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**Department
of
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I. FOREWARD

This year saw a successful conclusion to the campus-wide self-study, and the return of the department to full strength with the hiring of Dr. Liping Gan. At the same time the department continues to struggle with low numbers of majors and an increasingly tight operating budget.

Together, Drs. Black (hired in 1999) and Gan represent an expertise and vitality in nuclear physics that is remarkably strong for a department this size, and positions UNC Wilmington as an up-and-coming leader in this field. Obvious benefits include enhanced program visibility within the southeast region [and beyond], and heretofore-unmatched research opportunities for UNCW undergraduates at nationally recognized laboratories. Two undergraduate majors will assist Dr. Gan with her research at Jefferson Lab in the summer of 2002.

On another bright note, the evaluation team representing the Southern Association of Colleges and Schools (SACS) accrediting agency wrapped up its four-day visit to UNCW on Feb. 28 with an exit report that featured a rare and extraordinary commendation. The campus visit culminated two years of self-study and assessment by the university as part of the re-accreditation process that takes place every 10 years. The visiting team consisted of 14 evaluators from colleges and universities across the South and a staff representative from SACS. Based on their review, the team reported preliminary findings during the exit report offering six recommendations and two suggestions for improvement. Donna Wilkinson, SACS staff representative, noted that in her five years with the agency only one other institution that she helped review had fewer recommendations. Thanks go to all physics faculty who participated in the self-study for a job well done.

The decade-long, 25% decline in the number of baccalaureate physics degrees awarded in the U.S. is well documented, and UNCW has not been immune to this unfortunate trend. Last year the number of majors in the department dipped to 12, but vigorous efforts to combat the decline – especially those aimed at recruiting more double majors – have been effective. As of this writing, the number of majors stands at about 20, reason for optimism but still leaving plenty of room for improvement. The recent growth in nuclear physics research opportunities for our undergraduates promises to be one strong “selling point”, but more remains to be done. With its oceanography emphasis, the department is in a unique position (for a physics department) to add to the growing body of knowledge surrounding the important issues of global warming, coastal erosion, and storm (hurricane) development and tracking. In the coming year we will be looking for ways to exploit this resident faculty expertise in oceanography and the environment, and to repackage our curricula to attract students interested in those areas.

Finally, we note with sadness the passing of Dr. Irvin Clator, who died September 19, 2001 at Duke University Medical Center following a brief illness. Dr. Clator retired from UNCW in 1999 after 36 years of service, including a stint as Physics Department chair in the late 1970's.

Curt A. Moyer
June 2002

II. ORGANIZATION

1. Staff

Frances C. Brown, Department Secretary

Professors

Moorad Alexanian	Ph.D. Indiana University, 1964
Brian F. Davis	Ph.D. North Carolina State University, 1982
Marvin K. Moss	Ph.D. North Carolina State University, 1961
Curt A. Moyer	Ph.D. State University of New York at Stony Brook, 1971
Edward A. Olszewski, Jr.	Ph.D. University of North Carolina at Chapel Hill, 1976

Associate Professors

Frederick M. Bingham	Ph.D. University of California, San Diego, 1990
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Assistant Professors

Timothy C. Black	Ph.D. University of North Carolina at Chapel Hill, 1995
Liping Gan	Ph.D. University of Manitoba, Winnipeg, Canada, 1998

2. Departmental Committees for 2001-2002

Lab Development Committee

T. Black, *chairperson*
B. Davis
L. Gan
C. Moyer

Curriculum Committee

C. Moyer, *chairperson*
F. Bingham
M. Moss
E. Olszewski

Colloquium Coordinator

M. Alexanian

SACS Review Committee

All tenure-track faculty
C. Moyer, *chairperson*

SPS | Sigma Pi Sigma Advisor

T. Black
C. Moyer

Computing Resources

Coordinator
E. Olszewski

Faculty Senate Representative

F. Bingham

Academic Advising

M. Alexanian
B. Davis

Library Representative

L. Gan

II. FACULTY

1. Areas of Specialization

- **Atomic Physics**
Charge exchange in atomic collisions; response of atoms to intense electromagnetic fields; atomic structure studies; autoionization.
Professors *Alexanian, Davis, Moyer*
- **Marine Sciences**
Large-scale physical oceanography; observational oceanography; physics of the oceans.
Professors *Bingham, Moss*
- **Nuclear and Particle Physics**
Low energy few-nucleon systems; hypernuclear physics; quantum chromodynamics; string theory.
Professors *Black, Gan, Olszewski*
- **Physics Education**
Multimedia-based techniques for teaching introductory physics. General physics pedagogy.
Professors *Black, Moyer*

2. Honors and Awards

Dr. Fred Bingham

Appointed webmaster for the Ocean Sciences Section of the American Geophysical Union, and de facto member of the Ocean Sciences Section Executive Council.

Dr. Timothy Black

Selected as one of 65 individuals nationwide to participate in the New Faculty Workshop November 8-11, 2001, at the American Center for Physics in College Park, Maryland. This annual event brings together resourceful new faculty and exposes them to the latest methodology in physics education.

Summer research appointment at TUNL/Duke University from May 13 to June 21, 2002 to conduct experimental research in low energy few-nucleon physics and to develop sophisticated new detection instruments.

Dr. Marvin Moss

Principal investigator on the NOAA supported Coastal Ocean Research and Monitoring Program (CORMP). The project is multidisciplinary and involves investigators from UNCW Departments of Biological Sciences, Chemistry, Earth Sciences, and Physics and Physical Oceanography. Professor Moss also developed a proposal to establish a new coastal monitoring program at the University of South Carolina. The USC program is slated to begin in June 2002.

3. Grants and Gifts (awarded 2001-2002)

Agency and Investigators	Title Subject	Amount
National Oceanic and Atmospheric Association Marvin Moss (with 10 project co-PI's, including Bingham, F.)	<i>“Southeast Atlantic Marine Monitoring and Prediction Center: 2001 Coastal Ocean Research and Monitoring Program (CORMP)”</i>	\$925,000
Friends of UNCW Timothy Black	Pellicle beam splitter and neutral density optical filter.	\$358
TUNL/Duke University Timothy Black	Summer research support	\$5000
UNC Chapel Hill Nuclear Group Timothy Black	Summer research support	\$2500
National Science Foundation Liping Gan	<i>“Precision Measurements of Electromagnetic Properties of Light Pseudoscalar Mesons at 12 GeV via the Primakoff Effect”</i>	\$12,500

Proposal Submissions (2001-2002)

1. **Bingham, F.** *“Characteristics of mid-Latitude North Pacific Sea Surface Salinity Variability”*, to NASA Oceans and Ice; amount requested: \$202,965 (pending); to NOAA Climate and Global Change; amount requested: \$193,000 (declined); to NSF; amount requested: \$202,965 (declined).
2. **Bingham, F.** (with S. Howden), *“Characteristics of Open Ocean Sea Surface Salinity Variability”*, to NOAA Climate and Global Change; amount requested: \$236,000 (declined).
3. **Bingham, F.** (with S. Howden), *“Investigations into Sea Surface Salinity Variability from the Historical Database”*, to NSF; amount requested: \$124,513 (declined).
4. **Black, T.** (with M. Arif), *“High precision measurements of coherent neutron cross-sections of few-nucleon systems and fissionable nuclei”*, to DOE; amount requested: \$799,000 (pending).
5. **Gan, L.** *“Precision Measurements of Electromagnetic Properties of Light Pseudoscalar Mesons at 12 GeV via the Primakoff Effect”*, to NSF; amount requested: \$12,500 (approved).
6. **Gan, L.** *“Development of a High Precision Hybrid Electromagnetic Calorimeter at JLab”*, to Jefferson National Lab; amount requested: \$15,960 (pending).
7. **Moss, M.** (with 10 project co-PI's, including **Bingham, F.**), *“Southeast Atlantic Marine Monitoring and Prediction Center: 2002 Coastal Ocean Research and Monitoring Program (CORMP)”*, to National Oceanic and Atmospheric Association; amount requested: \$922,000 (pending).

8. **Moss, M.** “Operational Support of Cara-COOPS”, sub-contract request to University of South Carolina; amount requested: \$249,000 (pending).

4. Publications

1. **Alexanian, M.** “Generation of photonic superposition states by two-photon absorption”, Journal of Luminescence 94-95, 283 (2001).
2. **Alexanian, M.** “Macroscopic quantum superpositions: Atom field entangled and steady states by two-photon processes”, Physical Review A65, 033819 (2002).
3. **Bingham, F.** (with T. Suga and K. Hanawa), “The Origin of Waters Observed along 137°E”, Journal of Geophysical Research (2002). In press.
4. **Bingham, F.** (with L. Cahoon et. al.), “Monitoring the Coastal Ocean: Responses to Hurricane Floyd” pp. 247-253 in Facing Our Future: Hurricane Floyd and Recovery in the Coastal Plain, Coastal Carolina Press, Wilmington, NC.
5. **Black, T.** (with F. Xiong et. al.), “Precision measurement of the spin-dependent asymmetry in the threshold region of $^3\text{He}(e, e')$ ”, Phys. Rev. Lett. 87 (2001).
6. **Gan, L.** (with D. Gaskell et. al.), “Measurement of Longitudinal and Transverse Cross-Sections in The $\text{He-3}(E, E\text{-Prime Pi}^+)\text{H-3}$ Reaction At $W = 1.6\text{-Gev}$ ”, Phys. Rev. C65, 011001 (2002).
7. **Gan, L.** (with H. Kohri et. al.), “Study of The $\text{C-13}(\Lambda)$ Hypernucleus by The $\text{C-13}(K^-, \text{Pi-Gamma})$ Reaction”, Phys. Rev. C65, 034607 (2002).
8. **Gan, L.** (with T. Tamagawa et. al.), “The Xi N Interaction in Quasi-Free Xi^- Production”, Nucl. Phys. A691, 234 (2001).
9. **Gan, L.** (with A. Sakaguchi et. al.), “Recent Data from E929 Experiment At BNL”, Nucl. Phys. A691, 205 (2001).
10. **Gan, L.** (with B. Zeidman et. al.), “Electroproduction of Kaons on Light Nuclei”, Nucl. Phys. A691, 37 (2002).
11. **Gan, L.** (with D. Gaskell et. al.), “Longitudinal Electroproduction of Charged Pions From $\text{H-1}, \text{H-2}, \text{HE-3}$ ”, Phys. Rev. Lett. 87, 202301 (2001).
12. **Gan, L.** (with J.K. Ahn et. al.), “Production of $\Lambda\Lambda^4\text{He}$ Hypernuclei”, Phys. Rev. Lett. 87, 132504 (2001).
13. **Gan, L.** (with S. Ajimura et. al.), “Observation of Spin Orbit Splitting in Lambda Single Particle States”, Phys. Rev. Lett. 86, 4255 (2001).
14. **Gan, L.** (with E.C. Schulte et. al.), “Measurement of The High Energy Two-Body Deuteron Photodisintegration Differential Cross Section”, Phys. Rev. Lett. 87, 102302 (2001).
15. **Gan, L.** (with L. Lee et. al.), “Search for Strangeness -2 Hypernuclei”, Nucl. Phys. A684, 598 (2001).
16. **Gan, L.** (With F. Merrill Et. Al.), “ H-Dibaryon Search Via Ξ Capture on The Deuteron”, Phys. Rev. C63, 035206 (2001).
17. **Gan, L.** (with K. Tanida et. al.), “High-Resolution Gamma-Ray Spectroscopy of Hypernuclei with Germanium Detectors”, Nucl. Phys. A684, 560 (2001).
18. **Gan, L.** (with J. Reinhold et. al.), “Electroproduction of Kaons and Light Hypernuclei”, Nucl. Phys. A684, 470 (2001).

5. Talks Presented and Meetings Attended

Contributed Talks

1. **Alexanian, M.** “*Generation of Photonic Superposition States by Two-photon Absorption*”, paper presented to the 13th International Conference on Dynamical Processes in Excited States of Solids, in Lyon, France (July 1-4, 2001).
2. **Alexanian, M.** “*Macroscopic Quantum Superpositions: Atom-field Entangled and Steady States by Two-photon Processes*”, paper delivered to the 68th Annual Southeastern Section Meeting of the American Physical Society, in Charlottesville, VA (November 2001).
3. **Bingham, F.** “*The Coastal Ocean Research and Monitoring Program at the University of North Carolina at Wilmington*”, poster presented to the Southeastern Coastal Ocean Observing System planning meeting in Miami, FL, June 27-29, 2001 and to the AGU Ocean Sciences Meeting, Honolulu, Hawaii, February 11-15, 2002.
4. **Bingham, F.** “*Coastal Ocean Monitoring in Onslow Bay, North Carolina: Preliminary Results from the Physical Observations*”, poster presented to DU/NCOC meeting in Beaufort, NC, November 16-17, 2001.
5. **Bingham, F.** “*The Origin of Waters Observed along 137°E*”, “*Sea Surface Salinity in the Historical Database*”, “*Kinematics of the Middle and Outer Shelf of the South Atlantic Bight: A Comparison of Moored Observations*”, presentations made to the AGU Ocean Sciences Meeting, Honolulu, Hawaii, February 11-15, 2002.
6. **Bingham, F.** (with A. Quattrini) “*Diversity and Concentration of Ichthyoplankton in Shelf and Gulf Stream Waters in Onslow Bay, NC*”, poster presented to the American Society of Ichthyology and Herpetology, State College, PA, July 10, 2001.
7. **Gan, L.** “*The Result of PbWO₄ Crystal Prototype Detector Beam Test in 2001*”, presentation made to the PrimEx international collaboration meeting in Newport News, VA, November, 2001.
8. **Gan, L.** “*Forward Electron Compton Scattering and Absolute Energy Calibration of Tagged Photon Beams*”, presentation made to the PrimEx international collaboration meeting in Newport News, VA, March 8, 2002.
9. **Gan, L.** “*Development of a High Precision Hybrid Electromagnetic Calorimeter at JLab*”, paper delivered to the meeting of the American Physical Society in Albuquerque, NM, April 20-23, 2002.
10. **Moss, M.** “*The Coastal Ocean Research and Monitoring Program at the University of North Carolina at Wilmington*”, poster presented to the AGU Ocean Sciences Meeting, Honolulu, Hawaii, February 11-15, 2002.
11. **Moyer, C.,** “*Teaching Quantum Physics with QMTools*” paper delivered to the 123rd meeting of the American Association of Physics Teachers in Rochester, NY, July 21-25, 2001.
12. **Moyer, C.,** “*Visualizing Time-Dependent Quantum Phenomena With QMTools*”, paper delivered to the 68th meeting of the Southeastern Section of the American Physical Society in Charlottesville, VA, November 4-6, 2001.
13. **Moyer, C.,** “*Visualizing Time-Dependent Wavefunctions With QMTools*”, paper delivered to the 124th meeting of the American Association of Physics Teachers in Philadelphia, PA, January 19-23, 2002.

Invited Presentations

14. **Black, T.** “*Nuclear Reaction and Scattering Theory: Distilling Knowledge From Numbers*”, seminar presented to the Physics Department at Duke University, June 13, 2002.
15. **Black, T.** “*Notes from the teaching underground: The ugly truth and how to begin to win the science education war*”, Department of Physics and Physical Oceanography colloquium, UNC Wilmington, November 30, 2001.
16. **Moyer, C.**, “*Teaching Quantum Physics with QMTools*”, Department of Physics and Physical Oceanography colloquium, UNC Wilmington, November 2, 2001.

6. Community Service

Especially noteworthy examples of community service for the 2001-2002 academic year include:

1. Professor **Moorad Alexanian** contributed a letter titled “*Humans and Consciousness*” to *Perspectives on Science and Christian Faith* 54, 65 (2002).
2. Professor **Fred Bingham** contributed the piece “*Hurricane Warning*” to the Physics Department newsletter published in April, 2002. Professor Bingham also volunteered at the Carolina Beach School, teaching math and computer skills to gifted fifth grade students.
3. Professors **Timothy Black** and **Edward Olszewski** made public presentations at the Cape Fear Museum’s *Annual Science Spectacular* in April 2002. Professor Black also presented a demonstration for the *Science of Sports* show held at the Cape Fear Science Museum, March 2002.
4. Professor **Brian Davis** again served as Event Leader for the *Wilmington Regional Science Olympiad*, February 2002.
5. Professor **Brian Davis** has assembled for the Department a collection of more than 15 meteorites, including a rare piece of Mars. The UNCW collection was featured at the *2001 Cape Fear Fair and Expo* held in Wilmington October 18-27, 2001. Professor Davis was on hand for several hours during all but one of the ten fair days to safeguard the collection and take questions from the public. He also spent countless hours developing and mounting explanatory material for each meteorite in the exhibit, and is now seeking to display the collection permanently in DeLoach Hall.
6. Professor **Curt Moyer** served as a judge for the Science Fair held at the MCS Noble Middle School, March 2002.
7. Professor **Marvin Moss** serves on the Alumni Executive Board of Elon University, and the Board of Directors of the Eastern NC Area Health and Education Commission (AHEC). AHEC is affiliated with the New Hanover Regional Hospital.

III. ACADEMIC ENRICHMENT & SUPPORT PROGRAMS

1. Course Offerings and Enrollments

Summer 2001	Instructor	Enrollment
PHY 101 Elementary College Physics	Herman.	66
PHY 102 Elementary College Physics	Black	38
PHY 201 General Physics	Olszewski	62
PHY 202 General Physics	Olszewski	52
Fall 2001		
PHY 101 Elementary College Physics	Herman	64
PHY 101 Elementary College Physics	Moyer	64
PHY 101 Elementary College Physics	Bingham	80
PHY 103 Great Ideas in Physics	Alexanian	32
PHY 105 Introductory Physics	Olszewski	33
PHY 201 General Physics	Olszewski	38
PHY 201 General Physics	Black	36
PHY 201 General Physics-Honors Lab	Black	11
PHY 260 Introduction to Astronomy	Davis	80
PHY 311 Mathematical Physics	Alexanian	4
PHY 321 Mechanics	Davis	6
PHY 335 Modern Physics	Moyer	7
PHY 400 Advanced Laboratory	Black	3
PHY 411 Electricity & Magnetism	Alexanian	4
PHY 444 Quantum Theory	Herman	2
Spring 2002		
PHY 102 Elementary College Physics	Herman	59
PHY 102 Elementary College Physics	Moyer	48
PHY 102 Elementary College Physics	Bingham	72
PHY 105 Introductory Physics	Olszewski	34
PHY 111 Archaeoastronomy	Davis	41
PHY 202 General Physics	Olszewski	31
PHY 202 General Physics	Black	23
PHY 202 General Physics-Honors Lab	Black	8
PHY 260 Introduction to Astronomy	Davis	76
PHY 322 Mechanics	Moss	2
PHY 400 Advanced Laboratory	Black	6
PHY 412 Electricity & Magnetism	Alexanian	2
PHY 475/575 Physical Oceanography	Bingham	7
PHY 495 Physics Seminar	Davis	1

2. Innovative Teaching Initiatives

Consistent with its commitment to offer a quality physics degree program, the Department recognizes the following enrichment initiatives for 2001-2002:

Professor **Timothy Black** continues to teach an Honors section of physics laboratory for the introductory calculus-based sequence PHY 201-202. The honors lab has been an unqualified success and consistently reaches its enrollment target.

3. Research Opportunities for Undergraduates

The following research projects were active during the 2000-2001 academic year:

1. The “*Syros Project*” is a parasitic, distributed parallel processing network for carrying out complex and time consuming physics calculations utilizing unused CPU time on host machines included in the network. The ongoing effort is supervised by Professor **Timothy Black**, and again this year involved several undergraduate Physics majors
2. The “*QMTools Project*”, directed by Professor **Curt Moyer** and supported by a National Science Foundation grant, is developing multimedia-based materials for teaching quantum physics. Programming for the project is being carried out with assistance from a computer science undergraduate who will matriculate in May 2002.
3. Professor **Timothy Black** initiated an interdisciplinary study entitled “*A Comparative Bayesian Analysis of the Environmental and Economic Utilities of Pursuing Nuclear vs. Fossil Fuel Energy Strategies*”. The project involves one undergraduate physics major, and will be entered in the Undergraduate Research Award competition for 2002-2003 sponsored by the Society of Physics Students.
4. Professor **Liping Gan** has selected two undergraduate physics majors to assist this summer with her research at Jefferson Lab developing a low energy recoil detector. The students are supported by research grants from NSF and Jefferson Lab, and are expected to continue their efforts on campus during the coming academic year under Professor Gan’s tutelage.

4. Physics Department Colloquia

Date	Speaker/Affiliation	Title
October 19, 2001	Dr. Ashot Gasparian, Hampton University	<i>Symmetry Breaking Phenomena in Physics and the Neutral Pion Lifetime</i>
November 2, 2001	Dr. Curt Moyer, University of North Carolina at Wilmington	<i>Teaching Quantum Physics with QM Tools</i>
November 9, 2001	Dr. Gabriela Gonzalez, Louisiana State University	<i>Gravitational Waves: a new window to the Universe</i>
November 16, 2001	Dr. Anna L. Lin, Duke University	<i>Frequency locking of reaction-diffusion patterns</i>
November 30, 2001	Dr. Tim Black, University of North Carolina at Wilmington	<i>Notes from the teaching underground: The ugly truth and how to begin to win the science education war</i>
December 7, 2001	Dr. Shelly A. Page, University of Manitoba	<i>A Status Report on the Weak Nuclear Force</i>
January 31, 2002	Dr. Gurudas Ganguli, The Naval Research Laboratory	<i>Plasma Dynamics in the Earth's Auroral Region</i>
February 22, 2002	Dr. David Haase, North Carolina State University	<i>Manipulating Spins, Making Nuclei</i>
February 28, 2002	Dr. John Hubisz, North Carolina State University	<i>Science and Religion: A University Course</i>
March 1, 2002	Dr. Raffi Nazikian, Princeton Plasma Physics Lab	<i>Recent Developments and Future Directions in Fusion Energy Science</i>
March 15, 2002	Dr. Christian Iliadis, University of North Carolina, Chapel Hill	<i>New quests in nuclear astrophysics</i>
March 22, 2002	Michael Shaffer and Shane Oakley, University of North Carolina at Wilmington	<i>Superseding Darwin: The Future of Biophysics</i>
April 11, 2002	P.K. Kabir, University of Virginia, Charlottesville	<i>Creators of the Quantum Theory</i>
April 12, 2002	P.K. Kabir, University of Virginia, Charlottesville	<i>Triumphs and Challenges of Quantum Theory</i>
April 19, 2002	Dr. Dmitri Khveshchenko, University of North Carolina, Chapel Hill	<i>Dirac fermions in layered graphite and elsewhere</i>
April 26, 2002	Dr. Daniel Gauthier, Duke University	<i>"Fast" and "Slow" Light</i>
May 20, 2002	Scott Watson, Brown University	<i>Stabilization of Extra Dimensions: A Brane Gas Approach</i>

5. SPS/ΣΠΣ Activities

On April 11, 2002, undergraduate students Douglas Scott King and Jeremy Dale Pesicek were inducted into the UNCW chapter of Sigma Pi Sigma, the national physics honor society. Also joining the society at that time were Professors Timothy Black and Liping Gan.

IV. STUDENTS

1. Enrollment Statistics

Undergraduate Physics Majors

Year	Freshman (Fall)	Sophomores (Fall)	Juniors (Fall)	Seniors (Fall)	Total	Annual Graduates	
						B.A. Degrees	B.S. Degrees
1994- 1995	0	4	9	12	25	1	4
1995- 1996	1	4	7	8	20	3	3
1996- 1997	0	12	5	10	27	5	6
1997- 1998	0	7	11	11	29	5	3
1998- 1999	0	3	5	15	23	6	3
1999- 2000	0	4	1	12	17	3	5
2000- 2001	0	4	3	6	13	3	2
2001- 2002	0	*5	*2	*5	*12	2	2

* Count includes double-majors

2. Degrees Awarded

December, 2001

Bachelor of Arts:

Laura Anne Abernathy (cum laude)

May, 2002

Bachelor of Arts:

Scott Lewis Hutchins

Bachelor of Science:

Douglas Scott King (magna cum laude),

Anthony Carlton Pearson

3. Honors, Awards, and Scholarships

Walter Schmid Award recipient: *Douglas Scott King.*

Doug graduated *magna cum laude* with an overall GPA of 3.860. He also served as President of the local chapter of the Society of Physics Students and single-handedly redesigned the chapter web site <http://fluffah.phy.uncwil.edu/phy/sps/html/public/index.htm>.

On April 11, 2002, Doug was one of only two students inducted into the UNCW chapter of Sigma Pi Sigma, the national physics honor society. Starting in Fall 2002, Doug will begin graduate studies in physics at UNC Chapel Hill where he has been awarded a teaching assistantship.

Jefferson Lab Fellowships: *Michael Hollister and Michael Williams.*

The “two Mikes” were selected by faculty member Professor Liping Gan to assist this summer at Jefferson Lab in developing a low energy recoil detector that will be used in cutting-edge experiments to test one of the few predictions of QCD (Quantum Chromodynamics) that is relatively unambiguous. The students are supported by research grants from NSF and Jefferson Lab, and will continue their efforts on campus during the coming academic year under Professor Gan’s supervision.

Bookstore Scholarship Award Winners: *Jacqueline Nicole Hanson and Michael Kinnard Williams*