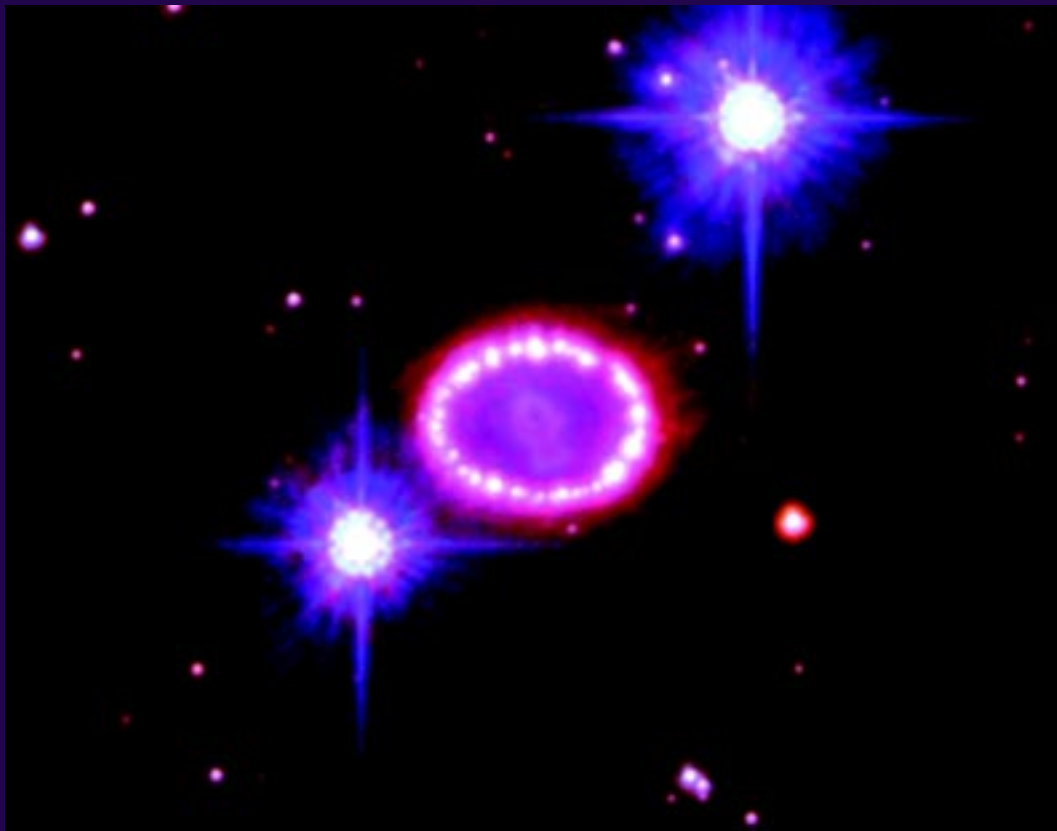


Physics Tracks

Newsletter of the Department of Physics
University of Notre Dame
Volume 4, No. 1



Letter from the Chair

Dear Friends, Colleagues, and Alumni,

We are delighted to bring you the latest issue of the *Physics Tracks* newsletter. Inside you will find several articles and features we hope you find both interesting and enjoyable.

We have recently finished another busy and eventful academic year. This past year saw the opening of the Jordan Hall of Science, a wonderful new teaching



facility that has received rave reviews from our students, faculty, and visitors. All of our laboratory courses, from the introductory sequence to the graduate level, have benefited from more space and new equipment. The department is starting to integrate the Digital Visualization Theater into our astronomy and astrophysics courses, and plans are being finalized for the purchase of a large, research-quality telescope situated on the rooftop observatory.

On Saturday, May 19, the department hosted a reception for our graduating students and their families.

The turnout was excellent and everybody really enjoyed the event. We had 11 senior physics majors earn their Bachelor of Science degrees this year. Of these, eight are immediately going on to graduate school in physics, mathematics, and law. Three of these seniors were honored over the weekend with departmental awards: Anthony Bendinelli was given the "Outstanding Senior Award," Thomas Schad the "Outstanding Research Award," and Bradley Tucker the "Citizenship Award."

At the graduate level, a total of 15 students earned their doctorates during the past year. Several returned to Notre Dame to attend the reception and commencement, coming from as far away as South America. The "Outstanding Dissertation Award" was presented to Dr. Bhoopesh Mishra, supervised by Professor Bruce Bunker. Bhoopesh is currently working as a postdoctoral researcher at Princeton University.

On Friday, June 1, we hosted a reception for some of our former physics majors as part of the three-day alumni weekend. A good number of physics "Domers" attended along with several current and emeritus faculty members. Emerson Funk

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Faculty News

Dinshaw Balsara



Dinshaw Balsara was promoted to the rank of Associate Professor.



Dinshaw Balsara was promoted to the rank of Associate Professor. Professor Balsara received his Ph.D. from the University of Illinois at Urbana-Champaign. He has been at Notre Dame since 2001. Professor Balsara's research interests are in the field of astrophysics.

Colin Jessop



Colin Jessop was promoted to the rank of Associate Professor with tenure.



Colin Jessop was promoted to the rank of Associate Professor with tenure. Professor Jessop received his Ph.D. from Harvard University. He has been at Notre Dame since 2003 where he continues to be involved in research with the BaBar experiment at the Stanford Linear Accelerator Center and the CMS experiment at CERN.

Christopher Kolda



Christopher Kolda, Associate Professor of Physics and Director of Undergraduate Studies, has been at the University of Notre Dame since 2000.



Christopher Kolda is the recipient of the 2007 Thomas P. Madden Award for outstanding teaching of first year students. A portion of the citation reads "As an academic who not only loves to teach but also brings the excitement of his own research to the classroom, this professor is a great role model for young Notre Dame students." Professor Kolda was also a recipient of the Kaneb Teaching Award in 2005.

Faculty News

Philip J. Sakimoto, Professional Specialist in Physics, was appointed by the National Research Council of the National Academies to serve on a study committee charged by Congress with evaluating the NASA pre-college science, mathematics, and technology education program. The committee will address questions regarding the effectiveness, funding priorities, and assessment procedures of NASA's program. Dr. Sakimoto has been at Notre Dame since 2005.

Philip J. Sakimoto



Philip J. Sakimoto, Professional Specialist, has been appointed to the National Academies Study Committee.



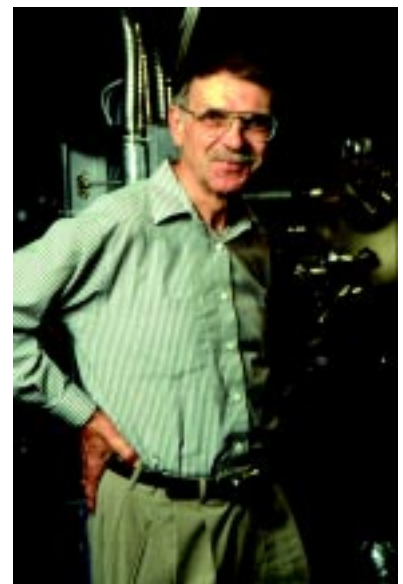
Jacek Furdyna Receives Purdue Honorary Degree

Jacek Furdyna, Aurora and Tom Marquez Professor of Physics, received an honorary doctor of science degree May 12 during commencement ceremonies at Purdue University's West Lafayette campus.

In its announcement of the honor, Purdue noted, "Throughout his career Dr. Furdyna projected the image of an extraordinarily creative scientist with a special talent for identifying fascinating new problems and new directions."

Furdyna's research interests involve the preparation of new semiconducting compounds and the investigation of their physical properties. Most recently, his research has focused on three semiconducting systems: quantum well structures for use in blue and blue-green light emitters, including semiconductor lasers; magnetic semiconductors (which combine "traditional" semiconductor phenomena with new magnetic properties, including ferromagnetism); and semiconductor nanostructures, such as self-assembled quantum dots, quantum wires, and their arrays. All these structures are fabricated at Notre Dame by molecular beam epitaxy.

Furdyna was born in Poland and was deported at age 6 to the Soviet Union with the outbreak of World War II. He spent much of his childhood in Kazakhstan and



Continued on page 13

Faculty News

Peter Garnavich to Share Gruber Prize in Cosmology

Peter Garnavich, associate professor of physics, has been awarded a share of the 2007 Gruber Prize in Cosmology for his work in the High-Z Supernova Search Team's discovery of the accelerating universe. The discovery of an accelerating expansion of space radically transformed the standard model of cosmology and led to the idea that the universe is dominated by a mysterious dark energy.

The Gruber Prize in Cosmology has been given annually since 2000 by the Peter and Patricia Gruber Foundation for "groundbreaking work that inspires and enables fundamental shifts in knowledge and culture." The 2007 prize is awarded to the High-Z Team (led by Brian Schmidt of the Australian National University) and the Supernova Cosmology Project (led by Saul Perlmutter of the Lawrence-Berkeley National Lab). The teams share a cash prize of \$500,000.

In 1994, Professor Garnavich helped establish the High-Z Supernova Search Team, an international collaboration of 20 astrophysicists, with the goal of tracing the expansion history of the universe using a type of bright, exploding star called a "type Ia" supernova. Peter and his colleagues expected to



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Michael Wiescher Named Humboldt Fellow

Freimann Professor Michael Wiescher has been named an Alexander von Humboldt Fellow by the Alexander von Humboldt Foundation.



The foundation was established by the Federal Republic of Germany to promote international cooperation in research. This prestigious fellowship will allow Wiescher to study the nuclear reactions leading to the formation of an isotope of iron, ^{60}Fe , which has been found in sediments on the deep-ocean floor. This isotope is thought to be related to a supernova a few million years ago in our neighborhood of the Milky Way galaxy.

Wiescher is a world-leading scientist in experimental nuclear astrophysics who has made numerous contributions to the determination of key nuclear reaction rates for the understanding of stellar evolution and the synthesis of the elements in the universe. He is particularly well known for the use of novel techniques involving low energy ion beams in measuring nuclear reactions determining the lifetime and evolution of stars. He also pursued the use of radioactive ion beams in measuring important reactions relevant in explosive astrophysical environments. These techniques will

Continued on page 13

Student Spotlight

January 2007
Ph.D. Students

Christopher D'Andrea
Eugene Galyaev
Jason Quinn
Istvan Robel

May 2007
Ph.D. Students

Hye-Young Lee
Stephanie Morrison
Boris Skorodumov
Elizabeth Strandberg
Smarajit Triambak

January 2007
Master's Students

Mary Beard
Paul LeBlanc
Shawn O'Brien
Daniel Robertson

May 2007
Master's Students

Sergio Almaraz-Calderon
Joseph Bychowski
Yong-Jin Cho
Tabatha Spencer
Yaya Chu
Brian Dudley
Yan He
Jennifer Little
Christopher Schmitt
Nan Sun
Christopher Wood
Ying Yuan Zhou

Graduate Students Honored

The American Association of Physics Teachers 2007 Outstanding Teaching Assistant Awards went to Nicholas Blumm, Cesar Hidalgo, Daniel Robertson, Matthew Smylie, and Xinghai Zhao.

The Kaneb Center TA Program presents annual awards to outstanding graduate student teachers and teaching assistants. The following graduate students are recipients of the 2007 Kaneb Teaching Assistant Award: Nicholas Blumm, Brian Bucher, Cesar Hidalgo, Daniel Robertson, Matthew Smylie, and Xinghai Zhao. This program recognizes graduate students who demonstrate excellence in the classroom or laboratory or in another significant instructional capacity.

Bhoopesh Mishra (Professor Bruce Bunker, Advisor) is the recipient of the 2007 Outstanding Graduate Dissertation Award for his dissertation "Molecular Binding Mechanisms of Aqueous Cd and Pb to Siderophores, Bacteria, and Mineral Surfaces."

Bachelor's Degrees

The following undergraduates were awarded Bachelor's Degrees in May 2007

Anthony Bendinelli
Corey Betker
Christian Burdziak
Matthew Gordon
Steven Kurtz
Bridget Osetinsky
Gary Pritts
Douglas Raney
Thomas Schad
James Talamo
Bradley Tucker

Undergraduate Students Honored

The 2007 Outstanding Senior Physics Major awardee is Anthony J. Bendinelli and the 2007 Outstanding Undergraduate Research awardee is Steven J. Kurtz.

The 2007 Physics Department Citizenship Award goes to Bradley E. Tucker.



PIXE-PAN 2007

Institute for Structure and Nuclear Astrophysics at Notre Dame

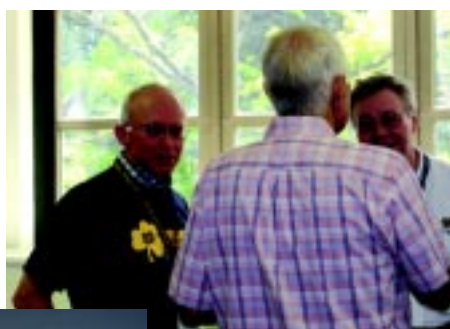
PIXE-PAN 2007 is a summer science program for science, physical science, chemistry, and physics teachers and high school students. Participants explore topics in modern science and nuclear physics/astrophysics. The program introduces teachers and students to the fundamentals of the extremely small domain of atomic nuclei and its connection to the extremely large domain of astrophysics and cosmology. Lectures and hands-on experiments are led by senior faculty and staff of the Institute for Structure and Nuclear Astrophysics (ISNAP) at the University of Notre Dame.

PIXE-PAN 2007 is sponsored by the Joint Institute for Nuclear Astrophysics (JINA), ISNAP, and the University of Notre Dame.



Alumni Reunion '07

On Friday, June 1, the Department of Physics hosted a reception during Alumni Reunion Weekend. This year's reunion was our third and, by far, the best attended reunion reception we have held. Invitees included the 50 Year Club and classes of 1957, 1962, 1967, 1972, 1977, 1982, 1987, 1992, 1997 and 2002. A few alumni not included in these years but who live or work close to Notre Dame also stopped by to visit. Those attending included Jim Merz '59, John Poirier '54, Pat Mooney '86, Keith Calkins '05, Kevin Kelly '67, Matt O'Donnell '76, Stephen Storch '67, Andrew Allen '72, Gerald Stanton '67, Paul Gregorowicz '75, John Bieszk '77, Jack Schickel '52, "Skip" '72, Jim Beres '72, and Ed Conway '62. We have already begun to plan for next year's reunion to make it bigger and better than ever so if next year is your year, please plan to attend. Look for information on our website and in future issues of *Physics Tracks*.



Donor's Corner

Benefactors often choose to memorialize or honor a special person by making a gift in their name. To make a memorial gift, please mail your check (payable to the University of Notre Dame) to:

Carol J. Hennion, Director
Development Donor Services
University of Notre Dame
1100 Grace Hall
Notre Dame, In 46556

Please include with your contribution the honoree's name and address, so that the University may notify that person of your thoughtfulness. In the case of a deceased honoree, please also include the name(s) and address of the family member(s) to whom you would like an acknowledgment sent, as well as their relationship to the deceased.

Typically, an acknowledgment letter will be sent to the donor (including IRS language), and then a letter will then be sent to the honoree or honoree's family. That letter will include the donor's name and address, but not the gift amount.

For more information, please contact

Shelly Goethals
Business Manager
(574) 631-4001
email: sgoethal@nd.edu

Many thanks to Steve Storch '67, for his generous donation to the Physics Department. In a letter to Professor Wayne, Steve thanked the department for the "splendid reception." Additionally, he said "it was a wonderful surprise and joy to meet two of my ND physics teachers, Professor Emerson Funk and Professor John Poirier" and also said he was "greatly impressed by the physics research that is now being done at ND especially in the areas of astrophysics and biophysics."

The Storm of the Millenium

Straight line winds hit the South Bend area late Tuesday, May 15, causing some of the worst storm damage in decades, just days before the University's Commencement exercises.

The spire on the southwest corner of the Basilica of the Sacred Heart, along with bricks and mortar, was blown to the ground. Two stained-glass windows were also damaged when a large pine tree snapped near the top and crashed into the side of the building. A crane was brought in to evaluate the spot where the downed spire stood and also removed the three remaining spires to prevent further damage to the Basilica and to ensure pedestrian safety. Many, who likely never thought they would claim such a piece of Notre Dame, walked away carrying bricks from the historic spiritual and architectural landmark.



In addition, more than 30 trees were blown down or so severely damaged that they had to be taken down. Tree damage around the Grotto was some of the worst on campus but no damage was inflicted on the Grotto itself. On the North Quad, trees were leveled in a



complete circle surrounding the Clark Memorial Fountain (Stonehenge) and large limbs were down all along the west side of Breen-Phillips and Farley Halls. Trees were also damaged on the Main Quad and in other areas of campus.

No injuries were caused by the winds and there was no evidence that a tornado touched down on University property. Ground crews worked hard to have the campus cleaned up by Friday, just before families arrived for Commencement weekend.

College of Science Hosts Undergraduate Research Meeting

On May 4, 2007, more than 40 undergraduate science and math students from the University of Notre Dame and Saint Mary's College presented results from their scientific research at the Jordan Hall of Science during the first College of Science Joint Annual meeting.

The First Place Winner of Best Research Presentation in Physics was Thomas Schad for his talk "Coronal Seismology: The Search for Propagating Waves in Coronal Loops." Tom did his work last summer as an REU project at the National Solar Observatory in New Mexico, trying to understand the physics that underlies the sun's corona. Tom finished his senior year as a Physics and Philosophy dual major. He will be attending the University of Arizona this fall where he will continue his work at the National Solar Observatory on uncovering the secrets of the sun.

The Second Place Winner of Best Research Presentations in Physics was Steve Kurtz for his talk "An Undergraduate Perspective on Accelerator Mass Spectrometry at Notre Dame." Steve gave a talk on his research done at Notre Dame with Professor Philippe Collon on the design and construction of our Accelerator Mass Spectrometer. He was involved in almost every phase of its development. Steve finished his senior year as a CSE and Physics major and will attend Notre Dame as a graduate student next year in engineering, studying quantum cellular automata.

*Peter Garnavich to Share
Gruber Prize in Cosmology
Continued from page 5*

measure the dark matter density, which, at the time, was believed to be slowing the expansion rate of space. After several years of searching for distant supernovas and precisely measuring their brightness, the team realized that instead of decelerating, the expansion rate was increasing with time. "Imagine that you tossed an apple up in the air and instead of falling back to Earth it gained more and more speed and shot off into space...the accelerating expansion was that big a surprise," Garnavich said.

The High-Z Team announced its surprising results in 1998 with three papers. The first was led by Garnavich and analyzed a handful of supernovas observed by the Hubble Space Telescope. The results pointed to a low dark matter density and hinted at the existence of a cosmological constant that would drive an acceleration. By March 1998, the High-Z Team had analyzed more supernovas and concluded, with high confidence, that the acceleration was real. The discovery was confirmed by the "Supernova Cosmology Project," a competing group.

The "Z" in High-Z Team is astrophysics shorthand for the amount the universe has expended as light travels through space. A large "Z" indicates a great distance and the High-Z Team has discovered and studied supernovas that exploded more than 5 billion light-years from Earth. More information on the High-Z Team can be found at <http://cfa-www.harvard.edu/supernova/HighZ.html>.

Continued from page 2

even showed up with his gradebook from 1977, much to the dismay of his former students!

Several physics department faculty members have been honored recently. It was just announced days before this newsletter went to print that Professor Peter Garnavich will share the 2007 Gruber Prize in Cosmology. Professor Chris Kolda received the 2007 Thomas P. Madden Award for excellence in teaching of first year students. Professor Jacek Furdyna received an honorary doctor of science degree at the May commencement ceremonies at Purdue University. Professor Michael Wiescher was named an Alexander von Humboldt Fellow. The Alexander von Humboldt Foundation was established by the Federal Republic of Germany to promote international cooperation in research. Professor Albert-Laszlo Barabasi was named the recipient of the John von Neumann Medal.

As we head into summer several activities are underway. We have our usual strong REU and RET programs in full swing. Our array of outreach programs continues to grow. Among those based in the physics department, QuarkNet is headed into its 10th year of work with high school physics teachers and students, JINA is helping sponsor the "Sensing my World" for middle school students, and Professor Gordon Berry is holding a 2-week workshop for middle school math and science teachers. In addition, a large new NSF grant to fund the Notre Dame extended Research Community (NDeRC) was awarded this spring. This program provides stipend support for graduate students in physics and other sciences to work with local teachers on research and curriculum development.

In addition to some major renovation work on the outside of Nieuwland Science Hall, plans are underway to upgrade the first year graduate student office and to add a study lounge for our undergraduate physics majors.

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. Please take a look at our website if you can't make it in person at <http://www.physics.nd.edu/>. We wish you all an enjoyable summer.

Mitchell R. Wayne, Chairman

70 Years of Nuclear Physics at ND

Nuclear Physics was born at the University of Notre Dame in 1937 with the first successful experiments accelerating particles. These experiments began an active scientific program and laid the foundation for one of the first nuclear laboratories in the United States of America. During its 70 years of history, the nuclear laboratory has contributed significantly to all aspects of Nuclear Physics, to our understanding of the nucleus as a unique few body quantum system, to our interpretation of nuclear reactions and reaction mechanisms as signatures of the four fundamental forces governing the Cosmos, and finally to the critical role these reactions provide for the synthesis of the chemical elements formed in generations of stars since the beginning of our Universe.

For the complete story, visit the website http://www.nd.edu/~sciwww/Pdf/NSL_history.pdf

Staff News

The Physics Department welcomes these new staff members.



The department is pleased to extend a warm welcome to Shelly Goethals. Shelly joined the department in late February as the Business Manager.

She comes to us from the National Institute for Trial Advocacy (NITA) where she most recently held the position of Director of Operations. Shelly had been with NITA since 1992.

"I have enjoyed my first few months with this group, and I'm impressed with the dedication and commitment of both the faculty and the staff," said Shelly. "My transition into this position will be a continual process, given the complexities of the daily operations of the department. It is a challenge, and that's why I accepted the position."

In May, Shelly graduated from Notre Dame's Mendoza College of Business Master of Business Administration (MBA) program. She received her Bachelor of Arts from Ball State University where she majored in Journalism/Public Relations with minors in English, French, and Sociology.

"The formal business education of the MBA program was an appropriate complement to my many years of practical business experience," says Shelly. "It was an invaluable opportunity to expand my horizons in a variety of traditional business subjects at a prominent program."

One special highlight of the program was the International Business course which required a trip to China in the summer of 2006.

Shelly has been married to Bob Goethals for 14 years. Bob is the founder and president of Goethals Custom Builders, LLC. They have two children, Grant, 10, and Camille, 8, that keep her busy. But now that she has completed the MBA program Shelly has resumed one of her favorite pastimes -- golf.



Mary DeWitt
JINA Outreach Specialist
At Notre Dame since January 2007. Mary's academic field is forensic anthropology/archaeology. She received her formal training at the Univ. of Texas-Arlington and the Univ. of North Texas.



Gary Edwards
Tool Maker - Machine Shop
At Notre Dame since April 2007. Gary has an Associate Degree in design. He enjoys fishing and reading Tolkien.



Nicolle Haley
Administrative Assistant, CCNR
Nicolle joined the department 6 months ago. She enjoys knitting and baking in the winter, floating down the Dowagiac River in the summer, and reading year round.



Jeanette Page
Administrative Assistant ISNAP
Joined the department in January 2007 after working in the Hesburgh Library for 8 1/2 years. She is working on her B.Sc. degree and enjoys reading, gardening, and collecting antiques in her spare time.



Mark Suhovecky
Computer Specialist ISNAP
Joined the Physics Department in June 2007. Mark has a BS in math and a MS in computer science from Kansas State University. He enjoys gardening, astronomy, and reading.



Anne Zakas
QuarkNet Administrator
Joined the Physics Department in May 2007. Anne came to South Bend as one of the first 125 freshman women on campus. She likes to share meals with friends, read, and spend time with family.

*Furdyna receives honorary degree
Continued from page 4*

Uzbekistan, and after his release from the USSR, in Iran, Iraq, Palestine, and in the United Kingdom, before immigrating to the United States.

Furdyna earned his bachelor's degree at Loyola University in Chicago, and his doctorate at Northwestern University. From 1962 to 1966, he was on the research staff of the Francis Bitter National Magnet Lab at the Massachusetts Institute of Technology.

He went to Purdue in 1966 as an associate professor of physics and established a new program in magnetic semiconductors and gained an international reputation through imaginative research on various topics in this field.

Furdyna joined the Notre Dame faculty in 1986 and is a fellow of both the American Physical Society and the Institute of Physics. For his scientific accomplishments, he was awarded a doctorate honoris causa by Warsaw University in 2002.

Oops!

In the previous issue of *Physics Tracks*, a picture of first year graduate student Ethan Uberseder was mistakenly substituted with a picture of Prof. Umesh Garg. Here is a current picture of Ethan.



Our Cover

A string of 'Cosmic Pearls' surrounds an exploding star. This Hubble telescope image shows the supernova's triple-ring system, including the bright spots along the inner ring of gas surrounding the exploded star. A shock wave of material unleashed by the stellar blast is slamming into regions along the inner ring, heating them up, and causing them to glow. The ring, about a light-year across, was probably shed by the star about 20,000 years before it exploded.

Photo courtesy Harvard-Smithsonian Center for Astrophysics

*Wiescher named Humboldt Fellow
Continued from page 5*

be implemented at the future U.S. Deep Underground Science and Engineering Laboratory (DUSEL) and the Future Radioactive Ion Beam (FRIB) facility. For his work Professor Wiescher received several awards, including the prestigious Hans Bethe Prize of the American Physics Society.

Wiescher is director of the Joint Institute for Nuclear Astrophysics (JINA), a collaboration formed between the University of Notre Dame, Michigan State University, and the University of Chicago, to address a broad range of experimental, theoretical, and observational questions in nuclear astrophysics.

JINA serves as an intellectual center with the goal of enabling swift communication and stimulating collaborations across field boundaries. It also provides a focal point for the rapidly growing and diverse field of nuclear astrophysics.

Wiescher was also recently selected as a recipient of the Rev. Edmund P. Joyce, C.S.C., Award for Excellence in Undergraduate Teaching.

Newsletter Change

In the last issue of Physics Tracks, we were considering making Volume 3 - Number 2 the last printed version of Physics Tracks. We heard from many of you, most encouraging us to maintain the printed version. So, for the time being, we will continue to print and mail Physics Tracks as well as make it available on line through our website at <http://physics.nd.edu/>. To all who wrote or emailed, thank you for sharing your opinions with us.

The newsletter of the Department of Physics at the University of Notre Dame is published semi-annually. Please send all inquiries and comments to:
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