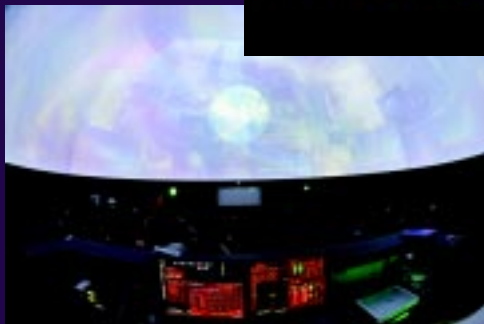


Physics Tracks

Newsletter of the Department of Physics
University of Notre Dame
Volume 3, No. 2



Letter from the Chair

Dear Friends, Colleagues and Alumni,

It is a pleasure to bring you the latest issue of the Physics Department newsletter. Inside you will discover several articles and features we hope you find both interesting and enjoyable.

You will no doubt notice that the department administration has changed once again since the last newsletter. We are very fortunate to have Kathie Newman and Chris Kolda serving as Associate Chairs and Directors of Graduate and Undergraduate Studies, respectively. I also want to

thank Neal Cason for his leadership as interim chair during the past year.



This fall marked the opening of the Jordan Hall of Science, a beautiful new building dedicated to the teaching of undergraduate science. This facility has already enhanced our current course offerings and affords us a great opportunity for future curriculum development. Jordan Hall contains new, spacious labs for our introductory courses. The upper level laboratories include two large rooms dedicated to modern physics, and a much improved lasers and optics laboratory. Within the physics space is also a "high end computing" room for courses such as numerical methods. At the southern end of the building is a rooftop observatory equipped with several small telescopes for our introductory astronomy courses, and work is in progress to purchase and install a large, research quality telescope on the roof. Finally, opposite the observatory is the Digital Visualization Theater. The DVT houses 136 seats under a 50 foot diameter dome. Utilizing a pair of digital Sony SXR D projectors and SkyScan software the theater provides us a planetarium and much more.

The undergraduate program continues to grow. This year we have a total of 94 physics majors (including freshman intents), the largest number in memory. We have made some significant improvements in the major's curriculum. In response to increased interest in astrophysics and astronomy we have added an "astro" track to the choice of physics major programs. Our

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Faculty News

Carol E. Tanner



Carol E. Tanner was promoted to the rank of Professor in August 2006.



Carol E. Tanner was promoted to the rank of Professor in the Department of Physics in August 2006. Professor Tanner is a Fellow of the American Physical Society and recipient of a 2001 Kaneb Teaching Award. Professor Tanner received her Ph.D. from the University of California, Berkeley and has been at Notre Dame since 1990.

Michael D. Hildreth



In August 2006, Michael D. Hildreth was promoted to the rank of Associate Professor.



Michael D. Hildreth was a Research Corporation Cottrell Scholar in 2003, and recipient of the U.S. Department of Energy's Outstanding Junior Investigator award in 2003. Professor Hildreth received his Ph.D. from Stanford University and has been at Notre Dame since 2000.

Neal M. Cason



Neal M. Cason, at Notre Dame since 1967, served as Chairman of the Department of Physics from 1985-1988 and 2005-2006. He is a Fellow of the American Physical Society.



Neal M. Cason is a recipient of the 7th Annual Kaneb Teaching Award. This award, established in 1999, recognizes excellence in undergraduate teaching at Notre Dame. The awards are apportioned among the faculty who have taught full time in undergraduate programs for at least five years. Professor Cason received his Ph.D. from the University of Wisconsin.

Faculty News

Umesh Garg is a recipient of the 7th Annual Kaneb Teaching Award. He was recognized for this award during the 161st Commencement Exercises that took place on May 21, 2006. In addition to being a guest scientist at Argonne National Laboratory and a Visiting Professor at Vrije Universiteit, Amsterdam, Professor Garg is the principal investigator of the Notre Dame Physics Department Research Experience for Undergraduates Program.

Umesh Garg



Umesh Garg, Professor of Physics, has been at the University of Notre Dame since 1982. He is a Fellow of the American Physical Society.



James L. Merz, Frank M. Freimann Professor of Electrical Engineering and Concurrent Professor of Physics, has been appointed the University's Interim Dean of the College of Engineering. Professor Merz is a former Vice President for Graduate Studies and Research at the University of Notre Dame. He is also a Fellow of the American Physical Society.

James L. Merz received a B.S. degree in Physics from the University of Notre Dame in 1959. He came to Notre Dame as Freimann Professor of Electrical Engineering in 1994.

James L. Merz



Ani Aprahamian, Professor of Physics, is the recipient of the fifth annual College of Arts and Letters Award of Appreciation for her significant contributions to their mission. Professor Aprahamian is on sabbatical from the physics department this academic year. She is serving as Program Officer for Nuclear and Particle Astrophysics at the NSF in Washington, D.C.

Ani Aprahamian

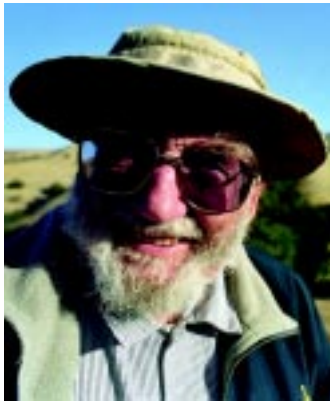


Ani Aprahamian received her Ph.D. from Clark University. She has been at Notre Dame since 1989.



Faculty News

James R. Wilson



James R. Wilson is a staff scientist at Lawrence Livermore National Laboratory and an Adjunct Professor of Physics at Notre Dame.



James R. Wilson has been awarded the prestigious Hans A. Bethe Prize "for his work in nuclear astrophysics and numerical work on supernovae core collapse, neutrino transport, and shock propagation. His codes reenergized supernovae shocks, launched numerical relativity and magnetically driven jets." Professor Wilson has been an adjunct professor in the Physics Department since 1995.



Zoltan Toroczkai, Associate Professor, joined the Notre Dame Department of Physics in August 2006. His area of research is in biophysics and condensed matter physics.

Zoltan Toroczkai



Zoltan Toroczkai's current research focuses both on complex networks and agent-based systems. Starting from a statistical physics base, his main goal is to develop a methodology for the understanding and modeling of these types of systems. He received his Ph.D. degree from Virginia Polytechnic Institute and State University in Blacksburg, Virginia.

Xiaodong Tang



Xiaodong Tang, Assistant Professor, joined the Notre Dame Department of Physics in August 2006. His research interests are in nuclear astrophysics.



Xiaodong Tang utilizes the available facilities and experimental technologies, combined with the latest nuclear theory, to determine those nuclear reaction data with strong astrophysical significance. He is also interested in developing new experimental techniques and equipment for the proposed U.S. radioactive beam facility. He received his Ph.D. degree from Texas A&M University.

Graduate Spotlight

January 2006
Ph.D. Graduates

Aaron Couture, Ph.D.
Zoltan Dezso, Ph.D.
Hung-Cheuk Ho, Ph.D.

August 2006
Ph.D. Graduates

Joe Reece Haywood, Ph.D.
Weng-Lee Lim, Ph.D.
Dylan Menzies-Gow, Ph.D.
Bhoopesh Mishra, Ph.D.
Hilma Vasconcelos, Ph.D.
Igor Vasconcelos, Ph.D.

January 2006
Masters Students

Raja Chakavorty, M.S.
Brandon Fogel, M.S.
Tao Li, M.S.
Hong Luo, M.S.
Stephanie Morrison, M.S.
William Zech, M.S.

May 2006
Masters Students

Lisa DeBeer Schmitt, M.S.
Yingqiong Gu, M.S.
Andras Libal, M.S.
Yang Liu, M.S.
Stephen Luke, M.S.
Chong Xi, M.S.

Students Honored

The following graduate students were honored by the Kaneb Center for Teaching and Learning with Teaching Assistant Awards: Ian Bentley, Yaya Chu, Lisa M. DeBeer Schmitt, Richard J. deBoer, Yang Liu, and William F. Zech. The Kaneb Center TA Program presents annual awards to outstanding graduate student teachers and teaching assistants. This program recognizes graduate students who demonstrate excellence in the classroom or laboratory or in another significant instructional capacity.

Hung-Cheuk Ho (Professor Walter Johnson, Advisor) is the recipient of the 2006 Outstanding Dissertation Award for "Third-order Many-body Perturbation Theory of Divalent Atoms and Ions."

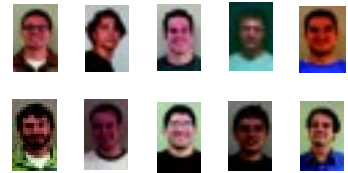
The 2006 Outstanding Senior Physics Major Award went to Patricia A. Engel and the 2006 Outstanding Undergraduate Research Awardee is Angelo J. Signoracci. Department of Physics Citizenship Awards go to Patricia A. Engel and Catherine R. Kennedy.

Congratulations to all of these students.

Incoming Graduate Students

Ten new graduate students were welcomed to the Department of Physics in August 2006.

Louis (Jamie) Antonelli, USA
Nicholas Blumm, USA
Brian M. Bucher, USA
Cornelius Griggs, USA
Antonios Kontos, Greece
Sean Lynch, USA
Colin McClelland, USA
Matthew Meixner, USA
Kritsanu Tivakornisathorn, Thailand
Ethan Uberseder, USA



Bachelor's Degrees

The following undergraduates were awarded Bachelor's Degrees in May 2006

Matthew T. Begley
Thomas D. Burger
Tristan P. Butterfield
Evan P. Donoghue
Patricia A. Engel
Matthew T. Hogancamp
George ShengChun Hsu
Catherine R. Kennedy
Kevin T. McCusker
Angelo J. Signoracci
Todd G. Strobel

It's busy here in the summer...

Many of you have asked about what we do here during the summer months. You know, when the students are gone. Contrary to what most people think, we are very busy with many special learning and teaching projects.

QuarkNet, headed by Dr. Dan Karmgard, Prof. Randy Ruchti, Prof. Mitch Wayne, and Ms. Beth Marchant, is an educational program sponsored by the National Science Foundation (NSF) and the Department of Energy (DOE) whose aim is to support science education in schools by establishing a nation-wide science teacher network. It provides opportunities for school science teachers to learn firsthand about frontline physics research in universities and establish mentor relationships between science teachers and physicists at universities and national laboratories.



This fall, high school seniors Kristen Anderson of Bremen High School and Mengwen Zhang of Penn High School were named semifinalists in the National Siemens Competition. Their research, entitled "Performance of Scintillating and Waveshifting Fibers for Particle Detectors," was conducted at the University of Notre Dame's QuarkNet Center during the summer of 2006 under the direction of Dr. Dan Karmgard and Mr. Mark Vigneault. Anderson is a QuarkNet-Ludlum Measurements, Inc. Fellow, while Zhang is a QuarkNet-Radiology, Inc. Fellow. They advanced to the Regional Competition at MIT.

The Siemens Corporation, a signature program of the Siemens Foundation, is the nation's leading science and mathematical research competition for high school students. The annual competition, administered by the College Board, awards college scholarships ranging from \$1,000 to \$100,000 in individual and team categories.

Research Experiences for High School Teachers at Notre Dame (RET). In 2006, the University of Notre Dame continued to expand its RET program to bring research opportunities in many science areas, including physics, chemistry, biological sciences, engineering, geosciences, nanotechnology, and mathematics. The projects vary in duration from 4 to 8 weeks and the stipends for participating teachers range from \$1,500 to \$5,000. The RET program is supported through the National Science Foundation and the University of Notre Dame. It has operated very successfully at Quarknet for several years in high energy and other experimental physics projects.

Research Experiences for Undergraduates (REU). Now in its 21st year, REU provides opportunities for undergraduate students to experience hands-on participation in research in many areas of physics. Students are granted stipends, housing allowance, and assistance with travel and food expenses. Students work closely with faculty and graduate students on a variety of research projects. The summer program not only provides each student direct experience with a specific project but also provides important exposure to all areas of physics research. Students will either help a professor with his or her work, or work on an experiment of their own. The REU program gives participants valuable research experience to help them decide if physics research is right for them. The program is open to US Citizens or permanent residents.

JINA, the Joint Institute for Nuclear Astrophysics headed by Prof. Michael Wiescher, has been involved in a week-long, all-day summer camp about physical science. Sensing our World, headed by former Outreach Director Dr. Suzanne Coshov, is a summer science program developed by the Michigan State University Center for Sensor Materials (CSM) and is open to students entering 7th and 8th grades.

Continued on page 9

Alumni Reunion '06

On Friday, June 2, 2005, all Physics Alumni were invited to attend a reception during Alumni Reunion Weekend. This year's reunion (our second) was, by far, the best attended reunion reception we have held and we look forward to repeating the event every year. If you were unable to attend this year, or it wasn't your reunion year, please plan on attending in the future and catch up with your classmates and faculty and make a few new friends. Pictured below are John Polking '56, Kristin Perlot Bloschock '01, Keith Calkins '05, Steve Colucci '75, Richard Steiner '76, Jerry Lapeyre '62, Vince Bernardin '01 and Steve Graff '90.



Donor's Corner

If you are over age 70 1/2, the federal government now permits you to roll over amounts from your IRA to charity without paying any taxes. These tax-free rollover gifts could be \$500, \$1000, \$10,000 or any amount up to \$100,000 in one year. Here are five reasons why you might want to take advantage of this special opportunity:

1. It's a simple and easy method for an end-of-the-year gift.

2. You want to make a gift past the 50% AGI limit.

3. You are looking for a good opportunity to make a major gift.

4. You take the standard deduction and would like extra benefits.

5. As a Social Security recipient, you want to save taxes.

For more information on these and other benefits of making an IRA rollover gift, please contact Ms. Jennifer S. Maddox, Business Manager at (574) 631-4001 or email her at jmaddox@nd.edu.



Continued from page 7

According to the Third International Mathematics and Science Study report, U.S. school children start out at the same level as their international peers in elementary grades. However, they fall behind in science and math by the time they reach the middle grades. When they reach high school, they score below the international average. In response to this finding, Sensing our World was designed to expose middle-school students to the exciting world of science, mathematics, and technology in an intensive hands-on environment. The goal of Sensing our World is to stimulate middle school students' interest in physical science using familiar objects that operate by important, basic physical principles. Hands-on experiments and lecture demonstrations are employed. For example, in a prior session each student built a burglar alarm using light sensitive CdS photodetectors, thereby introducing semiconductors, conductors and insulators, as well as simple circuits in the process. Students learned about smoke detectors that use a small quantity of radioactive materials.

Sensing our World '06 was sponsored by the Joint Institute for Astrophysics (JINA), a grant from the Arthur and Helen Shireman Fund and the Community Endowment Fund of the Community Foundation of St. Joseph County, the Department of Chemistry, the Department of Physics, the Kaneb Center for Teaching and Learning, the Nuclear Structure Laboratory and individual faculty researchers at the University of Notre Dame.

NISMEC, the Northern Indiana Science, Mathematics and Engineering Center, is a community resource center providing professional development opportunities and resources for educators to enhance standards-based STEM (science, technology, engineering, and mathematics) education.

In this joint Notre Dame and Saint Mary's College initiative we promote the use of guided inquiry in teaching at all levels from kindergarten to graduate school. Our present focus is on the professional development of K-8 teachers of science and mathematics through summer, school-year, and weekend workshops. We focus on the school as the locus of change, including the principals, as well as science and mathematics teachers to upgrade the learning environment at the school.

Two program examples are: (1) A joint partnership program (funded through the State of Indiana) with the Mishawaka School City to train all K-6 teachers in their 7 elementary schools; and (2) A Siemens Foundation program to support Middle School science teachers in month-long summer workshops – teachers from South Bend, Mishawaka and Penn-Harris Madison school districts participate.

Though NISMEC, Notre Dame has become a member for the PTEC University Alliance – a national program of about 20 Universities promoting the use of reformed teaching methods at all levels. The use of RTOP – the Reform Teaching Observation Protocol is encouraged as an improved means of assessing effectiveness of college teaching.

The Center promotes the understanding of Science for all members of the local community with programs for teachers, students, parents and all community members. Through a variety of outreach and network activities, the Center serves as a prototype for school and community improvement across the State of Indiana, and subsequently for the entire Nation. The center will stimulate a valuable integration and synergy of the science and mathematics outreach programs at the University of Notre Dame as well as at Saint Mary's College, at IUSB and at other local educational institutions. The Center publishes several newsletters each year – more information can be found at the NISMEC website <http://www.nd.edu/~nismec/nismec11.htm>

Undergrads

Physics Majors

Nicholas M. Battafarano	James H. Miller
Anthony J. Bendinelli	James N. Miller-Marquez
Corey J. Betker	Daniel B. Murphy
John W. Biddle	Kyle B. Neary
Ronald K. Bocinsky	Bridget K. Osetinsky
Patrick R. Brown	Matthew C. Phipps
Christian M. Burdziak	Marissa A. Pitterle
Andrew C. Chronister	Gary R. Pritts
John P. Connick	Alexander J. Radcliffe
Thomas O. Deering	Douglas W. Raney
Alissa G. Donovan	Thomas J. Rehagen
Benjamin J. Fehrman	Emily M. Rhatican
Scott B. Feister	Floyd S. Rose
Michael J. Florack	Leo J. Rubinkowski
Adam J. Gadziski	Eric K. Saito
Matthew E. Gordon	Thomas A. Schad
Erin L. Gutbrod	Gisela Schmidt
Joseph A. Hagmann	Thomas A. Scrace
Andrew T. Hartnett	Jacob H. Skrabacz
Alec S. Hirschauer	Leanna R. Steier
Patrick B. Hogan	Stanley D. Strycker
Jacob T. Hughes	Sean T. Sullivan
Andrew C. Kobach	James Talamo
Steven J. Kurtz	Krystyna M. Traudt
Zach Lamberty	Ryan M. Truesdale
Megan L. Leazenby	Bradley E. Tucker
Zachary J. Liptak	Brian J. Walsh
Mark D. Loehr	Edward R. White
Matthew J. Lucia	Jason D. Wittenbach
Cody Mack	Adam N. Work
Andrew W. Massari	
Michael J. McCann	
Reed W. McDonagh	
Thomas A. McKnight	

Notre Dame Student Awarded APS Scholarship

Richard Molina Jr., a University of Notre Dame first-year student and physics major intent, has been awarded the 2006-2007 American Physical Society Scholarship for Minority Undergraduate Physics Majors. The scholarship includes a monetary award of \$2000 (\$1000 per semester) for the first year, and renewing scholars receive an additional \$3000 per academic



year. A member of the APS Committee on Minorities has been assigned as a mentor for Richard. Also, the scholarship provides support to the physics department to provide local mentoring. Two University of Notre Dame physics faculty will serve as co-mentors for Richard to help guide him towards his interest in astrophysics. They are Chris Howk, an assistant professor and researcher in astrophysics, and Phil Sakimoto, a professional specialist and astronomer with a background in minority outreach. We are pleased to have such a special student in the Department of Physics.

Continued from page 2

physics club and local Society of Physics Students chapter are very active and they make important contributions to life in the department.

Graduate education and research is thriving as well. This past year saw 9 new Notre Dame Ph.D.'s in physics. Another five students will finish up this January. A number of significant grants were awarded to several members of the department. This fall we welcomed two new members to the faculty. Xiaodong Tang is an assistant professor in experimental Nuclear Physics. Xiaodong comes to us from Argonne National Laboratory. Also, Zoltan Toraczka has joined us as an associate professor in condensed matter physics. Zoltan was previously at Los Alamos National Laboratory. This year we are looking to add another two faculty members. There are searches ongoing in the areas of theoretical nuclear and elementary particle physics.

Finally, our departmental facilities continue to improve. Renovation of the northern wing of Nieuwland Science Hall is underway to convert our old teaching labs to research and lab space. A major infrastructure improvement is underway in conjunction with a new accelerator project in the nuclear structure lab. And we just completed a new, general purpose meeting room near the department office.

We hope that you will visit us in the near future so that we may show you around the department and the new Jordan Hall of Science. If you can't make it in person check out our website at <http://physics.nd.edu/>.

Mitchell R. Wayne, Chairman



Emeriti Honored

An event to honor our emeritus professors took place on Thursday, September 1, 2005 at Tippecanoe Place Restaurant in South Bend. Professor Ani Aprahamian hosted the dinner. Each professor received a framed sketch of Nieuwland Science Hall as a token of appreciation.

Pictured at bottom-left of page, from Left to Right Front Row: Profs. Sperry (Bud) Darden, John Poirier, Walter Tomasch, Samir Bose, and William Shephard.

Left to Right Back Row: Profs. William McGlinn, Paul Shanley, Jerry Jones, Emerson Funk, and V. Paul Kenney.

Not Present: Profs. Paul Chagnon, John Mihelich, and Eugene Marshalek

Staff News

Suzanne Aleva, Terry Arter, Susan Baxmeyer, Tina Bergland, Kathleen Burgess, Donald Gard, Shari Herman, Lesley Krueger, Heidi Lamm, Jerry Lingle, Jennifer Maddox, Beth Marchant, Jeffrey Marchant, Michael McFarland, Mimi Mostofi, Brad Mulder, Sandra Trobaugh, Mark Vigneault, Ping Zheng.

The Physics Department has 19 staff members, twelve office and seven technical trade staff members.

Suzanne Aleva

was recently promoted to the position of Administrator for the Center for Complex Network Research. Suzanne joined the Department of Physics in April 2002. She was a recipient of the Notre Dame Spirit Award in August 2004.

Suzanne is a science enthusiast, enjoying reading and participating in almost anything scientific but she especially enjoys astronomy. She is a member of a local amateur astronomy group and has been instrumental in working with our own astronomers to bring the stars to the general public in the community.

Shari Herman

joined the Department of Physics in April 2006 as a Senior Administrative Assistant. Prior to that she was with the National Institute for Trial Advocacy (NITA) for 13 years. Shari plays a vital role working with both graduate and undergraduate students in the areas of admissions and recruitment and in the REU program. In her spare time she enjoys country gardening, needlepoint, crocheting and writing poetry.

Mimi Mostofi

joined the Department of Physics in November 2006 as Administrator for the Institute for Theoretical Sciences. Prior to coming to Notre Dame, Mimi was Assistant Director for Advancement Services at LaSalle University in Philadelphia. She has a B.A. in French from Illinois State University in Normal, Illinois. Mimi was born in Isfahan, Iran (raised in Chicago) and is currently studying Arabic with hopes of becoming fluent in Farci and Arabic.



Suzanne Aleva
*CCNR Administrator
4.5 years of service to the
Physics Department.
Suzanne is an avid ama-
teur astronomer and
science enthusiast.*



Shari Herman
*Sr. Administrative
Assistant
13 years of service to
Notre Dame. Shari joined
the physics department 8
months ago. She enjoys
writing poetry.*



Mimi Mostofi
*ITS Administrator
Mimi joined the Physics
Department 2 months
ago. She loves to cook
gourmet meals and
enjoys traveling abroad.*



Michael McKenna
*High Energy Physics
Lab Manager
6 years of service to
the Physics Depart-
ment. Mike enjoys
boating, fishing,
woodworking and
American History.*



Sandra Trobaugh
*Administrative Assistant
25 years of service to the
Physics Department.
Sandy is retiring from the
university in February
2007. She plans to spend
more time with her
family, including triplet
grandchildren.*



Ping Zheng
*Web Designer
Joined the Physics
Department in Decem-
ber 2006. Ping enjoys
traveling, web design
and is a voracious
reader.*

New Science Building Open

Ground breaking for the Jordan Hall of Science took place on November 1, 2003 and was completed and ready for occupation in August 2006. The Jordan Hall of Science was underwritten with a leadership gift from John W. Jordan II, a 1969 Notre Dame graduate and a member of the University's Board of Trustees since 1993.

Instrumental in planning for the Jordan Hall of Science were Professor Mitch Wayne and Associate Professor Michael Hildreth. Prof. Hildreth was the Physics Department representative to the College of Science Jordan Hall committee chaired by Prof. Wayne. Prof. Hildreth spent many hours attending meetings on designing and refurbishing JHS, including the design of a "logo" representing physics research that would be etched into the floor of the main hallway of the building. In addition, he was responsible for the overall budget preparation for all of the physics laboratory equipment, planning for new laboratory development and the additional staffing needed. He was also a member of a committee that planned displays in the public spaces to advance science and to tell the story of science at Notre Dame.

The Jordan Hall of Science is an enormous step forward for the visibility and appreciation of science on campus and in the community at large.

Reproduced on the physics medallion are images in the authors' original handwriting.

Center Top: Albert Einstein's "Special Theory of Relativity."

Center 2nd Down: Max Planck's "Entropy and the Density of States."

Center 3rd Down: Albert Einstein's "General Theory of Relativity."

Center Bottom: Werner Heisenberg's "The Uncertainty Principle."

Outer Circle Top: Nicolas Copernicus' "The Heliocentric Model of the Solar System."

Outer Circle Bottom: Isaac Newton's "Law of Action and Reaction."



The Cover

The new Jordan Hall of Science. Clockwise beginning top left: the Galleria; one of the main lecture halls; JHS main entrance showing reading room on the left and herbarium on the right; a close-up view of the main entrance; the planetarium.

Photographs by Matt Cashor.

Please Note Newsletter Change:

We are considering making this the last printed version of Physics Tracks. Future issues will be available on our website <http://physics.nd.edu/> (as they are now). Of course, we will still have a few printed issues available for those who are not "on the internet." This is your opportunity to make your voice heard. Please let us know how you feel about this change. Write or call at the address/phone number below.

The newsletter of the Department of Physics at the University of Notre Dame is published semi-annually.

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