Vol. 12
Fall 2010
Michigan Tech Physics Department Newsletter.

Physics News

A Note from the Chair

By Dr. Ravindra Pandey
Professor and Chair

We are moving onto an exciting and new frontier of interdisciplinary research in quantum physics, thanks to a generous gift from **Richard and Elizabeth Henes** to establish an "Institute of Quantum Phenomena" in the department. Its mission will be to provide national leadership in investigation of processes linked together on the interdisciplinary theme of the "quantum world".

Employing the tools of quantum physics, **Ranjit Pati** has provided the theoretical foundation for a "massively parallel" computer composed of organic molecules. This is the first time a brain-like "evolutionary circuit" has been realized allowing instantaneous changes of ~300 bits. It is indeed an exciting conceptual breakthrough which was reported in "Nature Physics" (Volume 6, page 369, 2010).

Among the quantum physicists in the department, **Don Beck** has a unique distinction of receiving continuous support from the National Science Foundation since 1981 in the area of theoretical atomic physics. An accompanying article gives the details of his research activities spanned over the last thirty years.

Dave Nitz and **Brian Fick** received the Michigan Tech Research Award for their contributions in the field of experimental particle astrophysics. In addition to it, **John Jaszczak** was nominated for a Distinguished Professor of the Year award sponsored by public universities in Michigan. Also, **Will Cantrell** was nominated for the Michigan Tech Distinguished Teaching Award.

Congratulations to **Bob Weidman** for 30 years of service and **Bryan Suits** for 25 years of service at Michigan Tech. They have actively participated in transforming the department to become one of the leading departments in the university.

You will certainly agree that many of these achievements have been possible only because of your encouragement and support of the department. As you decide on end-of-the-year donations, please consider a contribution to the department's endowment for undergraduate and graduate students. Your continued support is deeply appreciated.

Best wishes for a joyous holiday season and a happy and prosperous New Year.

Current Research

Beck Research Group

Professor of Physics **Dr. Donald Beck** has been at Michigan Tech since December 1, 1980. His research involves the accurate calculation of wavefunctions and properties of transition metal, rare earth, and actinide atoms and ions. These are the most difficult atoms to deal with, due to their open *d* or open *f* subshells. Technologically, they are of great importance to many industries such as the automobile industry, and their scarcity has recently been noted in the international news.

On 30 Years of National Science Foundation (NSF) Support
By Dr. Donald Beck

A focus of our group, most recently comprised of two postdoctoral research associates, **Dr. Steve O'Malley** (now working at Atomic Energy Research) and **Dr. Lin Pan** (Michigan Tech), has been to calculate electron affinities (EA) of the rare earth and actinide atoms. EA is the energy gained by attaching an extra electron to the atom. Until 2008, these EAs were largely unknown because they were difficult to measure and to calculate. Calculation requires careful and efficient inclusion of correlation and relativistic effects. Systematic improvements in efficiency from 2008 to present have cut calculation times by a factor of 10-100 and have enabled the entire rare earth (actinide) row EAs to be obtained in six months. Previously, it took six months just to do a single ion (e.g. Nd^-). Calculations are done on a well equipped PC.

All the EA work, including code development and application, has been supported by NSF since 1981. Our results are starting to appear in the *CRC Handbook of Chemistry and Physics*, as they represent the most extensive (and in many cases, the sole) results for these complicated atoms. Our work continues on the calculation of photoionization cross-sections for the negative ions, in conjunction with experimental work on Ce^- being done at Denison College by **Prof. Wes Walter**. This should help identify just what is being measured for this complicated anion, which has an unusual number (30) of bound states.

More detail may be found at Beck's web address (*phy.mtu.edu/~donald/ri.html* and *phy.mtu.edu/~donald/pb.html*). Beck would also like to thank the Department of Energy for 15 years of support for work on the transition metal atoms.

Family Physics Night was held at the C-L-K Elementary School on March 18, 2010. SPS volunteer activities prompted a Blake Lilly award for the chapter.

Mineral Museum Move

The future site of the A. E. Seaman Mineral Museum will be on Sharon Avenue, near the Advanced Technology Development Complex. Construction has begun this fall, and the museum will re-open in the new location next summer. The exhibits are currently located on the fifth floor of the Electrical Energy Resources Center on the main campus grounds. The new facility will permit better access for the public, as well as opportunities for expansion. Professor of Physics **John Jaszczak** is adjunct curator of the museum.

APOD Wow!

Professor of Physics **Robert Nemiroff** spoke at the Rozsa Center on January 14, 2010 as part of the Van Evera Distinguished Lecture Series. His topic was on NASA's best space images, as featured in the online gallery Astronomy Picture of the Day (APOD). The amazing images included shuttle missions, nebulae, solar activity, galaxies, space exploration technology, and scenes of artistic fantasy. Nemiroff is co-editor of APOD, together with **Jerry Bonnell**.

Small things sometimes tell large story.
—Charlie Chan

Awards and Achievements

Michigan Technological University honored Professor **Bryan Suits** for 25 years of service and Associate Professor **Robert Weidman** for 30 years of service.

Physics alum **Werner R. Vogt** was inducted into the Academy of Sciences and Arts. Vogt, a 1966 BS graduate from Michigan Tech, is president of Amikles AG, Switzerland.

The Michigan Tech chapter of the **Society of Physics Students** has been selected as a 2010 Blake Lilly winner for their outreach efforts.

Physics major **Erin M. Scanlon** was among the Women of Promise recognized by the Presidential Council of Alumnae.

Hansen Nordsiek is the 2010 recipient of the Ian W. Shepherd Award for most outstanding physics graduate.

Physics graduate students **Chee Huei Lee** and **Jiang Lu** were Fall 2010 Finishing Fellowship Recipients, awarded by the Michigan Tech Graduate School. **Archana Pandey** received a Summer 2010 Finishing Fellowship.

Chee Huei Lee, a physics graduate student and research assistant, took a second place award in the Materials Research Society's popular Science as Art competition.

Colin Gurganus, a PhD student in atmospheric sciences, has received a DOE Graduate Fellowship. Gurganus was also awarded a fellowship from the DeVlieg Foundation.

Physics graduate student **Abhilash Kantamneni** has been offered membership in the prestigious Mensa International.

The 16th Annual Student Awards Banquet was held in Spring 2010. Among the award recipients was Engineering Physics graduate student **Archana Pandey**, who was honored for Exceptional Leadership in Residential Community. Former physics major **Elissa Barris** won the Provost's Award for Scholarship. Physics major **Gregory Lau** was nominated for the Provost's Award and physics major **Viktor Bollen** was nominated for the Exceptional Enthusiasm as a Student Leader Award.

Professor **John A. Jaszczak** was nominated by Michigan Tech's Provost for the Fourth Annual Michigan Distinguished Professor of the Year Recognition, sponsored by chief academic affairs officers of the 15 public universities in Michigan.

Will Cantrell was nominated for the 2010 Michigan Tech Distinguished Teaching Award in the Associate Professor/ Professor category.

David Nitz and **Brian Fick** were named co-recipients of the 2010 Michigan Tech Research Award.

Department Updates

The Department of Physics is pleased to announce the **Sam ('63) & Brenda Ochodnicky Annual Scholarship**. Sam received his Bachelor of Science in Applied Physics in 1963. The scholarship is established for a Michigan resident physics major, and carries with it a required minimum 2.5 GPA and demonstrated financial need. The first Ochodnicky Annual Scholarship will be awarded in January 2011.

The **Takashi Nakayama Conference Room** was named in recognition of a generous gift from the Nakayama family. Dr. Nakayama (deceased) received his Masters of Science Degree in Physics from Michigan Tech in 1964.

Uli Hansmann was co-organizer of the three-day CBSB10 workshop (computational biophysics and systems biology) last summer in Traverse City, MI. Hansmann also co-organized an international conference "Algorithms in MacroMolecular Modeling" last fall in Austin, TX.

Yoke Khin Yap was the lead organizer of the international symposium on nanotubes and nanostructures held at the 2009 Material Research Society Fall Meeting.

Michael Meyer was promoted from Lecturer to Senior Lecturer. Meyer also oversees the undergraduate teaching labs and lecture demonstrations.

Mrinalini Deshpande and **Amir Jalali** were appointed assistant adjunct faculty in Fall 2010. **Ming Han** joined the department as a postdoc in Spring 2010.

New Facility

Environmental Optics Lab
Operated by Claudio Mazzoleni

Academy of Sciences and Arts

Werner R. Vogt

Physics alum **Werner R. Vogt** was inducted into the Michigan Tech Academy of Sciences and Arts in 2010. The purpose of the Academy is to publicly recognize outstanding leadership in the professional work and public service of alumnae and alumni. The 1966 Michigan Tech graduate worked at Union Carbide, helping to build plants in many countries. He became General Manager for Speceram SA, developing and producing aluminum oxide ceramics. He was involved in the start-up of several high-tech companies, including Apinnova SA. He launched businesses involved in industrial buildings and industrial real estate. He serves as President/CEO or as a board member for 18 companies.

Recent Degree Recipients

2010	**Destination**
Jason P. Moscatello, PhD	
Ming Xie, PhD	Univ. of Colorado Boulder
Viktor Bollen, BS	Washington State Univ.
Eric Conrad , BS	Colorado State University
Aaron DeWahl, BS	Michigan Tech MSE
Dan Freeman, BS	Naval Surface Warfare Ctr.
John Hennen, BS	Illinois Institute of Tech.
Curtis Hunt, BS	
Joel Kangas, BS	
Nathan Kelley-Hoskins, BS	Michigan Tech Physics
Erich Kinder, BS	Bowling Green State U.
Ryan Lemmens, BS	Michigan Tech ME
Steven Nerat, BS	Wayne State University
Hansen Nordsiek, BS	University of Maryland
Christopher Schafer, BS	Oregon Health and Sci. U.
2009	
Ehab E. El-Houssieny, MS	Western Michigan Univ.
Parimal Kar, PhD	Max Planck Institute
May E. Kim, MS	
Abhay P. Singh, MS	University of Alberta

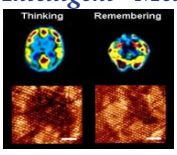
Research in the News

Physics research impacts scientific and popular communities on a global scale. Among some of the more widely distributed stories originating from Michigan Tech were:

DNA Sequencing: Department Chair **Ravi Pandey** is studying

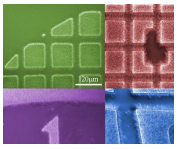
methods to speed up DNA sequencing using membranes based on carbon nano-structures. The story was in the *Michigan Tech Lode* and several *Facebook* sites: *Quantum Computing*, *Genetic Engineering*, *NSF*, and *Oak Ridge National Lab*.

Intelligent Molecular Computer: **Ranjit Pati** reported a



theory behind computing based on organic molecules on a gold substrate. It was the focus of a Michigan Tech News article and picked up by the business site *domain-b*, the *Facebook* site *Intelligent Computing Conclave*, *e! Science News*, and *HowStuffWorks*.

Nano Divas: **Yoke Khin Yap's** work on the temperamental



nature of boron nitride nanotubes was featured in a *Michigan Tech News* article. It was reflected in *NSF News From the Field*, *PhysOrg*, *ScienceDaily*, *Ceramic Industry*, *Innovations Report*, *World News Network*, *Electronic Component News*, and many more outlets.

Dean's List

Spring and Summer 2010 4.00

Anton, Nigel L	JR	SPH
Ayala Solares, Hugo Alberto	SU	SPH
Beaulieu, Travis W	SR	SPH
Holmes, Justin C	SR	SPH
Kragenbrink, Tyler J	SO	SPH
Petersen, Eric A	SR	SPH
Sutton, Katelyn P	SO	SPH

Spring and Summer 2010 3.50-3.99

Bollen, Viktor	SR	SPH
Boyde, Jonathan M	FR	SAP
Burrill, Daniel J	JR	SPH
Connolly, Ryan P	JR	SPH
Conrad, Eric D	SR	SPH
Curtis, Jonathan L	SO	SPH
Dobbs, Jeremy S	JR	SPH
Guthrie, Matthew W	SR	SPH
Hagen, Jordan S	SO	SAP
Hennen, John A	SR	SPH
Hutchinson, David J	SO	SPH
Jacobson, Darcy M	SO	SPH
Kelley-Hoskins, Nathan C	SR	SPH
Lau, Gregory M	SR	SPH
Leonard, Edward M	SR	SPH
Malec, Benedict J	JR	SPH
Miller, Daniel J	SR	SAP
Schafer, Christopher T	SR	SAP
Solfest, Peter M	SR	SPH
Szedlak, Anthony D	SR	SPH
VanderLaan, Derek J	SO	SPH
Wojdula, Justin K	SR	SPH
Yahr, William S	SO	SPH

Graduate Spotlight

Colin Gurganus

In the last two years I have completed my coursework for a Masters degree in Physics, as well as the majority of the requirements for a Ph.D. in Atmospheric Science. In my second semester I had the honor of joining Dr. Shaw's cloud physics group, where I work ice formation pathways.

Clouds play an important role in many fields (climate modeling, remote sensing, communications, etc.) but are still only poorly understood. The turbulent structure of these clouds, often composed of small supercooled water droplets, is partly driven by the latent energy released during ice nucleation. In the boundary layer heterogeneous ice nucleation from aerosols is the most prevalent ice formation pathway. Using ultra high speed photography and a precision temperature control chamber, our study will further characterize these ice nucleation mechanisms to improve cloud modeling and satellite retrievals.

I retain active membership in Sigma Pi Sigma, SPS, the American Physical Society, American Association of Physics Teachers, Optical Society of America and the American Geophysical Union. With the generous support of the Physics and Atmospheric Science Departments I have received the Recruiting and DeVlieg fellowships from Michigan Tech, as well as a Department of Energy three year fellowship.

In addition to my passion for Atmospheric Physics, I am also fascinated by high energy particle physics, and materials science. I also have a great love of history, especially the Hellenic-Roman and post Napoleonic eras. Outside of academia, I enjoy cycling, soccer, volleyball, broomball and travel.

Thanks!

We extend our deepest appreciation to friends and alumni who have made recent gifts or pledges to Michigan Tech. Did we miss your contribution? If so, contact *physics@mtu.edu*. As always, we appreciate your continued interest in the Department of Physics at Michigan Technological University.

Alumni

Stephen '02 & Jaime Beranek
Nathanael '03 & Katrina '03 Black
Donald '57 & Sharon Bullock
Ziyong '88 & Ping Cai
Andrew Drews '84 & Sue Inderhees
Eric '83 & Kari Duffin
John '52 & Geraldine Eisenlord
John '50 & Eugenia Evans
Walter '48 & Edith Gabriel
Frank '58 & Shirley Hastedt
Richard '48 & Elizabeth Henes
Thomas '92 & Heidi Hintz
Loren '60 & Kathleen Isley
Philip Kaldon '88 & Deborah Morrow
Anil '02 & Uma Kandalam
Paul '76 & Peggy Kaptur
Haijo A. Kiel '07
James '66 & Kathleen Kortge
Arne '52 & Joyce Koskela
Jack '62 & Kaethe Labo
Samuel C. Lambert '62
Robert '61 & Eugenia '64 Lind
Robert '49 & JoAnn Matheson
Dale '68 & Lauren Mukavetz
Daniel A. Nezich '02
Samuel '63 & Brenda Ochodnicky
Thomas '69 & Sharon Plutchak
James '74 & Karen Pulsipher
Mary J. Repar '75
Gary E. Rhoney '65
Joseph Roti Roti '65 & Stephanie Pagano (dec)
William '88 & Kathryn Siskaninetz
Donald '73 & Carolyn Szenina
C. John '64 & Kathryn Umbarger
Werner '66 & Tamara Vogt
Donald '63 & Carol '64 Wait
Bruce '63 & Linda Webb
William E. Wuerthele '66
Peter Zapol '98
Charles '66 & Mary Zeigler

Friends

Gary P. Agin
Keith & Wilma Baldwin
John & Sherry Jaszczak
Edward & Nina Nadgorny
David Nitz & Mary Marchaterre
John & Ann Pierce
Maximilian & Mary Ann Seel
Terrence & Susan Wilm
Kathleen S. Wollan

David Nitz and Brian Fick

Michigan Tech Research Award

David Nitz (left) and **Brian Fick** (right) have been named co-recipients of the 2010 Michigan Tech Research Award. Their research focuses on discovering and understanding the source of cosmic rays, the highest-energy particles in the universe. Nitz and Fick brought the work of the international Pierre Auger Observatory research project to Michigan Tech. Nitz has been one of the leaders of the project's first observatory in Malargue, Mendoza, Argentina, developing triggering technology. He also serves as Northern Hemisphere scientific spokesperson for a second observatory planned in the US. Fick worked from the beginning on the design of the Auger observatory as a hybrid surface and fluorescence detector. Both helped the University acquire an extensive package of valuable electronic design automation software. They helped establish the Malargue Anniversary Scholarship, which enables students from Argentina to come to Michigan Tech.

Senior Spotlight

Kyle Gorkowski

Kyle Gorkowski is a senior physics major with an historical studies minor, who has had an exciting undergraduate career. He received the 2010 Summer Undergraduate Research Fellowship. Kyle will present his findings at the American Geophysical Union meeting in San Francisco. His first step into research was with **Dr. Robert Nemiroff** in 2009, where he investigated micrometeorites and how to collect them locally at Michigan Tech. His summer 2010 research experience was with **Dr. Claudio Mazzoleni**; since then he developed two aerosol (microscopic particle) collecting instruments and deployed them in the field during the Carbonaceous Aerosols and Radiative Effects Study in Sacramento, California. The goal of this research is to better understand how aerosols transform in the atmosphere and to infer what is the aerosol's net climate effect. After graduating Kyle will be working at the Los Alamos National Laboratory, in the Earth and Environmental Sciences Division. He will then attend graduate school pursuing a PhD in Atmospheric Science. He sincerely thanks the many people that helped him along this course.

Henes Gift

The Department of Physics is grateful to **Richard and Elizabeth Henes** for a very generous gift of $700,000 toward the establishment of a new Henes Institute of Quantum Phenomena. The gift will advance state-of-the-art research facilities and upgrades within Fisher Hall. The mission of the new institute will be to provide national leadership in investigation of processes linked together on the interdisciplinary theme of "quantum world." Richard Henes is a mechanical engineering alumnus who also holds a law degree. Mr. and Mrs. Henes have been longtime supporters of Michigan Tech.

Softball Champs

Team Fiziks, composed of physicists, chemical engineers, biological scientists, and loyal supporters, took the 2010 championship in Michigan Tech's Graduate Summer Softball League. This is the second consecutive season with a perfect win record, despite the unique mix of rookie and pro onboard. The smashing success is not the result of a magic bullet (or other projectile), but of much training, practice and off-the-field activities that help build team comaraderie and create a well-oiled machine during games. Go Team Fiziks, for Summer 2011!!

Recent Funding

Research funding over the last year for the Department of Physics has been provided by DOD-ONR, Vice President for Research Office, SURF, MSGC, Biotechnology Research Center, Los Alamos National Lab, NSF, DOE Office of Science, and Richard and Elizabeth Henes.

Physics News
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Name _____ **Degree and Year** _____

Current Position/Employer _____

Address _____

Phone _____ **Email** _____

Website _____

Other Information _____

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