

## A Note from the Chair

By Dr. Ravindra Pandey  
Professor and Chair

“Splash with Rain Discovery” - some smaller raindrops can fall faster than bigger ones! This research conducted by Alex Kostinski and Raymond Shaw together with colleagues at the Universidad Nacional Autónoma de México received world-wide recognition in scientific journals and the popular press including *Nature*, *Scientific American*, the *BBC*, and the *Chicago Tribune*. This discovery could significantly alter our understanding of the physics of rain.

Applications in the area of nanotechnology have emerged as a forefront of exciting educational activities in the department. As a part of the Nanotechnology Enterprise, John Jaszczak is guiding students to share their knowledge and experiences with high school students. This effort is supported by the National Science Foundation. We are also committed to inquiry training for science teachers. Mike Meyer has been engaged in doing this with the help from the Michigan Department of Education.

Congratulations to Ulrich Hansmann who has been made a Fellow of the American Physical Society. Hansmann was honored “for pioneering protein simulations, innovative contributions to computational algorithms, and their applications to biological physics.” Fellowships are a recognition of excellence by one’s professional peers. This year he has also received the University Research Award. It is the fourth award in the past six years for the department. We are proud of this recognition by the University.

We are extremely pleased to welcome Petra Huentemeyer to the department. She comes to Michigan Tech from Los Alamos National Laboratory. Her research work is focused on understanding the origin of high-energy cosmic rays. An accompanying article gives the details of her research interests. We also look forward to her mentorship of our women undergraduate and graduate students.

Many of the successes achieved 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

Ulrich H. E. Hansmann

Professor of Physics Ulrich Hansmann is the 2009 recipient of the Michigan Tech Research Award. He was recognized for the development of numerical techniques in modeling the workings of living cells, as well as for his leading efforts in applying computational algorithms to protein physics. He was recently named a Fellow of the American Physical Society (APS), a recognition of excellence by his peers and one of the highest honors in his field.

Hansmann organized three international workshops on computational biophysics in a new, interdisciplinary field known as systems biology. While continuing to teach and do research at Michigan Tech, he also helped the John von Neumann Institute for Computing in Jülich, Germany, develop a computational biology and biophysics research group.

“Not all key processes or molecules are accessible by experiments; simulations are sometimes the only technique to detect hidden processes or proteins,” Hansmann explained. “A systems biology approach that aims at deciphering the life functions in a cell requires a close interplay between experiments and computing.”

Hansmann’s research goals include analysis and interpretation of biological data through modeling of molecular networks and simulation of cellular biophysics. He hopes this will enable scientists to analyze and predict complex diseases at a molecular level. Hansmann has already developed a software program called *Simple Molecular Mechanics for Proteins* (SMMP) that is freely available as open source software on the Internet. One of his ongoing research goals is to develop public software for molecular simulation of cells.

*(Extracted from Michigan Tech News, Jennifer Donovan)*

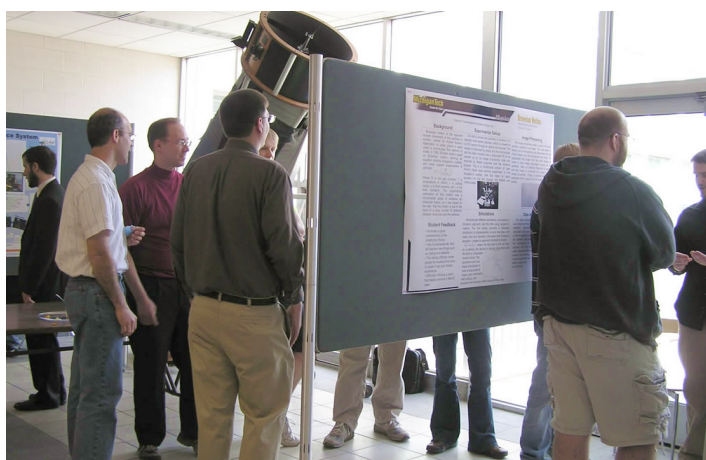


## EPSSI

The Remote Sensing Institute is now called the Earth, Planetary and Space Sciences Institute (EPSSI), which reflects current research and education thrusts on campus. EPSSI is directed by Associate Professor of Physics Will Cantrell. The interdisciplinary institute offers a minor in Remote Sensing, a seminar in Remoting Sensing, and a non-departmental PhD program in Atmospheric Sciences. Currently there are 22 faculty members from seven departments and schools active in EPSSI.

## New Facility

Quantum Optics Lab  
Operated by Kim Fook Lee



The departmental poster session was held in the Fisher Atrium on April 16, 2009. Graduate and undergraduate physics students presented diverse research explorations to the campus community.

## Dean's List

### Spring 2009 4.00

Dobbs, Jeremy S	SO	SPH
Gockenbach, Mark S	JR	SPH
Johnson, Brandon C	SR	SPH
Kestner, Daniel J	SR	SPH
Kilpela, Samuel T	SR	SPH
Solfest, Peter M	SO	SPH

### Spring 2009 3.50-3.99

Bollen, Viktor	SR	SPH
Boluyt, Martin	SR	SPH
Buccilli, Andrew T	SR	SPH
Burrill, Daniel J	SO	SPH
Butler, Carrie E	SR	SPH
Carlin, Caleb M	SR	SAP
Conrad, Eric D	SR	SPH

Adjunct Curator and Professor John Jaszczak collaborated with Curator and Professor George Robinson and web media specialist Sue Hill on an upgraded exhibit for the A. E. Seaman Mineral Museum at Michigan Tech. The interactive exhibit has a spectacular display of fluorescent specimens. Ultraviolet lighting is synchronized with a narrated computer animation exploring the physics behind fluorescence. Museum location and hours can be found at [www.museum.mtu.edu](http://www.museum.mtu.edu).

### Spring 2009 3.50-3.99

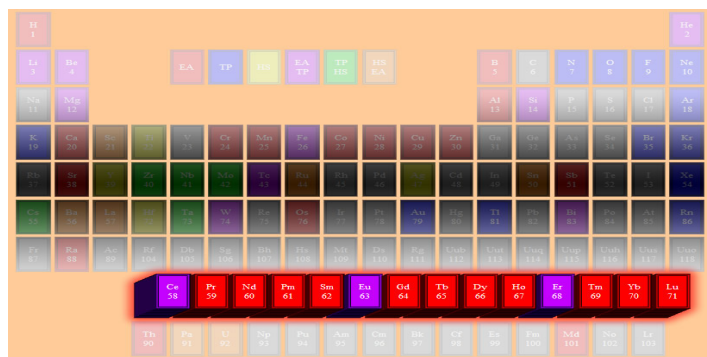
Deschaine, Jacob S	SR	SPH
Freeman, Daniel R	SR	SPH
Hinkley, Nathan M	SR	SPH
Holmes, Justin C	JR	SPH
Jaszczak, Patrick A	SO	SPH
Meier, Benjamin J	SR	SPH
Nelson, Arin D	SO	SPH
Nerem, Matthew P	SO	SPH
Petersen, Eric A	SR	SPH
Schafer, Christopher T	SR	SAP

## Raindrops

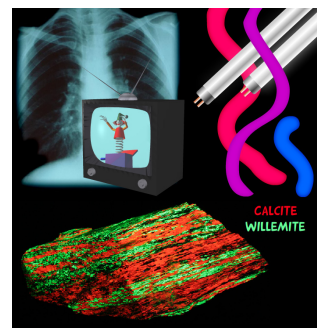
Physics research by Alex Kostinski and Raymond Shaw on the speed of raindrops reached several news outlets last summer. The research was noted for defying conventional wisdom on the relationship between drop size and speed. Some of the media interested in the discovery included the *Discovery Channel*, the *Toronto Star*, *Science 360*, the *BBC*, and the *Los Angeles Times*.

## New Electron Affinities

Groundbreaking computational work in atomic physics was acknowledged last spring when Don Beck and Steve O'Malley completed their calculations of electron affinities for the lanthanide series of elements. The vast difficulty in treating large numbers of electronic configurational states led to the development of new algorithms by the team. They were able to reduce the work load by 85 percent, completing the calculations within 18 months. They discovered 118 lanthanide anion states, 63 of which were new. According to Steve, "At some point I realized that it was simply unacceptable, given today's computational capabilities, that no one was even making an attempt at these calculations."



## Fluorescence Exhibit



## Department Updates

Max Seel was named interim provost and vice president for academic affairs.

Cosmic ray physicist **Petra Huentemeyer** is welcomed as a new Assistant Professor this fall. She was part of the Milagro Collaboration, which involved the Milagro Gamma-Ray Observatory in the Jemez Mountains near Los Alamos.

Joining the department as Adjunct Assistant Professors were **Katerina Aifantis**, **Anirban Bandyopadhyay**, and **Michael Bennett** (Spring 2009 only). **Saber Hussain** and **Markus Lazar** were appointed Adjunct Associate Professors this fall.

The department was visited by researchers **Maksim Kouza** and **Amir Jalali**. Physics alum **S. Gowtham** has returned and joined the department as a Postdoctoral Research Associate.

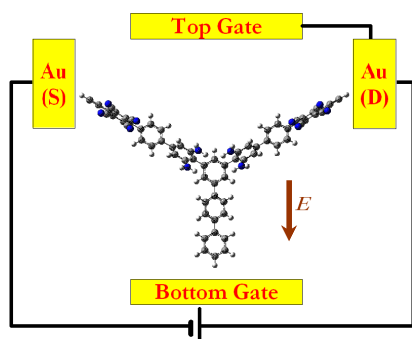
**Alex Kostinski** was on sabbatical leave last fall semester at the Weizmann Institute in Israel. **Yoke Khin Yap** was on sabbatical for the 2008-09 academic year, with time split between UC-Berkeley, the Institute of Physics-Beijing China, and the University of Malaysia.

**Uli Hansmann** was a co-sponsor of a seminar series hosted by Mathematical Sciences in Spring 2009. The seminars involved emerging computational tools, such as Graphical Programming Units and cluster design.

The department is saddened by the loss of Emeritus Professor **Sam Marshall**, who passed away in October 2008. A web memorial has been set up at [phy.mtu.edu/Marshall.html](http://phy.mtu.edu/Marshall.html) for any who would like to share their memories of Sam.

Visit [phy.mtu.edu](http://phy.mtu.edu) to learn more about the many recent and past activities within the Physics Department. You will find an extensive News and Awards section under Features.

## Molecular Transistor



*Michigan Tech News* featured research on molecular transistors last summer. The work is headed up by department chair **Ravi Pandey**. Theoretical models of a single-molecule field-effect transistor are being studied computationally by

**Pandey's** group using molecular orbital theory and quantum principles. A related article was published in *Nanotechnology*, volume 19, 2008. The news feature was picked up by the *Great Lakes IT Report* last August.

## Recent Degree Recipients

2009

Haiying He, PhD  
Puspamitra Panigrahi, PhD  
Ziyou Zhou, PhD  
Aaron Brickman, MS

Alexandria Blanchard, BS  
Rachel Blaser, BS  
Martin Boluyt, BS  
Jamie Bougher, BS  
Carrie Butler, BS  
Caleb Carlin, BS  
Jacob Deschaine, BS  
Matt Dunkman, BS  
Jessica Galbraith-Frew, BS  
Nathan Hinkley, BS  
Brandon Johnson, BS  
Daniel Kestner, BS  
Samuel Kilpela, BS  
Leland Kruse, BS  
Derek Meyers, BS  
Paul Rojas, BS  
Brandon Swatowski, BS  
Samuel Tootle, BS  
Nathan Wiley, BS

Destination

Argonne National Lab  
IGCAR, India  
Johnston Commun. Coll.  
University of Illinois  
Michigan Tech Physics  
University of Louisville  
Iowa State University  
Naval Surface Warfare Ctr.  
Penn State University  
Michigan Tech Physics  
University of Colorado  
Purdue University  
Ohio State University  
Univ. of AK - Fayetteville  
Michigan Tech Physics  
Michigan Tech ECE  
Department of Defense  
Western Washington Univ.

2008

Ewe Wei Saw, PhD

Max Planck Institute

## New Faculty



**Petra Huentemeyer** comes to us from a postdoctoral position at Los Alamos National Lab. She received her PhD in 2001 from the University of Hamburg/DESY, Germany. Her research interests span gamma ray, cosmic ray and particle physics. Petra's graduate work was in particle physics on the OPAL experiment at CERN, Switzerland. As a postdoc, her research focus was on HiRes/FLASH experiments in cosmic ray physics at the University of Utah.

Currently, she and **Brian Fick** are among the researchers involved with the High Altitude Water Cherenkov (HAWC) Observatory. This Gamma-Ray Observatory will be built 13,450 ft up the Sierra Negra Plateau just below the peak of the highest mountain in Mexico. When completed, it will consist of an array of 300 water tanks 24 feet in diameter and 13 feet in depth. The tanks will be closely stacked, covering an area of 377 by 492 feet. The project is realized by a collaboration of 14 US and 11 Mexican institutions. Visit [hawc.umd.edu](http://hawc.umd.edu) for more information.



## Awards and Achievements

Ulrich Hansmann has been named a Fellow of the American Physical Society in the Division of Computational Physics. He is a recipient of the Michigan Tech Research Award for 2009.

Daniel Kestner and Jamie Bougher received the 2009 Ian W. Shepherd Award for most outstanding physics graduates.

Physics graduate students Jason Moscatello and Puspamitra Panigrahi were Spring 2009 Finishing Fellowship Recipients, awarded by the Michigan Tech Graduate School.

Physics graduate student Archana Pandey tied for third place in the 2009 Graduate Student Council Poster Session competition. Parimal Kar received an honorable mention.

Physics undergraduate Hansen Nordsiek is a 2009 Goldwater Scholar.

Lecturer Mike Meyer was a finalist in the Assistant Professor/Lecturer category for the 2009 Distinguished Teaching Award at Michigan Tech.

## Thanks!

We extend our deepest appreciation to friends and alumni who have made recent gifts or pledges to Michigan Tech. Special thanks goes to Charles Zeigler, who has been a contributor since 1994, and to all who have invested in our long-term success. Did we miss your contribution? If so, contact [physics@mtu.edu](mailto:physics@mtu.edu). As always, we appreciate your continued interest in the Department of Physics at Michigan Technological University.

### Alumni

Ziyong Cai '88  
Michael C. Coleman '69  
Russell A. Compton '63  
Marvin J. Cox '64  
Paul R. Cupal '73  
Matthew W. Davenport '06  
Andrew R. Drews '84  
Eric W. Duffin '83  
John P. Evans '50  
Kenneth J. Genutis '79  
Gouri S. Giri '07  
Joseph R. Grochowski '07  
Frank R. Hastedt '58  
Thomas H. Hintz '92  
Loren D. Isley '60  
Mark W. Jacobs '83  
Philip E. Kaldon '88  
James E. Kauppila '59  
Walter E. Kauppila '64  
Wayne M. Keranen '97  
Peter A. Kiefer '02  
Haijo A. Kiel '07

Thomas R. Kugler '84  
Norman H. Larsen '61  
Robert W. Lind '61  
Charles J. McEwan '74  
David J. McLaughlin '61  
Ronald A. Meyer '64  
Jeffrey Allen Morris '84  
Dale W. Mukavetz '68  
Daniel A. Nezich '02  
Marcus B. Niessen '81  
Patrick J. Northrop '84  
Samuel S. Ochodnický '63  
Donald E. Parry '84  
Thomas M. Plutchak '69  
Mary J. Repar '75  
Gary E. Rhoney '65  
Jeremy D. Rogers '99  
Joseph L. Roti Roti '65  
Allan E. Saari '60  
Suresh K. Sampath '98  
Ronald F. Savino '69  
Burris R. Smith '64

Sanjay Sood '92  
James R. Strobel '74  
Donald J. Szenina '73  
Alfred J. Trapanese '69  
C. John Umbarger '64  
Roger L. Urbaniak '66  
Robert H. Wieber '60  
William J. Wilson '78  
Robert C. Yoder '67  
Charles W. Zeigler '66  
Gary B. Zulauf '72

### Friends

Keith M. Baldwin  
Winifred L. Blackford  
Georg Bollen  
Paul R. Hinzmann  
Ronald M. Kruse  
Mizuho Nakayama  
David F. Nitz  
Terrence Wilm

## Senior Spotlight

*Hansen Nordsiek*

Hansen Nordsiek is a senior physics major who has been very active in scholastics and research. He was named a Goldwater Scholar and was inducted into Sigma Pi Sigma in Spring 2009. The Society of Physics Students (SPS) is a major part of Hansen's life. In addition to helping out with many organizational activities, he considers the SPS lounge his home. He is also employed as a Teaching Assistant in the undergraduate physics labs.

During the past three academic years, Nordsiek has been doing experimental research in atmospheric fluid dynamics with Dr. Raymond Shaw. His work has resulted in a talk about the dynamics of charged water droplets in turbulence presented at the annual APS Division of Fluid Dynamics Conference, November 2009. He's also been a tour guide for Dr. Shaw's Cloud Physics Lab for university open houses, preview days, etc. During the summer of 2009, Hansen did research on a 2D fluid flow under Dr. Jerry Gollub at Haverford College, Ardmore, Pennsylvania.

Nordsiek plans to go to graduate school to work on Fluid Dynamics or Condensed Matter physics. He thanks the many students and professors who have helped steer him along this path of physics that would have otherwise been overlooked.

The image is in the eye of the beholder.  
—Max Seel

## Physics Outreach



Lecturer Mike Meyer has been involved in multiple physics demonstration outreach activities in local schools, making presentations in 2nd, 5th, 7th, and 9th grade science classes in Houghton and Hancock. He and lab associate Scott Rutterbush also continue to provide demonstration and teaching support for many on- and off-campus outreach programs through Michigan Tech's youth programs office. These include sessions

for the Women in Engineering and Explorations in Engineering programs, as well as two week-long summer explorations in astronomy and sports science. Raymond Shaw and Mike partnered last spring to offer a Nuclear Science merit badge class for local Boy Scouts, and Mike is currently working with the school of technology, the Intermediate School District, and the chemistry department to provide inquiry training and demonstration support for a total of 20 high school science teachers (locally and in Saginaw) through a grant from the Michigan Department of Education.

## Auger North

Funding is being sought for the \$127M northern site of the Auger Observatory, dedicated to the study of ultra-high energy cosmic rays. The proposed facility is to be located in an 80 by 100 mile area of southeastern Colorado, where the altitude, clear skies, flatness and low light pollution combine to provide good conditions for cosmic ray detection. The 4,400-detector facility would be a much-needed complement to Auger South, in active operation on the plains of Argentina. Auger North is expected to provide a factor of seven increase in statistics at the highest energies over the existing capabilities of Auger South.



The Pierre Auger Observatory is an international effort. Two proposals for the US portion of Auger North funding, requesting \$20M each of NSF and DOE, have been prepared by the US collaboration. In several NSF/DOE funding

scenarios considered, including the one considered most likely by *Physics Today*, funding for the Auger North Observatory is being recommended by the Particle Astrophysics Scientific Assessment Group, a sub-panel of the High Energy Physics Advisory Panel. The group also recommended funding for HAWC (see *New Faculty*) in this scenario.

The Auger Team at Michigan Tech consists of Professors Brian Fick and David Nitz, Associate Professor Roger Kieckhafer, and Research Scientist Johana Chirinos Diaz.

## Artists Among Us

There are many artists in the Department of Physics at Michigan Tech. Professor of Physics and Interim Provost Max Seel's visual art is featured at the Vertin Gallery this fall. The exhibit is entitled "Digital Realities". Some of his pieces were shown at the Great Lakes Art Showcase in 2008, an event held in McArdle Theatre on campus. Max and Professor Bryan Suits perform in the Keweenaw Symphony Orchestra. Many of the physics graduate and undergraduate students have performed in cultural events, as well as joining theatre and radio play productions, choir, pep band, wind symphony, and jazz ensembles.



## Perfect Season

The Michigan Tech Graduate Student Council softball season



Team Phys Engg, 2009  
Champions of Michigan Tech Graduate Students Softball League

rarely sees perfection. In Summer 2009, not only did Team Phys Engg win the season championship, but they did so with a perfect win record. More than 15 weeks of practice and organized team activity was responsible for a smashing success.

## Recent Funding

Research funding over the last year for the Department of Physics has been provided by C2E2, NASA, MuSTI, MSGC, SURF, Michigan Tech Vice President for Research (Research Seed Award), NIH, DOD ARL, NSF, Integrated Photonics, and Colorado State University.

Man's mind, once stretched by a new idea,  
never regains its original dimensions.  
—Oliver Wendell Holmes, Jr.



## Physics News

Michigan Technological University

1400 Townsend Drive

Houghton, Michigan 49931-1295

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Houghton, Michigan  
49931

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## Michigan Tech Physics Alumni - Get Listed On Our Website

We would like to stay in touch. Please include **ONLY** information below you wish to have publicly posted at [phy.mtu.edu](http://phy.mtu.edu).  
Any other information you may submit by logging in to Michigan Tech Huskylink at [huskylink.mtu.edu](http://huskylink.mtu.edu).

Name \_\_\_\_\_ Degree and Year \_\_\_\_\_

Current Position/Employer \_\_\_\_\_

Address \_\_\_\_\_

Phone \_\_\_\_\_ Email \_\_\_\_\_

Website \_\_\_\_\_

Other Information \_\_\_\_\_

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Feel free to attach information or to email us information at any time to [physics@mtu.edu](mailto:physics@mtu.edu). Indicate clearly that you wish to have your information posted on our website. If you would like to make a donation to the Physics Department, please make checks payable to the Michigan Tech Fund - **Department of Physics**. You can return this form and your donation to:

Physics Department, Michigan Technological University, 1400 Townsend Drive, Houghton, MI 49931-1295

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