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ANNUAL REPORT

OF THE

PHYSICS DEPARTMENT

Submitted to
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by

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HIGHLIGHTS OF THE YEAR

The Physics Department has continued to grow our educational mission, this year introducing new and innovative courses at all levels, including an introductory general science course *Cinema Physica*, and a set of new courses for in-service high school physics teachers. In research, our faculty and students have reported major new results in theory and experiment, from the physics of single layer carbon, or graphene, to the first report of single top quark production. In funding, our three most junior faculty all won major funding for their research, two on their first attempts, and we received a strong renewal of our main high energy umbrella grant. Total grant funding approached $10M.

The Department held its first Graduate Alumni Reunion in 25 years, attracting 100 current and former graduate students, combining research talks with career panels both inside and outside physics, and social networking events. The Physics Department was successful in spearheading a University-wide effort to renew the commitment to our key enabling resources of the Scientific Instrument Facility and the Electronics Design Facility. In the process, we have streamlined both cost center units, increased internal work levels as well as provided more access to external projects. The Department has been critical in developing the new PhD program in Materials Science and Engineering, and Physics faculty have been active on important search, oversight, and administrative committees across the institution.

Our new arrivals include Richard Averitt from the Los Alamos National Labs, an expert in ultrafast and terahertz spectroscopy of both natural and artificial complex and multi-functional materials, and Prof. Andrei Ruckenstein, a theoretical condensed matter turned biological physicist, recently hired in the post of Associate Provost and Vice President for Research. The CAS-funded visitors programs in elementary-particle theory and condensed-matter theory continue to bring many leading researchers to our department, providing both valuable collaborative interactions and positive exposure for our department.

We graduated 14 PhDs, 5 MAs, and 18 BAs. Our graduate recruitment season was extremely successful as we made 25% fewer offers yet more than filled our incoming class. This continuing increase in our acceptance rate is a clear measure of success, reflecting our growing national and international stature. In the latest US News and World Report rankings, Physics ranked 35th, 2nd highest of all science and engineering departments at BU.

A. FACULTY

1. Changes in Rank or Appointment

New Appointments:

Faculty:

Richard Averitt	PhD, Rice University, 1998, Assistant Professor.
Andrei Ruckenstein	PhD, Cornell University, 1984, Professor
Ophelia K.C. Tsui	PhD, Princeton University, 1996, Associate Professor.

Affiliated Faculty:

Amit Meller (BME)	PhD, Weizmann Institute of Science, 1998, Joint Assoc. Professor
Meenakshi Narain (Brown)	PhD, SUNY-Stony Brook, 1991, Adjunct Assoc. Professor

Anna Swan (ECE)	PhD, Boston University, 1993, Joint Assoc. Professor

Research Associates:

Nathalie Bouet	PhD, University of Orleans (France), 2006, Condensed Matter Experiment.
Robert Harrington	PhD, Northeastern University, 2006. High Energy Experiment.
Fuk Kay Lee	PhD, Hong Kong University of Science and Technology, 2005. Condensed Matter Experiment.
Louis Piper	PhD, University of Warwick (UK), 2006. Condensed Matter Experiment.
Veronica Sanz	PhD, University of Valencia (Spain), 2002. High Energy Theory.
Yan Yin	PhD, Boston University, 2006. Condensed Matter Experiment.
Yan Zhen	PhD, Shandong University (China), 2006. High Energy Experiment.

Visiting Scholars:

Pascal Degiovani	PhD, University Pierre and Marie Curie (France), 1992. Condensed Matter Theory.
Jonathan Gershoni	PhD, Hebrew University (Israel), 1980, Biological Physics.
Vitor Pereira	PhD, University of Porto (Portugal), 2006. Condensed Matter Theory.
Javier Sabio	MSc, Autonous University of Madrid (Spain), 2005, Condensed Matter Theory.

Promotions: In September 2006, Pritiraj Mohanty became a tenured Associate Professor of Physics.

Leaves and Sabbaticals:

Rama Bansil spent her Fall 2006 sabbatical as a Visiting Professor in Medicine at Harvard Medical School, where she continued her research on *h. pylori* and how it moves through the gel-like mucus layer in the stomach.

Rob Carey spent six weeks of his Fall 2006 sabbatical in Switzerland at The Paul Scherer Institute running the MuLan experiment as well as developing his experimental and theoretical skills.

Antonio Castro Neto spent his sabbatical during Fall 2006 at Harvard University developing new theoretical projects in the study of single atom layers of carbon, graphene.

Shelley Glashow spent a month during his Spring 2007 sabbatical at the University of Rome with visits to CERN to continue his research in high energy physics and cosmology.

Ed Kearns is currently on calendar year 2007 sabbatical, maintaining his ongoing program in neutrino physics and astrophysics with the Super-K experiment in Japan, as well as initiating research in the search for dark matter using cryogenic noble liquids.

Jim Miller spent a significant portion of his Fall 2006 sabbatical developing collaborations with the ATLAS group at the Large Hardron Collider at CERN.

Teaching release:

H. Eugene Stanley obtained grant-funded teaching release both semesters. His research group supports nineteen graduate students and numerous post-docs and visitors.

Ken Rothschild obtained a teaching buy-out for the fall 2007 semester to work at his company Ambergen.

Bennett Goldberg was granted teaching release both semesters, in consideration of an unusually heavy set of responsibilities as department chair as well as director of the Center for Nanoscience and Nanobiotechnology, a GK-12 graduate funding program, and his own large research group.

Faculty Searches: The department's requests to conduct faculty searches in the fields of biological physics (new) and experimental high energy physics (replacement) were denied.

Emeritus Faculty: More than half of our Emeritus Faculty remain active in the research and teaching missions of the department. These include Professors Chasan, Franzen, Hellman, Shimony, Stachel, Willis, and Zimmerman. Many continue to work with students in graduate research programs, support undergraduate research opportunities, and give invited lectures in the respective fields of expertise.

2. Faculty and Staff Honors, Awards, and Prizes

Recognition of the scholarship of our faculty and staff continues through a wide variety of awards, fellowships, and honors. Our faculty have chaired and organized many national and international conferences. A sampling of this year's distinctions include:

Professor Shelly Glashow was awarded an honorary doctorate from the University of Bologna.

Professor Ulrich Heintz served as Mercator Visiting Professor at the University of Freiburg (Germany) in summer 2006. This position is awarded by the German Science Foundation.

Professor Emanuel Katz was awarded a prestigious NSF CAREER award for work in "Electroweak and Strong Coupling Physics." He was also selected as an Alfred P. Sloan Research Fellow.

Professor Ed Kearns' article entitled "Measurement of atmospheric neutrino oscillation parameters by Super-Kamiokande I" as published in the journal *Phys. Rev. D* in June 2005 was identified by Essential Science Indicators as one of the most cited papers in the field of physics.

Professor Anatoli Polkovnikov was awarded a single investigator theory grant from the Department of Defense, on the first attempt and against considerable odds, entitled "Dynamics and thermodynamics of many-particle cold atom systems."

Professor Sid Redner was named Senior Visiting Fellow at the Newton Institute of Mathematical Sciences at Cambridge University in the UK.

Professor B. Lee Roberts received a Japan Society for the Promotion of Science Invitational Visiting Fellowship to visit Osaka University, Kyoto University and KEK.

Professor Martin Schmaltz received a Gambrinus Fellowship from Dortmund University, where he visited from May 28, 2006 to June 8, 2006.

Professor Gene Stanley was appointed Distinguished Professor at the University of Torino, where he delivered a 10-hour course.

Professor Larry Sulak gave the all-university lecture at the Carnegie-Mellon Distinguished Alumnus awards entitled “From the Big Bang…to the end of the Universe”.

Professor Ophelia Tsui was awarded her first NSF single investigator grant on her initial attempt.

Emeritus Professor Abner Shimony was honored on July 18-21, 2006 by a special Symposium on *Quantum Reality, Relativistic Causality, and Closing the Epistemic Circle* at the Perimeter Institute in Ontario, Canada for his lifelong work in physics and philosophy.

3. Faculty Election to or Offices in Professional Organizations and Societies

Rama Bansil was elected Secretary/Treasurer of the New England Section of the American Physical Society.

Andrew Cohen is serving a three year term on the executive committee of the APS Division of Particles and Fields. He also serves on the Executive Committee of the Aspen Center for Physics.

Ed Kearns was named to the Neutrino Scientific Assessment Group, a committee serving the Department of Energy and National Science Foundation. The committee is charged with making recommendations to the funding agencies about a future US program in neutrino oscillations.

Sid Redner was elected Vice President of the GSNP (Topic Group on Statistical and Non-Linear Physics) of the American Physical Society. He will follow a three-year track that will lead to being President of the group.

Anders Sandvik served as an Editorial Board member for the Institute of Physics Publishing.

Martin Schmaltz served on the Executive Committee of the Steering Committee of the LHC Theory Initiative.

Kevin Smith is an elected member of the AVS Surface Science Division where he is involved in invited speaker selection, student prize winner selection, and symposia selection.

Gene Stanley served as an elected member to the National Academy of Sciences Committee on the Role of Naval Forces in the Global War on Terror, charged with recommending “ways to protect against terrorist attacks from the sea”.

B. TEACHING PROGRAM

Highlights of the Undergraduate Program

Undergraduate Awards:

Phi Beta Kappa:	Valentina Dutta, Michael Genuardi
Alumni Student Award:	Michael Genuardi
College Prize for Excellence in Physics:	Valentina Dutta
Ada Draper Award:	Valentina Dutta
2007 Most Outstanding Aerospace Engineering Project:	Evan Butler
Humanities Foundation Award:	Elay Shech

Second Annual Pumpkin Smash
The BU Physics Department undergraduates hosted the second annual pumpkin smash on October 31, tossing nearly 100 pumpkins from the Metcalf Science and Engineering Center roof onto the plaza below. This year, digital video recordings were made, and data used to demonstrate projectile motion on the Metcalf Plaza as well as in undergraduate laboratories.

Physics on Ice
The Department hosted the second annual Physics on Ice evening, renting the Walter Brown arena; 100 faculty, undergrads, and grads showed up to skate.

Physics Freshman Majors visit Fermi National Laboratory
Professor Ulrich Heintz hosted 20 of the first year majors on a trip to Illinois to visit Fermilab, tour the accelerator, and discuss the frontiers of particle physics. The Department supported 50% of travel costs.

Undergraduate Research Highlights
This past academic year we had 29% of our upper classmen involved in research, with about 29% of all our majors engaged in research projects. Projects highlight include:

Graham Rowlands spent a year working with Prof. Steven Ahlen analyzing test data for the ATLAS muon chambers currently being installed at the LHC. He validated chamber operation and was the first to systematically study the performance of the temperature sensors through which he identified several problems that were later fixed. Graham is the most recent of six undergraduate students who have made very important contributions to ATLAS at BU.

Mike Genuardi worked jointly with Physics and Biology on a project that analyzed the social topology of agriculture in leaf-cutter ants to examine how the collective actions of hundreds of thousands of simple individuals – none of which has a plan to follow or receives instructions from a central command - to understand the organization of complex group agriculture. He developed new digital imagery acquisition and tracking software from which he constructed topological maps to illustrate and analyze patterns of distribution of new leaf tissue mulch, removal of old and inactive substrate, densities and caste identities of workers attending to different gardening tasks and the production of the ants' food crop over time. Mike presented his work at an international professional meeting in August 2006, where his study received much attention, and is in the process of writing up his results for publication.

Valentina Dutta worked with Prof. Meenakshi Narain involving a search for signs of Technicolor in proton-antiproton collisions at the Fermilab Tevatron. Her results will be published later this summer.

1. Undergraduate Enrollments, Concentrators, and Graduates

Enrollments in physics department courses are dominated by non-majors in the large service classes:

PY105/106 -- 762 students, and summer – 176 students (105+106)
Sargent College health science and CAS Biology, or premedical students in other majors, take the algebra-based Elementary Physics sequence PY105 and PY106.

PY211/ 212 -- 752 students, PY313 – 102 students, and summer – 87 students
Large numbers of engineering majors and some CAS science majors take the calculus-based General Physics sequence, PY211 and PY212, and Elementary Modern Physics PY313. These three courses are each taught in both spring and fall semesters in order to meet student demand, and to accommodate various student schedules.

PY241/242 -- 49 students
Seven Year Medical Program (SMED) students and a small but growing number of non-SMED students take the calculus-based Principles of General Physics sequence PY241 and PY242.

PY 105, 106, 211, and 212 are offered again over the summer.

The following table details enrollments in both the large service courses and the freshman and sophomore major's sequences for the last three years. The trends are an increase in the number of biology, applied health, and chemistry majors enrolling in physics, and a decrease in the number of engineering students. The latter trend is due partially to the changing requirements for engineering students, who in 2005 were no longer required to take three semesters of physics. We are working with the engineering college to update and make more relevant the third semester of engineering physics.

Course Sequence	Course Title	Course Audience	AY 04	AY 05	AY 06	Sum 05	Sum 06	Sum 07
105/106	Intro Physics	Pre-MED, Sargent	559	666	762*	170	176	198*
211/212	General Physics	ENG, Chem	820	763	752	88	81	95
241/242	Prin. Of Gen. Phys.	SMED majors	45	51	49	n/a	n/a	n/a
251/252	Principles of Phys.	1st yr Majors	72	60	65	n/a	n/a	n/a
313	Elem. Modern Phys	Non-majors	184	152	102	8	6	n/a
354/355	Physics	2nd yr Majors	80	68	47	n/a	n/a	n/a

All figures include MET and Honors sections

*off-cycle PY105 offered for the first time

Majors in Physics and Physics and Astronomy

While the classes serving non-majors are generally large, classes in the entry level physics sequence are small. This past year 33 were enrolled in PY251 and 32 in PY 252. The sophomore courses, PY354 Modern Physics and PY355 Math Methods in Theoretical Physics, had 22 and 25, respectively. The increase in sophomore year reflects the fact that PY 211, 212, and even 313, are acceptable alternative routes into the concentration. The more advanced undergraduate courses (four and five hundred level) typically have between 15 and 30 students, most of them undergraduate majors (Physics or Astronomy & Physics). The size of the Physics Department's undergraduate population has steadily risen over the past ten years. In 1995, 70 students were majoring in physics or a closely related field. This past year, there were 106 students declared as majors in our various programs. 52 were Physics majors, 28 students were Astronomy & Physics majors, 11 combined physics with mathematics, and 15 more combined physics with another discipline spread across a range of possible departments.

Attrition in the Physics major

There are some signs of attrition in the longitudinal profile of the classes. Last year, there were 29 freshman, 18 sophomores, 34 juniors and 23 seniors. We lose a few students at the end of freshman and sophomore years, although others, including some very strong students from the College of Engineering, enter the program in their sophomore or junior fall. While there are fewer young women than men in the undergraduate program, a recent longitudinal analysis of the classes of 1999-2005 indicates that the young women generally stay in the Physics program at a higher rate, as well as matriculate from the University at a higher rate. Of the 77 females who declared a physics major temporarily or permanently, 71% graduated in a Physics-related major, 19% graduated from BU in a non-Physics-related major, and 10% did not graduate from BU. Of the 172 males who declared temporarily or permanently, 63% graduated in a Physics-related major, 20% graduated from BU in a non-Physics-related major, and 17% did not graduate from BU. We believe the higher retention rate for females than males represents our efforts in mentoring as well as the fact that women tend to engage more seriously in their early stages of study.

B.A. Recipients in Physics and Astronomy and Physics

The Physics Department had 97 majors this academic year, with 65 concentrating in Physics, 28 in Astronomy and Physics, and 4 in Philosophy and Physics. We graduated 18 majors; 13 earned degrees in Physics and 5 in Astronomy and Physics.

Bachelor of Arts in Physics

Andrew Blaeser, *Cum Laude*
Jonathan Brewer
Evan Butler
Valentina Dutta, *Summa Cum Laude w/ distinction*
Michael Genuardi, *Summa Cum Laude w/ distinction*
Georgiy Kazantsev, *Cum Laude*
Michael Lu
Brent Randol
Graham Rowlands, *Cum Laude w/ distinction*
Elay Shech, *Magna Cum Laude*
Brian Stuart, *Cum Laude*
Chi Shung Yip, *Cum Laude*
Seth Zuckerman, *Magna Cum Laude*

Bachelor of Arts in Astronomy & Physics

Michael Gully-Santiago
Robert Lombardi, Jr.
Mitchell Mickaliger
Donald Schmit, *w/ distinction*
Joshua Shiode, *Summa Cum Laude w/ distinction*

Prospects for Recent Physics Graduates

Bachelor's recipients from the Physics Department have been successful in recent years in being accepted at the most prestigious graduate programs in the United States. They also have entered a diverse range of disciplines, reflecting the broad value of an undergraduate degree in physics. The majority (10 out of 18) of our graduating seniors in the class of 2007 will be continuing their education, either in physics or related fields. Of those not planning on graduate school, nearly all will be working in industry. We list below the plans of some of this year's graduating students:

Andrew Blaeser:	graduate school at Brown University (Physics)
Evan Butler:	engineer at General Dynamics Electric boat
Valentina Dutta:	graduate school at MIT (Physics)
Michael Genuardi:	Tufts Medical School or Pittsburgh Medical School
Georgiy Kazantsev:	financial software developer/analyst for Bloomberg, LP
Brent Randol:	graduate school at the University of Texas-San Antonio (Physics)
Graham Rowlands:	graduate school at the University of California-Irvine
Elay Shech:	graduate school at the University of Pittsburgh (History and the Philosophy of Science)
Brian Stuart:	graduate school at the University of Hawaii
Chi Shung Yip:	graduate school at the University of Wisconsin (Nuclear Engineering)
Seth Zuckerman:	Arete Associates (R&D)
Mitchell Mickaliger:	graduate school at West Virginia University (Astrophysics)
Donald Schmit:	graduate school at the University of Colorado-Boulder (Astrophysics); also has a position at the National Center for Atmospheric Research

Highlights of the Graduate Program

Graduate Student Awards:

The Gertrude and Maurice Goldhaber Award in Physics:	Armin Rahmanisisan
Teaching Fellow of the Year in Physics:	Mark Betnel, Kaca Bradonjic
Chair's Book Award:	Ronald Babich, Kipton Barros, Elizabeth R. Dominguez

Graduate Fellowship Awardees

Photonics Fellowships for AY 2007-2008:	Nicolas DiFiori ; Joel Kralj; Andy Walsh
Photonics Fellowships for AY 2006-2007:	Yu Chen; Sebastian Remi; Xihua Wang
GK12 Fellowships for AY 2006-2007:	Tyler Dunn; Andrew Inglis
GK12 Fellowships for AY 2007-2008:	Marc Betnel; Elizabeth R. Dominguez
ACES Fellowship AY 2006-2007:	Kipton Barros; David Schaich
UNCF/Merck Graduate Research Fellowship:	Aaron Santos
Photonics Travel grant:	Jason Amsden

Graduate Alumni Reunion

Our first graduate alumni reunion in more than 25 years was held on Friday and Saturday May 4th and 5th, 2007. The event was highlighted by two scientific sessions, two career panels, and two social events. Further information can be found in the Alumni section of this report.

Physics Teaching Assistantship Forum as part of AAPT
As part of the national conference 'American Association of Physics Teachers' held at Boston University this year, and hosted by chairman Karl Ludwig, BU Physics organized the first ever forum for physics teaching assistants. 50 physics TAs attending from Boston University, Harvard, MIT, Northeastern, Tufts, and Brandeis, and it is being adopted as a feature of future national conferences. Following the conference, our Physics Teaching Fellows have self-organized a weekly journal club on teaching methods, where students share papers and ideas on active learning, peer mentoring, NCLB, and many other issues.

Boston University Upward Bound
As part of the GK-12 program, BU Physics graduate students taught in the BU Upward Bound program for Boston area youth struggling to complete high school and matriculate to college.

2. Graduate Enrollments, Concentrators, and Graduates

Graduate Admissions
2007 saw an increase in total number of applicants, with most of the growth in domestic applicants. Women applicants were also up. Please see the table below for details. The Graduate Admissions and Recruiting Committee aggressively recruited the best graduate applicants. Each admittee was contacted several times by email and invited to visit the department. This year, 18 prospective students attended an open house weekend that included a BBQ at the home of Provost David Campbell, sessions of academic and research presentations, meetings with faculty, and lunch with current graduate students. In addition, 6 prospective students visited at other times during the spring. Of the 24 students who visited, 8 eventually chose to attend our graduate program, including some recruits with the best undergraduate records. These results demonstrate the importance of personal visits for recruitment.

Applicants	**2003**	**2004**	**2005**	**2006**	**2007**
Total Number	268	281	351	312	372
Foreign	152	188	223	200	216
Domestic	116	93	128	112	156
Males	207	236	274	252	295
Females	61	45	77	60	77
Offers					
Total Number	82	65	58	50	65
Foreign	40	34	12	14	33
Domestic	42	31	46	36	32
Males	32	55	49	43	49
Females	10	10	9	7	16
Prospect. Visits	14	24	23	24	24
Conversions	11	15	14	12	8
Acceptances	27	25	19	19	21
Foreign	17	14	6	10	14
Domestic	10	11	13	7	7
Male	24	22	15	17	19
Female	3	3	4	2	2
Yield	3.04	2.60	3.05	2.63	3.10

The Dean's Fellowships continue to be an important and welcome recruiting tool. This year we awarded two fellowships to outstanding applicants who accepted our admission offer and the fellowship. The possibility of offering an apartment in the graduate student residences at 580 Commonwealth Avenue appears to be helpful in our recruiting efforts.

Of the 372 applications submitted, 65 admissions letter were sent out with 21 students accepting our offer, with the following breakdowns:

By field: biological physics – 1; condensed matter experiment – 9; condensed matter theory – 4; high energy experiment – 3; high energy theory – 1; high energy theory/biological physics – 1; high energy experiment/high energy theory – 2

By country/gender: USA – 7; China – 10; Italy – 2; Spain – 1; Portugal – 1
Male – 19; female – 2.

In previous years, we typically admitted ~80 students for our target of ~20 acceptances, an anticipated yield of 1 out of 4. For the 2003 and 2004, the yield was higher, and we exceeded our target. To compensate we reduced our target last year to 15, and admitted only 50 (an expected yield of 1 out of 3.3). Even so, 19 accepted, so that our yield was 1 out of 2.6. This year, the ratio dropped slightly to 3.1. This increasing yield points both to our enhanced reputation and will allow us to continue to raise our admission standards. (See chart above for the last 5 years of admissions information.)

Graduate Student Degree Recipients
The Physics Department graduate program had 106 students this academic year. We graduated 5 MAs and 14 PhDs.

2007 Master of Arts in Physics:
Aram Avetisyan, Kaca Bradonjic, Daniel Gastler, Colin Nichols, Monica Pangilinan

2007 Doctor of Philosophy in Physics:
Jonathan Celli, Scott Clark, Adam Martin, Johan Nilsson, Ariel Ribeiro, Aaron Santos, Aaron Schweiger, Vishal Sood, Sameet Sreenivasan, Federico Vasquez, Wei Wang, Yiyi Wang, Daoxin Yao, Sijung Yun

Recent Ph.D. Recipients and their initial or current career path

Jonathan Celli	2007	Postdoctoral Fellow	Massachusetts General Hospital
Scott Clark	2007	Software Data Adm.	Ab Initio Software Coorporation
Adam Martin	2007	Postdoctoral Fellow	Yale University
Johan Nilsson	2007	Postdoctoral Fellow	Leiden University (Netherlands)
Ariel Ribeiro	2007	Postdoctoral Fellow	National Institute of Health (NIH)
Aaron Santos	2007	Postdoctoral Fellow	University of Michigan-Sharon Glotzer group
Aaron Schweiger	2007	Researcher	ITG, Investment Technology Group
Vishal Sood	2007	Postdoctoral Fellow	University of Calgary
Sameet Sreenivasan	2007	Postdoctoral Fellow	University of Notre Dame
Federico Vasquez	2007	Postdoctoral Fellow	University de las Islas Baleares, Spain
Wei Wang	2007	Postdoctoral Fellow	University of Wisconsin, Madison
Yiyi Wang	2007	n/a	Taking time off
Daoxin Yao	2007	Postdoctoral Fellow	Purdue University
Sijung Yun	2007	Postdoctoral Fellow	National Institute of Health (NIH)
Claudio Castelnovo	2006	Postdoctoral Fellow	Oxford University

Zhi Chen	2006	Postdoctoral Fellow	University of California, Irvine
Maryam Farzaneh	2006	Postdoctoral Fellow	Mount Holyoke
Lorenzo Feligioni	2006	Postdoctoral Fellow	Center for Particle Physics, Marseille, France
Kaushik Matia	2006	Assistant Vice President	Bank of America, Charlotte, North Carolina
Shouyong Peng	2006	Postdoctoral Fellow	Brigham and Women's Hospital
Joseph Howard	2006	Systems Engineer	Raytheon
Yan Yin	2006	Postdoctoral Fellow	Yale University
Robert Badzey	2005	Senior Scientist	Varian Semiconductor Equipment Associates
Kevin Black	2005	Postdoctoral Fellow	Harvard University
Jose Borreguero	2005	Postdoctoral Fellow	Georgia Tech-Center for Systems Biology
Hui Fang	2005	Postdoctoral Fellow	Beth Israel Deaconess Medical Center
Sarosh Fatakia	2005	Unknown	
Ian Friel	2005	Postdoctoral Fellow	Boston University, College of Engineering
Hai Huang	2005	Postdoctoral Fellow	Peking University
Kun Hu	2005	Postdoctoral Fellow	Beth Israel Deaconess Medical Center
Chiung-Yuan Lin	2005	Postdoctoral Fellow	Stanford University
Huifen Nie	2005	Postdoctoral Fellow	University of North Carolina at Chapel Hill
Xiaofeng Liu	2005	Sr. Software Engineer	Brion Technology in Santa Clara, CA
Eduardo Lopez	2005	Postdoctoral Fellow	Los Alamos National Laboratory
Colin Worth	2005	Scientist	PhotoDetection Systems, Acton, MA
Gregory Blasche	2004	Image Sensor Engineer	Draper Labs
Sara Bonella	2004	Postdoctoral Fellow	University of Rome
Brian Gregor	2004	Postdoctoral Fellow	Massachusetts Institute of Technology
Chung-Chuan Lo	2004	Postdoctoral Fellow	Brandeis University
Zhiheng Liu	2004	Postdoctoral Fellow	University of Minnesota, Engineering
Shantanu Desai	2004	Postdoctoral Fellow	Pennsylvania State University
James Downes	2004	Associate Professor	Assoc. Prof. in Physics at Victoria University
Ding Feng	2004	Postdoctoral Fellow	University of North Carolina at Chapel Hill
N. Giovambattista	2004	Postdoctoral Fellow	Princeton University
Jonathan Paley	2004	Postdoctoral Fellow	Indiana University
Palash Banerjee	2003	Postdoctoral Fellow	Ohio State University
Ahmet Ozcan	2003	Staff Scientist	IBM
Prashant Sharma	2003	Postdoctoral Fellow	Argonne National Laboratory
Erik Waldron	2003	Scientist	Draper Labs
Masako Yamada	2003	Physicist	GE Corporate Research & Development
Mete Atature	2002	Assistant Professor	Oxford University (United Kingdom)
Christian Hoelbling	2002	Postdoctoral Associate	DESY, Zeuthen, Germany
Emilia La Nave	2002	Postdoctoral Fellow	University of Rome
Kevin R. Lynch	2002	Postdoctoral Fellow	Boston University, Physics Department
Marco Popovich	2002	Postdoctoral Fellow	MIT AI Lab
Tonguc Rador	2002	IT Staff	Feza Gursey University, Turkey
Antonio Scala	2002	Postdoctoral Fellow	University of Rome
Victor Spirin	2002	Research Fellow	Brigham and Women's Hospital
Jeff Tollaksen	2002	Assistant Professor	George Mason University
Alexei Trofimov	2002	Asst. Radiation Physicist	Harvard Medical School/MGH
Gabriela Bunea	2001	R&D Engineer	Sun Power Corporation
P. Gopikrishnan	2001	Scientist	Goldman and Sachs
Wonmuk Hwang	2001	Assistant Professor	Texas A&M University
Harris Kudrolli	2001	Scientist	Photo Detection Systems
Gokhan Ulu	2001	Automation Group Leader	OmniGuide, Inc.
Xiaobo Wang	2001	Scientist	Philips Corporation
Marius M. Bunea	2000	Scientist	Avant Corporation
John A. Coller, Jr.	2000	R&D Engineer	Stanford Functional Genomics Facility
Somalee Datta	2000	Software Designer	Advanced Rendering Technology
Matthew A. Earl	2000	Medical Researcher	University of Maryland
Ivo Grosse	2000	Postdoctoral Fellow	Institute of Plant Genetics (IPK)
Vidya Madhavan	2000	Assistant Professor	Boston College

Hans Robinson	2000	Assistant Professor	Virginia Tech
Arti Tandon	2000	Software Designer	Long View Group
Gregory Vander-Rhodes	2000	Scientist	Ahura Corporation

3. Undergraduate and Graduate Curricular Changes

New Undergraduate Courses:

Cinema Physica

Prof. Andrew Cohen developed and taught for the first time a new course that examines the physical principles underlying the natural world. These principles are explored primarily through their representation in popular movies. The course emphasizes a quantitative approach to analyzing scenes from films using elementary physics, simple estimates and dimensional analysis. The films and topics change from year to year though the representative topics are: kinematics of motion; conservation of mass; momentum and energy; electricity and magnetism; pressure and fluids; strength of materials; quantum description of matter. Enrollment for Fall 2007 has jumped to 33 from the spring 2007 enrollment of 9. The films for the class are shown on Friday evenings and are also attended by a significant number of Physics undergraduate and graduate students.

Freshman Seminar for Physics Students

As part of the new PROSTARS program (Goldberg, PI; Programs for STEM Academic Retention and Success), a new two credit course called Freshman STEM Experience (FSE) will be piloted in the fall of 2007. This seminar, which is recommended but not required, is designed to support the efforts of freshman in STEM majors. It will acquaint students with learning strategies for physics, introduce them to the people (faculty and staff) of the department, our ongoing research activities and give them the opportunity to learn about the kinds of careers that can begin with an undergraduate degree in physics. Goldberg will be the instructor.

Undergraduate curricular reform

In response to various faculty and student concerns expressed in recent years, that a lack of excitement about and exposure to new physics was occurring in its early years, we are re-examining our undergraduate physics major program. In our last major curriculum revision, about 8 years ago, we removed the vibrations and waves course (PY353) from the sophomore spring, inserted our mathematical methods course into its place, and did some reshuffling of the 400-level courses, ultimately leaving a slot free in the senior spring for a physics elective. However, many faculty feel we have not successfully integrated the core material from the old PY353 into other courses and that more generally, essential topics from across the curriculum are being neglected for lack of time. Others disagree and would prefer to avoid adding another course to the major.

With no consensus on a way forward, the undergraduate committee is re-evaluating the curriculum as a whole, deciding which topics (and what level of coverage) are appropriate to each course. With a global view, it is much easier to eliminate unnecessary overlap among the courses or to remedy deficiencies in the coverage of essential topics. If we find that the current suite of courses is insufficient for our goals of a solid background in the fundamentals, coupled with a taste of what is new and exciting in physics, we will add a new course to the sophomore

spring. As a final note, once we have decided on the content of the lecture courses, the undergraduate committee will address reforms of the intermediate and advanced laboratories.

Graduate curricular reform
The proposal made in Spring 2006 for a revision the requirements for the Graduate Program have been accepted. The table below summarizes the requirements.

Category	**Old requirement**	**Approved new requirement**
Courses /Credits	8 total courses (32 credits) Including the following required: PY521, Electrodyanmics I **PY522, Electrodynamics II** PY511, Quantum Physics I PY512, Quantum Physics II PY581, Advanced Lab PY541, Statistical/Thermal Physics I	8 total courses Including the following required: PY521, Electrodyanmics I **PY501, Mathematical Physics** PY511, Quantum Physics I PY512, Quantum Physics II PY581, Advanced Lab PY541, Statistical/Thermal Physics I + **PY961, Scholarly Methods in Physics** (1 credit, subject to approval).
Language requirement	Required	Abolished, subject to GRS approval
Typical Schedule	Fall Year 1: **PY521, Electrodynamics I** PY511, Quantum Physics I PY541, Statistical/Thermal Physics I Spring Year 1: **PY522, Electrodynamics II** PY512, Quantum Physics II Elective course Fall Year 2: PY581, Advanced Lab Elective course	Fall Year 1: **PY501, Mathematical Physics** PY511, Quantum Physics I PY541, Statistical/Thermal Physics I Spring Year 1: **PY521, Electrodynamics I** PY512, Quantum Physics II Elective course Fall Year 2: PY581, Advanced Lab **PY522, Electrodynamics II** Elective courses (including PY522)

Note: Changes are shown in Bold

PY961-Scholarly Methods in Physics
The new mandatory 1-credit course (inspired by the example of the Chemistry Department) has been conducted for all incoming graduate students. A pilot course PY962 was held in Spring 2007 with revisions that included career planning and other topics. The courses PY961/962 involve weekly meetings of one hour with a different topic presented each week. The format is a mixture of talks, panel discussions, case studies, oral presentations, and role-playing intended to highlight the topic of the week. Formal approval for PY962 will be requested for Spring 2008.

Alterations to PY522 curriculum: Prof Averitt has been charged with revamping the curriculum for PY522 starting Fall 2008, in consultation with Prof Ahlen and Prof Erramilli. A discussion and vote on changes to this course are scheduled for Spring 2008

4. Contribution to College Programs

Professor Scott Whitaker was one of eight faculty who taught CC105, Core Curriculum Natural Science I, *Evolution of the Physical Universe and the Earth,* in the fall. Professor Sheldon Glashow taught PY100 (A1/ HP and HS) /UNI NS100, *Physics of the 20th Century and Beyond*, in the fall. Professor Andrew Duffy taught the largest (B1) lecture section of PY105 and 106, *Elementary Physics I and II*, as well as discussion section HS for the Honors Program. Professor Ed Kearns taught PY132, *The Physics of Motion,* also including an Honors Section for the Honors Program. Professor Larry Sulak taught WR150 LA, *Writing and Research Seminar,* for the College of Arts and Sciences in the Spring, developing a successful new offering on "Cosmology".

5. Student Advising

Undergraduate
Physics majors and minors meet with the Director of Undergraduate Studies and are assigned a faculty advisor as soon as they express intent to study in the department. Students are strongly encouraged to join one of our research groups during the school term or the summer, as a junior or senior thesis student, or for independent study. Before they complete their apprenticeship with the department, most undergraduates have had hands-on training with a research group, and many have co-authored a research paper. Educational research has shown that students who work in research laboratories as undergraduates are more likely to succeed in graduate school. Considerable care is paid to advising students on post-graduate training and obtaining jobs. We continued our training seminars for the GRE exam (Carey and Redner), and will be hosting career seminars this coming year. Because students majoring in Astronomy and Physics take the majority of their courses in Physics, those students are assigned an advisor in our department as well as one in their home Astronomy department.

Graduate
Members of the graduate curriculum committee advise entering and uncommitted graduate students. The advisors meet both before and after initial discussions with students to develop standard guidelines and to resolve open issues. An academic review of entering students occurs at the end of the first semester to identify potential problems early. If a student has trouble with our graduate program for two consecutive semesters, the student is encouraged to seek alternative opportunities. This early intervention helps avoid expending TF resources on students who have little chance of successfully completing the Ph.D. degree requirements.

The Chairman hosted three informal lunches with graduate students for socializing and to learn about student concerns. A number of policy changes were implemented in response to these concerns that should improve the quality of graduate student life. These include: renovations of additional graduate student offices, fundraising and construction plans for a new faculty-student common room, support for graduate student journal clubs, and support for graduate student and faculty tea and coffee hours. Graduate students are also interested in becoming more involved across campus, having interactions with alumni in various stages of their careers in industry, academia, and other fields, and creating a system whereby they can have input into the advanced course offerings. We are in the process of instituting these improvements and will be

implementing a course in the SIF on machining skills and related experimental techniques this year.

6. Student Awards and Prizes

Undergraduate Awards:

Phi Beta Kappa:	Valentina Dutta, Michael Genuardi
Alumni Student Award:	Michael Genuardi
College Prize for Excellence in Physics:	Valentina Dutta
Ada Draper Award:	Valentina Dutta
2007 Most Outstanding Aerospace Engineering Senior Project:	Evan Butler
Humanities Foundation Award:	Elay Shech

Graduate Student Awards:

The Gertrude and Maurice Goldhaber Award in Physics:	Armin Rahmanisisan
Teaching Fellow of the Year in Physics:	Mark Betnel, Kaca Bradonjic
Chair's Book Award:	Ronald Babich, Kipton Barros, Elizabeth R. Dominguez

Graduate Fellowship Awardees

Photonics Fellowships for AY 2007-2008:

Nicolas DiFiori works with Prof. Amit Meller (BME, Physics) on single molecule studies;

Joel Kralj is pursuing research with Prof. Ken Rothschild on spectroscopy of novel membrane proteins;

Andy Walsh is working with Prof. Anna Swan (ECE, Physics) as well as Profs. Bennett Goldberg and Antonio Castro Neto on spectroscopy of carbon nanotubes, graphene, and nanomaterials.

Photonics Fellowships for AY 2006-2007:

Yu Chen works with Prof. Raj Mohanty on biosensors;

Sebastian Remi works with Prof. Bennett Goldberg on low temperature Raman spectroscopy of graphene;

Xihua Wang works with Prof. Shyam Erramilli on silicon nanowire field effect transistor for biosensing.

GK12 Fellowships for AY 2006-2007:	Tyler Dunn, Andrew Inglis
GK12 Fellowships for AY 2007-2008:	Marc Betnel, Elizabeth R. Dominguez

ACES Fellowship AY 2006-2007:	Kipton Barros, David Schaich
UNCF/Merck Graduate Research Fellowship:	Aaron Santos

Pradeep Kumar, a graduate student working in Prof. Gene Stanley's group, has been offered a prestigious fellowship at Rockefeller University upon graduation.

Jason Amsden, from Prof. Ken Rothschild's group, was awarded a Photonics Travel grant to present his research at the 13th Time Resolved Vibrational Spectroscopy conference in Freising, Germany.

7. Student Organizations

PHOTON is the Boston University chapter of the Society for Physics Students. It serves as a social organization for undergraduates involved in physics at BU. Every semester, PHOTON organizes social events for physics majors, as well as tutoring by upperclassmen and lectures by faculty on subjects of current interest. *(Faculty Advisor: Claudio Rebbi; 2006-2007 President – Mitchell Mickaliger)*

8. Undergraduate Involvement in Research

The department spends considerable effort and continues to take pride in the large number of undergraduate majors who work in our research laboratories. This year we had 29% (26 out of 91) upper classmen involved in research projects. Upper-level students are strongly encouraged to become involved with a research group and gain exposure to experimental and theoretical research projects. This experience offers essential practical training for students who wish to pursue technical careers after their undergraduate degree and broadens the background of those planning graduate study in physics. This past year, we held our first-ever research open house, where members of the Physics faculty described their research to a packed house of undergraduates. A half-dozen students found research positions as a direct result of the meeting. Our goal is to reach 50% participation in

Many of our undergraduate research assistants work under their advisors' research grants, including some funded from NSF Research Experiences for Undergraduates grants. Several students join research groups through exchange programs or via UROP research awards. This past year, Evan Butler won the senior design award in the college of Engineering for his work on a submersible robot.

Several examples of this year's research projects include (also in undergraduate highlights above):

Graham Rowlands spent a year working with Prof. Steven Ahlen analyzing test data for the ATLAS muon chambers currently being installed at the LHC. He validated chamber operation and was the first to systematically study the performance of the temperature sensors through which he identified several problems that were later fixed. Graham is the most recent of six undergraduate students who have made very important contributions to ATLAS at BU.

Mike Genuardi worked jointly with Physics and Biology on a project that analyzed the social topology of agriculture in leaf-cutter ants to examine how the collective actions of hundreds of thousands of simple individuals – none of which has a plan to follow or receives instructions from a central command - to understand the organization of complex group agriculture. He developed new digital imagery acquisition and tracking software from which he constructed topological maps to illustrate and analyze patterns of distribution of new leaf tissue mulch, removal of old and inactive substrate, densities and caste identities of workers attending to different gardening tasks and the production of the ants' food crop over time. Mike presented his work at an international professional meeting in August 2006, where his study received much attention, and is in the process of writing up his results for publication.

Valentina Dutta worked with Prof. Meenakshi Narain involved a search for signs of Technicolor in proton-antiproton collisions at the Fermilab Tevatron. Her results will be published later this summer.

Andrew Blaeser and Mitch Mickaliger worked on a project to image patterns that formed in gelatin gels as they were dried from one edge. They recorded the microscopic patterns with a video camera and then analyzed the fractal images that formed.

Below we provide a listing of the majority of undergraduate research endeavors:

Student	**Advisor**	**Research Topic/Thesis Title**
Graham Rowlands	Ahlen	ATLAS muon chambers
Debbie Avery	Ahlen	ATLAS muon chambers
Dalit Engelhardt	Lane/Katz	Search for Technicolor at D0
Andrew Blaeser	Bansil	Light scattering from gels under electric fields
Megan Riley	Butler	Digital Calorimetry
Chad Madsen	Carey	Muon lifetime experiment: data analysis and simulation
Hugh Enxing	Carey	Muon lifetime experiment: data analysis and simulation
Michael Genuardi	Traniello (Bio), Carey	Social adaptations of leaf cutting ants
Amy Colgan	El-Batanouny	Surface magnetic scattering
Michele Kotiuga	Goldberg/Swan	Wave function calculations for graphene
Seth Zuckerman	Goldberg	Plasmon response of Au nanoparticles (UROP)
Georgiy Kazantsev	Goldberg	Electronics design and construction for near-field microscope
William Hubbard	Goldberg	Fabrications and studies of graphene
Brian Henning	Kearns	Neutrino physics
Safa Alzaim	Ludwig	Fabrications of nanostructures for ion bombardment studies
Genelle Pugliese	Ludwig	Fabrications of nanostructures for ion bombardment studies
Valentina Dutta	Narain	Search for Technicolor in D0 data
Matt Carelton	Sulak	LHC experiment (France)
Lela Todorova	Tsui	Solid state polymer physics using atomic force microscopy
Jon Bao	Tsui	Solid state polymer physics using atomic force microscopy
Nick Brady	Tsui	Solid state polymer physics using atomic force microscopy
Carla Benatti	Roberts (academic advisor)	REU at Michigan State University
Eric O'Dea	Butler (academic advisor)	Astronomy Department
Amanda Robison	Ludwig (academic advisor)	Astronomy Department
Dan Lam Tran	Erramilli (academic advisor)	REU at Los Alamos National Laboratory

9. Teaching and Laboratory Facilities and Infrastructure

Undergraduate Teaching Laboratories
The undergraduate teaching laboratories currently comprise four general-purpose rooms and five specialized computer labs. This represents a loss of two rooms in 2006-2007, as these rooms were renovated to become research lab space. The teaching laboratories staff provides equipment and facilities for the laboratory component for the following courses: PY103, 105, 106, 211, 212, 241, 242, 251, 252, 313, 354, 371, 408, and 681, as well as core curriculum courses and several School of Education/College of Arts and Sciences courses for high school physics teachers. Each of these courses has up to seven or eight labs per semester. The laboratory rooms are set up to accommodate as many as twenty-four students in groups of two, and labs typically run from two to three hours.

The overwhelming popularity of the first four computer labs has led to the addition of a fifth computer lab room, in what was formerly general lab space. Microcomputer Based Labs (MBLs) currently account for approximately three quarters of the experiments done in the *Intro I* courses, and approximately two thirds of the *Intro II* courses.

Along with the traditional physics courses that utilize the facility, there are other more conceptual survey courses, such as the new course PY103: *Cinema Physica*, with specific laboratory needs. Many of these labs have also been adapted for computer-controlled data acquisition and analysis over the last few years. In addition, new laboratory equipment, such as the damped driven chaotic pendulum, has been developed and incorporated into the curriculum for use in labs and lecture demonstrations. The teaching laboratories also provide resources that are utilized by faculty and staff in their own research and teaching, and they offer assistance to students involved in individual research.

Through the NSF-funded project "Enhanced Learning for Students in Intermediate and Advanced Physics" (PI Andrew Duffy, co-PIs Robert Carey and Bennett Goldberg), as well as departmental funds, we purchased several superconductivity and magnetic susceptibility kits that are now being used in the PY581 Advanced Laboratory course.

Improving the Teaching of Physics
Improving the Teaching of Physics (ITOP) is a joint effort between the Department of Physics and the School of Education. It is funded by the Massachusetts Board of Higher Education, and is designed to train in-service high-school teachers in physics and the teaching of physics. In 2006-7, the teaching labs provided space and laboratory equipment for several of the ITOP courses, including:

- SC545 – Concepts in Physics VI: Electromagnetism (fall 2006)
- SC546 – Concepts in Modern Physics I: Quantum Physics (fall 2006)
- SC525 – Concepts in Physics I: Force and Motion (spring 2007)
- NS541 – Concepts in Physics II: Rotation and Gravitation (spring 2007)
- NS547 – Concepts in Modern Physics II: Special Relativity (spring 2007)
- NS548 – Computer Modeling in Physics (summer 2007)

Details on the new NS 500 level courses is provided in the outreach section.

Undergraduate Lecture Demonstrations Facility
This academic year the primary project has been the continued reorganization of the demonstration facility. Through the expanding existing storage structures and rearranging the most used equipment, the accessibility of the demonstration collection continues to improve. The online database continues to be modified to more accurately match our existing collection and to provide background information about the demonstrations. However, the developing of the data base is not finished yet, some of the articles need to be corrected in order to bring a clearer description of the demo, and the process of taking photographs of our demonstrations for the database and uploading the photos onto the department server will continue. A scheduling interface, which was added last year for facility staff to provide demonstration-use tracking, still needs to be improved. In addition, a detailed list of the most popular demonstrations is being developed, which will be helpful for new faculty when preparing lectures.

Our most significant recent equipment acquisitions are a new solid-state Tesla coil and a tablet PC display which faculty can use during lectures for real-time incorporation of hand written notes into presentations. Many demonstrations were modified, repaired or acquired. A laserdisc player and a document camera were also obtained to replace older equipment.

The demonstration and laboratory staff has worked closely with Media Services and faculty to coordinate needed improvements in the lecture rooms to allow for the incorporation of more audio, video and student personal response systems in lectures.

Throughout the year, our demonstration and laboratory staff has lent equipment and expertise to a series of courses taught by Physics and School of Education faculty members for teachers at area high schools, primarily Boston Public Schools. As part of Boston University's Freshman Fridays, the demonstration staff put on a show of demos. The demonstration and laboratory staff also assisted the Chemistry, Biology and Astronomy Departments, Boston University Academy, numerous local elementary and high schools through the LERNet program, as well as many individuals in the University community.

C. RESEARCH PROGRAM

1. Character and Quality of the Research Program

a. Notable Accomplishments

Antonio H. Castro Neto was an invited author for Physics World on graphene, entitled "Drawing conclusions from graphene" published in the November 2006 issue. He also has organized a mini-workshop entitled "Electronic properties of graphene" at the Kavli Institute for Theoretical Physics at the University of California at Santa Barbara in January of 2007 and taught a tutorial on graphene physics at the 2007 March Meeting of the American Physical Society in Denver.

The complete results from five years of running the K2K (KEK to Kamioka) neutrino oscillation experiment were published in June, providing independent confirmation of the discovery of neutrino mass. This was the first man-made neutrino beam to travel and be detected at a distance

as great as 250 kilometers. Professors Kearns, Stone, and Sulak were co-authors. The group also announced the completion of construction of Super-Kamiokande III.

Richard Averitt was senior author on "Active Terahertz Metamaterial Devices" in *Nature* 444, 597 (2006) describing voltage controlled switching of the resonant electromagnetic response of split ring resonators arrays. These results enable, for the first time, efficient room temperature switching and modulation of terahertz radiation – a technologically relevant portion of electromagnetic spectrum lying between the microwave and visible. In addition, these results demonstrate the feasibility of active and dynamic control of metamaterial functionality opening a new avenue of research in this rapidly developing field.

The D0 group published an important paper on the first evidence for single top quark production. Observing this process confirms the electroweak interactions of the top quark and limits the possibilities for existence of a fourth generation of quarks and leptons. The BU group had a significant role in this with Meenakshi Narain, Shabnam Jabeen (postdoc), and Monica Pangilinan (graduate student) being one of three lead teams who carried out the data analysis with Ulrich Heintz as the top physics analysis group leader.

Professors Shelly Glashow and Andy Cohen appeared on the cover of *New Scientist* in January 2007. The article examined their theory of very special relativity-a challenge to Einstein's theory of special relativity.

The world's fastest oscillating device was demonstrated by Raj Mohanty and his group. At low temperature, signatures of quantum jumps in the oscillations are observed. Five international papers and many websites have covered the announcement. In a separate *Science* paper, Mohanty and students have driven oscillating nanomechanical beams between two states, producing a new nanomechanical switch with promise for memory applications.

The Molecular Biophysics Laboratory led by Prof. Kenneth J. Rothschild is working to understand the molecular basis of signal transduction in biological systems and has recently reported the discovery of key elements of light activated signaling mechanisms in bacteria.

In collaboration with physiologists at Brigham and Women's Hospital, Prof. Stanley and collaborators assessed heartbeat fluctuations in healthy individuals at different circadian phases and discovered significant circadian rhythms, with a notable response at 10am that has been linked to adverse cardiac events.

Prof. Bennett Goldberg, in collaboration with ECE Prof. Swan, has discovered a new technique to measure the electron-phonon coupling in low dimensional systems using two-phonon resonant raman scattering. Their work applied to individual carbon nanotubes appeared in Physical Review LettersPNAS.

Professor Gene Stanley co-authored, with two recent BU graduates and an assistant professor of economics at MIT, the first paper in the new physics subfield "econophysics" to appear in a strongly-refereed economics journal ranked in the top four journals in all of economics.

Professors Jim Miller and B. Lee Roberts' article "Muon (g-2): experiment and theory" in Reports on Progress in Physics, Vol 70, pp795 (2007), has been downloaded 250 times since April 2007, in the top 10% of all IOP journals articles over this quarter.

Professor Sid Redner has examined disparate social classes in a competitive population where individuals advance their fitness by competing against those in lower classes, and in parallel, individuals decline due to inactivity. Redner and colleagues have found a phase transition from a poor society, for large decline rate, to a multi-class society, for small decline rate, that consists of a finite-fraction poor condensate and a complementary upwardly-mobile middle class.

Condensed Matter and High Energy Theory Visitor Programs
The quantum condensed matter visitor's program, directed by Prof. Antonio Castro Neto, was established by the Dean Jeffrey Henderson of CAS in 2004 in order to bring prominent quantum condensed matter theorists from around the world to collaborate with scientists in the Physics Department at Boston University. The program supports travel, lodging, and local expenses for visitors and has brought more than 30 distinguished scientists from the most important research institutions in the United States, Europe, South America, Australia and Asia. As a result of these visits, the quantum condensed matter theory group has co-authored submitted manuscripts and published papers in distinguished journals such as *Physical Review Letters*, the prime journal in condensed matter research. These visits also led to the submission of grant applications to the National Science Foundation. Furthermore, the Visitor's Program has also benefited the experimentalists in the Physics Department. As a result of our Visitor's Program, renowned theorists have established new collaborations with experimental laboratories. This year, visitors included:

Ofir Alon (Technion), Dmitri Basov (UC San Diego), Rafael Bistritzer (Weizmann Institute of Science), Horacio Castillo (Ohio U.), Francisco Guinea (UC Santa Barbara), Yariv Kafri (Technion), Misha Katsnelson (U. of Nijmegen), Christopher Mudry (PSI), Philip Phillips (U. of Illinois, Urbana-Champaign), Rahul Roy (U. of Illinois, Urbana-Champaign), Fernando Sols (Autonomous U. of Madrid), Oleg Sushkov (U. of New South Wales).

Condensed Matter Experiment Faculty Visitors Program
The CME-FVP has brought a number of significant visitors to the department over the last year. The visitors have delivered seminars to the department, and interacted closely with faculty and students during their stay in Boston. This year, visitors included:

Russ Egdell (Oxford), Greg Hughes (Dublin City U.), Khalid Karrai (Ludwig Maximillian University), Chris McConnville (Warwick U.), Joseph Nordgren (Uppsala U.).

The continuing visitors program in elementary particle theory, supported by the College of Arts and Sciences and directed by Professor Andrew Cohen, also brought in prominent theory visitors from around the world. This year, visitors included:

Freddy Cachazo (Perimeter Institute), Gia Dvali (NYU), Tony Gherghetta (U. of Minnesota), Adam Martin (Yale), Michael Peskin (Stanford), David Smith (Williams College), Mithat Unsal (Stanford), Mark Wise (CalTech).

Major Conference Leadership
Professor Antonio Castro Neto organized a mini-workshop entitled "Electronic properties of graphene" at the Kavli Institute for Theoretical Physics at the University of California at Santa Barbara in January 2007. The seminars of the workshop can be accessed on-line at: *http://online.itp.ucsb.edu/online/graphene_m07/*

Professor Claudio Chamon chaired the organizing committee of the Spring School on Correlated Matter, sponsored by the International Institute for Complex Adaptive Matter (I2CAM). This school took place in Rio de Janeiro from March 11-17, 2007 and was intended for students and postdocs with funding obtained for 15 students from the US to travel to Brazil.

Dean Edmonds Colloquium
This year's Dean Edmonds Colloquium series speaker was Jim Cronin, the 1980 Nobel Laureate in Physics. The dinner was held in the Trustees Ballroom at Boston University at which the Goldhaber Prize, Teaching Fellow of the Year award, and the Chair's Book Prizes for excellence in research and teaching were awarded.

Selected Significant Publications
Professor Antonio Castro Neto: "Phonons behaving badly", Antonio H. Castro Neto, *Nature Materials* **6**, 176-177 (2007).

Professor Antonio Castro Neto: "Drawing Conclusions from Graphene", Antonio Castro Neto, Francisco Guinea, and Nuno Miguel Peres, *Physics World*, pg. 33-37 (November 2006).

Professors Jim Miller and B. Lee Roberts: "Muon (g-2): Review of Theory and Experiment", *Rep. Prog. Phys.* 70 , 795-881 (2007).

Professor Anders Sandvik: "Quantum Criticality And Percolation In Dimmer-diluted Two-Dimensional Antiferromagnets," *Phys. Rev. Lett.* 96 (2006); "Impurity Induced Spin Texture in Quantum Critical 2D Antiferromagnets," *Phys. Rev. Lett.* 97 (2007);

Professor Raj Mohanty: "Synchronized Oscillation in Coupled Nanomechanical Oscillators", Seung-bo Shim, Matthias Imboden, and Pritiraj Mohanty, *Science*, Vol. 316, No. 5821 (2007).

Professor Rick Averitt: "Active terahertz metamaterial devices", Hou-Tong Chen, Willie J. Padilla, Joshua M. O. Zide, Arthur C. Gossard, Antoinette J. Taylor and Richard D. Averitt, *Nature* **444**, 597 (2006).

Professors Andy Cohen and Shelly Glashow: "Very Special Relativity", Andrew G. Cohen and Sheldon L. Glashow, *Phys. Rev. Lett.* **97,** 021601 (2006).

Professors Bennett Goldberg and Anna Swan, "Optical Determination of Electron-Phonon Coupling in Carbon Nanotubes," *Physical Review Letters*, Vol. 98, No. 3, 19 2007

Professors John Butler and Ulrich Heintz: "Direct Limits on the B_s Oscillation Frequency", V. M. Abazov, et al, *Phys. Rev. Lett.* **97**, 021802 (2006).

Professors John Butler and Ulrich Heintz: “Evidence for Production of Single Top Quarks”, V. M. Abazov, et al, *Phys. Rev. Lett.* **98**, 181802 (2007).

Professor Anatoli Polkovnikov: “Full quantum distribution of contrast in interference experiments between interacting one-dimensional Bose liquids”, Vladimir Gritsev, Ehud Altman, Eugene Demler, Anatoli Polkovnikov, *Nature Physics 2*, 705 - 709 (01 Oct 2006).

Professor Anatoli Polkovnikov: “DNA unzipping and the unbinding of directed polymers in a random media”, Yariv Kafri, Anatoli Polkovnikov, *Phys. Rev. Lett.* **97**, 208104 (2006).

b. Research Facilities and Support Services

The Physics Department administers two major university-wide facilities for the Boston University community: the **Electronics Design Facility** and the **Scientific Instrument Facility**. In February of 2006, the University requested a large reduction in the subsidy of both the SIF and EDF, 25% for FY07, plus further reductions at the rate of 25% per year to zero support by 2010. The Department organized an effort to measure the impact, both direct and indirect, of the facilities, and design and propose a comprehensive economic and organizational plan. A 60-page report was delivered to the Dean, Provost and President in September. The highlights of the report include:

- All faculty, researchers, undergraduate and graduate students, numbering more than 100, provided direct evidence that the shops are critically enabling – without them, we would not win grants, retain leading faculty, provide unique educational environments, or achieve research and science of wide acclaim.
- The shops provide unsurpassed excellence, are convenient and cost effective, and engage students and faculty with ideas from detailed 3D drawing to scratches on scraps of paper.
- The SIF and EDF can count $70M in direct and follow-on external support. Averaged over their lifetime, this is between a 5:1 to 10:1 return on investment, better than all but a few Centers at Boston University.
- In SIF, we have cut costs, removing two exempt positions and an engineer, for a nearly 50% subsidy reduction over the time period 2003-2008, while at the same time increasing internal use from 40% to 75%. The re-organized SIF has already increased internal usage to 75% while retaining key external users and are on target to hit the reduced budget support of FY07.
- For SIF and EDF combined, future financial plans will result in a net reduction of an additional 30% over the next 5 years, reducing the combined subsidy to less than $550k from a prior year amount of ~$1M. Our rates have increased and will continue to do so, commensurate with what the market will bear.
- We are building the student shop in SIF, developing curricula and workshop material. We are engaging more HEE projects in EDF, as well as cultivating contacts across the institution. EDF Director Eric Hazen and faculty are working to revamp PY481/681 Electronics for Scientists.

In January, the Provost guaranteed support for the facilities within the current financial structure. We are anticipating a letter for the Provost acknowledging the key role the facilities play in the research and educational infrastructure of the institution.

Physics Research Computation Facility
This facility, directed by Guoan Hu, provides systems support for departmental servers and assistance with workstations and personal computers to our extensive group of faculty, staff, and student users. The Systems Analyst, Richard Laskey, is a recent graduate of the Mathematics Department and worked for four years in the Astronomy Department, where he was extensively involved in systems administration, database and website development. This year he successfully created and implemented a graduate admissions database and will continue to help us expand our web-accessible database interfaces for administration and teaching use. In addition, a new departmental website was launched in the final quarter of the year.

Center for Computational Science
The Center for Computational Science, under the direction of Professor Claudio Rebbi and working jointly with the Scientific Computing and Visualization Group of the Office of Information Technology, provides advanced computational facilities to all members of the Boston University research community. The facility features an IBM BlueGene supercomputer, with 1024 compute nodes and a peak capacity of 5.7 Tflops, a 112-processor IBM p690 with peak performance of approximately 580 Gflops, an IBM p655 with 72 Power4 processors and a peak capacity of approximately 370 Gflops, an IBM Linux cluster with 52 dual processor compute nodes and 24 display nodes, a Deep Vision Display Wall (a high resolution stereographic display), Gigabit and Fast Ethernet Networks, and a 1Gb/s connection to Nox 2.4 Gb/s Abilene-Internet2 port.

With support from an NSF IGERT grant, the Center runs an interdisciplinary graduate training program called ACES (Advanced Computing in Engineering and Science), offering a Certificate in Computational Science, and NSF funded traineeships for students pursuing the Ph.D. in any of nine participating departments, including Physics.

D. OUTREACH AND ALUMNI PROGRAMS

1. Outreach and Community Development

Massachusetts Physics Olympiad: The Boston University Physics Department hosted the Massachusetts Physics Olympiad this year, in collaboration with the Boston University Academy. The event brought 100 high school students from across the state to compete.

Physics Day at Boston University: The Boston University Physics Department presented at the second annual *Physics Day* at BU, bringing in 200 high school students from around the city. The Physics Demo Show *Under Pressure* was performed, as was a chemistry talk and a talk on nanotechnology by Prof. Bennett Goldberg.

FIRST Robotics support The Physics Department supported the BU team "#246 – Overclocked" in machine shop, design, and encouragement. The team did extremely well this year, making the

regional finals for the first time. In addition, through former BU grad student Gary Garber (lead physics teacher at BU Academy) several under-served Boston high school classes participated.

2007 Boston University Science Bowl In collaboration with the Chemistry and Biology Departments, BU Physics helped support and staff the 2007 Science Bowl. The event was a great success, bringing hundreds of competing teams from around New England.

GK12 Boston Urban Fellows Physics graduate student Tyler Dunn received a GK12 fellowship and was placed in a physics classroom in Quincy, MA where he helped develop new curricula for physics classes.

LERNet
Throughout the school year the teaching laboratories have worked in coordination with LERNet, Boston University's Learning Resource Network run by Administrative Director Cynthia Brossman, to conduct educational and enrichment activities for local middle-school and high-school students, including BU Academy and Bedford High School. LERNet also hosted a Physics Day for high school students on May 4th, during which Prof. Andrew Duffy performed a physics demo show called "Under Pressure" and Prof. Bennett Goldberg introduced students to the field of nanotechechnogy and its research applications. LERNet was the prime organizer of the 2007 Department Of Energy ScienceBowl during which 20 teams vied for the opportunity to compete in the National Bowl in Washington, D.C. LERNet also provided organizational assistance to Gary Garber of BU Academy for the Physics Olympiad and Western Suburban Science League Event.

Improving the Teaching of Physics
The involvement of the Department of Physics in Project ITOP (Improving the Teaching Of Physics) has been a major outreach effort. Project ITOP is a rigorous two-year 20-credit program, in which high school teachers come to BU to learn about physics, physics pedagogy and education research, and the conceptual history of physics. The target audience consists of teachers who are teaching physics in the high schools without having the qualifications or the background to teach the subject. There are roughly 40 such teachers in the Boston Public Schools, and more such teachers in towns close to Boston.

The ITOP program began in May 2004 as a joint effort between the Department of Physics, the School of Education, and the Boston Public Schools. Since then, the program has been funded through a three-year $450,000 grant through the Massachusetts Board of Higher Education (PI Peter Garik (SED), co-PI Andrew Duffy (Physics)) that has allowed an expansion of the collaboration to include the University of Massachusetts Boston and the Revere Public Schools.

Courses from Project ITOP have now been taken by approximately 35 Boston-area teachers, most from the Boston Public Schools, but with several from Revere and with single teachers from Holliston, Franklin, Brookline, Manchester-Essex and Quincy. Two cohorts of teachers are currently enrolled in the program. Cohort II, with 11 teachers, meets on Monday and Friday evenings, while cohort III, with 4-6 teachers, meets on Tuesday and Friday evenings. The lead instructors are Andrew Duffy (Physics) and Val Voroshilov (Physics), who shared the physics instruction, and Peter Garik (SED) and Luciana Garbayo (Ph.D. student in Philosophy) sharing the instruction pertaining to the history and philosophy of science and to education research. Val

Voroshilov, the Director of the Lecture Demonstration Facility in Physics, was a key addition to the ITOP team this year, allowing the two cohorts to be taught simultaneously.

Until this year, the ITOP courses had been offered through the School of Education. This year, however, the sequence of 10 courses won approval from the College of Arts and Sciences to be cross-listed as NS (Natural Science) course at the 500 level. These NS 500 level courses will address the content of STEM disciplines, the educational research conducted in the field, and the conceptual history of the discipline. They are intended to further the understanding of the students within the liberal arts and science tradition by focusing on research based content and analytical reasoning. The new CAS designation formally acknowledges the value brought by PhD faculty in the disciplines for in-service instruction for the first time, more appropriately identifies the content covered, and provides the participants with the credentials they have earned. Math has a similar structure based on the Focus on Math program.

This will be an important benefit for the teachers as they work toward their professional license. Also, this year three of the participating teachers passed the Massachusetts Test for Educator Licensure (MTEL) in Physics, giving them the qualifications they need to be licensed to teach physics. Several of the other teachers have either taken the MTEL and are waiting to hear their results, or plan to take the MTEL in July 2007, so we expect even more of the teachers to also become licensed physics teachers, meeting one of the primary goals of the ITOP program.

Between summer 2006 – summer 2007, six ITOP courses were given, three to cohort II, two to cohort III, and one to teachers from both cohorts II and III. More details on these courses is given elsewhere in this document, in the section on Undergraduate Labs. The courses were held in the Department of Physics, primarily in the undergraduate lab rooms. The courses are run in a non-traditional workshop format in which the teachers spend much of their class time in small groups, doing hands-on work.

Art and Science Project
This past year installation took place of “Visual Entanglements: The Search for Connections between Science, Art, and Life”, a series of images representing the sciences (Physics, Biology, and Chemistry) addressed within the Metcalf Science Center. The images are based on both research currently being done at BU and on basic theories and images pertaining to those fields.

Evolution of Darwin
Beginning in October 2006, artist Esther Solondz created an installation on the Metcalf Science Center Plaza entitled “The Evolution of Darwin”. The project used portraits of Darwin and other evolutionary scientists to create rust portraits by sandwiching images composed of iron filings between two pieces of cotton gauze. The filings were then placed on the concrete platforms on the Plaza with compressed salt bricks in various stages of crystallization placed on top. The pieces were left in the open to evolve organically by exposure to the weather. This project was sponsored jointly with the Physics, Chemistry and Biology Departments.

QUARKNET
In 1999, Associate Professor Ulrich Heintz started one of the first quarknet centers in the country in collaboration with colleagues from Northeastern University. Quarknet is an initiative to involve high-school teachers and their students in state-of-the-art research that seeks to resolve

some of the mysteries about the structure of matter and the fundamental forces of nature. It is supported by the National Science Foundation and the U. S. Department of Energy. Activities have involved research internships for teachers, a three-week workshop for teachers in 2000 in which many faculty members from BU participated, and annual one-week workshops since then.

2. Fundraising Initiatives

We have worked with Gene Lyman and Karen Fung in CAS and Mike Dettelbach and Adam Wise in the Provost office for several major initiatives. We are working toward an Edmonds Chair in Physics, have visited alumni in the Boston area, and have developed opportunities with faculty members Raj Mohanty and Gene Stanley. We are working on the new Lawrence R. Sulak Common Room and have a $10,000 donation promised by Dean Edmonds.

3. Alumni Initiatives

Our first graduate alumni reunion in more than 25 years was held on Friday and Saturday May 4 & 5, 2007. The event was highlighted by two scientific sessions, two career panels, and two social events. For the scientific program, we invited eight of our most distinguished alumni over the past two decades and all but one were able to attend. The invited speakers included Laszlo Barabasi (Notre Dame University), Eli Ben-Naim (Los Alamos National Laboratory), Max Chertok (Univ. of California, Davis), Sharon Glotzer (University of Michigan), Michael Manfra (Bell Labs, Alcatel-Lucent), Mark Messier (Indiana University), Michael Naughton (Boston College).

The scientific sessions were attended by 40-60 of our current graduate students and faculty, as well by approximately 20 graduate alumni. Many of our graduate students were inspired by the high degree of professionalism and pedagogy that was displayed by our alumni. The talks covered a wide range of physics fields and were extremely well produced and delivered. They were inspirational for our current graduate and for the faculty in attendance.

We also had two very informative and productive career panels---one devoted to physics careers and one devoted to careers outside of physics for physics Ph.D. graduates---in which five alumni each participated in lively question and answer sessions. Again, many of our current graduate students found these sessions quite eye-opening. A number of our students made contacts with our graduate alumni that should prove useful in employment searches. Our social events---a Friday evening buffet dinner and a Saturday lunch---also provide our students with the opportunity for useful one-on-one interactions with our graduate alumni.

Our graduate alumni reunion was a great success, both scientifically, and from the perspective of strengthening our alumni relations and the connections between our current graduate students and alumni. We look forward to hosting graduate alumni reunions on a regular basis, probably biannually. We envision that these events will provide a valuable entry point for our graduate students in their professional careers. Ultimately, we hope that our alumni reunions will foster a community spirit that will lend itself to philanthropic activities.

We also published the third issue of our graduate alumni newsletter in December 2006, a copy of which can be found at the end of this report.

4. Webpage

The URL of the Physics Department home page is *http://physics.bu.edu/*. This site provides links to internal resources such as personnel lists, descriptions of facilities and research programs, undergraduate and graduate program listings, calendars of talks and events, and course descriptions. Links are also provided for external resources such as outreach to secondary school programs, job opportunities, educational web sites, and other physics-related websites**.** In the past year, progress has been made on redesigning the website and updating it to provide significant intranet capabilities.

E. PHYSICS DEPARTMENT AND RELATED STAFF

Physics Department Staff:

Business Manager:	Rachel Meisel
Facilities and Purchasing Specialist:	Lawrence Cicatelli
Grants Administrator:	Anita Gupta
Accounts Technician:	Nancy Kostowski
Administrative Assistant:	Cristi Menard
Graduate Coordinator:	Mirtha Cabello
Undergraduate Coordinator:	Julia Elder
Department Secretary:	Winna Somers
Program Coordinator:	open position
Director of Computer Resources:	Guoan Hu
Systems Administrator:	Richard Laskey III
Undergraduate Teaching Laboratories Manager:	Erich Burton
Teaching Laboratories Technical Coordinator:	Valentin Voroshilov-promoted January 2007 Lucas Wickham-hired January 2007
Teaching Demonstrations Coordinator:	Christian Murphy-resigned December 2006 Valentin Voroshilov-hired January 2007

Physics-Related Centers that Share SCI and PRB:

Center for Computational Science:

Assistant Director: Ilona Lappo
Research Professor: Raquell Holmes
Program Manager: Maryanne Jule
Administrative Assistant: Cheryl Endicott

LERNet

Administrative Director: Cynthia Brossman
Faculty Advisor: Robert Devaney (Math)

Polymer Center

Administrative Secretary: Jerry Morrow
Senior Program Assistant: Robert Tomposki

Scientific Instrumentation Facility

Manager/Machinist:	Heitor Murato
Coordinator/Welder	Robert Kingsland
Senior Experimental Machinists:	Russell Boudreau, Umberto Fazio, Sai-Ho Ma, Robert Snee

Electronics Design Facility

Director:	Eric Hazen
Electrical Engineers:	Paul Bohn, William Earl, Shouxiang Wu
Administrative Coordinator:	Christopher Lawlor

F. SIGNIFICANT PLANS AND NEEDS

The Physics Department has increased its rating to 35th by US News and World Report, second only to Biomedical Engineering among the science and engineering departments at Boston University.

The central concern that has emerged in our self-study, external review and strategic planning is that the department, though excellent in several areas, is too small and too narrowly based to simply wait for its growing reputation to automatically propel it to "the next level". Rather, we need to aggressively build enhanced strength in additional areas that are of intrinsic interest within physics but which also couple effectively to other developments at Boston University. The best defined of these is the area of Biological Physics. The Department is requesting that it be authorized to begin searching during FY08 for the first of several faculty appointments in this area. In an attached document entitled *Initiative in Biological Physics* we argue that such an expansion would accomplish two key strategic goals: *i*) Strengthen the Physics Department's future impact and overall standing in biological physics, a rapidly rising subfield of the discipline, and *ii*) Strengthen the Physics Department's interdisciplinary links with a variety of related Programs and Centers at the University including (but not limited to) the Center for Photonics which has recently launched a 5-year growth plan in biophotonics, the Training Program in Quantitative Biology and Physiology, the Bioinformatics Program, the Center for Adaptive Systems, the cross-campus Cellular Biophysics Training Program, and the Department of Physiology and Biophysics at the Medical School.

A somewhat larger faculty would also allow the Physics Department to broaden its outreach and impact in the area of undergraduate teaching. In addition to anticipating enrichment of the physics undergraduate electives, we are planning a joint junior-level seminar course with the Quantitative Biology program. There is also an opportunity for broader offerings by the Physics Department that serve both CAS and ENG. Our calculus-based introductory courses could incorporate more biologically relevant content, since we ought to respond to the fact that nearly half of all ENG students now go into Biomedical Engineering. This could serve as a firm foundation for graduate studies in medicine. Biological physics can also be the basis for our department to provide another Freshman Seminar/WR150 course, and perhaps even an attractive new type of General Education course for non-scientists.

Another need recognized by the department and highlighted by the External Review committee is to reorganize and solidify the participation of Boston University high energy particle physicists at the soon-to-be-operational Large Hadron Collider in Geneva, Switzerland. During the construction phase, several Boston University physicists have made substantial contributions to one or the other of the large detector teams at LHC, even as still others have played key roles in the upgrades and physics research presently being conducted at the Fermi National Accelerator Laboratory "Tevatron". The recent loss of Professor Meenakshi Narain to Brown University is an unexpected development, and we need to quickly look for opportunities to

appoint a strategically chosen person who can make a major contribution to our LHC team effort.

Specific undergraduate program needs continue to be the systematic improvement of experiments for its Intermediate and Advanced Laboratory courses. This not only requires money from the departmental budget and external grant funding (whenever possible), but also requires recognition of the enormous amounts of time and effort required to develop and perfect new experiments. The same faculty member who prepares lectures and personally teaches the discussion section(s) for junior and senior level courses, while maintaining a vigorous research program, rarely has time or energy to think creatively about the lab that may be tied to the course. For this reason, Prof. Skocpol has begun teaching the junior lab course that is appended to PY408, Classical Mechanics, as his Fall Term assignment, even though these lab sections are listed as "0.0 credits" for the students.

We are currently looking to develop computational modules for use in intermediate level and advanced course, and Prof. Anders Sandvik as agreed to spearhead this effort during his sabbatical next year. This is another area in which creative efforts beyond normal class preparation and presentation is required. There is a significant need to reward successful projects in this area by teaching release, either at the time of a major project, or after the accumulation of a larger number of smaller projects over a period of several semesters.

Construction projects anticipated for FY08:

1. *New common room:* SCI 262, the Chasan lab, plus the copy room, SCI 251, are being renovated to create a common space. The new space will allow casual discussions, small seminars, a cup of coffee or tea, or a place for a bag lunch, all shared by faculty and graduate students. Plans are appended. Partial funding from a donor has been obtained, and more will be sought.
2. *Renovation of the Condensed Matter Theory* space on the third floor: We are working with faculty and CAS designers and the Provost office to complete the plans and proceed with the renovation.

Physical Plant Improvements (SCI in general):
We are actively working with Minor Construction on plans for the renovation of the SCI HVAC unit, and the associated changes in lecture and research space.

G. APPENDICES

1. Undergraduate Students and Their Advisors

Advisor	Student	Advisor	Student	Advisor	Student
Ahlen	Deborah Avery	**El-Batanouny**	Michael Gully-Santiago	**Miller**	Dalit Engelhardt*
	Jonathan Bao		Jonathan Hoffman		
	Michi Baubock		William Hubbard	**Mohanty**	Kevin Leahy
	Dalit Engelhardt		Anthony Lollo		David Huckle
	Benyamin Farahvash		Ashton Szabo		Edward Liipchus
Averitt	none	**Erramilli**	Emily Cody	**Pi**	Alexander Krause
			Dan Lam Tran		Andrew Blaeser
Bansil	Catherine Summerhayes		Ian Cohen		Alice Olmstead
					Jack Degroot
Butler	Nicholas Boitnott	**Glashow**	Michele Kotiuga		
	Daniel Walkup		Elay Shech	**Polkovnikov**	none
	Christopher Moses				
	Eric O'Dea	**Goldberg**	Michael Lu	**Rebbi**	Megan Riley
			Georgiy Kazantsev		Graham Rowlands
Carey	Nicholas Brady				Donal Schmit
	Charles Greenstein	**Heintz**	Neil Lender		Harry Stinson
	Amir Hevroni*		Scott Dietrich		Kristofor Maynard
	Matthew Molinario		Ryan Eriksen		Matthew Whitrock
	David Pickholtz*		Matthew Preble		
				Redner	Jamie Perkins
Castro Neto	None	**Katz**	none		Andrew Wasem
					Douglas Hamilton
Chamon	Hugh Enxing	**Kearns**	Haruki Oh		
	Michael Genuardi		Yuliya Miretskaya	**Roberts**	Carla Benatti
	Michael Green		Caitlin O'Nan		Gregory Jones
	Alexander Boyd		Joshua Shiode		Mitchell Mickaliger
					Andrew Menz
Cohen	Ashley Adams	**Klein**	Andrew Fraine *		Scott Sandler
	Adam Romines				
	Lisa Baubock	**Lane**	Amir Hevroni	**Rohlf**	Lela Todorova
	Valentina Dutta		Andrew Fraine		David Tooley
	Brian Henning		Amanda Kearney		Julian Vasilkoski
			Brian Pardo		Clare Thomas
Duffy	Amy Colgan		David Pickholtz		
	Zenas Chan			**Rothschild**	Peter Ashton
	Margaret Clemens	**Ludwig**	Genelle Pugliese		Eric Cornelius
	Robert Lombardi		Sean Rawson		Jessica Donaldson
	Brian Stuart		Noelle Richey		
	Matthew Preble*		Amanda Robison		

			Neil Lender		
			Jessica Leach		
Sandvik	Chad Madsen	**Skocpol**	Elizabeth Barris	**Stone**	Katherine Jameson
	Joseph Megnia		Evan Butler		
	Julia Williams Chi		Kyoko Fujimoto	**Sulak**	Ashley Aguilar
	Chi Shung Yip		Jun Iriyama		Bryan Anderson
			Nadisha Perera		Joseph Peacock
Schmaltz	none		Brent Randol		Daniel Pilon
			Seth Zuckerman		Glenn Sugar
		Smith	Valentina Dutta*	**Tsui**	None
			Laura Storch		

*Secondary Advisor

2. Graduate Students and Their Advisors

Last Name	First Name	Academic Advisor	Research Advisor
Amsden	Jason	Karl Ludwig	Ken Rothschild
Ann	Kevin	Steve Ahlen	Gregg Jaeger
Azenberg	Eitan	Edward Kearns	Karl Ludwig
Avakian	Adam*		
Babich	Ronald	Claudio Rebbi	Claudio Rebbi
Barros	Kipton	Claudio Chamon	Bill Klein
Betnel	Mark	Shyam Erramilli	Gregg Jaeger
Boline	Daniel	Martin Schmaltz	Ulrich Heintz
Bradonjic	Kaca	Steve Ahlen/Martin Schmaltz	
Busko	Claudio	Edward Kearns	
Celli	Jonathan	Shyam Erramilli	Shyam Erramilli
Chen	Pu	Karl Ludwig	Sidney Redner
Chen	Yu	Raj Mohanty	Raj Mohanty
Chen	Yiping	Shyam Erramilli	Gene Stanley
Clark	Scott	Edward Kearns	Edward Kearns
Clough	Andrew	Edward Kearns	
Colakerol	Leyla	Shyam Erramilli	Kevin Smith
D'Alesio	Luca*		
Das	Amitabha	Ulrich Heintz	Ulrich Heintz
Davis	Jacob	Claudio Chamon	
De Grandi	Claudia	Claudio Chamon	
Demasi	Alexander	Claudio Chamon	Kevin Smith
Dickison	Mark	Shyam Erramilli	
DiFiori	Nicolas	Shyam Erramilli	Amit Meller (ENG)
Dogan	Mehmet	Bennett Goldberg	Bennett Goldberg
Dominguez	Elizabeth	Martin Schmaltz	Bill Klein
Donovan	Adam*		
Dufour	Fanny	Claudio Chamon	Ed Kearns
Dunn	Tyler	Shyam Erramilli	
Fu	Dongfeng	Ulrich Heintz	Gene Stanley
Gastler	Daniel	Martin Schmaltz	Ed Kearns
Guerra	Diego	Claudio Guerra	
Han	Sungho	Claudio Chamon	Sidney Redner
Han	Tzong-Ru	Shyam Erramilli	
Hipolito	Rafael	Anders Sandvik	Anders Sandvik
Hou	Chang-Yu	Claudio Chamon	Claudio Chamon
Huang	Xiaobo	Robert Carey	James Miller
Huang	Xuqing*		
Ibanez Herrera	Luis*		
Imboden	Matthias	Martin Schmaltz	Raj Mohanty
Inglis	Andrew	Steve Ahlen	Gene Stanley
Jensen	Mikkel	Shyam Erramilli	
Jin	Songbo*		
Kemiktarak	Utku	William Skocpol	Kamil Ekinci
Kitsak	Maxim	Shyam Erramilli	Gene Stanley
Kralj	Joel M.	Sidney Redner	Ken Rothschild
Kumar	Pradeep	Gene Stanley	Gene Stanley
Lam Ng	Alfonso	Gene Stanley	Gene Stanley
Larkin	Joseph*		

Lascaris	Erik	Martin Schmaltz	
Lawson	Philip*		
Learmonth	Timothy	Karl Ludwig	Kevin Smith
Lemos Rodrigues Dos Santos	Joao Ricardo		
Li	Guanliang	Shyam Erramilli	Gene Stanley
Li	Qian*		
Li	Minghai	Rama Bansil	Rama Bansil
Li	Wei*		
Lin	Jianxun	Shyam Erramilli	Ken Rothschild
Litos	Michael	Ed Kearns	Ed Kearns
Liu	Chen*		
Liu	Mengkun	Shyamsunder Erramilli	Richard Averitt
Liu	Yongsheng	Steve Ahlen	Rama Bansil
Lou	Jie	Claudio Chamon	Anders Sandvik
Love	Jeremy	Steve Ahlen	
Luo	Jiayuan	Shyam Erramilli	
Ma	Zhonghua	Claudio Chamon	David Coker (Chemistry)
Majumdar	Arnab	Claudio Chamon	Gene Stanley/Bela Suki
Martin	Adam	Kenneth Lane	Kenneth Lane
Mastrangelo	Roberto*		
Mazza	Marco	Gene Stanley	Gene Stanley
Mcguigan	Marc	Bennett Goldberg	Bennett Goldberg
McNerney	James	Claudio Chamon	
Michelman Ribeiro	Ariel	Rama Bansil	Rama Bansil
Morrison	Will*		
Nation	Nigel	Sidney Redner	Steve Ahlen/Scott Whitaker
Nichols	Colin (LOA)	Steve Ahlen	
Nilsson	Johan	Antonio Castro Neto	Antonio Castro Neto
Otis	Keith*		
Parihar	Vivek	Ulrich Heintz	Ulrich Heintz
Peng	Qinzeng	Claudio Chamon	James Miller
Peng	Shouyong	H.E. Stanley	H.E. Stanley
Petersen	Alex	Claudio Chamon	
Phillips	Justin	Martin Schmaltz	
Pinnick	Eric	Martin Schmaltz	Shyam Erramilli
Qui	Le	Shyam Erramilli	Lev Perelman
Raber	Erica	Shyam Erramilli	
Rahmanisisan	Armin	Shyam Erramilli	
Remi	Sebastian	Bennett Goldberg	Bennett Goldberg
Roccaro	Alvaro	Claudio Chamon	
Roy	Tuhin	Martin Schmaltz	Martin Schmaltz
Sanborn	Christopher	Steve Ahlen	Karl Ludwig
Santos	Aaron	William Klein	William Klein
Schaich	David Alexander	Ami Katz	
Schweiger	Aaron	William Klein	William Klein
Serino	Christopher	Martin Schmaltz	
Shao	Jia	Shyam Erramilli	
Sood	Vishal	Sidney Redner	Sidney Redner
Spring	Julian*		
Sreenivasan	Sameet	H.E. Stanley	H.E.Stanley
St. John	Jason	Martin Schmaltz	James Rohlf

Stokely	Kevin	Martin Schmaltz	H.E. Stanley
Strekalova	Elena	Claudio Chamon	H.E. Stanley
Strikwerda	Andrew	Ami Katz	Richad Averitt
Su	Zhiqiang*		
Sun	Wei	Shyam Erramilli	Johannes deBoer
Sutin	Jason	Ami Meller	Amit Meller
Tam	Ka Ming	Claudio Chamon	David Campbell
Tang	Ying*		
Tenenbaum	Joel	Ami Katz	
Tomita	Hidefumi	Martin Schmaltz	Steve Ahlen
Vazquez	Federico	Sidney Redner	Sidney Redner
Velenich	Andrea	Claudio Chamon	Dirk Kreimer
Viola	Silvia	Claudio Chamon	Antonio Castro Neto
Volovik	Daniel*		
Walsh	Andrew	Bennett Goldberg	Bennett Goldberg
Wang	Duan*		
Wang	Ling	Anders Sandvik	Anders Sandvik
Wang	Fengzhong	Steve Ahlen	H.E. Stanley
Wang	Wei	Edward Kearns	Edward Kearns
Wang	Xihua	Shyam Erramilli	Shyam Erramilli
Wang	Yiyi	Karl Ludwig	Karl Ludwig
Wenzler	Joseph-Stefan	Steve Ahlen	Raj Mohanty
Wu	Zhenhua	Karl Ludwig	Gene Stanley
Xu	Limei	Karl Ludwig	Gene Stanley
Yan	Yin	Bennett Goldberg	Bennett Goldberg
Yan	Zhenyu	H.E. Stanley	H.E. Stanley
Yao	Daoixn	David Campbell	David Campbell
Yao	Yangyang	Claudio Chamon	Michael El-Batanouny
Younger	Richard (LOA)	Shyam Erramilli	Bennett Goldberg
Yun	Sijung	H.E. Stanley	H.E. Stanley
Zhang	Jingdi*		
Zhang	Wei*		
Zhang	Yufeng	Kevin Smith	Kevin Smith
Zhou	Jun	Sidney Redner	David Campbell
Zhu	Xuetao	Steve Ahlen	Michael El-Batanouny
Zolfagharkhani	Guiti	Raj Mohanty	Raj Mohanty

*Incoming Fall 2007

3. Seminars and Colloquia

Biological Physics Seminars

Date	Speaker	Affiliation	Abbreviated Title
9/6/06	Michael Rosenblum	Potsdam U.	Controlling Collective Activity in a Population of Neurons
9/29/06	Yariv Kafri	Technion, Israel	Cooperative Dynamics of Interacting Molecular Motors
11/3/06	Srikanth Sastry	Jawaharlal Nehru Centre for Advanced Scientific Research	Gelation, Phase Separation and dynamical arrest in fluids
11/17/06	Jay Tang	Brown U.	Biophysics Studies of a fast swimming, chemotactic, and super sticky bacterium
12/1/06	Johannes de Boer	Wellman Center	Optical Coherence Tomography
12/4/06	Emanuela Zaccarelli	Universita di Roma La Sapienza	The physics of Attractive Colloids
3/30/07	Joel Kralj	Boston U.	Time resolved FTIR and Raman measurements on individual microbial rhodopsin crystals
4/3/07	Cestmir Konak	Czech Academy of Sciences	Biodegradable nanocoatings of nanoparticles
4/13/07	Jan Genzer	North Carolina State	Combinatorial polymer brushes
4/27/07	Sid Redner	Boston U.	Dynamics of Microtuble Growth and Catastrophe

Colloquia

Date	Speaker	Affiliation	Abbreviated Title
9/12/06	JC Seamus Davis	Cornell U.	Visualizing Complex Electronic Quantum Matter
9/19/06	Matthew Fisher	UC Santa Barbara	Quantum Choreography
9/26/06	Ulrich Heintz	Boston U.	Faculty Research Symposium
10/3/06	James Rohlf	Boston U.	Physics at the CERN Hadron Collider
10/12/06	Francoise Brochard	Institute Curie-Paris	Dynamics of Detachment of Real and Artificial Cells
10/17/06	Angela Olinto	U. of Chicago	A New Era of UHE
10/24/06	Raymond Laflamme	U. of Waterloo	Quantum Computing*
10/31/06	Nancy Kopell	Boston U.	Multiple Rhythms and Switches in the Nervous System
11/7/06	Philip Kim	Columbia U.	Relativistic Quantum Physics at your pencil tips
11/14/06	Lee Smolin	Perimeter Institute	Quantum Gravity and the Standard Model
12/5/06	Mike Lubell	American Physical Society	Science on the National Agenda
1/23/07	Marcelo Gleiser	Dartmouth College	The Chirality of Life
1/30/07	Marusa Bradac	KIPAC Institute	Shedding Light on Dark Matter
2/6/07	Eugene Demler	Harvard U.	Strongly correlated quantum systems
2/13/07	Amit Meller	Boston U.	DNA translocation, diffusion and unzipping through a nanopore
2/27/07	Gerald Gabrielse	Harvard U.	New Measurement of the Electron Magnetic Moment and the Fine Structure Constant
3/1/07	Andrei Ruckenstein	Rutgers U.	Towards Quantitative Models of Transcription
3/20/07	Doug Durian	U. of Pennsylvania	Unified force law for impact cratering in loose granular media

3/27/07	Rick Averitt	Boston U.	Faculty Research Symposium
4/10/07	Jim Cronin	Fermi Lab	Cosmic Rays**
4/17/07	John Marko	Northwestern University	Microchemical Study of DNA-protein interactions and chromosome structure
4/24/07	David Pines	UC Davis	A Tale of Two Fluids
5/1/07	Anna Swan	Boston University	Photo Physics of Carbon Nanotubes

*Chertok Memorial Lecture
**Dean Edmonds Colloquium

Condensed Matter Seminars

Date	Speaker	Affiliation	Abbreviated Title
9/8/06	Eli Barkai	Bar-Ilan	Weak Ergodicity Breaking
9/12/06	JC Seamus Davis	Cornell U.	Is the 'Hidden Electronic Order' in Cuprates neither Hidden nor Ordered
9/15/06	Ewelina Hankiewicz	U. of Missouri-Columbia	Spin transport and spin-Hall effect in 2DEG
9/22/06	Patrick Lee	MIT	Spin liquid in two dimensional organics
9/29/06	Arshad Kudrolli	Clark U.	Clustering and dynamics of granular rods, polymers and magnets
10/6/06	Andy Mackenzie	U. of St. Andrews	Formation of a nematic fluid at high fields in Sr3Ru207
10/13/06	Eunezio de Souza	Mackenzie U.	Pulse Duration vs. High Repetition Rate in Fiber Lasers*
10/20/06	Rama Bansil	Boston U.	Kinetics of Order
10/27/06	Chris Bauerle	CNRS-Grenoble	Electron Coherence in Mesoscopic Kondo Wires
11/3/06	Mark Sutton	McGill U.	Using x-ray speckle to test dynamical scaling
11/17/06	Lorenza Viola	Dartmouth College	Dynamical decoupling techniques for coherent quantum control
12/1/06	CF McConville	U. of Warwick	Indium Nitride
12/15/06	Sudip Chakravarty	UCLA	Competing ferromagnetism in high temperature copper oxide superconductors
2/2/07	Corey S. O'Hern	Yale U.	Are Mechanically Stable Hard Particle Packings Equally Likely
2/9/07	Mathias Steiner	Tubingen U.	Optical Control of Molecular Spontaneous Emission
2/15/07	Valeri Kotov	Boston U.	Quantum phase transitions beyond the dilute Bose gas limit
2/16/07	P. Sodano	U. of Perugia	Boundary Field theory approach to superconducting quantum circuits
2/22/07	Eduardo Mucciolo	U. of Central Florida	Electronics with single-molecule magnets
3/2/07	Nikolai Prokofev	UMass-Amherst	Superfluid disorder in quantum solids
3/13/07	Rahul Roy	U. of Illinois	Unconventional insulators with time reversal symmetry
3/16/07	Erwin Frey	Ludwig Maximilians U.	Roc-paper-scissors games and biodiversity
3/23/07	Wan Kyu Park	U. of Illinois	Point-contact spectroscopy of heavy-fermion superconductors and metals
4/5/07	Sean Garner	Harvard U.	Manipulating optical information with coherent matter-wave dynamics
4/6/07	Eric Weeks	Emory U.	The colloidal glass transition in tight spaces
4/13/07	Smitha Vishveshwara	U. of Illinois	Inhomogeneous Phases of Bosons in Optical Lattices
4/18/07	Chandra Varma	UC Riverside	Deriving Marginal Fermi-liquid
4/20/07	Gergely Zimanyi	UC Davis	Freezing, aging, and coarsening in long range glasses

4/25/07	Jose Andrade	UFC Fortaleza Ceara	Physics of Complex Networks
4/26/07	Dimitri Basov	U. of California	Electrostatic doping of new materials
4/27/07	Marcelo Gleiser	Dartmouth College	Oscillona: Properties and Applications
5/1/07	Misha Katsnelson	U. of Nijmegen	Graphene: new bridge
5/3/07	Philip Phillips	U. of Illinois-Urbana	Field Theory of Mottness
5/7/07	Immanuel Bloch	U. of Mainz	Exploring Quantum Matter in Artificial Crystals of Light
5/10/07	Peter Weichman	BAE Systems	Dirty bosons: 20 years later
5/17/07	Shinsei Ryu	UC Santa Barbara	Quantum transport of non-interacting 2D Dirac fermions
5/24/07	Dimitri Maslov	U. of Florida	Non-analytic behavior of Fermi liquids
6/1/07	Sergej Flach	MPIPKS-Germany	The Fermi-Pasta-Ulam Paradox

*Special Joint Seminar with the Photonics Center

Joint Theory Seminars

Date	Speaker	Affiliation	Abbreviated Title
11/8/06	Freddy Cachazo	Perimeter Institute	Twister Methods in Gauge Theory
12/6/06	Mark Wise	CalTech	Modifying the properties of the Higgs boson
3/7/07	Mithat Unsal	Stanford U.	Phases of large N QCD-like gauge theories and non-perturbative equivalences
3/28/07	Tony Gherghetta	U. of Minnesota	A Gravity Dual of Single Sector SUSY Breaking
4/18/07	Alvaro DeRujula	CERN	Gamma Ray Bursts and Cosmic Rays
5/9/07	Gia Dvali	NYU	De-gravitation

Particle Physics Seminars

Date	Speaker	Affiliation	Abbreviated Title
9/21/06	Thomas Gadfort	U. of Washington	Search for single top quark production at D0
9/27/06	Eugene Galyaev	U. of Notre Dame	Measurement of the high-pT b-jet differential cross section at sqrt(s)=1.96 Tev
3/1/07	George Gollin	U. of Illinois	The International Linear Collider

Particles and Fields Seminars

Date	Speaker	Affiliation	Abbreviated Title
9/18/06	Graham Kribs	U. of Oregon	A Universe without Weak Interaction
10/2/06	Johannes Hirn	Yale U.	Negative S parameter in Holographic Technicolor
10/10/06	Isaac Hall	U. of Oklahoma	X(3872) at D0
10/23/06	David Shih	Harvard U.	Meta-stable vacua in SQCD and MQCD
10/30/06	Tuhin Roy	Boston U.	Can we see unification at the LCH
11/9/06	Giacomo Cacciapaglia	UC Davis	A Gaugephobic Higgs
11/13/06	Itay Yavin	Princeton U.	Spin determination at the LCH
11/20/06	Kaustubh Agashe	Syracuse U.	Warped Compactifications
11/27/06	Anupama Atre	U. of Wisconsin-Madison	The search for majorana neutrinos
12/4/06	Maxim Perelstein	Cornell U.	Littlest Higgs Model with T Parity
12/11/06	David Tucker-Smith	Williams College	Using jet mass to find vector quarks at the LCH
12/14/06	Brian Feldstein	UC Berkeley	Landscape predictions for the Higgs Boson and Top Quark Masses
1/29/07	Ron Babich	Boston U.	Diquark correlations in baryons on the lattice

2/5/07	Gabriella Sciolla	MIT	Searching for New Physics in B decays at BaBar
2/26/07	Hong Liu	MIT	String, black holes and heavy ion collisions
3/5/07	Natalia del Toro	Harvard U.	MARMOSET
3/26/07	Michael Peskin	Stanford U.	Event generation with Twistors
4/5/07	Harald Fritzsch	LM University-Munich	Fundamental Constants in Physics
4/9/07	Dam Thon Son	U. of Washington	Graphene as a Lorentz-breaking defect quantum field theory
4/11/07	Jennifer Raaf	Boston U.	Results from Mini-BooNE
4/18/07	Andreas Karch	Washington U.	Transport properties of the hot N=4 plasma
4/26/07	Ayana Holloway	Lawrence Berkeley Lab	Getting over the top
4/30/07	Thomas Gregoire	Boston U.	Composite gluinos at the LCH
5/7/07	Devin Walker	UC Berkeley	Using top quarks to discern new physics at the LCH
5/14/07	Eduardo Ponton	Columbia U.	Precision constraints of warped scenarios with custodial protection
5/17/07	Yasunori Nomura	UC Berkeley	Simplified Gauge Mediation
5/21/07	Jay Wacker	Stanford U.	New searches for subgravitational forces
5/24/07	Gilad Perez	Stony Brook U.	

Other Seminars

Date	Speaker	Affiliation	Abbreviated Title
10/12/06	Pierre-Gilles de Gennes	Institute Curie, Paris	Neural Growth via self organization of axons
10/16/06	Michio Tokuyama	Tohoku U.-Japan	Mean-field theory of glass transitions
12/8/06	Clemens Heske	U. of Nevada, Las Vegas	How to reveal the chemical and electronic properties of interfaces, buried layers, and liquids with soft x-ray spectroscopy
12/8/06	Tom Powers	Brown U.	Life at low Reynolds number revisited
1/26/07	BI Shklovskii	U. of Minnesota	Ion transport in biological ion channels and silicon nanopores
2/1/07	Oleg Sushkov	U. of New South Wales	Spirals in the t-J model and structure of the Spin-Glass State of Ls(2-x)SrxCu04
2/23/07	Gabriel Popescu	MIT	Nanoscale cell membrane fluctuations
3/5/07	John Stachel	Boston U.	Einstein's Odyssey
3/23/07	Gregg Jaeger	Boston U.	Decoherence, entanglement and foundations of quantum mechanics
3/28/07	V. Berezinsky	Laboratori Nazionali del Gran Sasso	Ultra high energy cosmic rays: from puzzle to solution

4. Grant Awards

Faculty in the Physics Department continue to conduct active research programs, despite an unfavorable funding climate caused by the decline in non-defense federal research funding since 2004 and the shift of federal R&D resources to biomedical research beginning around 2000. We were awarded $9,844,200 this past fiscal year, including funding by PIs within the department yet counted solely through another unit.

The table below shows data compiled by the Office of Sponsored Programs on number and amount of applications and awards in the Physics Department and the Center for Polymer Studies in the years 2003-2007.

SUMMARY OF GRANT AND CONTRACT ACTIVITY
PHYSICS

	FY2003		FY2004		FY2005		FY2006		FY2007	
	No.	**Amount**	**No.**	**Amount**	**No.**	**Amount**	**No.**	**Amount**	**No.**	**Amount**
Applications	53	16,353,115	46	32,123,637	55	29,295,990	43	14,328,486	51	18,449,880
Awards	49	7,846,984	45	8,715,547	37	5,132,353	35	5,107,638	39	5,585,611

SUMMARY OF GRANT AND CONTRACT ACTIVITY
CENTER FOR POLYMER STUDIES

Applications	20	7,707,631	27	27,298,703	12	2,680,011	7	4,210,806	5	442,195
Awards	17	2,618,546	14	1,972,897	10	729,468	9	1,207,604	11	1,173,355

6. Plans for Lawrence R. Sulak Common Room