# *PHYSICS DEPARTMENT*
# *OF*
# *THE UNIVERSITY OF TEXAS AT DALLAS*

## SELF-STUDY REPORT
## SPRING 2007

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# EXECUTIVE SUMMARY

The Physics Department of the University of Texas at Dallas is an important unit in UT Dallas's strive to achieve the status of a tier 1 research university.

Since last program review was conducted, the UT Dallas Physics Department has made significant progress. World class faculty have been recruited who have broadened our research base into new areas such as nano-materials physics and astrophysics; faculty research funding levels are among the highest in the University; steady growth of graduate enrollment in light of fierce competition and the addition of the Masters Program in Applied Physics; healthy growth in the undergraduate program; active faculty participation in the assessment of degree programs, faculty hires and curriculum development; significant increase in the course offerings by physics faculty. New administrative staff was added to improve the Department's business operation and to bring the Department into compliance with increasingly complex policies and business procedures. New faculty are playing critical roles in all aspects of the Department. Our faculty members are sought after for invited talks around the globe.

Despite these accomplishments, there are issues that have not been fully addressed and consequently hinder the Department's ability to flourish. We list here the most crucial issues and show how we will address them:

- The fragmentation of the Department into multiple locales has seriously reduced the ability of the faculty to collaborate and communicate amongst ourselves and with students. To enhance faculty morale, to attract and retain top students, and to maintain the synergy of the Department, a centrally located physics building is strongly requested where all teaching faculty will be located.
- We are understaffed with regard to teaching assistants. We recommend strongly adding 50% more teaching assistants over the next three years.

- The effective size of the faculty is small and the faculty carry heavy teaching load and added administrative duties; the result is that core research areas are under critical mass and elective course offerings are limited. We will continue to work with UTD administration to expand the size of the Physics faculty by hiring the best scientists.
- Our ability to attract and retain talented graduate students is hampered by the low stipend relative to other universities, limited tuition coverage, and by the unnecessary administrative procedure which adds uncertainty and causes delay in making an offer generally resulting in the student accepting an offer elsewhere. We will work with UTD administrators to put forward competitive TA and RA packages and streamline the operation procedure so to reduce delays in paper work.
- Physics is an experimental science and a graduate student, whether experimentally or theoretically inclined, needs to experience a range of modern physics experiments before embarking on a dissertation specialty. We seek to obtain funding and space for a graduate teaching laboratory..

# 1.0 Strategic Plan for the Physics Department

### The Physics Department at the University of Texas at Dallas, 2006-16

## Mission

The Physics Department of the University of Texas at Dallas strives to achieve national ranking in the top 50 public universities within the next decade. This will be accomplished by development and expansion of research thrusts that both capitalize on present strengths and enhance strong interdisciplinarity.

## Current Status

The Department of Physics has 18 tenure or tenure-track faculty appointments. Collectively the Physics faculty received about $4.3M in external funding in 2004 and generated 81 reviewed publications. Currently 86 undergraduate students are enrolled in the physics BS, BA degree program and 76 graduate students are pursuing physics MS, MSAP (Master of Science in Applied Physics) and Ph.D. degrees.

## Strategies for the Future

The Physics Department at UT Dallas will play an important role in UTD's ascendancy to a nationally recognized research institution over the next decade. Its contributions will derive from efforts within the department, through interactions with other units of the university, and through greatly enhanced connectivity with UT Southwestern (UTSW) as well as other major Texas universities. The underlying strategy requires significant growth in research-active faculty, graduate student numbers, contracts & grants, and the addition of modern teaching and research facilities. A key factor will be interdisciplinary research thrusts growing out of present areas of strength. Growth and resources will be focused in several targeted areas including modern materials and instrumentation, space exploration, computational and applied physics areas, and astrophysics and elementary particle physics.

The Physics Department plans to grow the faculty appointment to 30 by 2016, strengthen the current strong areas, initiate new research directions, and broaden the degree and teaching programs within the MSAP and Ph.D. tracks.

Enrollments of undergraduate physics majors and graduate students, together with the demands for introductory physics courses are steadily increasing. The department's emphasis will be on growing the MSAP and Ph.D. programs, and would like to target a total graduate enrollment of 100 by 2010, and 150 by 2015. To achieve these goals we must bring in top faculty whose research areas are attractive to students, and who are well funded to provide Research Assistantships. We will extend our graduate course offerings, increase significantly student recruitment activities, and optimize the physics graduate curriculum. These efforts have already started in the Physics Department.

The proposed growth for the Physics department will require at least 95,000 sq. ft. of floor space for research laboratories.

In order to provide adequate support for our teaching program, particularly the service courses, it is important that the School makes available additional TA slots for Physics at a ratio of 1:1 between TA and RA in order to carry out the aggressive targets set forth here.

Our current strength areas are**:** Space Sciences, Quantum Electronics, Nano/material Physics and High Energy Physics. We plan to maintain strength in High Energy Physics, further strengthen Space Sciences by faculty

additions in solar physics and bio-space physics, grow significantly in nano/material physics by strategic hires of faculty who will collaborate with Electrical Engineering, Biology, and Chemistry, and initiate new areas that include Applied Computational Physics, Medical Imaging and Visualization with faculty hires who will collaborate with UT Southwestern Medical Center, Computer Science, School of Management, Biology, Geosciences and Chemistry. We expect these hires will be a mix of junior and senior appointments with an appropriate number of chaired positions.

Areas needing strengthening to reach critical mass include High Energy Physics. The intellectual contributions of HEP since the last review have rivaled anything produced by this department, arguably anything in the university. The discovery of the Y(4260) is extensively cited, and has received much public attention, including but not limited to the Discovery Magazine "Top 50 Discoveries in 2005". UTD HEP is at the forefront of high performance computing on the UTD campus. HEP pioneered the building of multi-node Linux farms, and we continue to be a leading proponent. We will shortly be the first major users of GRID computing technology on campus.

UTD HEP has just joined Atlas experiment, which will keep us at the leading edge of discovery physics for the next 15 years. However, we are having difficulties that we haven't faced before because the physical and intellectual center of the experiment is in Europe, not California. We are encountering operational difficulties because at times, neither faculty (Izen and Lou) are free to travel to Europe during a semester due to teaching and administrative obligations. We do not have the manpower to participate in Atlas Upgrade activities that are now beginning. In a well-rounded HEP group, as in a space science group, there is expertise in both physics analysis and experiment building. We have been extremely successful in analysis, but we have no in-house hardware activity.

The case for completing the HEP group is compelling that we diminish ourselves and loose credibility if we do not make it. Hiring of an established HEP physicist with strong instrumentation experience will significantly strengthen the group.

# 2. Faculty

## *SUMMARY*

| Faculty Name | Area | Title | Office/Department | Extension | E-mail Address |
|---|---|---|---|---|---|
| Anderson, Phillip | Space Sciences | Associate Professor (untenured) | FO2.708D / WT2.716 | 2875 | phillip.anderson1@ |
| Chaney, Roy | Solid Sates | Professor | FO2.724B | 2887 | chaneyr@ |
| Collins, Carl | Quantum Electronics | Center Director/Professor | NB1.106 | 2864 | cbc@ |
| Kyeongjae Cho | Computational Material Sciences | Associate Professor | FO2.322 | 2845 | kjcho@ |
| Cunningham, Austin | Spectroscopy | Graduate Dean/Professor | FO2.716B / FN3.218 | 2879 | cunning@ |
| Earle, Gregory | Space Sciences | Professor | FO2.314A / WT1.720 | 6828 | earle@ |
| Fenyves, Ervin | Nuclear & Neutrino Physics | Professor | FO2.704D | 2971 | ezbd@ |
| Gartstein, Yuri | PHYS | Associate Professor (untenured) | FO2.314B | 2834 | yuri.gartstein@ |
| Glosser, Robert | Solid Sates | Professor | FO2.724C | 2876 | glosser@ |
| Heelis, Roderick | Space Sciences | Center Director/Professor | FO2.704C / WT1.702 | 2822 | heelis@ |
| Hoffman, John | Space Sciences | Associate Dean UGE/Professor | FO2.322C | 2846 | jhoffman@ |
| Ishak-Boushaki, Mustapha | Astrophysics | Assistant Professor (untenured) | FO2.322B | 2815 | mishak@ |
| Izen, Joseph | Particle Physics | Professor | FO2.704C / WT2.602 | 2598 | joe@ |
| Lou, Xinchou | Particle Physics | Department Head/Professor | FO2.304B / WT2.106 | 6409 | xinchou@ |
| MacAlevey, Paul | Teaching | Senior Lecturer II | FO2.708B | 4634 | paulmac@ |
| Rasmussen, Beatrice | Teaching | Senior Lecturer I | FO2.708A | 2842 | bearas@ |
| Rindler, Wolfgang | Cosmology & Astrophysics | Professor | FO2.716A | 2880 | rindler@ |

| | | | | | |
|---|---|---|---|---|---|
| Tinsley, Brian | Space Sciences | Professor | FO2.708C / WT2.802 | 2838 | tinsley@ |
| Wallace, Robert | Material Sciences | Professor | **EN 3.614** | 6638 | rmwallace@ |
| Zakhidov, Anvar | Nano-material | Professor | BE2.312 | 6218 | zakhidov@ |

**Physics faculty who are also UTD senior administrators –**

| | |
|---|---|
| **Austin Cunningham** | **Graduate Dean** |
| **Da Hsuan Feng** | **VP for Research** |
| **Myron Salamon** | **SNM Dean** |
| **Bryan H. Wildenthal** | **Provost & Exc. VP** |

# Faculty Search for FY08

**Below we present, in summary form, our basic approach to future Physics Department faculty hires. Much of this is an outcome of our most recent Faculty Retreat**

- Assistant professor in nano/material with application in biology/energy –
  **lean on the institutional support of UTD Nano Inst.**
  **fits the growth plan and demographics need of Physics**
  **Search in progress**

- Assistant professor in medical physics (imaging) –
  **add/strengthen UTD Applied Physics MS program**
  **collaborate with UTSW faculty/staff**
  **using UTSW Medical Imaging Facility (Dir: Dean Sherry)**

- Opportunity hire –
  **woman, minority, or**
  **mid-career senior/established scientist**

## Physics 2006 Retreat

| Physics: Areas of Research/Education-- Recommended Growth | | | | | | |
|---|---|---|---|---|---|---|
| Research | funding | New Degree Plans | Creativity | Student Mix | Interdisciplinary Thrust areas | Education |
| Nano-material Physics | good | none. | excellent | EE, Chemistry | yes | good prospect |
| Space Sciences (hardware, GIS) | excellent | none. | excellent | EE, GIS | yes | good prospect |
| Applied Computational Physics | good | Ph. D. | new | EE, CS | yes | good prospect |
| Bio-medical Physics | excellent | Ph.D. certificate | new | EE,CS,UTSW | yes | good prospect |

# Current Faculty

**Phillip C. Anderson**

*Associate Professor of Physics*

Phillip Anderson received his Ph.D. from UTD after which received a National Research Council Postdoctoral Fellowship and spent 2 years at Goddard Space Flight Center in Laurel. MD followed by 11 years at the Aerospace Corporation in Los Angeles, CA. In 2004 he returned to UTD where he joined the Physics faculty and the W. B. Hanson Center for Space Sciences. He is the author or co-author of over 40 publications in peer-reviewed journals, seven since arriving at UTD, and numerous articles in conference proceedings and technical reports. Two of his papers were featured on the cover of Geophysical Research Letters, he has received NASA group achievement awards, and is a member of NASA's Geospace Missions Operations Working Group, an advisory panel to the Science Mission Directorate. He has given numerous invited talks and seminars, six since arriving at UTD, organized conferences, and participated in several outreach programs with local public schools such as organization of science nights and the Seeds in Space program. In this program, plant seeds were flown on rockets launched into space thought the aurora borealis, recovered, grown by elementary school students, and compared with seeds kept on the ground. He has participated in numerous satellite projects including NASA's DE-2, Polar, TIMED spacecraft and the International Space Station, and the Air Force DMSP, GPS, SSTS, and PicoSAT spacecraft and is considered the world's expert on spacecraft charging in low-Earth orbit and the subauroral ion drift phenomena. His work on spacecraft charging was instrumental to changes in the rules for astronaut EVA activities on the space station. He has had numerous successful proposals, three since arriving at UTD, and is currently supporting one Ph. D. candidate as a Research Assistant.

**Roy Chaney**

*Professor of Physics*

Space Science
October 2001-September 2002 – Mars Instrument Program (Jet Propulsion Laboratory)
Responsible for the software development for a prototype mass spectrometer to study evolved gas from mars dirt samples.
Fall 2003-September 2006 – Phoenix Project (Jet Propulsion Laboratory) Lead software developer for the mass spectrometer for the evolved gas analyzer on the 2007 Mars Lander experiment.
2003-2006 – Software development on Tether project to generate artificial gravity in space.
2005-2006 – Lunar Volatile Evolved Gas Analyzer (LVEGA) Johnson Space Center – software development for a laboratory mass spectrometer prototype.

Medical Instrumentation
1/30/2003 – Present – subcontract through The University of Texas Southwestern Medical School from Alcon Industries, for collaboration with Dr. Fred Tibbals (UTSW) on the development of a tonometer for monitoring the eye pressure in laboratory animals

Students Mentored
Olga Vassilieva – PhD - 1999

Papers and Patents

1. "Gamma Ray Imaging Using A Cadmium Zinc Telluride Crystal And Micro-Channel Plates", Roy C Chaney, J. Estera, T. Sinor, and K. Passmore, IEEE - Transactions on Nuclear Science, Fall (1996) .
2. "Simulation of Physics Laboratory Experiments Using LabView", Roy C. Chaney and Austin J. Cunningham, Proceedings of National Instruments Conference NIWEEK 97 (August 1997).
3. "Position-Sensitive Electromagnetic Radiation Detectors", Roy C. Chaney, and Hilton D. Hammack - Patent awarded to UT System February 1998.
4. "Method for reducing background artifacts from image in SPECT with uniformly redundant array (URA) coded aperture", Olga Vassilieva and Roy C. Chaney, to appear in March 2002 issue of Journal of Applied Optics.
5. "Method and System for Reducing Background Artifacts from Uniformly Redundant Array Collimators in Single Photon Emission Computed Tomography", Roy C. Chaney and Olga Vassilieva – Patent awarded to UT System 2003.

**Kyeongjae (KJ) Cho** (joined UTD in 2006)

*Associate Professor of Physics*

PROFESSOR KYEONGJAE (KJ) CHO's research and teaching area is computational materials science using atomistic and quantum simulations to investigate the structure-property relationship of nanoscale material systems. His research is developing a fundamental theoretical framework to study nanoscale materials as well as applying the newly developed methods to study diverse nanomaterial applications including nanoelectronics and renewable energy technology. Atomic structure optimization is one of the most fundamental problems in nanomaterials science and technology since the atomic structures of nanomaterials are not fully understood yet. He has been developing a universal inter-atomic potential method which can model major solid state nanomaterials including metallic, ionic, and covalent bonding solids. He has also developed a universal tight-binding method which can provide electronic structures of nanomaterials at given atomic structures. His research has been using the first principles quantum simulation method (density functional theory) to investigate nanomaterials with full microscopic details and accuracy. He has applied these simulations methods to study high-k gate stack systems, semiconductor surfaces, carbon nanotubes, silicon nanowires, and metal nanoparticles. These nanomaterials are closely related to micro/nano electronics and renewable energy applications as basic material building blocks. He has supervised 11 doctoral students and 10 postdoctoral associates for their research in nanomaterials modeling. 8 doctoral students have completed their PhD's at Stanford University by June 2006. He has published 78 journal articles and 19 conference papers in computational materials science, and he owns 6 US patents.

**Carl B. Collins**

*Professor of Physics*

Faculty Highlights (1996-2006)
Reviewed publications – 33
PhD's supervised – 3

Conferences and Professional organization:

| | |
|---|---|
| 1997-1998 | Chairperson of the Texas Section of the American Physical Society. |
| 1997 | Chaired the Organizing Committee for the First International Induced Gamma Emission Workshop (IGE'97, Predeal, Romania, August 16-20, 1997) sponsored by the USAF Office of Scientific Research. This started an annual AFOSR workshop that continued 9 years until 2006. |
| 2000 | Chairperson Atomic, Molecular, Optical, and Laser (AMOL) Panel for Awards by the US Civilian Research and Development Foundation for the Independent States of the Former Soviet Union (CRDF). |

Funding (2001-2006) External support of $2,115,000 was awarded and received from DOD agencies.

**Austin Cunningham**

*Professor of Physics, Graduate Dean*

Professor Cunningham's research is directed towards a detailed understanding of the collisions and interactions of ions with atoms and molecules, and electrons and photons in a wide variety of plasma environments. Included are studies of (a) reactions of excited states in plasma etching environments, (b) growth and stability of cluster ions at low temperature, (c) ultraviolet spectroscopy of multiply-charged ions and (d) reactions of ions and electrons at elevated temperatures. Facilities used in support of this work include optical spectrometers, high voltage discharge cells, pulsed and continuous lasers, computer-controlled fast data acquisition systems, and magnetic sector mass spectrometers. Such capabilities allow detailed examination and adjustment of the plasma environments of interest and simulation of such weakly ionized plasmas as found in the ionospheres of planets, laser discharges and fusion plasmas. Primary areas of teaching are in Modem Physics, Atomic and Molecular Processes, Atomic and Molecular spectroscopy and Physical Measurements.

**Gregory D. Earle**

*Professor of Physics*

Gregory D. Earle joined the UT Dallas physics department in January of 1996 as an assistant professor. He was promoted to associate professor in 2001, and became a full professor in 2006. In 2005 he became an affiliated professor of electrical engineering, where he regularly serves on student committees. Since coming to UTD he has co-authored one book on high frequency communication systems, and authored over 30 papers in refereed journals. He has regularly contributed papers and posters at conferences sponsored by the National Science Foundation and the American Geophysical Union, and has given approximately six invited lectures. He regularly serves on NASA and NSF advisory panels and proposal review committees, and has chaired these committee efforts three times. His research activities have concentrated on mid- and low-latitude ionospheric dynamics, and on the development of new instrument technologies for satellite and rocket-borne experiments. These research activities have garnered over $3 million in principal investigator funding during his tenure at UTD. Professor Earle has graduated two doctoral students and five MS students, and has served on the graduate committees of 24 others. He currently mentors one post-doctoral research associate and four graduate students. His university service has included membership in the academic senate, the distance learning

committee, the athletic advisory committee, and the committee on educational policy. Within the physics department he has served on the graduate and undergraduate curriculum committees, the admissions committee, and the SACS committee. He has served as the faculty sponsor of the society of physics students and the UTD gun club, and played a major role in developing the program for the MS degree in Applied Physics (MSAP). He currently serves as the academic advisor to all active students in the MSAP program. In addition, he is presently the co-chair of the graduate curriculum committee, which oversees and implements changes to the graduate physics program.

**Ervin Fenyves**

Professor of Physics

Ervin J Fenyves was in the last five years with his graduate and undergraduate students mainly involved in the following projects:

1. Design and development of large area very sensitive neutron detectors for astrophysical experiments such as OMNIS { Observatory for Multi-Flavor Neutrinos from Supernovae }, and for the the development of a Very Sensitive Detector of Nuclear Fission Explosives and Nuclear Bombs in collaboration with UCLA.
2. Preparation of the NOvA Project, a $ 200 million proposal for DOE to build a 20 kton Detector to study muon-neutrino oscillations into electron-neutrinos, together with 19 other universities and scientific institutions under the the direction of Fermilab.

**Yuri Gartstein**

Associate Professor of Physics

Yuri Gartstein joined UTD in the summer 2003 as an Associate Professor after several years at Xerox Wilson Center of R&T. His research interests concentrate around the theory of electronic, transport and optical properties of various novel materials, particularly at the nanoscale. Projects Yuri has been working on have already resulted in 9 research papers (incl. submitted) and 2 review articles (in a book and in a special Journal issue). One of these research papers was selected as an “Editor's choice” in *Science* magazine. Yuri also served a guest co-editor of a special issue of *Synthetic Metals*. Yuri participated in several funded projects as a team member and has recently received, as a PI, a grant of $150K for research on spectroscopy of carbon nanotubes. Yuri has been engaged in mentoring research of 4 undergraduate and 2 graduate students. Yuri has developed and been teaching 2 graduate core courses (“Statistical Physics” and “Quantum Mechanics II”) and 2 undergraduate core courses (“Electromagnetism and Waves” and “Modern Physics II”) that received very positive students’ responses. At the University level, Yuri served as a co-Chairman of two International Conferences supported by UTD and is now a member of the UTD Advisory Committee on Research; he also served twice as an external chair of the dissertation committees. At the Departmental level, Yuri serves as a chairman of the Physics Colloquium committee and as a member of the undergraduate and graduate curriculum committees. He has also been involved in a new faculty search and served as a member of several graduate student dissertation committees. While at UTD, Yuri has reviewed about a dozen papers at the request of physics and nanoscience Journals.

**Robert Glosser**

*Professor of Physics*

Robert Glosser has worked in the area of optical properties of solids since 1967. Dr. Glosser received his Ph.D. and M.S. from the University of Chicago and his S.B. from MIT. Following his graduate work, he spent 2 years at Michelson Lab in China Lake, California and then was a Lecturer at the University of California, Santa Barbara. He then became an Assistant Professor at the University of Maryland and in 1975 came to the University of Texas at Dallas as an Associate Professor. He has mentored 25 students to their Ph.D. during his academic career.

The experimental solid-state physics at UTD is primarily concerned with optical properties of solids. We have a variety of techniques available including micro-Raman and micro-photoluminescence. There are three modulation spectroscopy apparatuses that give spectral coverage from the mid infrared through the vacuum ultraviolet. These are used to uncover the fundamental electronic and vibrational properties of solids. Materials studied recently include InGaSb, AlGaN, as well as other III-V compounds and alloys. In addition, we have studied the semiconducting silicides including $FeSi_2$, $OsSi_2$ and $Ru_2Si_3$. These research opportunities provide the student with hands-on experience in a variety of techniques including optical, vacuum, electronic, low-temperature and machine shop techniques. Since 1975, this activity has provided many Ph.D. dissertation research topics from which students have gone on to positions in industry, academia and government laboratories.

**Rod Heelis**

*Cecil and Ida Green Honors Professor of Physics, Director of William B. Hanson Center for Space Sciences*

Over the past ten years Heelis has pursued an extensive research program in ionospheric electrodynamics. This program involves the development of computational models and the design and implementation of space-based experiments to investigate how the interaction of the planet with the interplanetary medium affects the distribution of charged particles in the near-Earth space environment. This work has been undertaken with support from the National Science Foundation, the National Aeronautics and Space Administration and the Department of Defense. In addition international collaborations have allowed him to play a leading role in the first satellite program undertaken by the National Space Program Office of Taiwan. Over the past 10 years his work has been supported by external contract and grant funding that exceeds $13M. During that time he has published 60 papers in refereed journals and supervised 8 PhD students. In addition to this fundamental research work Heelis has also been involved in space science education and advocacy at national and international levels. He has contributed to NSF sponsored schools with tutorial lectures in ionospheric electrodynamics and ionosphere-magnetosphere coupling. He has also contributed to lecture series in international summer schools held in the USA and Italy. At the advisory committee level Heelis has served as a member NASA Solar-Connections Advisory Subcommittee, the NSF CEDAR Science Steering Committee, the NASA Strategic Planning Roadmap Committee, and the AGU Student Awards Committee. Most recently he served as a member of National Research Council Space Science Decadal Survey Committee and the NASA Space Science Advisory Committee. In 2006 he was elected as a fellow of the American Geophysical Union and invited to give the prestigious Nicolet lecture to the general AGU assembly. He presently serves as Associate Editor, for the Journal of Geophysical Research.

**John Hoffman**

*Professor of Physics*

This review covers the period from 1997 to 2006. During this time, Professor Hoffman held the position of first, Physics Department Head and College Master, then Associate Dean for Undergraduate Education in the School of Natural Sciences and Mathematics. He resigned as Department Head in 2001 and continued as Associate Dean. He taught courses during 1997 to 2003. Then in 2004, 2005 and through the summer of 2006, worked half time on a NASA research contract involving an instrument for a flight to Mars in Summer 2007.

Research
Dr. Hoffman worked on two major research areas during the review period.
The first is instrumentation development for planetary atmosphere abundance and isotopic ratio studies, and with the employment of small ovens to heat and pyrolyze regolith and icy surface materials to study the evolved gases from melting and decomposition to determine mineralogy of the solid materials and to measure the isotopic ratios of carbon, oxygen, hydrogen and the noble gases. These studies resulted in a contract in 2004 to design and construct a mass spectrometer evolved gas analyzer for the NASA Phoenix mission scheduled to be flown to Mars in August 2007. The instrument has been built and delivered to the University of Arizona (prime contractor for the Phoenix mission) and is undergoing final preparation for delivery to the spacecraft contractor.

The second major project is the development of a tethered satellite system that can produce artificial gravity in orbit or in space by spinning two equal end-masses about their center of mass. At a separation of 1 to 2 km, the spinning produces a "g" force on the end masses. This spin-up maneuver is a demonstration of a method of developing "artificial gravity" in a spacecraft that could be used by humans traveling to other planets in the solar system.

His research has been funded by 14 contracts during this review period totaling about $6.1 million.

**Mustapha Ishak-Boushaki**.

*Assistant Professor of Physics* (joined UT Dallas in 2005):

**1. Number of invited talks (since 2005):** Ishak-Boushaki gave 11 seminars and colloquia at locations including NASA Goddard Flight Center, the Johns Hopkins University, Princeton University, University of Texas at Austin, and The Ohio State University.
**2. Number of refereed papers (since 2005):** Ishak-Boushaki published 3 referred papers in Physical Review D and 2 refereed papers in the Monthly Notices of the Royal Astronomy Society and submitted 3 additional papers.
**3. Grant and contract funding (since 2005):** Ishak-Boushaki received in 2006 a Hoblitzelle Grant of $56,369 to build a computer cluster for calculations in cosmology, relativity and astrophysics. The period of the activity is the academic year 2006-2007. He also received in 2006 a Clark Summer Mentor Award of $1000.
**4.Numbers of Ph.D. students mentored:** Ishak-Boushaki mentored 3 full-time Ph.D. students and 2 part-time Ph.D. students.
**5. Accomplishments and/or innovations in teaching:** Ishak-Boushaki designed a new course in cosmology that he offered in spring 2006 (PHYS5V49 Contemporary Cosmology). The course is designed for graduate students and advanced under-graduate students and has a special strong emphasis on current research in cosmology. A large number of 22 graduate students and 6 undergraduates registered to the course in Spring 2006. The evaluations of the course were very good (i.e. 4.5/5.0 and 4.9/5.0) and the course will be offered each year.

**6. Service (internal and external) activities including outreach:** Ishak-Boushaki served in the committee on undergraduate curriculum and education and is the chair of the standard exit test evaluation committee for the Physics Department. He also joined the committee of graduate students' recruitment. Ishak-Boushaki refereed articles for Physical Review Letters, Physical Review D, Astronomy & Astrophysics, and Classical and Quantum Gravity Journals. Served on a review panel for the National Science Foundation. Served on NASA postdoctoral fellowship review panel. Ishak-Boushaki involved 4 undergraduate students and 1 high school student in research activities. He participated in rejuvenating the North Texas seminar in Relativity and Cosmology attended by faculty, students and researchers from a number of neighboring institutions. His recent results published in Physical Review D, 74, 043513 (2006) were subject of an invited press release and an invited interview by the Astronomy Magazine. The results were broadly disseminated in Astronomy Magazine, SPACEDAILY, Spaceflight Now, and NASA Beyond Einstein web site, thus outreaching the general public. Also, Ishak-Boushaki led the effort of preparing and coordinating an information both about UT Dallas Physics program at the 2006 April meeting of the American Physical Society, held in Dallas. In 2006 Ishak-Boushaki brought to UT Dallas, Dr. Nicholas White, Director of the Exploring the Universe Division of NASA Goddard Center, to offer a public lecture about NASA future plans for the exploration of the Universe.
**7. Astrophysics & Cosmology Group:** Ishak-Boushaki has been actively working on building a research group in Astrophysics & Cosmology at UTD and things have been going very well. The group meets weekly to discuss the progress on research projects and include two professors (Ishak-Boushaki and Rindler), 3 full-time Ph.D. students (Jacob Moldenhauer, Delilah Whittington, James Richardson), 6 part-time graduate students (Jeffrey Scott, Brian Troup, David Garred, Christopher Allison, Anthony Nwankwo, Kenneth Scadden) and 2 undergraduate students**.**

**Joseph M. Izen**

*Professor of Physics*

**Date** February, 2007
**Name** Joseph M. Izen, Professor of Physics
**Born** November 14, 1956 in Brooklyn, New York

**Education**

The Cooper Union, B.S. in Physics and Mathematics, *Summa Cum Laude*, June 1977
Harvard University, A.M. in Physics, June 1978
Harvard University, Ph.D. in Physics, June 1982
Ph.D. Advisor: Francis M. Pipkin
Postdoctoral Mentor: Sau Lan Wu, University of Wisconsin at Madison

**Experience**

Research Assistant, Harvard University, 1977-1982
Project Associate, University of Wisconsin at Madison, 1982-1985
Assistant Professor of Physics, University of Illinois at Urbana-Champaign,1986-1991
Assistant Professor of Physics, University of Texas at Dallas, 1991-1994

Visiting Associate Professor of Physics, Colorado State University, 1994-1997
Associate Professor of Physics, University of Texas at Dallas, 1994-1999
Professor of Physics, University of Texas at Dallas, 1999-present

**Honors**

Henri D. Dickinson Fund Prize, best record of B.S. recipients, Cooper Union, 1977
Cooper Union Alumni Assoc. Award, 1977
Eli Lilly Teaching Fellow, 1987-1988
National Science Foundation – Center for Global Partnership Fellow, 1997-1998

Dr. Izen specializes in collider physics and the physics of heavy quark flavors. He is Principal Investigator of a Dep't. of Energy High Energy Physics grant and has attracted more than $3,000,000 in external funding since 1992. Currently, he collaborates on the Altas experiment at CERN and the *BABAR* experiment at the Stanford Linear Accelerator Center. Atlas will explore the origin of mass and search for physics beyond the standard model at the world's highest energy proton-proton collisions. His interest on *BABAR* is the study of use charmonia, charm, and exotic particles in the energy region from charm threshold to the $\Upsilon(4S)$ using the radiative return from the $\Upsilon(4S)$ and *B* meson decays. He was co-principal author of the Y(4260) discovery paper. Izen and his group have built large Unix farms for production computing and analysis. In the past he collaborated on the Cleo, Tasso, Aleph, Mark III, SLD, SDC, and BES experiments, and he served as the US BES Spokesperson from 1996–1997. He has graduated 5 Ph.D. students, and he currently advises one Ph.D. candidate. Izen currently teaches Quantum Mechanics I (undergraduate), Quantum Mechanics I (graduate), and Honors Physics I (Mechanics and Heat). In the past he has taught the undergraduate courses Mechanics and Heat, Mechanics and Heat Lab, Electricity and Magnetism, Electricity and Magnetism Lab, Contemporary Physics (Optics, Relativity, Pre-Quantum), Optics and Analog Electronics. He's also taught graduate courses in Elementary Particle Physics, *CP* Violation, $e^+e^-$ Physics and Accelerator Physics. He chairs the Physics Undergraduate Curriculum Committee, and is a member of the Physics Graduate Curriculum Committee, the Information Resources Advisory Committee, and the Distance Learning Committee and he is faculty advisor to Comet Hockey Team and co-advisor to Women in Physics.

**Xinchou Lou**

*Professor of Physics; Head, Department of Physics*

Research

XinChou Lou specializes in heavy flavor physics at $e^+e^-$ colliders, high performance computing (HPC) and Monte Carlo simulation. Lou and co-workers recently confirmed Belle's discovery of double charm events (**Phys.Rev.D72:031101,2005**). Lou worked with colleagues and finalized the discovery of the Y(4260) (**Phys.Rev.Lett.95:142001,2005**) the Y(4360) (**submitted to PRL**) structures using the ISR technique that he has developed. His direct observation of initial state radiation $\psi$ signal was among the first physics results from the *BABAR* experiment (**Int.J.Mod.Phys.A16S1B:486-488,2001**). During 1998 – 2000 he was the US physics analysis coordinator of the BES international experiment studying the tau and charm physics. He has designed, built and

upgraded high performance computing systems at UTD for *BABAR* research. He has published several BES papers investigating QED, hybrid states, and D decays. His analyses of OPAL data were among the first to provide evidences for the existence of b baryons and of the $B_S^0$ meson and led to the first measurement of the $B_s^0$ lifetime. He coordinated the OPAL exclusive B physics working group during 1992-1993. On OPAL he also investigated $B_S^0 \overline{B}_S^0$ oscillation, b baryon lifetime and worked on the design and implementation of the SHIFT distributed computing and data farm. Briefly on Mark II he did the parallel analysis of the first measurement of $Z \to b\overline{b}$ that was published in Phys. Rev. Lett.

In September 2006 Lou joined the Atlas experiment at the European Lab for Particle Physics (CERN). The Atlas detector will be operated at the Large Hadron Collider which will be colliding 14 TeV protons to explore new physics, beginning in 2008.

Teaching and Administration

Lou regularly teaches undergraduate and graduate courses at UTD. He has developed eight new courses since 1994 and contributed to the physics curriculum development. Between 2000-2004 Lou served four terms on the national *College Board SAT II Physics Committee*. Lou became the head of UTD Physics Department in August 2004.

**Paul Macalevey**

*Senior Lecturer*

I have written (or been involved in the writing) of four refereed papers. (References are in my CV). I have written and continue to update a "Laboratory Manual for Physics II" (2006) that is used by the University of Texas at Dallas. I mentored two Ph.D. students. In my teaching of introductory Physics, I use some the ideas of Eric Mazur (and other educational researchers) to enhance the learning environment for students. I serve on the committees for undergraduate curriculum and for SACS.

**Beatrice Rasmussen**

*Senior Lecturer*

I am in the process of updating the "Laboratory Manual for Physics I" that is used by the University of Texas at Dallas. One thing I hope to do is include more appropriate labs for the biosciences majors. In my teaching of introductory Physics, I believe in a complete introduction to the basic physical concepts and utilizing these concepts in problem solving strategies. I am also continuing to work on integrating computer based teaching strategies with my courses including online homework and WebCT quizzes. I serve on the committees for undergraduate curriculum and for SACS as well as the Faculty Senate for 2006-7 academic year. I have also been involved in the AP Readings for Physics.

**Wolfgang Rindler**

*Professor of Physics*

Professor Rindler has, within the last ten years, supervised five Ph.D. students to completion: Paul Sheldon, Brian Turner, Bill Turner, Richard Harke, and Tamara Trout. He chaired the last SACS review for physics, the search committee that recruited our newest faculty member Dr. Ishak-Boushaki, and others as well. In 1996 he was awarded the Gold Medal of the City of Vienna (for lifetime achievement), in 1998 he was elected to the Austrian Academy of Science, and in 2000 to the Turin (Italy) Academy of Science. Professor Rindler was invited speaker at the Austrian Academy of Science for the Einstein celebration in 2005, and invited speaker at the International Goedel Centenary in Vienna in 2006. He was Visiting Professor at the University of Rome in the summers of 2000 and 2002 and was invited for lengthy visits to the Universities of Cambridge (after being an Overseas Bi-Fellow at Churchill College in 1990), Bologna, Pavia, and Guanajuato. In the last 10 years he has published 10 refereed papers and one book plus a largely rewritten 2nd edition of that book ("Relativity", Oxford University Press 2001, 2nd ed. 2006). The latter is presently an alternative selection of the Scientific American Book Club.

**Brian A. Tinsley**

*Professor of Physics*

Dr. Brian Tinsley has been constructing numerical models and analyzing meteorological data as he builds an ever stronger case for his theory on atmospheric electric effects on clouds and precipitation, and ultimately on climate. The relevance of this is that changes in the magnetic fields of the sun and solar wind couple into the global atmospheric electric circuit, and the resulting electrical current changes cause changes in microphysical processes in clouds. This explains small amplitude weather changes and larger amplitude climate changes that correlate well with solar activity. About half the global warming, over the past century, is due to increases in solar activity. An exciting new development is that the same theory now explains even larger electrical effects on clouds that are internal to the atmosphere; variable thunderstorm activity in the tropics generates currents that affect clouds all over the globe. Each year Dr. Tinsley publishes on average 2 to 4 refereed papers and gives 2 to 4 invited talks at national and international conferences or universities. His funding has been mainly from NSF and NASA, between $60K and $100K per year. He has mentored 3 Ph.D. students in the last decade, and a Chinese scholar on a 2-year visit.

**Robert Wallace**

*Professor of Physics and Electrical Engineering*

Professor Wallace has authored or co-authored more than 100 peer reviewed journal and conference publications, 40 issued US patents, and at least 27 international patents over his career. His work has led to 50 invited presentations around the globe, with 17 of these at national and international symposia. The total number of citations as of August 2006 to his work is greater than 3700, with an impact factor is $h$=23.[i]

Wallace is a co-inventor on the use of Hf-based (and Zr-based) dielectrics for high-k gate dielectric applications in CMOS. The key innovation in this work is the understanding that the control of the interfacial composition between the gate dielectric and the underlying Si channel requires thermodynamic considerations for optimum gate stack properties. These materials are now under development by all major semiconductor companies for production in CMOS transistors by the semiconductor industry for the 45 –22 nm nodes enabling the benefits of scaled integrated circuit technology for society.

Wallace also co-authored the first publications on Hf-based (and Zr-based) dielectrics for high-k gate dielectric applications. These publications presented the application of these materials for high-k gate dielectrics and conclusively demonstrated their potential for integration in CMOS process flows through capacitor studies. These publications launched the field of Hf-based and Zr-based high-k dielectric research and development. The review article entitled "High-k Gate Dielectrics: Current Status and Materials Properties Considerations"[ii] was recently recognized by the Semiconductor Research Corporation as the top ranked "influential research paper" for the semiconductor industry based upon peer citations, and has been recently selected among the 45 high impact papers in nine peer reviewed journals for the 75th Anniversary of the American Institute for Physics.[iii] According to the AIP, "This review has become the essential starting point for researchers developing materials systems in this area."

[i]The impact factor "*h*" is the highest number of papers a scientist has that have each received at least that number of citations. See: Nature 234 (2005) 500, and Proc. Nat. Acad. Sci. 102 (2005) 16569.

[ii]G.D.Wilk, R.M.Wallace and J.M.Anthony, Journal of Applied Physics 89 (2001) 5243.

[iii]See: http://www.aip.org/anniversary/pubs_research.html

**Anvar Zakhidov**

*Professor of Physics and Deputy Director of the NanoTech Institute*

Dr. Anvar Zakhidov is a Deputy Director of UTD-NanoTech Institute, Full Professor of Physics and Adjunct Professor of Chemistry at the University of Texas at Dallas (UTD), working in the area of nanotechnology, carbon nanostructures, (carbon nanotubes and fullerenes) photonic crystals and nanostructured solar cells and OLEDs. Earlier he was working as Senior Research Scientist of Honeywell, (former Allied Signal Inc.) since March 1996. He also holds an honorific position of the Head of Molecular Systems lab in Uzbekistan Academy of Sciences in the Department of Heat Physics (in Tashkent, Uzbekistan). Dr. Zakhidov received his Ph.D. in Optics in Moscow in 1981 and since that time has been actively involved in scientific research in various places, including 4 years spent in Japan (as Monbusho Visiting Professor in IMS, Okazaki and Osaka University), 1.5 year in Italy (Bologna, Institute Molecular Spectroscopy). Anvar Zakhidov has been awarded internationally recognized awards and fellowships for excellence in the field of Physics and Material Science (Monbusho, NEDO, and INTAS). He was recognized by "The Engineer of the Year Award" by CIE/USA in the year 2002.Most recently he got Nano50 Award from Nanotech Briefs Magazine (2006), and the NanoVic Prize from Australia (2006) for development of transparent carbon nanotube sheets and their studies in solar cells, OLEDs and field emission devices.

Dr. Zakhidov also serves as a Managing Editor of *International Journal of Nanoscience* (in charge of North America) and in the Editorial Board of *'Molecular Materials",* an International journal and edited a guest volume of *Synthetic Metals*. He is a Principal Investigator in several grants on advanced nanomaterials and nanodevices awarded by such USA Government agencies, as DARPA, AFOSR, NASA, DoD, DoE and he has more than 200 published papers (including 7 in "Science" and "Nature"), and 5 patents in the field of advanced materials, including conducting polymers, carbon nanotubes, and frontier materials and devices.

During 5 years at UTD, Zakhidov has created a state of the art nanomaterials characterization experimental lab and a Nanotech Bay in a clean room equipped with multichamber organic-inorganic deposition system. Among his recent achievements are: high efficiency polymeric solar cells and bright OLEDs, both with quantum dots and nanotubes as parts of architecture, fundamental studies of negative refraction at optical wavelengths, and development of new forms of carbon nanostructures with enhanced hardness and unconventional physical properties. He has graduated 4 Ph.D. and 3 master students in UTD since 2001, and presently he supervises 6 graduate students and 2 undergraduate students.

# 3. Facilities---Present and Future

## *Present*

Physics faculty offices are divided between five buildings: Founders Building, Waterview Science and Technology Center, Berkner Building, the North Office Building, and the Natural Sciences and Engineering Research Laboratory (NSERL). Also one Physics Faculty member is half-time in Electrical Engineering and his office is in the Engineering and Computer Science Building. This division of the Department has been deleterious to developing a coherent Physics program. It does not allow regular face-to-face contact with many of our colleagues nor do we have a place were we can conveniently and regularly meet with them or students. Classrooms are largely remote from the faculty offices. This is further complicated by staff members distributed amongst these four buildings.
The breakdown is as follows:

*Founders Building*

Faculty
Chaney
Cunningham
Fenyves
Gartstein
Glosser
Hoffman
Ishak-Boushaki
Macalevey
Rasmussen

Staff
Baker
Jean
Swaim (25% time)
Renfrow

*Waterview Science and Technology Center*

Faculty-Space Science
Anderson
Earle
Heelis
Heikkila
Tinsley

Faculty-High Energy
Izen
Lou

*North Office Building*

Faculty-Quantum Electronics
Collins

Staff
Davanloo

*Berkner Building*

Faculty-NanoTech Institute
Zakhidov

### *Future*

It has taken a concerted effort by Physics faculty and staff to maintain our high standards for productivity in research, funding, teaching, and University and community service, despite increasing fragmentation. Time lost by faculty forced to commute between campus locations is quantifiable. The cost of missed interactions amongst faculty and between faculty and students is intangible, but has had a demoralizing affect on all concerned. We dream of a future Physics Department united in a building that would include offices for faculty, staff and graduate students, classrooms, lecture halls, commons room, conference rooms, laboratories for both research and teaching and physics support facilities (e.g. machine shop), and with our colleagues from other departments within walking distance.

## Current Physics Experimental Facilities

*CENTER FOR SPACE SCIENCES (HEELIS (Director), ANDERSON, EARLE, TINSLEY)*

The Center for Space Sciences is housed in the Waterview Science and Technology Center, where it occupies about 13000 sq feet of laboratory and office space. This newly created facility meets all the present needs of the Center and those anticipated as the next generation of space experiments for Earth space weather observations are developed. The office space includes the main offices for 4 faculty members and one emeritus faculty member in the Physics department, office space for 9 (presently 7) professional technical staff members and an administrative unit of 2 people. In addition the center accommodates office space for 7 research scientists and 10 graduate students. It includes library and meeting room space for technical and internal meetings as well as external reviews and science activities associated with funded projects. The center has its own computer facility that handles the regular delivery of data from present space experiments, the ground data software systems and serves a web delivery system for access to the data by the national and international communities.

Space is allocated for 2 major research laboratories. One, electrostatically clean facility directed by Dr Heelis, devoted to the design, construction, and test of space flight experiments and another directed by Dr Earle devoted largely to new instrument development. These labs also service graduate student research activities. Finally the center houses a small machine shop, and rooms for record storage and retrieval as required by past and present federally funded contracts and grants.

*GLOSSER Lab*

1. Approximate square footage that is occupied by the Op Prop group.
   1700 sq. ft.
2. A brief description of your lab facilities
   The laboratory is dedicated to the study of optical properties of materials. A number of tools are available:

a. JY Horiba, 1 m, double monochromator micro Raman system using an Olympus microscope. It is equipped with both a cooled GaAs photomultiplier and a CCD detector. This instrument can be used to make photoluminescence measurements in the visible and near infrared.

b. There are three modulation spectroscopy apparatuses.

(1) A system for the study of materials in the ultraviolet and vacuum ultraviolet.

(2) A system for the study of materials in the infrared and visible

(3) A general purpose system for use in the visible

(4) An AFM

(5) A "homebuilt" micro-photoluminescence system for use in the infrared

3. How many faculty/research scientist offices.

There is only one faculty member associated with this effort and the office is in Founders Building. The office is adequate.

4. How many student offices.

Each lab area has desk space for at least one student and this is adequate.

5. Other facilities worth mentioning in the report.

There is an oil-free high vacuum evaporator for e-gun or thermal evaporation of materials.

.

*HOFFMAN Lab*

1. Approximate square footage that is occupied by your group

1350 sq. ft.

2. A brief description of your lab facilities

Research labs that contain vacuum systems, a clean room, two electronics labs and one small office.

3. How many faculty/research scientist offices. Adequate?

Two faculty offices and 2 small research offices, not included in the lab area above.

4. Other facilities worth mentioning in the report.

The clean room is a class 100 level clean room. It is used for assembly of flight hardware.

*HIGH ENERGY PHYSICS (IZEN and LOU)*

1. Approximate square footage that is occupied by HEP.

HEP occupies approximately 1750 square foot in West Tech. Center for offices (faculty, staff and graduate students), and about 1/4 of a 1,000 square foot cluster computing lab.>

2. A brief description of your lab facilities

The space includes a small assembly and testing room, a meeting room doubly used as a printing/copy room.

The cluster computing lab is a SNM facility shared among biologists, geoscientists, chemists and physicists. It is cooled by a 40 ton dedicated AC unit and has an electric wiring capable of delivering 1,200 Amps of current to clusters of high performance computers and data storage systems.

3. How many faculty/research scientist offices. Adequate.

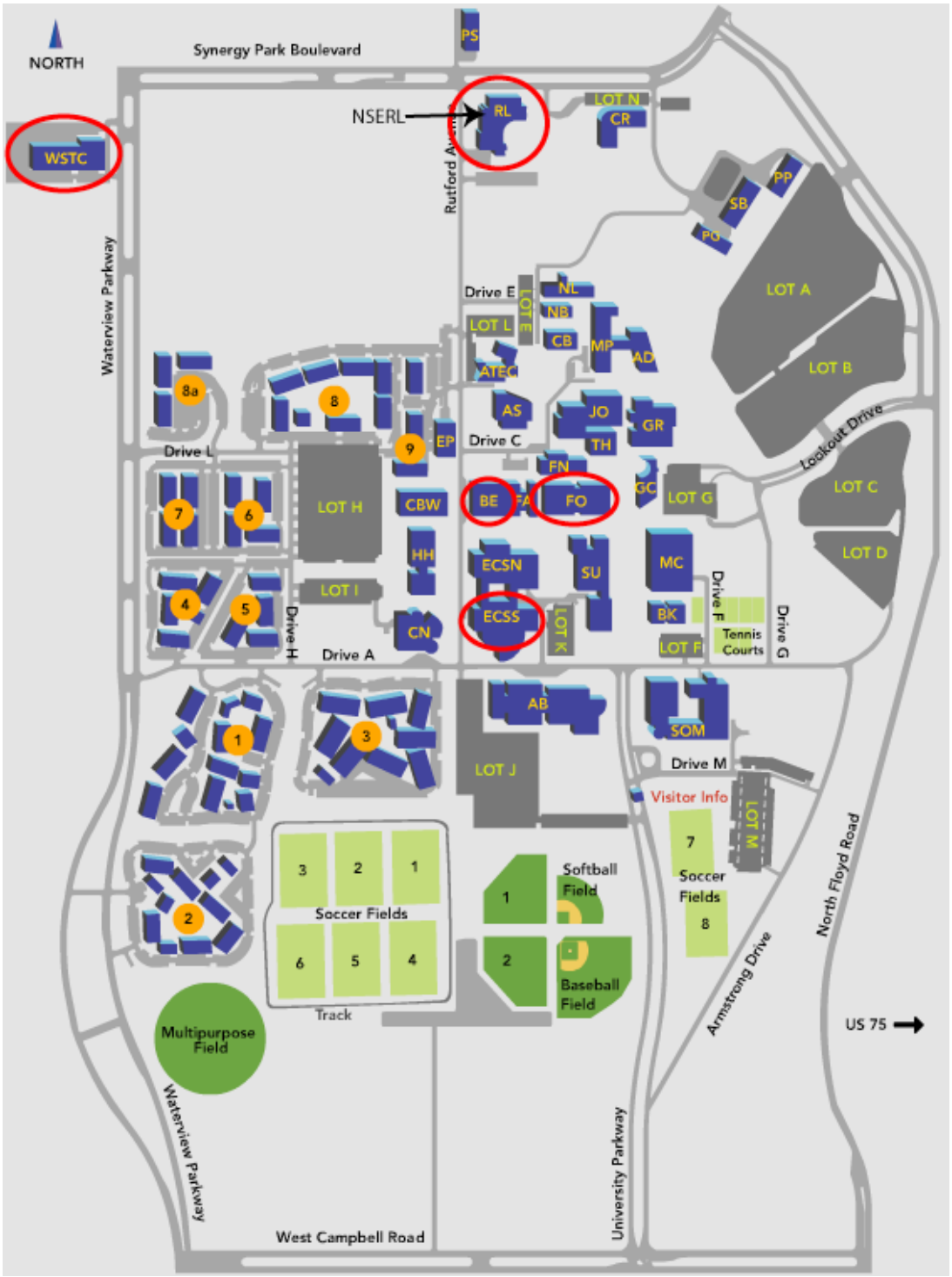
2 office for faculty and 1 for research staff. Need 1 more office for staff to be hired in November, 2006.>

4. How many student offices. Adequate.

2-3 student offices. OK for now.

*NATURAL SCIENCE AND ENGINEERING RESEARCH LABORATORY (NSERL) (CHO, ZAKHIDOV)*

This brand new building will be a state-of-the-art, 192,000 square foot research facility that will encompass research over a range of disciplines including Chemistry, Biology, Physics, Electrical Engineering, Materials Science and Engineering, and Behavioral and Brain Sciences. (All Physics locations are circled below.)



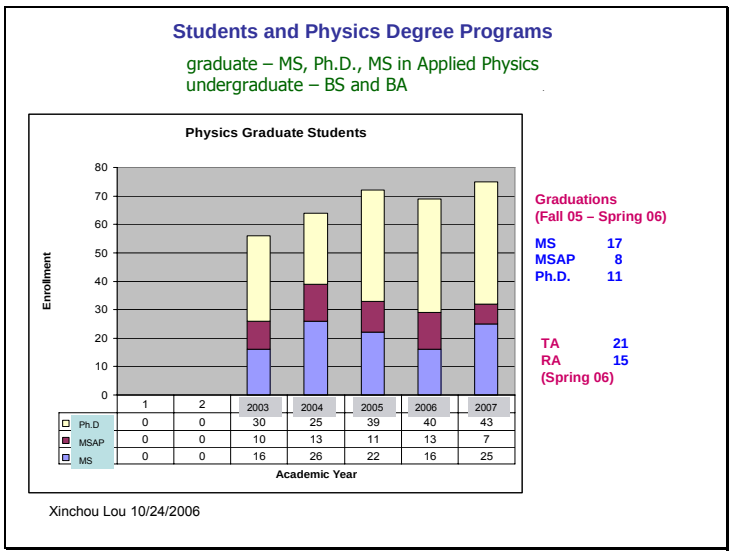
# 4. Affiliated Institutes and Centers

There are two affiliated institutes and one center that have strong ties to the Physics Department. More detailed information is contained in the bios and CVs of the associated Physics faculty members.

The Center for Space Sciences has been a mainstay of the Physics Department since even before the actual founding of UTD. It is currently headed by Professor Rod Heelis and also includes as faculty members Professors Phillip Anderson, Greg Earle and Brian Tinsley. In addition Professor Walter Heikkila, now retired, continues to be active in this center. The Center is located in the Waterview Science and Technology Center building.

The NanoTech Institute is made up of faculty from Physics, Electrical Engineering, Chemistry and Biology. The prime contributor from Physics is Professor Anvar Zakhidov who is associate Director.

# 5. Graduate Degree Programs




| | 1 | 2 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|
| Ph.D | 0 | 0 | 30 | 25 | 39 | 40 | 43 |
| MSAP | 0 | 0 | 10 | 13 | 11 | 13 | 7 |
| MS | 0 | 0 | 16 | 26 | 22 | 16 | 25 |

### 5.1.1 History

The history of the graduate physics program begins with the founding of a private institution called The Southwest Center for Advanced Studies (SCAS) in the early 1960's by the founders of Texas Instruments. The purpose of this institution was to foster science and technology in the Dallas, Fort Worth area. Advanced degrees were awarded at nearby universities to students mentored by Physics staff at SCAS. When UTD was formed by the transfer of SCAS to The University of Texas system in 1969, the members of the senior physics staff were appointed to the UTD Physics Faculty. The original disciplines were Space Science, and Relativity and Cosmology. Soon after the transfer, Atomic and Molecular Physics, Quantum Electronics, High Energy Physics, Optics, Solid State Physics and Chemical Physics were added. In the past few years, a strong discipline has developed in the area of nanotechnology. All of these areas continue to produce Ph.D. and M.S. as well as BS and BA graduates.

In 1999, the physics faculty introduced a new graduate degree, a Masters of Science in Applied Physics (MSAP), to support a large group of technical professionals who wanted to understand the fundamental knowledge behind the latest technology, and be prepared for new technology that appears in the future. The students in this program come from diverse backgrounds, with bachelor's degrees in computer science, engineering, physics, chemistry, biology, and mathematics. The faculty determined that this degree should provide a solid background in physics, yet offer sufficient flexibility for the students to tailor their program to their specific needs. This required a combination of an MSAP core which includes graduate level courses in atoms molecules and solids, electromagnetism, mechanics, mathematical methods of physics, solid stated physics, and applied numerical methods, as well as a diverse list of graduate elective courses that can be taken from physics or other departments.

From the beginning of UTD there have been two categories of graduate students. One represents the traditional Ph.D. seeking student who comes to UTD with a B.S. or M.S., is supported by a Teaching or Research Assistance and continues through to completion of a Ph.D. The second category is represented by people employed in local industry, who continue to work a full time job, but wish to take courses to improve their marketable skills. Although a few of them have completed a Ph.D. working part time, most of them receive MS or MSAP degrees. In order to accommodate the second group all of the MSAP courses and many of the core MS and Ph.D. courses are taught in the evening.

The makeup of the graduate student population may be divided into groups based upon the degree pursued. For example, in the academic year of 2006-2007, there are a total of 76 graduate students. Of these, 30 are Ph.D. candidates, 19 are working towards a Masters but expect to continue towards a Ph.D., 3 Masters students are in a hiatus status, 3 students are non-degree, 6 students are working for their MSAP degree and there are 15 terminal Masters students. The graduate enrollment for the last 7 years is shown in Table 5.1.

**TABLE 5.1**

| Year | Graduate Physics Enrollment |
|---|---|
| 2000 | 59 |
| 2001 | 58 |
| 2002 | 49 |
| 2003 | 75 |
| 2004 | 84 |
| 2005 | 62 |
| 2006 | 76 |

As of fall 2006 the physics department has been responsible for the award of 175 PhD degrees, 296 MS degrees and 24 MSAP degrees. Table 5.2 lists the number of degrees granted during the last six years.

**TABLE 5.2**

| Year | PhD | MS | MSAP |
|---|---|---|---|
| 2000 | 7 | 5 | 0[1] |
| 2001 | 9 | 3 | 3 |
| 2002 | 1 | 9 | 1 |
| 2003 | 0 | 11 | 3 |
| 2004 | 6 | 9 | 2 |
| 2005 | 6 | 17 | 10 |

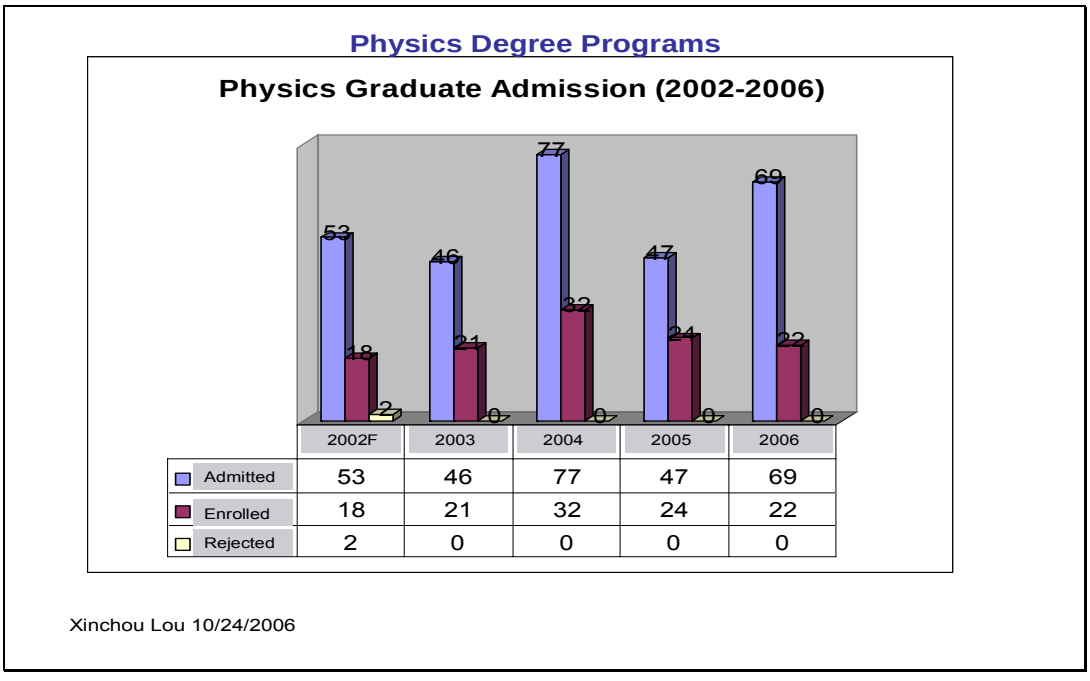
It is one of our prime goals to maintain and, if possible, to exceed this rate. To this end, we have made it a top priority to look for a new faculty with a strong interest in mentoring students and in involving them in their own funded research. A faculty member is expected to support the students that he mentors after they have received their master's degree.

### 5.1.2 GRADUATE RECRUITMENT AND ADMISSION

The graduate recruitment and admission can be divided into to two parts:

1. Full time students who will be supported by teaching assistantships and pursing a PhD degree.
2. Part time students who will mostly be getting a MSAP, MS degree, or non degree student.

#### 5.1.2.1 FULL TIME STUDENT RECRUITMENT AND ADMISSION




[1] Students were admitted to the MSAP program in 1999.

Four year schools in Texas and surrounding states provide a large proportion of our graduate school application. We have benefited greatly from referrals from our graduates and other contacts with local schools that do not have advanced degrees. Although we have been active in periodic UTD Physics Faculty visitations and presentations at local schools, it has not been as productive as working with contacts.

Our visibility is maintained at a national level by yearly inclusion of the UTD Graduate Physics Program in the AIP's Graduate Programs in Physics, Astronomy and Related Fields (Appendix B) and a home page on the internet (http://www.utdallas.edu/dept/physics). The physics home page has an entry into a graduate application form (select Texas Common Application) to facilitate the application process. As a result of these advertisements and recommendations from faculty elsewhere we receive nationwide responses from prospective students which range from full applications to simple GRE score reports. All of these are followed up with expressions of interest and encouragement from our graduate Physics Program coordinator. A large number of international students apply by letter or e-mail. Only those with exceptional academic records from well recognized schools, high GRE scores and fluency in English are encouraged to continue the application process.

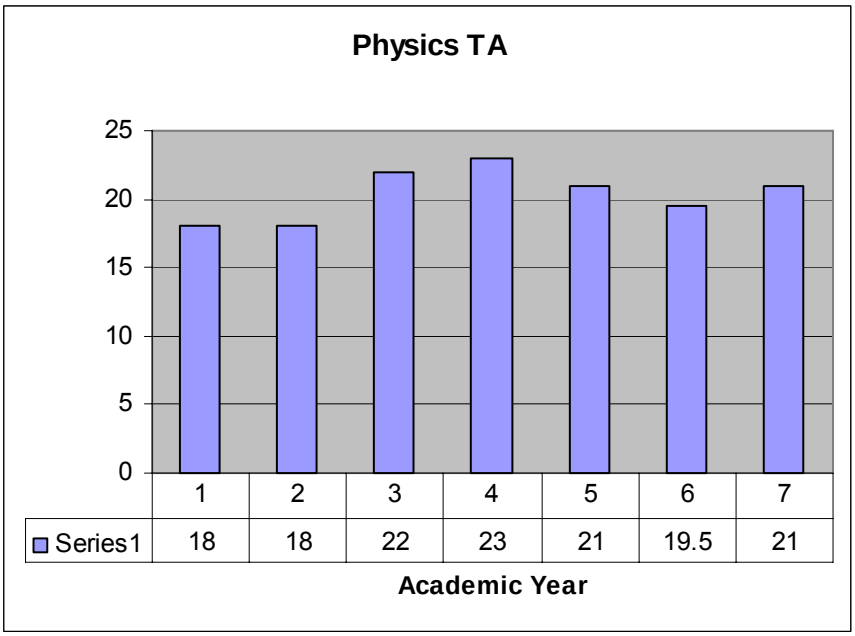
Admission is based on having a Bachelor's degree in physics or a related field, college course grades, GRE scores, and three letters of recommendation. The GRE provides a nominal threshold for admission. Our expectation is that a student will have a score of at least 700 on the quantitative and 500 on the verbal. The average for the 2006 admission was 1240. Over the years, physics has maintained the highest average GRE scores in the University. In addition to these requirements, international students must score at least 550 on a written TOEFL exam or 213 on a computer TOEFL exam taken within the previous five years. In the fall 2006 process we admitted 49 applicants of which 15 became physics graduate students.

Currently we have 21 teaching assistant (TA) positions. The number may vary depending on the availability of University funds and the number of physics courses which require TAs. Research assistantships (RA) are generally awarded to students after they have completed their core courses and are primarily concerned with their research.

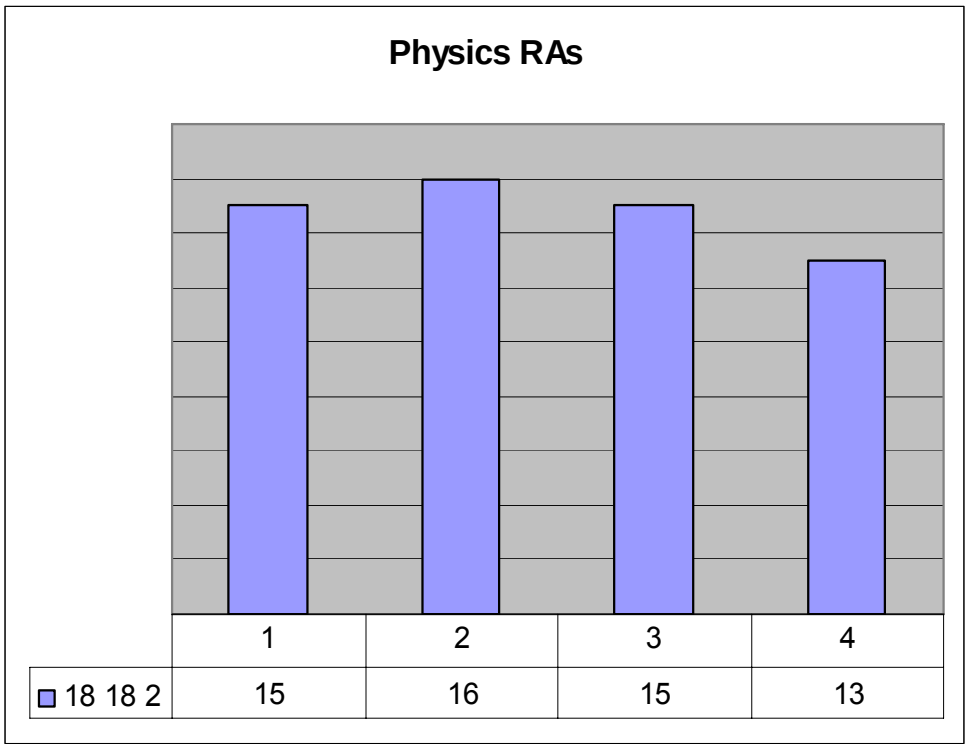
### 5.1.2.2 FULL TIME STUDENT FINANCIAL SUPPORT

A TA receives $1061/month and is expected to work a nominal of 20 hours per week. In addition each TA receives a graduate student scholarship (GSS) to cover tuition fees. For the fall 2006 semester the GSS was $3120/semester. At the current cost per hour, this pays for nine hours per semester. (Tuition for nine hours is $3000 and this essentially sets the number of hours a TA must take per semester.) In order to remain a TA, a student must (1) Take at least the requisite nine hours (2) Maintain a grade point of at least 3.0, and (3) meet the deadlines for other program requirements as necessary. It should be noted that in many competing universities, the tuition is waived for TAs no matter how many hours the student takes. The charging of fees not covered by scholarship for students taking more than nine credit hours seriously impacts UTD's ability to attract high quality graduate students.

# Graduate Student Assistantships and Support




- at ~20 with increasing teaching activities
- priorities given to large service courses/labs and core UG and G courses
- stipend not competitive; GSS restrictive, lack of flexibility → missed opportunities




- 2007 RAs reduced by NASA funding, HEP transition
- Spring 07 TA →RA movement expectation:
  Gartstein(1), Lu(2), Yang(1), Cho(2)
- However TA 'hiring freeze' may deliver a 'penalty'
- Strategy for growing RAs: (1) **faculty res. funding**, (2) **affiliated faculty (EE, UTSW) needing physics students,** (3) **allocating TAs to funded areas,** (4) **faculty incentives**.

### 5.2.1 PART TIME STUDENT RECRUITMENT

Our primary recruitment for part time students is word of mouth from local people who have been in our program and through our web site (http://www.utdallas.edu/dept/physics). Once a perspective student contacts the graduate coordinator, we are very proactive in answering questions and recruiting them into our program.

## 5.3 GRADUATE CURRICULUM AND DISSERTATION

### 5.3.1 DOCTORAL STUDENTS

A student seeking to be accepted into the Ph.D. program must complete a 32 hour core curriculum consisting Classical Mechanics, Statistical Mechanics, Electromagnetism I, II, Mathematical Methods of Physics I, II, Quantum Mechanics I and II. The minimum grade point average for these eight courses must be 3.3. The grading of the core courses has a finer granularity than the normal ABC grading and has values of +/- to more closely evaluate the student. The student must also take a minimum of four elective courses, two from within his/her area of specialization and two selected from two different areas of physics out of his/her area of specialization. There is no foreign language requirement for physics doctoral students. A B average is required for all courses taken at the graduate level. An additional requirement is passing the Ph.D. qualifier examination, which is given once each year. All of the above requirements must be met for admission to Ph.D. candidacy.

During the early period of graduate study, the student is encouraged to become involved in any of the research activities ongoing in the Program and ultimately link himself/herself to an advisor and develop a dissertation topic. After reaching Ph.D. candidacy, a dissertation topic is defined, and a faculty committee is formed to monitor the student's progress. The student then submits a written dissertation proposal to this committee. This proposal should describe the background of the proposed research indicating what the student plans to do and how he/she plans to accomplish it. After the written proposal is approved by the committee the student gives an oral presentation defending his/her proposal to the committee and members of the physics faculty. He/she is questioned and given recommendations about his/her future research. The student must present his/her proposal seminar prior to the end of the third full year in order to remain in good standing within the Program and to be allowed continuing financial support. The progress of the student is monitored on a yearly basis by the members of the committee and a progress report is provided to the Graduate Dean. The mean time for a student to complete his/her Ph.D. is about 5 years. There is a requirement on the state support through TA's, that they be limited to 5 years.

Upon completion of the research, the student prepares a dissertation manuscript which must be defended. Prior to the dissertation defense, the student will normally have submitted a significant portion of his/her research as a manuscript to a professional refereed journal. The defense consists of a public seminar followed by questions from the committee and a general audience. Acceptance of the dissertation document (which includes acceptance of the style and format by the Graduate Dean) and approval of the seminar which includes proper response to questions from the Supervising Committee complete the Ph.D. requirements.

### 5.3.2 MASTER OF SCIENCE STUDENTS

The Masters of Science candidate must complete a minimum of 32 hours which must include Mathematical Methods of Physics I, Electromagnetism I, and Quantum Mechanics I. Twenty additional elective hours in Physics may be selected by the student with the approval of the Graduate Adviser. Six hours of research along with the presentation of a Master's Thesis may be substituted for 6 of the elective course hours.

### 5.3.3 MASTER OF SCIENCE IN APPLIED PHYSICS

The Masters of Science in Applied Physics is designed to meet the needs of students interested in practical applications of physics. It is not a lead-in to the Ph.D. program, but instead caters to students seeking industrial jobs. Candidates must complete a total of 32 credit hours and satisfy the following:

1. Complete 16 hours of physics MSAP graduate level core courses
2. Complete 16 elective hours from a list of approved graduate electives.
   Up to 6 hours of industrial internship or supervised research may be substituted for elective courses.

## 5.4 ORGANIZATION OF THE GRADUATE PROGRAM

The day to day operation of the Graduate Program is centralized in the office of the Graduate Student Coordinator. From the time a graduate student applies until he/she graduates the program maintains a status record. After graduation the location and status of alumni are maintained by the program and then distributed to other alumni through the publication of a yearly newsletter (The Whatsis, Appendix E). All graduate admissions are handled through the Graduate Program office. This entire record keeping procedure provides quick access to data on each of our students and forms a data base for various student population profiles. This centralization yields information which makes certain that students are taking the proper courses and guides in the choice of courses to be offered during a particular semester.

*In what follows, we present more detailed information regarding our graduate students.*

## 5.5 GRADUATE STUDENT STATISTICS SUMMARY

The UTD Physics Department has graduated 392 graduate students between 1972-2006. Of these 392 graduates, we have the following statistics:
286 held jobs when they were last contacted
4 housewives have chosen to stay home
102 could not be reached as no contact information was available.
An estimate for the job placement rate is between 73% - 99% for the period 1972-2006.

## 5.6 TEACHING ASSISTANT TIME UTILIZATION

In the time breakdown noted below, it should be noted that TAs are working close to, at or even above their 20 hour time allotment.

Aronsen, Elin - PHYS1301 (86 students) grading, recitation hours, 10 hrs/wkly grading, 3 hrs/wkly tutoring, 5 hrs grading quizzes. PHYS2303 (39 students) monitoring and equipment set-u@ 2 hours doing set-ups and

tear-downs for class (20 hrs)

Aryal, Mukti PHYS1101-601 & 602 (24 & 26 students) - Teach labs 6 hours/wk, Lab meetings 1 hour weekly, Office hours 2 hours, Grading lab reports @6 hours/weekly, office hours 2 hours wk, preparation time 2 hours weekly. 1 hr/wkly for Lab meeting. (20 hrs)

Bhaneja, Preeti - PHYS2326-001 (6l) and PHYS3342-001 (93); 8 to 11 hours grading for 2326, and 8 to 10 hours for 3342. (16 to 21 hours)

Chopra, Irinder - PHYS2126 (sections 102 & 107) (28 & 30); 2 hrs/wkly for lab meetings; 6 hrs teaching labs; 2 hrs prep time; grading 7 to 8 hours (17 to 18 hrs)

Colvin, Scott - PHYS1101-101 & 2125-103 (19 & 27) - 1 hr/wkly for lab meeting, 2 hrs prep time; 5 hrs teaching; grading papers 5 hrs, office hours 3. (16 hours)

Davidson, Ryan - PHYS2126-105 & 2326-001 (28 & 61)1 hr/wkly for lab meeting, @9 hours grading for lab and @ 7 hours grading for 2326. (17 hours)

Haaser, Robert - PHYS2126-104 & 109 (11 & 29); 1 hour/wkly lab meeting, office hours - 4 hrs, prep and set-up 4 hrs, grading 11 hours. (19 hours).

Mayo, Michael - PHYS2125 (101 & 102) (30 & 30); 1 hr/wkly for lab meeting, grading 6 hrs, conducting labs - 6 hrs, office hours - 2 hrs, email help for students 2 hrs/wk, lab set-up and preparation - 2 hrs (19 hrs)

Moldenhauer, Jacob - PHYS5411 & ISNS3368 (14 & 91); auditing and grading for 5411 - 14 hours, auditing, copying and grading for 3368 - 7.5 hours. (21.5 hrs)

Mwene, Anthony - PHYS6400-501 (14); 3 hrs in class, 2 hrs for review \sessions, 9 hrs for grading, 2 hrs for office hours, 3-5 hrs photocopying notes and preparation for Review sessions and office hours. (19 to 21 hrs)

Peden, Jeffrey - PHYS3416-0021 (11) & NATS Labs 1111 (3 sections) (40); 9 hours weekly administering labs, 2 hrs/wk setting up and tearing down lab demos, @ 3 to 4 hours grading lab reports.E&M - @3 hr/wk for grading homework & 2 hrs/wk for office hours. (19 to 20 hrs)

Patel, Jagruti - PHYS2325-501 & PHYS4352-50l (66 & 16) 2325 - 10 hr/wkly grading, 2 hr/wkly office hours, 4352 - monitoring, tutoring and grading 8 to 9 hours. (20 to 21 hrs)

Rafferty, Stephanie - PHYS2126 (sections 101 & 103) (28 & 25), @9 hrs/wkly IN lab between labs and set-up time, 2 hrs/wkly for office hours, @5 or 6 hrs/wkly grading, 1 hour for weekly lab meetings, and @ 1 hour answering queries out of office hours. (18 to 19 hrs)

Rouse, Joshua - PHYS2325-001 & PHYS3312-501 (104 & 16); office hours 4 hrs 2325, grading for 2325 - 7 hrs, grading 3312 - 4 hrs, office hours or 3312 - 4 hrs, homework review prep - 2 hrs. (21 hrs)

Schaefers, Justin - PHYS2125 (sections 601 & 602); lab set-ups - 2 hrs; teaching labs - 6 hrs; office hours – 2 hrs; email help - 2 hrs; prep for each lab - 1 hr; grading lab results - 6 to 7 hours. (19 to 20 hours)

Stoneback, Russell - PHYS5422-001 (15), 4 hrs auditing class, 3 hrs in office hours, 4 hours grading, 2 hrs answering email, 12 hrs completing solutions for homework and ensuring accuracy. (25 hours)

Ussery, Geoffrey - PHYS5401-501 (24) - 14 hrs/wkly grading, 4 hours office hours. (18 hours)

Whittington, Delilah - PHYS 3380-001 & NATS1311-001 (25 & 43); 5 hrs auditing class, 3 hrs office hours, 10 to 12 hours grading. (18 to 20)

Wong, Wei-Cheng - PHYS2326-002 & PHYS3330-501 (92 & 20); 9 hr/wk auditing, grading, office hours 2 hrs/wk for 2326 & 5 hrs/wk auditing, grading for 3330. Monitoring tests for various instructors 2 hours each at intervals. (18)

Zandstra, Steven - PHYS PHYS3342-001 & 5371-501 (93 & 10), 3342 - grading 10 hrs/wk, office hrs 2 hrs, auditing, grading for 5371 -7 hrs. (19 hours)

Zarnani, Faranak - PHYS2126 (sections 601 & 602) (25 & 16) - lab meeting and set-up - 2 to 2.5 hours; preparation for teaching lab (reading manual, doing the experiment, making lecture notes - 6 to 8 hours, conducting lab sessions - 6 hrs; office hours - 2 hrs; grading Pre-Labs and reports, updating spreadsheets, etc. - 7 to 9 hours.

Extra time will be required of all TA's when mid-term and finals are administered.

**5.7 GRADUATE STUDENT SPECIFICS**

| ***Name*** | ***Date/Deg.*** | ***1st Deg.*** | ***PhD Rec.*** | ***Last known occupation*** |
|---|---|---|---|---|
| Abreu, Vincent | Dec. 74 | PhD | | Research Scientist |
| Adams, Dan | Dec-81 | MS | | Government Research Scientist |
| Akoshile, Clement | Aug-84 | PhD | | Teaching and doing research in Nigeria |
| Alameddin, Ezzat | Aug-92 | MS | | Teaching and doing research in Saudia Arabia |
| Al-Arfaj, Esam | Aug-01 | PhD | | Teaching and doing research in Saudia Arabia |
| Al-Kuhaili, Mohammad | Aug-99 | PhD | | Teaching and doing research in Saudia Arabia |
| Al-Zamil, Mohammed | May 05 PhD | PhD | | Teaching and doing research in Saudia Arabia |
| Ames, Kent | Dec-91 | MS | | Teaching in High School |
| Anderson, Jon | Aug-80 | PhD | | Doing clinical medical research at SW Med School |
| Anderson, Phillip | Aug-85 | MS | Aug-90 | UTD Physics Faculty |
| Anthony, Lou | May-86 | MS | | Teaching in High School |
| Arikan,Tufan | May-96 | MS | | Unknown |
| Armstrong, John | Dec-05 | MSAP | | Working in local industry |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Badakhshan, Alireza | Aug-79 | MS | Dec-90 | Research Scientist in Private Industry |
| Badiee, Abolghasem | May-82 | MS | | Working in local industry |
| Bakhshian, Habib | May-83 | MS | | Unknown |
| Balasubramanian, Ramkumar | Dec-02 | MS | | Working in local industry |
| Balog, Stephen | May-86 | MS | Dec-94 | Teaching in Private School |
| Banan, Massoud | May-79 | MS | | Unknown |
| Bandeh-Ahmadi, G. Hossein | Dec. 77 | MS | | Teaching in Iran |
| Barlow, Samuel | May-05 MSAP | | | Working in local industry |
| Beasley, William | Aug. 74 | PhD | | Teaching - University |
| Benninger, Tracy | Dec-98 | MS | | Computer applications - private industry |
| Bhawalkar, Jayant | Dec-93 | PhD | | Research Scientist - Private Industry |
| Birdwell, Glen | Dec-96 | MS | May 01 | Engineer - local industry |
| Bishop, Rebecca | Dec-97 | MS | Aug-01 | Research Scientist - Aerospace |
| Bittencourt, Jose | May-75 | PhD | | Research Industry - Brazil |
| Blanton, John | Aug-94 | MS | | Unknown |
| Blum, Ira | Dec-93 | MS | May-99 | Computer Consultant |
| Boehme, Jeffrey | May-97 | MS | Dec-99 | Research Scientist - Private Industry |
| Borovina, Dan | May-95 | MS | Aug-97 | Government Research Scientist |
| Borawski, Philip | Aug-00 | MS | | Computer applications - private industry |
| Bowen, Tracey | May-87 | MS | Aug-88 | Government Research Scientist |
| Bourree, Loig | Aug-00 | MS | May-03 | Engineer - local industry |
| Brown, Crystal | May-06 | MS | | Graduate School |
| Burkart, Robert | May-94 | MS | | Retired |
| Burkey, Ronald | May-83 | MS | May-89 | Research Scientist - Local Industry |
| Burns, Matthew | May-05 MS | | | Working in local industry |
| Burton, Rhett | May-72 | PhD | | Government Research Scientist |
| Bushnell, Brian | Aug-03 | MSAP | | Working in local industry |
| Butler, Rhett | Dec-84 | MS | | Unknown |
| Byrd, Marc | Aug-90 | MS | PhD-Rice 94 | Computer Management |
| Bythrow, Peter | May-78 | MS | Dec 80 | University Professor |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Cai, Hong | May-87 | MS | | Unknown |
| Cameron, Michael G. | Aug-06 | MSAP | | Attorney for local industry |
| Campbell, Jeff | Aug-91 | MS | | Unknown |
| Cannedy, Janell | Dec-98 | MS | | Manager for Frito-Lay |
| Carfora, Mauro | May-81 | PhD | | Professor and Researcher - Italy |
| Carlson, Don | Dec-89 | MS | | Unknown |
| Carroll, James Jeffrey | Aug-91 | PhD | | University Professor |
| Cavanah, Taylor | May-04 | MS | | Manager for Zytek |
| Chellehmalzadeh, Mohammad | Dec. 75 | MS | Dec 78 | Teacher in Iran |
| Chang, Chi-Ming | May 73` | PhD | | Unknown |
| Chang, Kou-Tsi | May-79 | MS | | Unknown |
| Chen, Chao-Keng (Andy) | Aug-86 | PhD | | Unknown |
| Chen, Jiun-Bor (David 2) | Aug-90 | MS | | Manager - local industry |
| Chen, Jingqiu (Chu-Chu) | Dec-93 | MS | Dec-99 | Engineer - TI |
| Chen, Ko Chung (Roger) | May-82 | MS | | Owns Import-Export Company |
| Chen, Kuo-Cheng (Evan) | Dec-00 | PhD | | Unknown |
| Chen, Nien-Po | May-92 | MS | | Unknown |
| Chen, Zhi-Zheng (David 1) | May-91 | MS | Aug-94 | Unknown |
| Chi, Chih-Dar | Dec-83 | MS | | Unknown |
| Chi, Hsinmin (David) | Aug-81 | MS | | Unknown |
| Cho, Hyun-jai (Damian) | Aug-97 | MS | | Unknown |
| Chu, Danny | May-90 | PhD | | Teaching in China |
| Clark, Jerry | May-82 | PhD | | University Professor /Researcher |
| Clow, Dallas | May-05 MSAP | | | Consultant - local computer company |
| Collins, Steve | May-97 | MS | May-01 | Manager - Nanotech - UTD |
| Colton, David | Aug. 76 | MS | | Unknown |
| Coogan, John | Dec-88 | MS | Dec-89 | Manager - TI |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Crain, David | May-87 | MS | May 91 | Teacher/Researcher |
| Crenshaw, Michael | Dec-86 | MS | May-89 | Research Scientist - Govt. |
| Criss, Robert (Randy) | Dec-93 | PhD | | University Teacher/Researcher |
| Croley, Richard (Rick) | May-96 | MS | Dec-01 | University Administrator - NTSU |
| Cumnock, Judy | Aug-91 | MS | May-94 | Research Scientist - UTD |
| Danesh, Nasser | Aug-80 | MS | Dec-88 | Research Scientist - Industry |
| Daniel, Jose | Dec-02 | MSAP | | Working in local industry |
| Davanloo, Farzin | Dec-79 | MS | May-84 | Research Scientist - UTD |
| Davis, Nolan | Aug-85 | MS | Dec-88 | Entrepreneur - financial investments |
| Davis, Ricky | May-98 | MS | | Teacher in high school |
| Decker, Trevor | Aug-06 | MSAP | | Working in local industry |
| DeGroat, Ron | Dec-80 | Ms | U. Colorado | University Professor/Research Scientist |
| Demir, Gazi | Dec-04 MS | PhD | | Owns Import-Export Company |
| Dennie, Bryan | May-06 | MSAP | | Working in local industry |
| Dennis, Andy | May-84 | MS | | Unknown |
| DePaola, Brett | Aug-84 | PhD | | University Professor/Research Scientist |
| DiMarco, Steve | May-88 | MS | Aug-91 | University Professor/Research Scientist |
| Ding, Tianyang (Tim) | Aug-92 | MS | | Engineer in Taiwan |
| Dinwiddie, David | Dec. 75 | PhD | | Government Research Scientist |
| Dostalik, William | May-92 | MS | Aug-97 | Engineer - TI |
| Drake, Kelly | May-04 | MS | | Graduate School |
| Drummond, Brandon | Aug-05 MSAP | MS | | Graduate School |
| Dugan, Mike | Dec-82 | MS | | Engineer - local industry |
| Duke, Steve | May-99 | MS | | Engineer - local industry |
| Durbin, Christopher | Aug-92 | PhD | | Computer Engineer - Private Industry |
| Eberhard, Carol Diffey | Dec-82 | MS | May-85 | Manager/Research Scientist - NG |
| Eberhardt, Greg | Dec-98 | MS | | Working in local industry |
| Engfer, Daniel | May-94 | MS | Aug-98 | Government Research Scientist |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Estrera, Joseph | May-92 | MS | Dec-92 | Manager, NG |
| Evans, Todd | May-79 | MS | UTAustin | Research Scientist - Private Industry |
| Ezelle, Patsy | Dec-92 | MS | | Manager - local industry |
| Feleke, Tadesse | Dec-98 | MS | | Unknown |
| Felvey, Forest | May-84 | MS | | Unknown |
| Fernandes, Juvenal | Aug-87 | MS | Dec-95 | Unknown |
| Fowler, Thomas | Dec-90 | MS | | Unknown |
| Frank, Steve | May-05 MSAP | | | Computer work - local industry |
| Frazier, Gary | Dec-84 | PhD | | Manager - Raytheon |
| Friedrich, John | May-94 | PhD | | Owns Computer Company |
| Funkhouser, Jeffrey | May-95 | MS | | High School teacher |
| Garner, Stephen | Dec-86 | MS | Aug-91 | Engineer - local industry |
| Garred, David | May-06 | MS | | Engineer - local industry |
| Gary, James | Aug-91 | MS | May-94 | Manager - UTD |
| Gemmell, John | Dec-91 | MS | | Unknown |
| Gemmill, Paul | Dec-92 | MS | | Computer Consultant |
| Gilbreath, Timothy | Dec-03 | MSAP | | Attorney for local industry |
| Giordana, Adriana | Aug-90 | PhD | | Research Scientist - NG |
| Glatz, Robert | May-93 | MS | | Dentist |
| Glesener, John | Dec-90 | PhD | | Research Scientist - NG |
| Glosson, Clyde Allen | Dec-86 | MS | Dec-90 | Computer Consultant |
| Golnabi, Hossein | May-77 | MS | May-81 | Teacher in Iran |
| Golshan, Shahram | Aug-79 | MS | | Unknown |
| Gordon, Mark | May-92 | MS | | Unknown |
| Gorton, Michael | May-88 | MS | | Manages Country Western Singer |
| Graebner, Mark | May-79 | MS | | Research Scientist |
| Granger, Jamaal | May-04 | MSAP | | Engineer - Private Industry |
| Gratton, Patrick | Aug-92 | MS | May-96 | Computer Consultant |
| Greeson, Robert | May-01 | MSAP | | Attorney for Private Industry |
| Groothuis, Steve | May-91 | MS | | Engineer - local industry |
| Guenter, James | Dec-84 | MS | | Engineer - local industry |
| Gupta, Rishi | May-05 | MSAP | | Engineer - local industry |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Guthrie, John | Dec-84 | MS | May 89 | Minister |
| Gylys, Thomas | May-84 | MS | Aug-86 | Research Scientist - Private Industry |
| Habiger, Trent | May-04 | MSAP | | Working in local industry |
| Hackworth, Douglas | Dec-96 | MS | | Computer Consultant |
| Hademenos, George | Dec-87 | MS | Dec-90 | High School teacher |
| Halling, Dale | May-84 | MS | | Attorney |
| Halvis, James | May-80 | MS | | Unknown |
| Handley, Gerald | Aug. 76 | MS | | Unknown |
| Hansell, Robert Thomas | May-84 | MS | | Head Master at Private School |
| Harke,Richard | Dec-90 | MS | Dec-00 | Consultant - local computer company |
| Harshaw, Robert | May-81 | MS | May-84 | Owns Company - Air procedures |
| Hartman, William Andrew | May-03 | MS | | Graduate School |
| Hassler, John | Dec-94 | PhD | | Engineer - local industry |
| Hawkins, Ronald | May 73` | MS | | Unknown |
| Hebert, Joseph | May-94 | MS | Aug-00 | Retired |
| Hedstrom, John | Aug-05 MSAP | MS | | Graduate School |
| Hei, Matthew | May-99 | MS | Dec. 04 | Postdoc - Govt. |
| Henson, Steven | May-94 | MS | | Engineer/Manager - local company |
| Herriott, Laura | May-95 | MS | | Engineer - local industry |
| Herzlinger, Peter | May-90 | MS | | Computer Consultant |
| Hindman,David | Aug-80 | MS | | Unknown |
| Hiromoto, Robert | Aug. 78 | PhD | | Head, Math Dept. - University |
| Hoerner, Lynnette | May-91 | MS | | Housewife |
| Hollenbeck, Dawn | May-96 | MS | Aug-00 - EE | Teacher in University |
| Hong, Chinsoo | Dec-93 | PhD | | Unknown |
| Houpt, Stephen | May-84 | MS | | Unknown |
| Howard, Jeff | Aug-88 | MS | | Teacher - Junior College |
| Hsia, Kang-Min | May-88 | MS | Aug-91 | MSEE 8/91 - Teacher/Research Scientist Univ. |
| Huang, I-Ping | Dec-05 MSAP | | | Teacher in China |
| Hudson, Cheri | May-90 | MS | Dec-94 | Engineer - local industry |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Huffman, James | Aug-97 | MS | Aug-01 | Engineer - TI |
| Hung, Yao-Wei | Aug-93 | MS | | Unknown |
| Inoue, Kanzan | Aug-01 | MS | Dec-05 | Engineer - local industry |
| Iyengar, Gita | May-90 | MS | | Housewife |
| Jacques, John | Dec-94 | MS | | Engineer - local industry |
| Jahani, Hamid | May-82 | MS | May-87 | Research Scientist - Private Industry |
| Jander, David | May-89 | MS | Dec-91 | Working in local industry |
| Jani, Yashvant | May-76 | PhD | | Teacher |
| Jiang, Lin | May-88 | PhD | | Deceased |
| Johnson, Eric | May-02 | MS | Dec-05 | Research Scientist - Govt. |
| Johnson, James | Aug-92 | MS | Dec-95 | Engineering Manager |
| Johnson, Norman | Dec-94 | PhD | | Owns Company - Computer Consulting |
| Jones, Robert | Aug-81 | ms | | Opthamalogist |
| Juengerman, Eric | Dec-90 | PhD | | Working in local industry |
| Jurica, Janise | Dec-97 | MS | | Unknown |
| Kamalamma, Manju | Dec-04 MS | | | Homemaker/Mother |
| Karimi, Behzad | Aug-03 | MSAP | | Working in local industry |
| Kashefi, Feraydun (Fred) | May-90 | MS | May 99 - EE | Postdoc - local University |
| Keady, John | Aug-98 | PhD | | Entrepreneur - Attorney - Inventor |
| Keating, Christopher | May-91 | MS | May-94 | University Teacher/Researcher |
| Kennedy, William David | Dec-80 | MS | | Unknown |
| Khodadoost, Baback | Dec-80 | MS | | Unknown |
| Khoobehi, Bahram | May-78 | MS | | Unknown |
| Kil,Hyosub | Dec-97 | PhD | | Working in local industry |
| Kim, Byung-kyu | Aug-97 | PhD | | Research Scientist - Korea |
| Kim, Seogkyo | Aug-99 | MS | | Research Scientist - Korea |
| Kimble, Thomas | Aug-88 | MS | | Unknown |
| Kirkland, Matt | May-94 | MS | Aug-96 | Government Research Scientist |
| Kitayama, Itaru | Dec-01 | MS | | Unknown |
| Kivanc, Onder | Dec-94 | MS | Dec-97 | Computer Consultant - Privatae Company |
| Klenzing, Jeffrey | Dec-05 | MS | | Graduate School |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Klocek, Paul | May-87 | MS | | Unknown |
| Knowles,Dennis | May-91 | MS | | Unknown |
| Koblentz, Michael | Aug-82 | PhD | | Unknown |
| Koch, Mark | May-78 | PhD | | Owns Research Company - locally |
| Korioth, Johnelle | May-95 | MS | Dec. 98 - EE | Research Scientist - Govt. |
| Krishna, Venkatas | May-80 | MS | | Computer Company - Private Industry |
| Kronmiller, David | Dec-87 | MS | Aug-91 | Unknown |
| Kuehne, John | Dec-83 | MS | | Engineer local industry |
| Kumar, Shiv | May-79 | PhD | | Teaching in India |
| Kumari, Anjana | Dec-05 MS | | | Graduate School |
| Laba, Jeffrey | Dec-95 | MS | | Teacher in high school |
| Labrie, Arlisa | Aug-91 | MS | | Unknown |
| Laitala, Wayne | May-81 | MS | | Engineer - local industry |
| Lam, Wang-Kong | Dec. 72 | MS | | Unknown |
| Landon, Preston | Dec-00 | MS | Aug-05 | Postdoc - Cal. |
| Laster, Stanley (David) | Dec-89 | MS | | Unknown |
| Lee, Benjamin | May-98 | MS | | Working in local industry |
| Lee, Chung-Ho | Dec-79 | MS | | Unknown |
| Lee, Ming-Way | Dec-80 | MS | Aug-85 | Teaching/Researcher - Taiwan |
| Lee, Tain-Shain | Dec-81 | MS | | Unknown |
| Lee, Tae Jong | Aug-92 | PhD | | Unknown |
| Lee, Wei-Min | May-83 | MS | Dec-88 | Computer work in China |
| Lewis, Riley | May-02 | MS | | Retired |
| Liao, Shry-Sann | May-88 | PhD | | Teaching in China |
| Liaw, Dah-Wuu | May-87 | MS | | Manager - IC - Taiwan |
| Liu, Weiping | Dec-93 | MS | | Homemaker/Mother |
| Loper, Robert | May-98 | MS | | Military Officer |
| Loranc, Mark | Dec-83 | MS | Aug-88 | Working in private industry |
| Love, David | Dec-94 | MS | | Chief Science Officer - Oil Company |
| Love, James | Aug-99 | MS | | Working in local industry |
| Lowery, Waymond (Bruce) | May-90 | MS | Dec-94 | Computer Consultant |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Lu, Kai-Ping (Joseph) | Dec-82 | MS | | Unknown |
| Luo, Laizhong | Dec-89 | MS | | Unknown |
| Luo, Jhy-Ming | May-83 | MS | | Unknown |
| MacAlevey, Paul | May-96 | MS | Aug-99 | Lecturer - UTD |
| Madakasira, Pallavi Chandra | May-05 MS | | | Engineer/Researcher - Private Industry |
| Maher, Louis | May-79 | PhD | | Research Scientist - Exxon |
| Mahmoud, Jawdat | May-93 | MS | | Unknown |
| Malarcher, Casey | May-91 | MS | | Unknown |
| Maleki, Mehram (Joe) | Dec-83 | MS | | Working in local industry |
| Malveaux, Jerry | Dec-88 | MS | | Unknown |
| Manderscheid, Richard (Rick) | May-01 | MS | | Working in local industry |
| Marsh, Jasmina | Aug-99 | MS | | Unknown |
| Marshall, Elizabeth (Betsy) | Dec-86 | MS | | Unknown |
| Marshall, James | May-83 | MS | | Unknown |
| Mason, Mark | May-97 | PhD | | Computer Consultant |
| Mathunjwa, Mduduzi | May-95 | PhD | | University Professor/Research Scientist - Nigeria |
| Mazidi, Muhammad | May-79 | MS | | Unknown |
| McCarthy, Thomas | Dec-95 | PhD | | Private School Master |
| McDonald, William | Dec-92 | MS | | Unknown |
| Medikonduri, Rajeesh | Dec-05 MSAP | | | Working in local industry |
| Meeker, David | Dec-97 | PhD | | Government Research Scientist |
| Megee, Robert | Dec. 78 | MS | | Engineer - local industry |
| Meissner, Edward | Dec-89 | MS | | Engineer - TI |
| Merk, George | Aug-86 | MS | | Unknown |
| Milsted, Carl | Dec-86 | MS | Aug-91 | Research Scientist/Computer Co. |
| Mire, Charles | Dec-05 MSAP | | | Working in local industry |
| Mirza, Yaqub | Dec. 74` | PhD | Dec 75 MAT | Entrepreneur - Financial Disbursements - 3d World |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Moeller, William (Bill) | May-90 | MS | | Engineer |
| Mohamed, Kasem | May-96 | MS | | Unknown |
| Mohapatra, Sasmita | Dec-04 MS | | | Graduate School |
| Moore, Eric | Aug-94 | MS | | Engineer |
| Moosavi, Seyed-Kalil | Dec-80 | MS | | Unknown |
| Morrison, Maurice D. (Danny) | May-78 | MS | Aug 82 | Government Research Scientist |
| Mozdzen, Thomas | May-85 | MS | | Engineer - Private Industry |
| Mulia, Tony | Aug-84 | PhD | | Univ. Teacher/Researcher/Importer/Writer/etc. |
| Murdock, Richard (Dick) | May-89 | MS | | Unknown |
| Myers, Gary | May-77 | PhD | | Oil Company Research Scientist |
| Nanjundaswamy, Rashmi | Aug-05 MSAP | PhD | | Engineer - Private Industry |
| Navarro-Sorroche, Juan | Aug-05 MSAP | | | Engineer - local industry |
| Nelson, Gregory | May-89 | MS | Dec-93 | Government Research Scientist |
| Nguyen, Thang | Aug-95 | MS | | Unknown |
| Nicollian, Paul | Dec-90 | MS | | Unknown |
| Novikov, Alexandr | Dec-01 | MS | May-05 | Unknown |
| O'Malley, Mark | May-00 | MS | May-03 | Engineer - TI |
| Orgeron, Joseph | May-90 | MS | May-93 | Owns Off-Shore Industry in Louisiana |
| Osborn,William | May-87 | MS | May 92 | Teaching Junior College |
| Osterman, Gregory | Dec-94 | PhD | | Government Research Scientist |
| Ostromek,Timothy | Aug-96 | PhD | | Manager - NG |
| Palmer, Shane | May-88 | PhD | | Manager - TI |
| Park, Hwantae (Ted) | Aug-94 | PhD | | Unknown |
| Passmore, Keith | Dec-89 | MS | | Unknown |
| Patel, Jagruti | May-06 | MS | | Graduate School |
| Patrick, David | May-03 | MS | | Graduate School |
| Petersen, Joel | Aug. 78 | PhD | | Engineer - Private Industry |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Peterson, Gary | May-82 | MS | Aug-85 | Manager - Private Industry |
| Pitassi, Stefano | Aug-97 | MS | May-01 | Researcher in Italy |
| Pitchford, Leanne | Aug. 73 | MS | Aug 76 | Research Manager in France |
| Plemmons, Abigail | Dec-98 | MS | Aug-05 | Homemaker/Mother |
| Pongkrapan, Sorapong | Aug-00 | MS | | Unknown |
| Quam, Duane | Aug-95 | MS | | Unknown |
| Quinn, Paul | Aug-90 | MS | Dec-97 | Engineer - Cal Co. |
| Rahbari-Kafi, Abbas | May-82 | MS | | Unknown |
| Rasmussen, Beatrice | Dec-96 | MS | | Lecturer - UTD |
| Rassoul, Hamid | Dec-80 | MS | Aug-87 | University Professor/Researcher - FIT |
| Redfern, Francis | May-86 | PhD | | University Teacher/Researcher |
| Reed, Jeffrey | Dec-91 | MS | Dec-97 | Computer Consultant |
| Rehrl, Matthew | May-87 | MS | | Doctor |
| Reittinger, Peter | May-86 | MS | Dec-88 | Researcher/Oil Industry |
| Renfro, Timothy | Dec-04 PhD | | | University Professor |
| Richards, Evan | May-04 | MS | | Graduate School |
| Richardson, James | May-03 | MS | | Graduate School |
| Roddy, Patrick | May-02 | MS | Dec-05 | Postdoc - UTD |
| Rookstool, James | Aug-80 | MS | | Unknown |
| Rudolf, Paul | May-78 | MS | Dec 80 | Owns Research Company in San Antonio TX |
| Rusu, Claudiu | Dec-02 | PhD | | Working in local industry |
| Ryan, Laurence | Dec-84 | MS | May 88 | Working in local industry |
| Sadighi, Rasool | May-78 | MS | Dec 83 | Government Politician - Iran |
| Saleh, Abdul-Basit | May-92 | MS | Aug-95 | University Professor - Yemen |
| Samadi, Nasrola | May-82 | MS | | Unknown |
| Sampson, William Michael | Aug-05 MSAP | PhD | | Postdoc - UTD |
| Samu, Fiby | Dec-98 | MS | | Unknown |
| San Filipo, William | Dec. 78 | MS | | Engineer - Private Industry |
| Sawyers, Bryce | May-01 | MSAP | | Engineer - TI |
| Scadden, Kenneth | May-95 | MS | | Working in local industry |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Schaefers, Justin | May-04 | MS | | Graduate School |
| Schmidt, Eric | Dec-83 | MS | | Owns Computer Company - East Coast |
| Schoepf, David | Aug. 76 | MS | Brandeis | University Professor/Researcher - |
| Sears, William | Dec-89 | MS | | Research Scientist - Private Industry |
| Seth, Uma | Aug. 78 | PhD | | Unknown |
| Semnani, Razieh | Dec. 77 | MS | | Unknown |
| Sena, Charles (Chuck) | May-90 | MS | | Unknown |
| Sesler, Donald | May-92 | MS | | Unknown |
| Sheldon, Paul | May-99 | PhD | | Consulting |
| Shemwell, David | Dec-86 | PhD | | Engineer - Private Industry |
| Shen, Mu-Ching | May-77 | PhD | | Engineer - Private Industry |
| Shoberg, Tom | Aug-85 | MS | | Unknown |
| Sierra, Rafael | Dec. 78 | PhD | | Manager, Private Industry |
| Sills, James Guy | Dec-90 | MS | | Engineer - TI |
| Sinor, Tim | Dec-88 | PhD | | Engineer - Manager - NG |
| Son, Tae | May-99 | MS | | Unknown |
| Southerland, Richard (Rick) | May-02 | MSAP | | Engineer - local industry |
| Spiro, Robert | Aug. 78 | PhD | | University Professor/Researcher |
| St.Clair, Terri | Dec-99 | MS | | Working in local industry |
| Stafford, James | Aug-90 | MS | | Unknown |
| Standifird, John | May-92 | MS | Aug-97 | Computer Consultant |
| Stevens, Joel | May-85 | MS | | Unknown |
| Stevens, Patrick | Dec-92 | MS | May-95 | Medical Physics-Illinois |
| Stolar, Paul | Dec-01 | MSAP | | Engineer - local industry |
| Stoneback, Russell | May-06 | MS | | Graduate School |
| Strand, Arne | Dec-97 | MS\ | | Engineering Tech - SWM School |
| Strecker, Richard (Dick) | May-87 | MS | | Engineer - local industry |
| Strozewski, Ann Cavin (Annie) | Dec-91 | MS | Aug-95 | Homemaker/Mother |
| Strozewski, Kirk | Aug-95 | PhD | | Manager, Private Industry |
| Stutzman, Jerrod J. | Aug-06 | MSAP | | Engineer - Private Industry |
| Suh, Sang-Won | May-87 | MS | | Unknown |

| *Name* | *Date/Deg.* | *1st Deg.* | *PhD Rec.* | *Last known occupation* |
|---|---|---|---|---|
| Summers, Michael | Dec. 78 | MS | | Unknown |
| Sundaram, Ganesh | Aug-86 | MS | | Unknown |
| Supplee, James | Dec. 77 | MS | Aug-79 | 12/78 2d MS - Univ. Professor/Researcher |
| Suson, Daniel | May-86 | MS | Dec-88 | University Professor/Researcher |
| Swedlow, Michelle | May-04 | MS | | U. S. Army |
| Tanaka, Junichi | May-97 | MS | | Unknown |
| Tang, Xiao Ning | May-97 | MS | | Unknown |
| Tarn, Guo-Wu | Dec-82 | MS | | Unknown |
| Tatsch, Charlotte | May-89 | MS | Aug-01 | Homemaker/Mother |
| Taylor, Ken | Aug. 73 | MS | Dec 77 | Public School Educator - Administrator |
| Taylor, Michael | Aug-93 | MS | May-95 | Air Force |
| Tepfenhart, William | Dec-81 | MS | May-87 | Bell Labs - Res Scientist |
| Terhune, Theron (Terry) | Dec-87 | MS | | Retired |
| Thamban, P. L. Stephan | May-02 | MS | Dec-05 | Teacher University |
| Thompson, William S. III | May-92 | MS | | Owns Marketing Company |
| Ting,Hsien-Jen | May-84 | MS | | Engineer - Taiwan |
| Tober, Richard | May-86 | PhD | | Government Research Scientist |
| Tran, Hung | Dec-83 | MS | Dec-88 | Several degrees - Pharmacist |
| Trout, Tamara | Dec-99 | MS | Dec-05 | Teaching High School |
| Tuckwell, James | May-94 | MS | | Teaching High School |
| Turner, Bill | Dec-93 | MS | Dec-99 | Engineer - local industry |
| Turner, Brian | May-93 | MS | Dec-96 | Unknown |
| Ussery, Geoffrey | May-06 | MS | | Graduate School |
| Valladares, Cesar | Dec-79 | MS | May-83 | Government Research Scientist |
| Vanesko, Douglas | May-04 | MS | | Home Builder |
| Vasilliev, Andrei | May-00 | PhD | | Manager - local industry |
| Vasillieva, Olga | Dec-99 | PhD | | Engineer - local industry |
| Venkatraman, Sarita | Dec-96 | MS | Aug-99 | Research Scientist - UTD |
| Vicharelli, Pablo | Dec-81 | PhD | | Government Research Scientist |
| Villalobos, Jaime | May-82 | MS | Dec-88 | University Professor/Researcher - Colombia |
| Wade, Donovan | Aug. 76 | MS | | Unknown |

# 6. Undergraduate Program

## 6.1 HISTORY

The Physics Program initially served only graduate students. The undergraduate physics program began in the fall of 1975 when UTD admitted its first undergraduate students. These were upper division students at the junior and senior levels who came primarily from the local community colleges. From 1975 until 1990 this population plus transfers from other colleges and universities was our only source of undergraduates. Because many students worked during the day, UTD offered most undergraduate courses at night.

Physics course offerings included the introductory *Fundamentals of Physics.* This two semester sequence initially had upper division course numbers since we were only an upper division school at that time. In 1990, UTD added the lower division allowing the full range undergraduate degree programs to be offered. The Physics Department then developed a four year undergraduate curriculum. The Physics Department now offers courses ranging from an introductory sequence taken by both physics and non-physics science majors, a rigorous upper division curriculum for physics majors as well as both masters' and PhD program sequences.

Some innovative courses were developed early on and are still being taught. The late Nobel Laureate, Polykarp Kusch, developed a two-semester course for non-physics majors entitled *The Phenomena of Nature*. It had a minimum of mathematics and was a conceptual physics course that relied heavily on a series of demonstrations spanning mechanics, heat, sound, electricity, magnetism and optics. Professor Phil Anderson currently teaches this course. The Physics Department also offers basic astronomy courses, *From the Cosmos to Earth*, and *Our Nearest Neighbors in the Sky*, and a meteorology course, *Weather and Climate.* These courses are part of the science core curriculum program for non-science majors.

## 6.2 STATUS OF THE UNDERGRADUATE PROGRAM

The Physics program has grown extensively since the introduction of the Lower Division in 1990. In the fall 2006 semester the Physics Department had 86 majors. There has been a steady growth in the number of Physics majors over the past five years. The quality of our undergraduates has increased considerably with the introduction of the very generous undergraduate scholarships. We attract the top high school graduates.

The Physics undergraduate curriculum has been undergoing a systematic review by the Undergraduate Curriculum Committee. For many years we have required calculus I to be completed before taking *Mechanics* (Fundamentals of Physics I) and Calculus II before *Electromagnetism and Waves* (Fundamentals of Physics II). Therefore, Mechanics is offered in the spring term of the freshman year and *Electromagnetism and Waves* in the fall of the sophomore year. In the first semester of the freshman year, physics majors, and many others take a course called *The Fun of Physics* which is an introduction to the field of physics that includes presentations by members of the faculty of their research areas. Usually, at least one third of the students in the class have not selected physics as their major, but are curious about the subject. The course has served as a good recruiting tool for physics students.

Another first semester course in the freshman year is called *Contemporary Physics*. This serves as a pre-calculus introduction to $20^{th}$ century discoveries and includes a section on geometric optics.

Due to the nature of the development of the undergraduate programs at UTD, the upper division physics courses have been offered in the evening hours. UTD began its undergraduate programs with only juniors and seniors. Since most of the students were working full time, courses had to be offered in the evening. With the introduction of freshmen and sophomores in 1990, the lower division program was developed. We now have many full time students, so we rotate our offerings of some of the upper division courses between the day and the evening.

The Founders building contains the Physics Department Office and many of the faculty offices. Adjacent to the Founders Building is Founders North that has been recently renovated to allow several large laboratory rooms to be constructed. Two rooms are devoted to introductory labs: one to the mechanics lab, the other to the electricity lab. The space also includes a dedicated electronics lab. These labs had been in the Multipurpose building, far removed from the main area of the Physics department.

**6.3 CURRICULUM**

Introductory Physics courses are offered at two levels, algebra-based and calculus-based. B.A. Biology majors and liberal arts students opt for the algebra-based course. In addition, we offer a number of courses described in appendix D for non-science majors that satisfy the general education core science course requirement

Two undergraduate degrees in physics are offered. The Bachelor of Science is designed for a student headed for a career in physics or immediately related science. For those students who intend to pursue a non-physics career in science, the Bachelor of Arts program contains a strong basic physics background but also provides a large number of science elective hours. This plan allows students to take up to five courses in other science disciplines in lieu of the senior level physics courses. Students planning to teach sciences in K-12 schools benefit from this program.

The mathematics and chemistry requirements are the same for both the B.A. and the B.S. degrees. Both degrees require a total of 122 credit hours broken down as follows:
General education core courses, including 6 hours of math and 9 hours of science: 42 credit hours.
Major Preparatory Courses: 21 credit hours.
Major Core courses: 26 credit hours.
Major Related Courses: B.A. any upper division science courses: 15 credit hours.
B.S. 3 required upper division physics courses and 2 elective physics courses: 15 credit hours.
General elective courses: 6 hours of advance electives; 12 hours of free electives.

Graduation requirement: 51 hours of upper division courses.

Fast track B.S./M.S. program:
For students interested in pursuing graduate studies in physics, the Physics Department offers an accelerated B.S./M.S. fast track that involves taking graduate courses in lieu of several advanced undergraduate courses. Acceptance into the Fast Track is based on the student's attaining a GPA of at least 3.00 on a minimum of 30 hours of specified upper division courses. Eligible students may take up to 15 credit hours of selected graduate courses that may be used to complete the baccalaureate degree and also satisfy requirements for the master's degree. These credits can be used to partially satisfy the M.S. degree requirements when the student completes the B.S. degree.

After broad consultation between the Physics Undergrad Curriculum Committee and Engineering and Chemistry faculty, the Physics faculty accepted a recommendation that PHYS 2325, *Mechanics and Heat* reduce its scope, and the course title was changed to *Mechanics*. Much of the introductory thermodynamics was redundant with material taught in General Chemistry courses. This is in keeping with national trends in introductory physics courses to teach less so that students retain more. Time pressures from shortened semesters increased this pressure. Physics majors take a thermodynamics/statistical mechanics in their senior year, so there is no degradation for students in our own program. Physics students may elect to replace PHYS 2325 with PHYS 2421 - Honors Physics I where topics in thermodynamics have been retained.

An honors introductory physics sequence PHYS 2421/2422, has been introduced as an elective alternative in place of PHYS 2325/2326. Each part is a four-credit course that includes a recitation section taught by the course instructor. The syllabi include all the material of the regular course. The honors course integrates calculus more fully, provides more general derivations, and offers more challenging problems. PHYS 2421 contains introductory thermodynamics topics which have been deleted from PHYS 2325. Enrichment material and activities such as field trips are included at the instructor's discretion.

We have also introduced PHYS 3341/3342, Physics I and II for bioscience students. This is a calculus-based physics course that covers most of the same material that is presented in the standard physics course for physics and engineering students, but with examples from biological problems.

**PHYS 3341 Physics for Bio Science I** (3 semester hours) Calculus based. Basic physics for pre-health science students. Topics include mechanics, some discussions on biological applications. Two lectures and one recitation session per week. Prerequisite: MATH 2417. Must register for Physics Laboratory I (PHYS 2125). (3-0) Y

In the second course, Electricity and Magnetism, optics, are introduced. Topics eliminated are AC circuits with inductors and capacitors, multiloop circuits and inductors.

**PHYS 3342 Physics for Bio Science II** (3 semester hours) Continuation of PHYS 3341. Topics include electricity, magnetism and optics. Some discussions on biological applications. Two lectures and one recitation session per week. Prerequisites: PHYS 3341 and MATH 2419. Must register for Physics Laboratory II (PHYS 2126). (3-0) Y
The courses are designed to introduce the physics contained in the MCAT exam.

A new honors introductory physics course PHYS 2421/2422, has been introduced as an option in place of PHYS 2325/2326. Each part is a four-credit course that includes a recitation section taught by the course instructor. The material covered is the same as in the regular course, but there is more in-depth discussion with more integrated use of calculus.

Quantum Mechanics II is offered as an elective course.

Because we are a relatively small department, practically all of our courses are taught by faculty and not by graduate students. The rare exceptions have been one or two summer courses.

## 6.4 UNDERGRADUATE PLACEMENT

Until the start of the lower division program at UTD, most of the physics majors worked at full time jobs and took courses at night. Now, we have developed a sizeable group of 4-year students at UTD. These are generally interested in a career in physics and many are going on to graduate programs. Of course, we like to keep the students we know in our own graduate program, and the fast track program is designed to do that.

But we also support the idea that it may be best for many of the students to attend a different university for their graduate work. We encourage a student to choose a school that has a good reputation in the field of interest to the student.

Two of our best undergraduate students entered the graduate programs at California Institute of Technology. They recently received their PhD degrees from the Engineering School. They found that having a physics undergraduate background put them far ahead of the other engineering graduate students with a background in engineering.

## 6.5 PROBLEMS TO BE ADDRESSED

Our calculus-based fundamentals course is under review in collaboration with the Engineering School.

Pre-Health majors dominate the enrollment of the calculus-based Physics for Biosciences and the algebra-based College Physics sequence. After broad consultation with our colleagues in Biology, the Physics faculty accepted a recommendation from the Physics Undergraduate Curriculum Committee to merge students from Physics for Biosciences and College Physics into the same laboratory course to allow an introduction of experiments with increased relevance for biologists. We plan to implement this change beginning in Fall, 2007.

The physics courses cover a large amount of material in each course. We are looking at ways of streamlining the material to reduce the number of topics covered and allow more time for a better understanding and in-depth treatment of the materials of the courses.

Further development of the bioscience physics sequence is being worked on with input from faculty of the biology department. Plans include exchanges between faculty in introductory biology courses and the physics courses. Each would refer to materials in the other discipline to show the students how the two subjects are related.

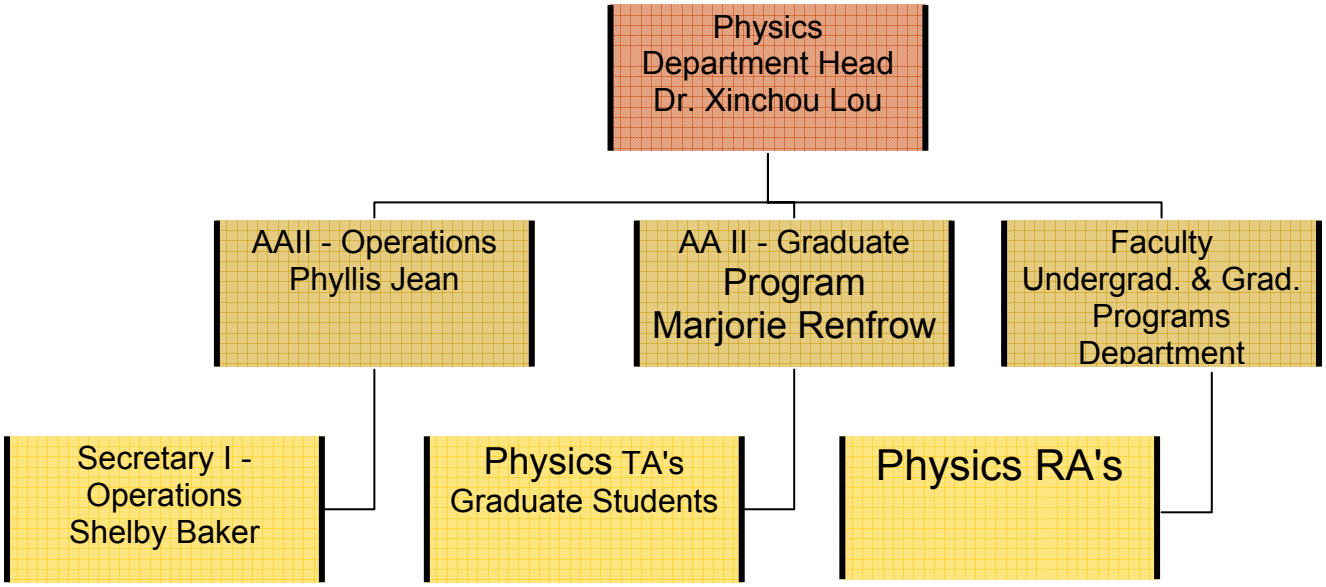
There is pressure from the State of Texas Coordinating Board of Higher Education to reduce the number of credit hours required for each degree offered to 120 hours. Thus far we have been able to justify the 122 hours we require for the Physics degrees. However, this may not be possible in the future. It would be beneficial to the students to have an introductory physics sequence of three or four semesters in duration. This would allow the material to be taught at a reduced pace so that students would better absorb the material. However this is very unlikely in view of the pressure being applied to reduce the duration of the curricula.

A chronic problem is the shortage of physics elective courses. Two elective courses are required for the B.S. degree. We routinely offer Astronomy and will be offering a course in Cosmology. For the other electives we rely either on special topics courses that are taught one-on-one between student and a faculty member that result

in a paper or project, or approved courses in other majors. The problem stems from a shortage of teaching faculty in the department.

# 7. Personnel, Department Administration and Budgets

## Organizational Chart




### 7.1 PERSONNEL

#### 7.1.1 Faculty

In addition to the full-time faculty enumerated in Section 2, several affiliated faculty in other programs on occasion serve as mentors for physics graduate students. They are Cyrus Cantrell (Electrical Engineering), John Ferraris (Chemistry), Wenchuang Hu (Electrical Engineering), Mary Urquhart (Science Education) and Duck J. Yang (Research and Interdisciplinary Studies). Walter Heikkila is retired but is carrying on an active research program. Curricula Vitae of the faculty can be found in Appendix G.

Two Senior Lecturers teach full time (MacAlevey, Ph.D., Rasmussen, M.S.). Three part-time lecturers are employed to teach one course each: Ronald Jackson (KDFW meteorologist, BS with certification) regularly teaches the very popular Weather and Climate course, Jianlong Hu (FedEx, Ph.D.) teaches undergraduate Numerical Methods, and Timothy Renfro (University of Dallas, Ph.D.) teaches Physical Measurements Lab in the summer semester

Several Adjunct Professors regularly augment the faculty program: Ali Aliev (UTD, nanotechnology), A. Glen Birdwell (Texas Instruments, optical properties), David Cline (UCLA, high energy physics), Mario Diaz (UT

Brownsville), Walter Duncan (Texas Instruments, solid state), Joseph Estrera (Northrop Grumman, optical properties), Carlos Lousto (UT Brownsville), Timothy Ostromek (Northrop Grumman, optical properties), Shane Palmer (Texas Instruments, atomic physics), Richard Price (UT Brownsville), Claudiu Rusu (Richland College, nuclear physics). All hold Ph.D. in Physics.

**Physics Departmental Committees**

**Committee on graduate curriculum and education** –
Roy Chaney (Co-chair), Greg Earle (Co-chair)
Philip Anderson, Austin Cunningham, Yuri Gartstein, Rod Heelis, Joe Izen and
Bob Wallace.

**Committee on undergraduate curriculum and education** –
Joe Izen (Chair)
Philip Anderson, Yuri Gartstein, Bob Glosser, Mustapha Ishak-Boushaki,
Paul MacAlevey, Bea Rasmussen

**Physics ad hoc faculty hiring committee**
Xinchou Lou (Chair), Greg Earle, Bob Glosser, Robert Wallace, Anvar Zakhidov

**Physics Self-study/SACS committee**
Bob Glosser (Chair), John Hoffman (adviser), Roy Chaney, Greg Earle, Xinchou Lou, Wolfgang Rindler, Brian Tinsley, Anvar Zakhidov, Paul MacAlevey, Beatrice Rasmussen

**Physics web committee**: Rod Heelis (Chair), Phyllis Jean, Xinchou Lou

**Physics colloquium committee**: Yuri Gartstein (Chair)

**Graduate advisers**: Greg Earle (MSAP), Roy Chaney (Ph.D./M.S.)

**Graduate admission and recruitment committee**
Roy Chaney (Chair), Greg Earle, Bob Glosser, Rod Heelis, Mustapha
Ishak-Boushaki, Margie Renfrow

**Undergraduate advisers**: John Hoffman, Philip Anderson

**Hosts for Visits of Prospective Undergraduates**: Philip Anderson, John Hoffman, Joe Izen

**Standard test evaluation**: Mustapha Ishak-Boushaki

**Annual Physics retreat planning committee**
Xinchou Lou (Chair), Rod Heelis, Phyllis Jean

**Physics Departmental Committees**

- Issues examined and studied in departmental committees.
- Recommendations and issues brought to monthly faculty meetings for vote or further discussions.
- Major decisions on curriculum, faculty hiring, etc. discussed/made at annual Physics Retreat.

### 7.1.2 Research Staff

The department has two associated research centers: the Center for Space Sciences directed by Dr. Roderick Heelis and the Nano Technology Institute under the leadership of Dr. Ray Baughman (Chemistry) and Dr. Anvar Zakhidov (Physics).

The founder members of the Center for Space Sciences, professors Johnson, Hanson, Hoffman, Tinsley, and Heikkila provided the institution with an international reputation for research excellence. With the evolution of the space program, and the center, it now supports the activities of 5 faculty members (Anderson, Earle, Heelis, Hoffman, Tinsley) one emeritus faculty (Heikkila), 4 research scientists (Blomberg, Coley, Hairston, Venkatraman), and 2 post doctoral fellows (Roddy, Zhou). There are presently 8 graduate students actively involved in research projects.

The Nano Technology Institute is a new addition to UTD and is closely associated with the Chemistry department. Its co-founders, Professors Anvar Zakhidov (in Physics), and Ray H. Baughman (Welch Prof. of Chemistry with a joint appointment in Physics)have achieved, during the past 5 years, an international reputation for high impact discoveries and research excellence. Their team has been awarded several international prizes including the NanoVic and the Nano50 prizes and the Scientific American Award. With the evolution of the nanotechnology programs at UTD, supported by SPRING (Strategic Partnership for Research in Nanotechnology) consortium of Texas and also by CONTACT (Consortium for Nanomaterials for Aerospace Commerce and Technology, involving 7 universities in Texas lead by AFOSR) the Nanotech Institute currently supports the activities of 5 faculty members. These are Gartstein, K.J. Cho, Cunningham, Hoffman, Glosser and one prominent visiting faculty, the Pioneer of Nanotechnology, Vladimir Agranovich. In addition, there are 5 research scientists (MaCauley, Aliev (Adjunct in Physics), Zhang, Fang, Kozlov), and 2 post doctoral fellows (Chris Williams, Sezen Demirtas). There are presently 10 graduate students of Physics actively involved in research projects (Alex Kuznetsov, Raquel Ovalle, Joshua Rose, Kamil Mielczarek, Irinder Chopra, Suresh, Mukti Aryal, Dean Hsu, Brian Wang, Hasan Shodiev), and also several undergraduate students.

The High Energy Physics group was founded by Dr. Joseph M Izen and includes two faculty (Izen and Lou), two research scientists (Galyaev and Ye) and two Ph.D. students. The group collaborates on the Babar and Atlas experiments.

### 7.1.3 Administrative, Secretarial and Support Staff

| Staff Name | | | | | | :
|---|---|---|---|---|---|
| Margie Renfrow | PHYS | AAII, graduate programs | FO2.724 | 2884 | margie@ |
| Phyllis Jean | PHYS | AAII, business/budget | FO2.304 | 2840 | phyllis.jean@ |
| Shelby Baker | PHYS | Secretary I, support | FO2.304 | 2835 | shelby.baker@ |
| Keith Swaim (1/4) | PHYS | general support | WT1.816 | 2836 | keith.swaim@ |

The staff consists of three full-time office employees: two Administrative Assistants and one Secretary. The department also shares one part-time Technical Staff Associate with the Center for Space Sciences.

### 7.2 DEPARTMENT ADMINISTRATION

The Department administration is under the direction of the Department Head. The office staff report to him, as does the technical staff. The Department Head is responsible for communication between the Dean of the School of Natural Sciences and Mathematics and the faculty, and for assuring that University policies and budgetary constraints are met. Faculty teaching duties are assigned by the Department Head after receiving input from each faculty member. The Department Head is responsible for ensuring that each faculty member has the proper teaching load credit consistent with the percent FTE on the faculty salary budget.

Advising students on courses, degree plans and career development is an important part of the Physics Department's activities. Dr. Roy Chaney serves as the Graduate Student Adviser with the assistance of the Administrative Assistant of the graduate program. Dr. Greg Earle is the MSAP adviser. Dr. John Hoffman serves as the Associate Undergraduate Dean of Natural Science and Mathematics. Dr. Hoffman heads the department of NS&M Undergraduate Advising which includes four advisers and one secretary. Retention of advisers has been an ongoing problem that in turn results in lack of continuity in recommendations for a student's choice of courses. Undergraduate Advising reviews the progress of NS&M undergraduate students, recommends appropriate courses according to the degree plans of the various departments and maintains the degree plan for each student.

New faculty appointments are handled as follows: a Search Committee is recommended by the Department Head to the Dean. The Committee is usually chaired by the senior faculty member of the field designated for the new appointment opportunity. The Committee conducts the search according to University policy and recommends three or more candidates for visits to the campus. The Search Committee then compiles input from the faculty, determines the top candidate and submits the choice to the faculty for approval. The selected candidate is then recommended by the Department Head to the Dean, who sends his recommendation through the Committee on Qualifications to the Provost.

The duties of administering the Physics Department are divided between the graduate program and department operations:

The Administrative Assistant of the graduate program works with the Graduate Student Adviser. She is the Graduate Counselor and Student Coordinator for all graduate students and is responsible for all timely academic reporting and problem solving for all graduate students. She supervises all Teaching Assistants, making their assignments and ascertaining their completion. She actively recruits applicants for the program, and maintains a liaison with book publishers to receive teaching materials. Her in-house data base provides valuable information for evaluation of students and degree plans, and 30 years of record-keeping have proven invaluable in current reporting procedures. Another innovation she has provided for the past 20 years is the ability to track alumni by way of an alumni newsletter, the WHATSIS.

The Administrative Assistant of operations supervises the Secretary and is responsible for management of departmental finance including fiscal budgets, expenditures, contract and grant oversight, and reconciliation of department accounts; personnel management including coordination of employee searches, hire paperwork and monthly payroll; travel arrangements; and departmental compliance to laws, regulations and policies. The operations Administrative Assistant is also responsible for maintenance of departmental files, equipment and office facilities; sits on department and university committees; serves as the department's liaison to other university units and assists the Department Head with special assignments and projects as directed.
**Error!**

## Pending Staff Changes

- Add AA I for Undergraduate Activities – FY08
  recruitment/admission, counseling,
  overlap with graduate counselor & get trained.

- Expect Margie Renfrow (AA II, graduate counselor) to retire soon after FY08.
  replace with another AA I

### 7.3 ACADEMIC BUDGETS:

The annual State budget is appropriated in several parts: academic salaries (including faculty, full- and part-time lecturers and teaching assistants), staff salaries, and departmental operations (including travel as well as maintenance and operations).

#### 7.3.1 Faculty Salaries Budget:

The salary costs for FY07 were Faculty, $1,280,568, Lecturer, $86,656, and Teaching Assistants, $201,304. Faculty salaries from grants and contracts, typically amounting to 15 to 20 percent of total faculty salaries, constitute buyout which allows the Dean some flexibility in the use of funds in the School.

UTD Physics faculty salaries fall at about the national average. Results from the 2005-06 Physics Faculty Salary Survey, conducted by Florida State University of 76 universities that grant the Ph.D. in physics, show UTD Physics faculty salaries rank 33 out of 76 for the department as a whole. At the professor level, UTD ranks 37 out of 76; at the associate level, 18 out of 76; and 37 out of 76 at the assistant level.

Teaching Assistants receive support at several levels depending on longevity. The base salary is $9550 for the 9-month academic year. Summer support varies from year to year depending on funding, but the base monthly support per T/A remains constant. Research Assistants, paid from contracts and grants, currently receive support at two levels depending on whether they have completed their dissertation proposal defense. Level 1 pays $14,400 and Level 2 pays $15,759 for the 12-month fiscal year.

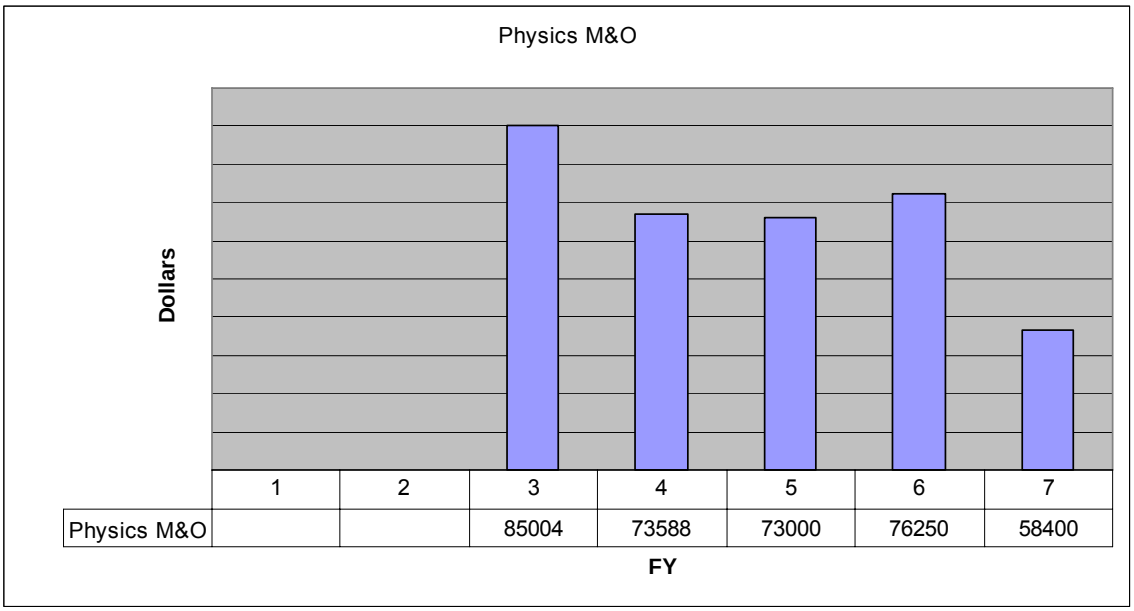
T/As and R/As currently receive a tuition supplement of $3,120 per semester during the academic year, and some receive an additional medical insurance package. The tuition supplement for summer varies but is somewhat less than the spring and fall semesters. In FY07, the Department has 21 T/As, an undergraduate assistant and twelve R/As. The R/As are supported on contracts and grants by the Nanotech, Space Sciences and High Energy Physics groups, and Electrical Engineering.

### 7.3.2 Departmental Operations

The Staff salary budget has remained at a relatively constant level since 2003 while the number and type of positions have varied. The total salary budget has ranged from $115,000 to $119,000 during this period. The FY07 Physics staff is comprised of three full time office personnel and one technical person at 25% FTE, the whole at an annual cost of $116,000.

The departmental Operations budget has declined in the past five years, from a high of $85,004 in FY03 to the current budget of $58,400 in FY07. Maintenance and operations expenses include both fixed and variable costs. Fixed costs include items such as telephones and office machine leases. Variable costs include allocations for colloquium speakers, faculty and student recruiting, teaching lab equipment/acquisition/repair, travel support for faculty and students to attend conferences and meetings, support of Women in Physics summer camps, undergraduate student employee wages, office supplies, copy center charges, postage and miscellaneous operating expenses.

## Department of Physics Finance Status Excluding Infrastructure Fund



# Department of Physics Financial Status Actual Spending and Projections for FY08

| Category | per person or 2004 actual | FY08 | | |
|---|---|---|---|---|
| **Faculty hires and development:** | | | | |
| Faculty interviews for 8 candidates | | | | |
| Ads, 2 positions: Chronicle, Physics Today | $ 1,640.00 | $ 3,280.00 | | |
| Airfare and hotel | $ 750.00 | $ 6,000.00 | | |
| Meals and entertainment | $ 140.00 | $ 1,120.00 | | |
| Faculty travel (6 trips) | $ 1,400.00 | $ 8,400.00 | | |
| New faculty start-up for 2 hires | | | | |
| Travel | $ 2,000.00 | $ 6,000.00 | | |
| Computer and furnishings | $ 5,000.00 | $ 15,000.00 | | |
| Total faculty hires | | | $ | 39,800.00 |
| **Lab/class expenditures for 17/20 instructors:** | | | | |
| Gas Demurrage | $ 1,410.00 | $ 1,660.00 | | |
| Glosser Lab | $ 8,620.00 | $ 8,620.00 | | |
| Faculty Purchases <$1000 | $ 8,000.00 | $ 9,410.00 | | |
| Faculty Purchases >$1000 | $ 9,780.00 | $ 11,510.00 | | |
| Total lab/class expenditures | | | $ | 31,200.00 |
| **Academic expenditures for 17/20 professors:** | | | | |
| Colloquiums, 10 per year | | | | |
| Airfare and hotel | $ 750.00 | $7,500 | | |
| Meals and Entertainment | $ 140.00 | $ 1,400.00 | | |
| Print Services | $ 2,430.00 | $ 2,860.00 | | |
| Total academic expenditures | | | $ | 11,760.00 |
| **Operations for 19/23 personnel:** | | | | |
| Copier: (Lease $2200, usage $450) | $ 2,650.00 | $ 2,740.00 | | |
| Copy Center | $ 320.00 | $ 390.00 | | |
| Freight/Postage | $ 1,220.00 | $ 1,480.00 | | |
| Office Supplies | $ 5,140.00 | $ 6,220.00 | | |
| Physical Plant | $ 1,780.00 | $ 2,160.00 | | |
| Graduate Recruitment (pay for applicants' visits) | $ 600.00 | $ 6,000.00 | | |
| Telecommunications | $ 12,720.00 | $ 15,400.00 | | |
| Total operations | | | $ | 34,390.00 |
| **Total** | | | **$** | **117,150.00** |

## FY08 Operations Needs

AA I: Undergraduate counseling/train-to-get-ready for

graduate counseling

**graduate counselor has been on sick leave frequently, affecting**

**recruitment and advising/counseling programs.**

**growth of Physics UG students and faculty locations problematic**

- M&O and operation fund ($96K) –

**operation with some normalcy**
**aggressive graduate recruitment (graduate jamboree)**
**discretion of the dept. head**

- Teaching Relieve for Core Experimentalists –
  **manage projects, discovery potentials,**
  **enhance chance for future grants/contracts awards**

## 8. Grant Support

| PI | Funding Agency | FY02 AWARD | FY03 AWARD | FY04 AWARD | FY05 AWARD | FY06 AWARD |
|---|---|---|---|---|---|---|
| Anderson | DOD NAVAL RESEARCH LABORATORY NRL | | | | 30,000 | |
| Anderson | NASA | | | | 80,631 | 82,000 |
| Anderson | NASA | | | | 15,000 | 14,980 |
| Chaney | | | 6,056 | | | |
| Coley | NATIONAL SCIENCE FOUNDATION NSF | 60,000 | 120,001 | | | |
| Collins | | | | | | |
| Collins | | 0 | | | | |
| Collins | | 150,000 | 75,000 | | | |
| Collins | DOD US AIR FORCE OFFICE OF SCIENTIFIC RE | 258,000 | 100,000 | 50,000 | | |
| Collins | DOD US AIR FORCE OFFICE OF SCIENTIFIC RE | | 564,000 | 614,000 | | 10,000 |
| Collins | DOD US AIR FORCE OFFICE OF SCIENTIFIC RE | | 75,000 | 150,000 | 150,000 | 75,000 |
| Collins | Southwest Research Institute | | | 4,159 | | |
| Cumnock-Blomberg | NATIONAL SCIENCE FOUNDATION NSF | 80,272 | 82,677 | | | |
| Cumnock-Blomberg | NASA GOODDARD SPACE FLIGHT CENTER GSFC | | | 89,369 | | 94,813 |
| Cumnock-Blomberg | | 0 | | | | |
| Cumnock-Blomberg | NATIONAL SCIENCE FOUNDATION NSF | | | | | 91,788 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Cunningham | UTSWMCD NASA | | | | | |
| Earle | NASA GOODDARD SPACE FLIGHT CENTER GSFC | 411,667 | 270,000 | | | |
| Earle | NASA | 59,966 | | | | |
| Earle | NATIONAL SCIENCE FOUNDATION NSF | | | | | 71,928 |
| Earle | NASA GOODDARD SPACE FLIGHT CENTER GSFC | | 190,489 | 190,489 | 299,355 | |
| Earle | NASA GOODDARD SPACE FLIGHT CENTER GSFC | | | | | 170,843 |
| Fenyves | | 10,000 | | | | |
| Fenyves | | | 20,000 | | | |
| Fenyves | | | 20,000 | | | |
| Fenyves | DEPT OF ENERGY FERMI NATIONAL ACCELERATO | | | | | |
| Fesen | | 0 | | | | |
| Fesen | | 0 | | | | |
| Fesen | | 75,074 | | | | |
| Hairston | NASA | 80,000 | | | | |
| Hairston | NATIONAL SCIENCE FOUNDATION NSF | 70,001 | 140,000 | | | |
| Hairston | NATIONAL SCIENCE FOUNDATION NSF | | 72,896 | 76,865 | | |
| Hairston | NATIONAL OCEANIC & ATMOSPHERE ADMIN NOA | | | 50,500 | 50,000 | |
| Hairston | NASA GOODDARD SPACE FLIGHT CENTER GSFC | | | | 30,304 | |
| Heelis | DOD | 10,000 | | | | |
| Heelis | | | | | | |
| Heelis | NASA GOODDARD SPACE FLIGHT CENTER GSFC | 2,238,667 | 2,275,648 | 496,000 | 869,467 | 270,371 |
| Heelis | NASA GOODDARD SPACE FLIGHT CENTER GSFC | 15,947 | 71,053 | 6,000 | | |
| Heelis | NASA GOODDARD SPACE FLIGHT CENTER GSFC | 48,773 | 23,227 | | | |
| Heelis | NASA GOODDARD SPACE FLIGHT CENTER GSFC | 164,472 | 405,528 | 99,000 | 119,847 | |
| Heelis | DOD | 27,517 | 47,500 | 33,000 | | |
| Heelis | | 0 | | | | |
| Heelis | | 0 | | | | |
| Heelis | DOD UNITED STATES AIR FORCE | 34,348 | 60,290 | 36,452 | 32,575 | |
| Heelis | DOD UNITED STATES AIR FORCE | 40,753 | 32,782 | 16,153 | 41,394 | 33,943 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heelis | NASA | 67,435 | 70,053 | | | |
| Heelis | DOD | 24,000 | 24,000 | | | |
| Heelis | US AIR FORCE RESEARCH LAB (AFRL) | | | 196,078 | 343,137 | |
| Heelis | NATIONAL SCIENCE FOUNDATION NSF | | | | 78,510 | 80,866 |
| Heelis | BALL AEROSPACE/INTEGRATED FUNDING OFFICE | | | | 135,000 | 185,000 |
| Heelis | REGENTS OF THE UNIV OF CALIFORNIA/DOE | | | | 39,125 | |
| Heelis | DOD UNITED STATES AIR FORCE | | | | | |
| Heelis | Ball Aerospace | | | 7,100 | | |
| Hekkila | | 0 | | | | |
| Hoffman | | 159,800 | | | | |
| Hoffman | ORBITAL TECHNOLOGIES CORP NASA | | | 70,000 | | 69,000 |
| Hoffman | | | | | | |
| Hoffman | | | | | | |
| Hoffman | | 20,738 | | | | |
| Hoffman | | 49,811 | 94,985 | | | |
| Hoffman | NASA | | 10,000 | | | |
| Hoffman | NASA | | 30,000 | | | |
| Hoffman | UNIVERSITY OF ARIZONA/JET PROPULSION LAB | | | 1,550,000 | 3,086,977 | 577,000 |
| Hoffman | UNIVERSITY OF ARIZONA/JET PROPULSION LAB | | | | | |
| Hoffman | NASA JOHNSON SPACE FLIGHT CENTER JSFC | | | | | 126,798 |
| Hoffman | NASA | 34,000 | | | | |
| Ishak-Boushaki | HOBLITZELLE FOUNDATION | | | | | 56,369 |
| Izen, Lou | Dept. of Energy | 305,626 | | | | |
| Izen, Lou | | 219,000 | | | | |
| Izen, Lou | DOE OAKLAND FIELD OFFICE | 61,851 | (14,610) | 50,862 | | 265,000 |
| Izen, Lou | DOE OAKLAND FIELD OFFICE | 149,149 | 332,837 | 162,722 | | 151,611 |
| Izen, Lou | DOE OAKLAND FIELD OFFICE | | | 26,415 | | 44,965 |
| Tinsley | NSF | 64,237 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Tinsley | NSF | 65,051 | | | |
| Tinsley | NATIONAL SCIENCE FOUNDATION NSF | 58,714 | 56,000 | 60,932 | 64,155 |
| Venkatraman | NATIONAL SCIENCE FOUNDATION NSF | 78,729 | 82,246 | 83,513 | |
| Zakhidov | DOD US AIR FORCE OFFICE OF SCIENTIFIC RE | 130,000 | 153,245 | 157,221 | 19,385 |
| | **4,991,104** | **5,531,906** | **4,266,655** | **5,687,988** | **2,488,795** |

# 9. Student Physics Organizations

## *Student Physics Society*

**President: Kathleen Morgan**
**Vice President: Omar Shankles**
**Faculty Advisor: Xinchou Lou**
**Membership: 60**

The UTD chapter of the Society of Physics Students (SPS) is involved in a number of activities. Each semester, the group holds some kind of contest, whether it involves measuring the height attained by a rocket, constructing edible cars, or launching eggs with a catapult. The UTD chapter won the SPS Outstanding Chapter Award for the 2002-2003 academic years as well as receiving national funding for a student-led experiment investigating probable causes of the Marfa Lights.

The group has a student lounge in Founders (FO 1.406) that is open most hours. They share the lounge with their sister society, Women in Physics. The SPS goal is to project the image that it is cool to be all about physics as well as have help for those who need it.

The UTD SPS all-volunteer student-run tutoring program offers science and math help at no charge to UTD students. They provide a relaxed environment for UTD students to talk about physics. The facilities include chalkboards to aid in discussions, tables to study at, and computers to check online homework. To maintain the casualness, they have a microwave and a donations-only snack bar.

Besides making the topic of physics more approachable, the organization sponsors science related movies in Kusch Auditorium. They also organize potluck dinners. At the end of last semester, the chapter organized a two-day camping trip to Lake Whitney.

### *Women in Physics*

**President: Renee Stranely**
**Vice President: Faranak Zarnani**
**Faculty Advisors: Mary Urquhart, Joe Izen**
**Membership: 31**

The Women in Physics (WIP) at UTD was founded in 2003 to expose students to female scientist role models. This was done in order to create an awareness of women's contributions to the scientific field and to provide a positive, supportive environment for female science majors. There are many activities that the Women in Physics participate in each year including Sounds of Class, public telescope observing with the Texas Astronomical Society and student/faculty mixers. The spotlight activity each year for WIP is the Summer Physics Camp. The camps are designed for girls in junior high school. There are two camps each year, each lasting one-week. One week is a basic camp that focuses each day on a different area of physics. The second week is an advanced camp for students returning from the previous year. Camp participants are introduced to physics principles more advanced than they may receive in their schools in a fun and exciting way with hands on activities. With an all female staff, physics camp lets these girls see that physics can be a rewarding career path for women. Membership in The Women in Physics at the University of Texas at Dallas is open to both male and female students and faculty at UTD.

## 10. OUTREACH

The Physics Department outreach programs have included a Physic Circus that is performed both on campus in the Kusch Auditorium and at various high school and middle school sites. It consists of a series of physics demonstrations designed to attract the interest of young people and stimulate their curiosity about the world. The idea is to present the demonstrations without explanation as an entertainment feature, but with stimulation of the curiosity of the students as a learning tool. The typical show lasts about 45 minutes.

Typical demonstrations include a set of Magdeburg hemispheres that cannot be pulled apart when evacuated; a large spool with a band of stiff cloth wound around the center cylinder that when pulled horizontal to the floor causes the spool to roll in a direction not intuitively obvious; a magnet that takes 8 seconds (counted as chimpanzees) to fall through a 6 foot long aluminum tube; standing waves in a stretched elastic chord showing up to 20 harmonics; bottles half filled with different viscosity materials that have races down an incline plane (the one with lead shot does not roll at all); a 10 in. diameter glass cylinder filled with saturated air that is pumped up to 25 PSI and then the air is suddenly released with a corresponding loud bang to show cooling upon expansion; Styrofoam balls that float on air streams; a Van de Graff machine; a Jacob’s ladder; and a banana frozen in liquid nitrogen that is used as a hammer.

Most shows are done on campus in the Kusch auditorium because we have facilities like vacuum pumps, water, a sink and compressed air. These are typically not available off campus.

Another outreach activity associated with the Physics Department is the Women in Physics summer camp for middle school girls. This runs for 5 days and is a hands on activity from which the girls learn some basic physics.Women in Physics is a group of women in the graduate and advanced undergraduate programs in physics. It is geared toward 7th grade girls. About 20 students are in the camp each year. This past summer a

second week of camp was organized for girls who had been to the previous year camp. More advanced experiments were presented to this group.

Scholars Day is a recruitment activity of the University Admissions Office. It is designed to attract prospective freshmen for the next fall's class. It is geared towards high school juniors and seniors and their parents. Activities include a popular lecture by one of the faculty, a presentation on the degrees offered, courses required, and typical schedule, and an Information Fair where students and parents can interact one-on-one with faculty. There are four Scholars Days scheduled each year.

Another outreach activity involves UTD hosting the regional Science Olympiad on March 31, 2007. The Science Olympiad is a nonprofit organization to increase student interest in science and recognize outstanding achievement in science education. This is one step in a national Science related competition for high school and junior high students. The students, their parents, and their coaches will be on campus for this event. Beatrice Rasmussen is developing the Physics Lab exercise for the high school students this year. This will consist of a lab exercise with calculations to be performed and questions to be answered.

A number of Physics faculty members have been research mentors for local high school students who participate in UTD's Clark program. These students come to UTD for several weeks of the summer and participate in research with their particular mentor. Some of these students have gone on to do their academic work at UTD and two are currently enrolled as Ph.D. Candidates.

## 11. PRODUCTIVITY

### Productivity-Research

| Faculty | CY2005 (CY2004) Major Publications | CY2005(CY2004) Invited Talks |
|---|---|---|
| [redacted] | 4 | 5 |
| [redacted] | 3 | 2 |
| [redacted] | 3 | 1 |
| [redacted] | 1 | 3 |
| [redacted] | 0 | 2 |
| [redacted] | 8 | 11 |
| [redacted] | 2 | 0 |
| [redacted] | 4 | 6 |
| [redacted] | 0 | 0 |
| [redacted] | 0 | 0 |
| [redacted] | 3 | 8 |
| [redacted] | 3 | 4 |
| [redacted] | 64 | 7 |
| [redacted] | 64 | 4 |
| [redacted] | 4 | 3 |
| [redacted] | 0 | 0 |
| Total | 99 (81) | 56 (38) |
| | (w/o HEP) 35 (22) | |

**Productivity-Teaching**

| Semester | No. Large UG Service Courses | Other UG Courses | Graduate Courses | All Courses |
|---|---|---|---|---|
| **AY2007 (planned)** | **7+1+1 (PHYS/ISNS/NATS)** | **26+2+3 (PHYS/ISNS/NATS)** | **12** | **52** |
| **Fall 2006** | **6+1+1 (PHYS/ISNS/NATS)** | **25+2+3 (PHYS/ISNS/NATS)** | **12** | **50** |
| **Spring 2006** | **6+2+0** | **28+2+0** | **10** | **48** |
| **Fall 2005** | **6+1+1** | **24+2+3** | **11** | **48** |
| **Fall 2004** | **5+1+1** | **21** | **10** | **38** |

**No net faculty increases during 2004-2006**
**(**Panhuis left UTD, hired Ishak-Boushaki)