rev. Lett. 51, 1282-1285 (1983).

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

10. A. Margolina, Z. V. Djordjevic, D. Stauffer and H. E. Stanley, "Corrections to scaling for branched polymers and gels" Phys. Rev. B 28, 1652-1655 (1983).

11. P. Meakin and H. E. Stanley, "Spectral dimension for the diffusion-limited aggregation model of colloid growth" Phys. Rev. Lett. 51, 1457-1460 (1983).

12. H. E. Stanley, R. L. Blumberg and A. Geiger, "Gelation models of hydrogen bond networks in liquid water" Phys. Rev. B 28, 1626-1629 (1983).

13. H. E. Stanley and A. Coniglio, "Fractal structure of the incipient infinite cluster in percolation" In Percolation structures and processes (eds G. Deutscher, R. Zallen and J. Adler), pp 101-120.

14. H. E. Stanley, F. Family and H. Gould, "Kinetics of aggregation and gelation" Invited talk, INSTITUTE FOR THEORETICAL PHYSICS CONFERENCE ON POLYMER DYNAMICS (University of California at Santa Barbara, December 1982), Proceedings: J.

15. H. E. Stanley, K. Kang, S. Redner and R. L. Blumberg, "Novel superuniversal behavior of a random walk model" Phys. Rev. Lett. 51, 1223-1226 (1983).

16. R. L. Blumberg, A. Geiger and H. E. Stanley, "Connectivity studies of liquid water" J. Chem. Phys. 80, xxx (1984).

17. A. Coniglio and H. E. Stanley, "Screening of deeply invaginated clusters and the critical behavior of the random superconducting network" Phys. Rev. Lett. 52, 1068-1072 (1984).

18. A. Coniglio, N. Jan, I. Majid and H. E. Stanley, "New model embodying the physical mechanism of the coil-globule transition at the theta point of a linear polymer" Phys. Rev. Lett. (submitted).

19. H. J. Herrmann, D. C. Hong and H. E. Stanley, "Backbone and elastic backbone of percolation clusters obtained by the new method of 'burning'" J. Phys. A Lett. 17, L261 (1984).

20. D. C. Hong, N. Jan and H. E. Stanley, "Comment on 'Self-similarity in irreversible kinetic gelation'" Phys. Rev. Lett. (submitted).

21. D. C. Hong, S. Havlin, H. J. Herrmann and H. E. Stanley, "Breakdown of Alexander-Orbach conjecture for percolation: Exact enumeration of random walks on percolation backbones" Phys. Rev. Lett. (submitted).

22. D. C. Hong, N. Jan, H. E. Stanley, T. Lookman and D. A. Pink, "Fractal Dimensionality for Kinetic Gelation with Conserved Initiators" J. Phys. A 17, Lxxx (1984).

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

24. I. Majid, D. Ben-Avraham, S. Havlin and H. E. Stanley, "Exact enumeration studies of random walks on percolation clusters in two dimensions" Phys. Rev. B (submitted).

25. P. Meakin and H. E. Stanley, "Novel dimension-independent behavior for diffusive annihilation on percolation fractals" J. Phys. A 17, L173-L178 (1984).

26. H. E. Stanley, "Physics of the oilfield: Application of fractal concepts to porous media" Proc. All-Carribbean Conf. in Physics (in press).

27. H. E. Stanley, "Anomalous diffusion on fractals--a mini-review" Proc. International Conf. on Fractals [to be published in J. Stat. Phys.].

28. H. E. Stanley, "Anomalous transport in random bond networks" Proc. International Workshop on "Structure and Dynamics of Water and Aqueous Solutions: Anomalies and the possible implications in biology" [to be published in Les éditions de physique].

9. H. E. Stanley, "Fractal concepts in colloids, gels and polymeric materials" Proc. International Topical Conf. on the Kinetics of Aggregation and Gelation.

). H. E. Stanley and A. Coniglio, "Flow in porous media: The backbone fractal at the percolation threshold" Phys. Rev. B 29, 522-524 (1984).

Willis

1. Charles R. Willis, Physical Review 29A, 774 (1984).
2. Charles R. Willis, "Effect of Driving Laser Fluctuation in Optical Bistability" in Optical Bistability Plenum 1984.
3. Charles R. Willis, "Phase Transition Analogy for a Laser with an Injected Signal" in Coherence and Quantum Optics V Plenum 1984.

Work in Progress

1. I have a manuscript in preparation "Quantum Fluctuations in Optical Bistability, Laser with Injected Signal and Lasers."
2. I am preparing a manuscript "First Order Phase Transitions in Lipid Membranes."
3. I have been working with Professor El-Batanouny for about 6 months on theoretical models of surfaces which we expect to lead to joint proposals on experimental and theoretical proposals on commensurate-incommensurate phase transitions on solid surfaces. Professor El-Batanouny and I have made a joint proposal to the graduate school for support for a student to carry out computer studies on the models we have been studying.

Zimmerman

(with S.E. Millman) "Observation of Spin Glass State in $FeCl_3$ Intercalated Graphite", J. Phys. C: Solid State Phys., 16 L89 (1983).

(with J.S. Brooks & R. Meservey) "Apparatus for the Measurement of the Magnetic Susceptibility of Liquids in High Magnetic Fields", Rev. Sci. Instrum. 54, 1234 (1983).

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

(COLLOQUIUM)

BOSTON UNIVERSITY PHYSICS COLLOQUIUM SERIES SEMESTER I 1983

September	21	J. R. Dahn National Research Council Labs, Ottawa "Lithium Order-Disorder Phase Transitions in the Layered Compound Li_xTaS_2"
September	28	I. Silvera Harvard University "Compression of Spin Polarized Atomic Hydrogen to High Density"
October	5	William Bertozzi Massachusetts Institute of Technology "A Modern View of Nuclear Structure and Some of the Mysteries"
October	19	W. Jeffrey Hughes Boston University/Astronomy "Waves in Space Plasmas"
October	26	Asher Peres Technion Israel "Chaos in Quantum Systems"
November	2	Jorge Jose Northeastern University "Zero Point Fluctuations in Granular Superconducting Films"
November	16	Amnon Aharony Tel-Aviv University "Transport in Porous Media"
November	30	David Z. Albert University of South Carolina "Relativistic Quantum Theory of Measurement"
December	7	Peter Barnes Carnegie-Mellon University "The Modern Problems in Hypernuclear Physics"

Refreshments: 4:00 pm SCIENCE CENTER (SCI) Room 121
590 Commonwealth Avenue

Colloquium: 4:15 pm SCI 115

Colloquium Committee: George Kirczenow 353-2609
Rama Bansil 353-2969

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(COLLOQUIUM)

BOSTON UNIVERSITY PHYSICS COLLOQUIUM SERIES - SEMESTER II, 1984

JANUARY 18	JAMES DAVENPORT, BROOKHAVEN NATIONAL LABORATORY *"Understanding the Electronic Structure of Solids"*
JANUARY 25	LOU LANZERROTTI, BELL LABORATORIES *"Laboratory Studies of Energetic Ion Irradiation of Ices and Applications to Solar System Problems"*
FEBRUARY 1	ANTONIO CONIGLIO, NAPLES, ITALY *"Fractal Concepts in Random Systems, Phase Transitions, Polymer Physics and Metastability"*
FEBRUARY 15	BEN CHU, SUNY, STONYBROOK *"Laser Light Scattering Characterization of Kevlar, The Wonder Polymer for Bullet-Proof Vests, Sailing Hulls and Airplanes"*
FEBRUARY 22	HORST MEYER, DUKE UNIVERSITY *"Critical Transport Properties"*
FEBRUARY 29	SIDNEY REDNER, BOSTON UNIVERSITY-PHYSICS *"Kinetics of Diffusion Controlled Reactions"*
MARCH 21	SOL GRUNNER, PRINCETON UNIVERSITY TBA
MARCH 28	SO-YOUNG PI, BOSTON UNIVERSITY-PHYSICS TBA
APRIL 4	***DEAN S. EDMONDS, SR. LECTURE*** PAUL CHAIKIN, UNIVERSITY OF PENNSYLVANIA TBA
APRIL 18	MICHAEL EL-BATANOUNY, BOSTON UNIVERSITY-PHYSICS TBA
APRIL 25	***CHERTOK LECTURE*** LARRY SULAK, UNIVERSITY OF MICHIGAN *"Maybe Diamonds Are Forever...-Results from the IMB Proton Decay Experiment"*
Refreshments	*4:00 pm SCIENCE CENTER, Room 121, 590 Commonwealth Avenue*
Colloquium	*4:15 pm SCIENCE CENTER, Room 115, 590 Commonwealth Avenue*
Colloquium Committee	*Rama Bansil 353-2969*

Please Post

Philosophy and History of Science
Director - Robert S. Cohen
Acting Director while Robert S. Cohen was on sabbatical - Abner Shimony

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

Tuesday, October 4, 1983

The Physicist's Toolbox

MARTIN H. KRIEGER, *Science, Technology, and Society,* Massachusetts Institute of Technology
Commentator: S. S. SCHWEBER, *Physics,* Brandeis University
Chair: BERNARD CHASAN

Wednesday, October 12, 1983

Scientific Knowledge and the Act of Faith

WOLFHART PANNENBERG, *Theology,* University of Munich
Commentator: HAROLD H. OLIVER, *Theology and Science,* Boston University
Chair: GEOFFREY BANNISTER
[In association with the Boston University Institute for Philosophy and Religion]

School of Nursing Auditorium, 635 Commonwealth Avenue

Tuesday, October 18, 1983

Do Electrons Exist?

ASHER PERES, *Physics,* Technion, Haifa
Commentator: JOHN STACHEL, *Physics,* Boston University and the Einstein Project, Princeton
Chair: ABNER SHIMONY

Tuesday, November 8, 1983

The Principle of Equivalence: Einstein's Way Out

JOHN NORTON, *Physics,* Boston University and the University of Pittsburgh
Commentator: JOHN C. GRAVES, *Philosophy of Science,* Boston
Chair: KENNETH BRECHER

Tuesday, November 15, 1983

General Relativity: A Theory Without Problems?

JEAN EISENSTAEDT, *Physics,* Institut Henri Poincaré, University of Paris
Commentator: STANLEY DESER, *Physics,* Brandeis University
Chair: JOHN STACHEL

Tuesday, March 27, 1984

From Quarks to the Big Bang: The Synthesis of the 1970's

SHELDON GLASHOW, *Physics,* Boston University and Harvard University
Commentator: KENNETH BRECHER, *Astronomy and Physics,* Boston University and NASA-Goddard Space Flight Center
Chair: ABNER SHIMONY

Tuesday, February 14, 1984

Einstein on Locality and Separability

DON HOWARD, *Philosophy of Science,* University of Kentucky
Commentator: JON P. JARRETT, *Philosophy of Science,* University of Vermont
Chair: ABNER SHIMONY

Tuesday, February 28, 1984

Saving the Scientific Text: Documents, Readers and the Way Of The World

ROBERT PALTER, *History of Science,* Trinity College, Hartford
Commentator: MORDECAI FEINGOLD, *History of Science,* Harvard University
Chair: ABNER SHIMONY

Center for Polymer Studies: Seminars and Colloquia

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

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

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

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

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

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

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

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

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

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

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

June 28, 1983: seminar...Keith de Bell
(xx)
"xx"

June 30, 1983: seminar...Fereydoon Family
(Emory University)
"xx"

July 12, 1983: seminar...Agustin Gonzalez
(University of Mexico)
"Viscoelasticity of ionomers"

July 13, 1983: seminar...Matieu Ernst
University of Delft
"Kinetics of reversible gelation"

Center for Polymer Studies: Seminars and Colloquia

July 14, 1983: seminar...Agustin Gonzalez
(University of Mexico)
"Reptation in concentrated solutions of ionomers"

August 9, 1983: seminar...Francois Leyraz
(University of Geneva)
"Kinetics of gelation and aggregation"

September 16, 1983: seminar...Hans Herrmann
(CEN, Saclay)
"Collapse transition of a branched polymer"

September 19, 1983: seminar...Richard F. Voss
(IBM)
"Fractal properties of thin gold films near the percolation threshold and diffusive aggregation"

September 20, 1983: seminar...Daniel Ben-Avraham
(Bar-Ilan University)
"Self-avoiding walks on finitely ramified fractals"

October 3, 1983: seminar...Benjamin Ross
(Geo Trans, Inc.)
"Random processes in porous media"

October 7, 1983: seminar...Max Kolb
(University of Paris, Orsay)
"Kinetic clustering of clusters: Scaling properties of a growth model"

October 17, 1983: seminar...Nino Boccara
(University of Paris, Orsay)
"Random Ising models"

October 31, 1983: seminar...Tom Keyes
(Boston University)
"Light Scattering from Aggregating Proteins"

November 8, 1983: seminar...Itamar Procaccia
(Weizmann Institute of Science)
"Strange Attractors: The Fractal Structure of Temporal Chaos"

November 9, 1983: seminar...Itamar Procaccia
(Weizmann Institute of Science)
"Heavy Clouds and Winds: Fractal Structures in Turbulence"

November 14, 1983: seminar...Ayao Okiji
(Osaka University)
"Thermodynamic Properties of the Anderson Model"

November 16, 1983: seminar...Amnon Aharony
(Tel-Aviv University)
"Do Fractals Really Describe Percolation?"

November 18, 1983: seminar...Shlomo Alexander
(Hebrew University, Jerusalem)
"Recent Results in Random Systems"

Center for Polymer Studies: Seminars and Colloquia

December 9, 1983: seminar...H.G.E. Hentschel
(M.I.T.)
"The Fractal Structure and Dynamics of Aggregate Growth"

December 13, 1983: seminar...George H. Weiss
(N.I.H.)
"Random Walks and Their Applications"

December 19, 1983: seminar...J. Machta
(University of Massachusetts, Amherst)
"Random Walks on Disordered Lattices"

January 23, 1984: seminar...R.J. Speedy
(Victoria University, Wellington, New Zealand)
"Self replicating structures in water"

January 30, 1984: seminar...C. Austen Angell
(Purdue University)
"Strong and fragile liquids"

February 6, 1984: seminar...Shlomo Havlin
(Bar-Ilan University, Israel, and N.I.H.)
"Topological structure of percolation clusters"

March 16, 1984: seminar...Dietrich Stauffer
(University of Cologne)
"Kinetic aspects of percolation"

March 19, 1984: seminar...H.J. Herrmann
(Saclay, France)
"Problems of elasticity of random media"

March 28, 1984: seminar...H.J. Herrmann
(Saclay, France)
"The future of computing in physics"

April 6, 1984: seminar...R. Jullien
(Orsay, France)
"Connection between cluster-cluster and particle-cluster aggregation"

May 8, 1984: seminar...C. Williams
(Saclay, France)
"Ionomers"

May 23, 1984: seminar...J.L. Cardy
(Boston University and U.C.S.B.)
"Introduction to conformal invariance"

May 29, 1984: seminar...J.L. Cardy
(Boston University and U.C.S.B.)
"Introduction to conformal invariance for condensed matter physicists - part II: Application to surfaces"

June 15, 1984: seminar...L. Reatto
(Universita di Parma)
"Toward a liquid state theory of critical phenomena"

June 20, 1984: seminar...M. Shlesinger (ONR)
"Fractal time and Williams-Watts dielectric relaxation: An intermittent diffusion model"

Report of the Graduate Studies Committee

Chair - George O. Zimmerman

The Graduate Studies Committee spent most of its time reviewing petitions and reaffirming and trying to enforce regulations which were already on the books, namely the duties and privileges of the Second Reader on a thesis (see "Formal Requirements for Graduate Study in Physics"), and the continuation and reaffirmation of the oral examination.

Oral Examination

One of the redefinitions of its purpose is:

a. to examine the student on his or her research ability;
b. to test the compatibility of the working relationship between the student and the faculty member;
c. to test the breadth of knowledge of the student of his research field, and the awareness of the relation of his research field to other fields of physics.

In the deliberations it was expressed that a completion of a project should not be important so long as the above items could be tested for. The nominal time for scheduling an oral examination should be 6 to 8 months after passing the comprehensive examinations with a high pass, but the deadline should remain 1 year (the regulation that the oral should be taken by the 30th of June of the year following the comprehensives will have to be modified).

500-Level Courses

The review of core materials which 500-level courses should contain, which was started by the Booth graduate committee the previous year, was completed and adopted by the faculty. The core material was circulated both to the faculty and the graduate students. Course descriptions are appended.

700-Level Courses

These courses were discussed and it was decided that they were too individualistic to have core material assigned to them. Any revisions can be seen in the catalogue descriptions.

"Formal Requirements for Graduate Study in Physics" was reviewed and updated, incorporating changes adopted by the faculty during the previous year. Mistakenly, the requirement that graduate students audit one course per semester after fulfilling their course requirements was left out. That omission will be corrected in our next edition.

Comments

It is appalling how many students and faculty are ignorant or unaware of the regulations which they have approved. I urge everyone to read the Formal Requirements (which seems to be our bible) carefully.

CORE MATERIAL OF 500 LEVEL COURSES DECIDED ON BY THE GRADUATE COMMITTEE AND APPROVED BY THE PHYSICS FACULTY

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

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

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

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

PY 507, 508 Quantum Mechanics: Quantum mechanical operators; eigenfunction equations; Dirac notation, role of matrices; the Superposition Principle, amplitudes, completeness; hermiticity; Hamiltonian; Eigenvalue Spectra -- discrete, non-degenerate/continuous; degenerate; orthonormal sets of vectors; position and momentum operators and eigenstates, Dirac delta function; coordinate space wave function; non-local potentials, local potentials; wave packets; commutators; Heisenberg uncertainty principle and the minimum wave packet.One-dimensional problems; barrier, well; probability current, continuity equation; Parity, time reversal, simple harmonic oscillator in one dimension, raising and lowering operators; angular momentum, commutators, representation in polar coordinates, eigenvalues and eigenvectors; rotations and rotation operator.Central forces; center-of-mass separation, 3-D square well, H-atom.Unitary transformations; displacements, rotations, Schrodinger picture, Heisenberg picture.Potential scattering; wave packet description (fully time dependent), cross section, Born approximation, Born series, scattering amplitude. Partial wave expansion and phase shifts, optical theorem. Addition of angular momentum, Clebsch-Gordan coefficients. Intrinsic spin -- spin ½, spin 1; Pauli matrices. Stationary state perturbation theory, Rayleigh-Schrodinger; degenerate perturbation theory; time dependent perturbation theory; Fermi Golden Rule; interpretation of $\Delta E \Delta t \geq \hbar$ uncertainty principle; interaction of matter with electromagnetic fields; external E, B fields; photons; Atomic transitions -- electric dipole, magnetic dipole. Rotations and irreducible spherical tensors; Wigner-Eckart theorem. Identical particles -- fermions and bosons; projection operators; scattering of spin ½, spin 1 particles; polarization, coulomb scattering, variational principles.

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

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

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

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

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

TO: Faculty, Physics Department, Professor Hughes, Astronomy

FROM: George O. Zimmerman

DATE: November 1, 1983

SUBJECT: Rules adopted by the Physics Faculty on 10/25/83 regarding the prerogatives of the second reader

The Second Reader should become involved at the latest at the beginning of the writing of the thesis. He/she should approve:

a) the thesis outline (scope)

b) the thesis content

c) the first draft

d) the final draft before the thesis exam is scheduled.

Report of Physics Education Committee
(liaison with SED)

Chair - George O. Zimmerman

There were three principal developments this year in the Physics education field. They were:

1. The start of the Honors Workshops for Precollege Teachers of Science and Mathematics

2. The start of the Master of Arts in Teaching program

3. The initiation of a relationship between our Physics department and Boston Latin School (which, I heard, will be emulated by other departments)

Honors Workshop

The idea for the Honors Workshop originated with members of the Physics department and subsequent discussions by the previous Chairman of this department with the Lexington school system. It was deemed proper to involve the School of Education in this enterprise, of which Gerald Abegg was the lone science professor. Near the end of the 1982-83 school year, a meeting took place of representatives from the Lexington public school system and members of Physics, Biology, Chemistry, Mathematics, and the School of Education, at which Dennis Berkey put Abegg in charge of the overal organization of any further activities. With the urging and aid of departmental representatives Zimmerman from Physics, Samuels from Chemistry, and Slecta from Biology, a pilot program was initiated with school systems being asked to nominate distinguished faculty to this program with a fee of $100. per person once the faculty member was accepted. There were 15 teachers accepted in the Physics program, 20 in the Chemistry program, and 24 in Biology. Appended is a list of the teachers accepted in the Physics program.

The Physics program was organized by the generous donation of time by the Physics faculty whom I approached. The format was a two-hour morning lecture with a two to three-hour afternoon practicum. The participants were:

11/15/83	Sheldon Glashow	Elementary Particles
12/14/83	William Hellman	Continuation of Elementary Particles
11/15 and 12/14	Afternoon practicum was conducted by Professor Franzen with demonstrations of teaching apparatus	
1/17/84	Rama Bansil	Micromolecules and Biophysics
	Afternoon practicum, assisted by members of her lab staff	
3/14/84	E.C. Booth	Lectures and practicum
	Conducted at Bates Linear Accelerator assisted by various members of its staff.	

4/10/84	G.O. Zimmerman	Low Temperature Physics
	Afternoon practicum by J. Brooks at the National Magnet Laboratory - demonstration of Low Temperature solid state measurements	
5/9/84	Kenneth Rothschild	
	Assisted by Biophysics personnel for the afternoon practicum	

Professor Abegg applied for a grant to the NSF for this program, as well as a follow-up in which high school teachers could join the departments for approximately eight weeks during the summer during which time they would perform research with the various research groups. This program was subsequently funded for three years, receiving $142,000.

It is hoped that future endeavors by SED would be performed in greater consultation with the individual CLA departments. It is planned to continue this program, now funded, next year with honoraria for the faculty participating in it.

Master of Arts in Teaching

The MAT was initiated by SED and approved by CLA in 1982-83. Again, there was no consultation and minimal notification of the CLA departments. Following my urging, one meeting took place which I could not attend, but Professor Booth did. Subsequently one student applied to the Physics MAT program, was reviewed by our Admissions Committee, and admitted.

I will spend next year urging greater coordination and consultation.

Relations with Boston Latin School

During 1982-83, dialogue was initiated between the principal and science department of Boston Latin and various members of the Physics department. Among those were Professors Chasan and Franzen, and Mr. Stone. We decided that because of its proximity, a good start would be to have some selected students from Boston Latin come to our laboratories and participate in them. This was initiated this year, with Mr. Woodworth being the Boston Latin teacher and Professor Franzen designating the particular laboratories which the students could attend. One of the criteria was that the laboratory had space for the students and that the lab instructor had the proper skills and temperament to deal with high school students. Up to eight students attended our PY 105 and PY 212 labs. Instructors were Mr. Reina in the first term and Mr. Folkerts in the second term.

The program will be continued next year with this year's experience being pronounced a magnificent success by Boston Latin as well as the lab instructors.

Ruth Shane, the liaison between BU and Boston schools, was informed about this program and upon higher authority, the program will be replicated in other science departments.

PHYSICS SEMINAR

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Bruce Seiger
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Thomas Soisson
Framingham South High School
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Framingham, MA 01701

Richard Spillane
Boston Latin School
78 Avenue Louis Pasteur
Boston, MA 02115

Laurence E. Ullman
Bedford High School
Mudge Way
Bedford, MA 01730

Robert Webster
Duxbury High School
St. George Street
Duxbury, MA

David Woodworth
Boston Latin School
78 Avenue Louis Pasteur
Boston, MA 02115

Graduate Admissions Report - Kenneth J. Rothschild, Chair
Members: Hellman, Miller, Willis, Rothschild, Chasan

As seen below this year we experienced a slight increase in our completed applications as well as the entering class.

The number of incoming graduate students from the U.S. still remained high as was the case last year (10 out of 13) reversing a previous trend towards more predominantly foreign students in the entering class. One serious problem we continue to encounter is the inability to compete effectively for the highest quality students which we accept. For example, last year 5 of our applicants received University Fellowships. This is a very positive factor. However, none of these students actually accepted our offers. Part of this problem is due to the lack of funds to bring these students to Boston University in order to meet faculty and see the campus. Other comparable schools normally invite students who they consider in the top end of the admissions. In addition, the University Fellowships are not extremely strong inducements since they are for only one year and while not requiring teaching duties actually pay less than a T.F. unless it is supplemented by Department funds. One possible solution would be to "fatten" the financial aid package by adding the U.F. onto the T.F. for one or more years. For example, instead of offering a $7,000 U.F. for one year, we would offer a $9,500 enriched T.F. for two years.

	1982	1983	1984
Completed Applications	73	70	77
Accepted - T.F.	10	11	11
Accepted - No aid	1	0	3
Cancelled Offers	1	0	0
Refused Offers of Aid	10	12	14
Rejected	22	12	33
Offered Admissions with no aid	25	30	5
Applications, incomplete, action deferred	11	5	13

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

Boesch, Richard	Surface Physics
Caserta, Jr., Frank	Theoretical Physics/materials research
Goettee, Jeffrey D.	Undecided
Given, James	Theoretical
Kondo, Mamoru	Biophysics
Powers, Roberts	Theoretical
Swanson, Alka	Experimental
Vyas, Vikram	Quantum Field Theory
Hettinger, Jeffrey	Experimental
Stassinopoulosm Dimitris	Theoretical
Heisey, Curtis	Undecided

Accepted - No Aid

Considine, David B.	Experimental
Kuric, Mark V.	Undecided

This incoming class again appears to be one of the best in recent years.

Library Committee Report - Professors E. Corinaldesi and S. Redner

Data refer to situation on April 24, 1984.

Cost of Periodical Subscriptions		$42,660
Cost of Standing Orders		1,271
Amount Spent on Monographs	5,720	
Amount Encumbered for Books not Recd.	2,645	
Total Book Expenditures	8,365	8,365
		52,296
Total Allocation for 1983-1984		55,000
On April 24 the budget underspent was		2,704

However, because of massive ordering after that date, the budget is (estimated / expected) to be overspent.

Number of Monographs purchased: approximately 130.

New Journals ordered:

Physics Today (our subscription was cancelled in 1973 due to budget cutbacks; the library receives gift copies, but there is no record of this, nor of which issues we have received; old issues have not been kept and bound since 1973)

Current Physics Index (this is a very up-to-date index to the journals of the American Institute of Physics; it will be kept in the Science Library Reference section)

Journal of Vacuum Science & Technology, parts A & B

Journal Backfiles ordered:

Physics Today (1974-1983)

I.N.I.S. Atom Index (various missing years and issues)

The main event of the year was the opening of the new Science & Engineering Library in Fall 1983. The library currently has a full-time staff of 10, including two librarians; a third librarian will be hired soon.

We are very pleased with our collaboration with Mr. David Sauer who is now in charge of purchases of Physics books.

Language Committee Report 1983-84 - Professor E. Corinaldesi

The proficiency in English of the foreign student Zorica Djordjevic was certified. Shawn Burdick and Kenneth Gall passed examination on May 8, 1984, respectively in French and German.

Bulletin Board - Prof. E. Corinaldesi

Same old thing!

Honors Committee - Dean S. Edmonds, Jr., Chairman

The Honors Committee recommended awarding the College Prize in Physics to Jeffrey Mark Melzak, and the Student Alumni Association Award to Suzanne Dickinson. These awards were duly made at the Class Day exercises, May 12, 1984. The College Prize carries with it a cash award of $50.00 from CLA. This award to Mr. Melzak was not augmented by the Department.

The CLA - Engineering Liaison Committee (Chasan)

Our relations with the School of Engineering have not been good. For the coming academic year we are losing the engineering electricity and magnetism course for no really good reason.

A breath of fresh air has been the Liaison Committee (Chasan, Booth, Brooks, Isaacson, Eisenberg) which for the first time has provided a real forum for give and take, a genuine exchange of ideas about physics education for engineering students. Not all is sweetness and light. I think that our engineering colleagues are basically wrong in their insistence on a PY 211-212 curriculum which includes A Little of Everything. And since PY 211-212 also services a substantial number of CLA students there is a conflict here. Nonetheless the Liaison Committee is an important advance and we should value this chance for understanding.

A Summary written by Isaacson and Eisenberg from the Engineering point of view follows.

MEMORANDUM

May 25, 1984

TO: Prof. Bernie Chasan; Chairman, Physics Department

FROM: Profs. Mort Isaacson and Sol Eisenberg; ENG

SUBJECT: Summary of PY-ENG liaison activities, 1984

A. TOPICS DISCUSSED

The following topics were discussed in the PY-ENG Liaison Committee this semester, and agreed upon in principle:

1. Increasing lecture time in PY 211, 212 from 3 to 4 hr/wk without a decrease in recitation or lab time.

2. Increasing the content of the labs in PY 211, 212, but not necessarily their number or duration.

3. The official syllabus for PY 211, 212 will be as shown on the attached sheet, but will not include the last three topics: Light and Quantum Physics, Waves and Particles, One Election Atoms.

4. The placement exam for PY 251 is to be given to all students taking freshman physics (PY 211, 251). How the results will be used will be up to the Physics Department.

5. The official syllabus for PY 313 will consist of approximately one-third vibrations and waves and two-thirds "modern physics", primarily quantum mechanics and physics of solids.

6. A very important facet of freshmen physics is that it is a mechanism whereby students learn to think in a mathematical-analytical way about the physical world. It is probably the major place where they learn that basic concepts are more useful for solving problems than just plugging and chugging in memorized formulas. This should be the guiding philosophy in PY 211, 212 as well as in PY 251, 252. The ENG faculty is vitally interested in this and is upset not at having their students work hard in physics courses, but at having their students fail to learn the above philosophy.

B. REVISED ENG NATURAL SCIENCE REQUIREMENT

In addition to the above, we are attaching a copy of the revised ENG natural science requirement which was passed by the faculty on May 11, 1984. This revised requirement will hold for the freshmen entering the college this September. Therefore it will effect the size of physics classes this coming year. The best estimates we can give for the number of engineering students to be expected in the freshman physics courses in 1984-85 are as follows:

	Fall 1984	Spring 1985
PY 211, 251:	200+ [20]*	350+ [?]
PY 212, 252:	[50]	200+ [20]

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* Brackets mean non-freshmen

From ABET Materials

COURSE DESCRIPTION
PY 211, 212
General Physics

1980-82 Catalog Data:

CLA PY 211 and 212 General Physics Basic principles of physics emphasizing topics from mechanics, thermal physics, electricity and magnetism, geometrical optics, and atomic and nuclear physics. For premedical students who wish a more analytical course than CLA PY 105, 106 and for science concentrators and engineers who require a one-year physics course. Lectures, discussion, lab. Prereq: CLA MA 123; coreq: CLA MA 124.

Textbook: Halliday and Resnick, Fundamental Physics: Extended Version
Coiffard and Edmonds, Experiments in College Physics

Coordinator: Brooks, J.S., Professor of Physics

Topics:

1. Measurement
2. Vectors
3. Motion in One & Two Dimensions
4. Particle Dynamics
5. Work & Energy
6. Conservation of Energy
7. Dynamics of Systems & Parts
8. Collisions
9. Rotationals Kinematics & Dynamics
10. Equilibrium of Rigid Bodies
11. Oscillations
12. Gravitation
13. Fluid Mechanics
14. Waves, Sound
15. Temperature
16. Heat, Thermodynamics
17. Kinetic Theory of Gases
18. Entropy and Second Law
19. Charge & Matter
20. Electric Field
21. Gauss's Law
22. Electric Potential
23. Capacitors & Dielectrics
24. Current & Resistance
25. Electromotive Force
26. Magnetic Field
27. Ampere's Law
28. Faraday's Law
29. Inductance
30. Alternating Currents
31. Maxwell's Equation
32. Optics
33. Light and Quantum Physics
34. Waves & Particles
35. One Electron Atoms

Delete

Laboratory Projects:

Addition of Vectors
Uniform Acceleration
Ballistic Pendulum

Version Approved by ENG Faculty 5/11/84

Natural Sciences Requirement

All students must fulfill one of the natural science options listed below. Biomedical engineering majors must select Option B. All other majors must select Option A.

Option A (for engineering majors, except biomedical engineering)

The standard natural sciences requirement for engineering majors consists of one chemistry course and a three course physics sequence.

The chemistry course may be either CLA CH 101 General Chemistry or CLA CH 111 General and Quantitative Analytical Chemistry. CLA CH 111 is recommended for students with a strong chemistry background.

The physics sequence is either CLA PY 251 (or PY 211), CLA PY 252 (or PY 212), and CLA PY 313. CLA PY 251, 252 Principles of Physics is more rigorous than CLA PY 211, 212 General Physics.

Students may substitute the combination of CLA PY 353 Vibrations, Waves and CLA PY 354 Modern Physics for CLA PY 313 Elementary Modern Physics. Either a fourth physics course or a second chemistry course may be used to satisfy engineering core elective credit requirements.

Because it is important to have a solid foundation in calculus before beginning the physics courses, freshmen entering the college without advanced placement credit in calculus (or one year of high school calculus) should begin with the chemistry course in their first semester and then take the physics courses in the subsequent three semesters. Freshmen entering the college with this calculus background are encouraged to begin the physics sequence in their first semester.

Option B (Six natural science courses. For biomedical engineering majors only.)

The natural science requirement for biomedical engineering majors consists of two biology courses, two chemistry courses and two physics courses.

The biology courses are CLA BI 107, 108.

The chemistry courses may be either CLA CH 111, 112* General and Quantitative Analytical Chemistry (which are recommended for students with a strong chemistry background), or CLA CH 101, 102 General Chemistry.

The physics sequence may be either CLA PY 251 (or PY 211), and CLA PY 252 (or PY 212). CLA PY 251, 252 Principles of Physics is more rigorous than CLA PY 211, 212 General Physics.

Freshmen entering the college without advanced placement credit in calculus (or one year of high school calculus) should take CLA BI 107 and CLA CH 111 (or CH 101) in the first semester of the freshman year, and CLA CH 112* (or CH 102) and CLA PY 251 (or PY 211) in the second semester. CLA PY 252 (or PY 212) and CLA BI 108 are taken respectively in the first and second semester of the sophomore year.

Freshmen entering the college with advanced placement credit in calculus (or one year of high school calculus) should take CLA CH 111 (or CH 101) and CLA PY 251 (or PY 211) in the first semester of the freshman year, and CLA CH 112* (or CH 102) and CLA PY 252 (or PY 212) in the second semester. CLA BI 107, 108 are taken respectively in the first and second semester of the sophomore year.