

A Note from the Chair

*By Dr. Ravindra Pandey
Professor and Chair*

Greetings! The atmospheric physics group is receiving a major boost in capability for performing interesting new research in cloud microphysics. Allowing access to a full range of relevant temperatures and pressures in a laboratory, a new cloud chamber will help clarify the roles of thermodynamic factors in the formation of clouds and precipitation. This facility, supported by the National Science Foundation, will represent an important addition to the U.S. scientific infrastructure for laboratory-based environmental studies.

Research in atmospheric physics has a long history in our department. Investigation of the upper atmosphere was initiated by Prof. Donald Yerg in 1955, who sadly passed away this summer. Prof. Yerg had a long and distinguished career at Michigan Tech, which includes a Research Award in 1957.

The focus on novel research in atmospheric physics is carried out in Prof. Claudio Mazzoleni's Environmental Optics Laboratory where, among other activities, undergraduate student Kyle Gorkowski participated in the multi-institutional DOE-funded field study called CARES (Carbonaceous Aerosol and Radiative Effects Study) that took place in the foothills of the Sierra Nevadas.

A recipient of this year's Michigan Tech Teaching Award is Mike Meyer, who was recognized for his significant contributions in the teaching of algebra-based introductory physics courses and the development of modern physics laboratories. Specifically, he is to be commended for the incorporation of basic physics concepts to develop critical thinking, problem solving, and decision making skills in the minds of first-year students at Michigan Tech.

Congratulations to Prof. Donald Beck and Andrea Lappi for 30 years of service with Michigan Tech. Prof. Beck was instrumental in starting up the PhD program in Physics in 1987. Ms. Lappi is a key person in the department with her invaluable services as the departmental coordinator.

Many of these achievements have been possible only with 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. Your continued support is deeply appreciated. *Best wishes for a joyous holiday season and a happy and prosperous New Year.*

Current Research

Raymond Shaw



Raymond Shaw has been at Michigan Tech since August 1999. He is part of the department's atmospheric physics group, and his research deals mostly with processes relevant to clouds.

Clouds are important not only because of their part in the water cycle, but also because of their great climatological importance. For example, a cloudy planet absorbs much less sunlight than a cloudless one, but a cloudy planet also cools differently by emitting infrared radiation from different heights and, therefore, different temperatures.

One factor important in determining the distribution and duration of clouds is the rate at which precipitation forms. One can think about precipitation formation as the destabilization of a colloid, for example. Rain forms through two pathways: a thermodynamic one involving the formation of ice in mostly liquid clouds, and a mechanical one involving collisions and coalescence of cloud droplets. Shaw's research group is studying both pathways. They study how ice formation is catalyzed by the presence of particles, and specifically the role of the water-air interface in that process. Does ice tend to form preferentially in bulk water or at the water surface? Evidence from two of their experiments points to both possibilities, so further studies are delving into this mystery.

Of relevance to the second rain formation pathway is the collision rate of cloud particles and its dependence on particle size, turbulence, and electric charge. One research tool used extensively is a speaker-driven turbulence chamber with 3D holographic particle tracking.

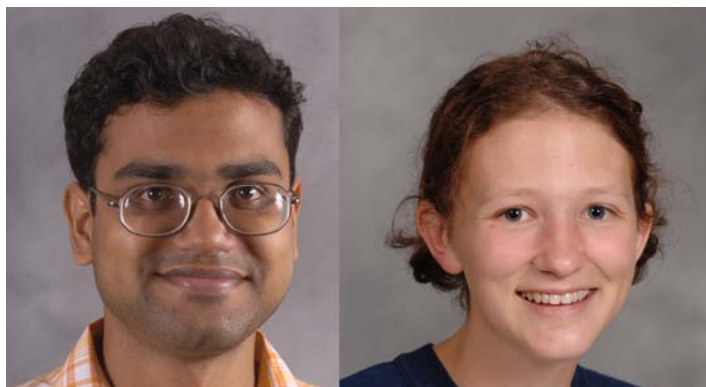
More recently, Shaw is involved with the development of a large cloud chamber facility, in collaboration with other Atmospheric Sciences faculty on campus. This ~3 cubic meter chamber will allow for simulation of realistic thermodynamic environments for cloud formation within the bottom 10 km of Earth's atmosphere.

Shaw's research has been supported by the National Science Foundation for 12 years, as well as NASA and the Department of Energy.

Partha Pal and Amalia Anderson

Dean's Award for Outstanding Scholarship

Former physics graduate students **Amalia Anderson** and **Partha Pal** are recipients of the Dean's Award for Outstanding Scholarship. They were nominated by the Department of Physics. Pal and Anderson also received Finishing Fellowships from the Michigan Tech Graduate School.

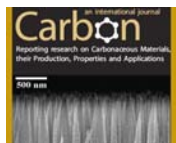


Research in the News

Physics research again received much notice in popular and scientific media. Some of the top stories originating from Michigan Tech were:



Cloud Chamber: Raymond Shaw is leading the development of a cloud simulation chamber to be housed in the Great Lakes Research Center. The story was in *Michigan Tech News*, *The Detroit News*, *UpperPeninsula dot Biz*, *CBS Detroit*, and the *Mining Gazette*.



Carbon Nanorods: Yoke Khin Yap had another image published on the cover of *Carbon*. The nanorods contain nitrogen donors intended to enhance the electrochemical properties of the material.



Nanotech Filter: Yoke Khin Yap and Jaroslaw Drelich from Materials Science and Engineering developed a filter of carbon nanotube-coated stainless steel mesh. The story appeared in *Michigan Tech News* and was published in *Carbon*. In April Yap was interviewed by *WLUC TV6* for the evening news.



PICO Mountain Observatory: Claudio Mazzoleni and other Michigan Tech researchers study aerosol behavior at Mt. Pico in the Azores. Recently featured in *Michigan Tech News*, the PICO projects have received multi-year funding from NSF and DOE.

Awards and Achievements

For groundbreaking work in nanotechnology, Professor **Yoke Khin Yap** and then-PhD student **Chee Huei Lee** received Michigan Technological University's Bhakta Rath Research Award.

Senior Lecturer **Michael Meyer** is a recipient of the 2011 Distinguished Teaching Award.

Physics graduate student **Wil Slough** is a recipient of the Outstanding Graduate Student Teaching Award at Michigan Tech.

The Michigan Tech chapter of the **Society of Physics Students (SPS)** has been selected as one of the 2010 Outstanding SPS Chapters.

Eric Petersen is the 2011 recipient of the Ian W. Shepherd Award for most outstanding physics graduate.

The Presidential Council of Alumnae recognized physics graduate student **Marwa Abd Almonem** as a Woman of Promise.

Michigan Technological University honored Department Coordinator **Andrea Lappi** and Professor **Donald Beck** for 30 years of service.

Physics graduate student **Abhishek Prasad** won an award in the 2010 Materials Research Society Fall Meeting. Prasad was one of the 50 finalists in the *Science as Art* competition for his entry entitled "Stem of nanoflowers."



Recent Funding

Research funding over the last year for the Department of Physics topped \$1,137,000. Funding has been provided by the Vice President for Research Office, SURF, NSF, DOE, the Henry M. Jackson Foundation for the Advancement of Military Medicine, Marshall University Research Corporation, the Pacific Northwest Division of the Battelle Memorial Institute, and the Nevada System of Higher Education-Desert Research.

Department Updates

Professor **Ulrich H. E. Hansmann** is a faculty member in the Department of Chemistry and Biochemistry at University of Oklahoma. He is now an adjunct professor in the Michigan Tech Department of Physics.

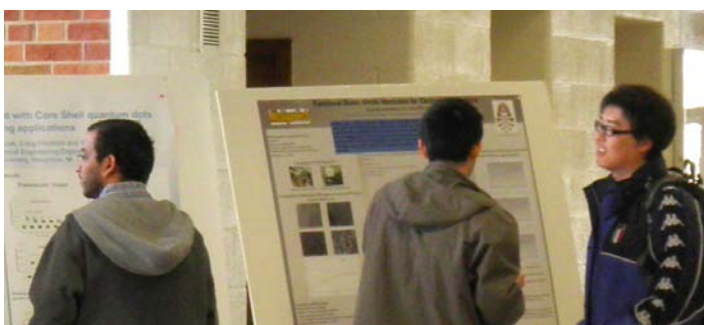
Former postdoctoral research associate **Lin Pan** joined Cedarville University, Ohio, as a tenure track assistant professor.

Yoke Khin Yap was promoted from Associate Professor to Professor.

Researcher **Nelly Iceta** visited during the summer. **Vyom Parashar** is a visiting researcher this fall.

Postdoctoral research associates **Maksim Kouza** and **Chee Huei Lee** have left the department for other employment. New research scientists and postdocs **Rodrigo Garcia Amorim**, **Emanuele Bonamente**, and **Jiang Lu** have joined us this year.

Dr. Elena Semouchkina from Electrical and Computer Engineering is an Adjunct Associate Professor with the physics department.



The Physics Graduate Poster Session was held on April 21, 2011, in the Fisher Atrium. Seven students presented research posters.

Wil Slough

Outstanding Graduate Student Teaching Award



Physics graduate student **Wil Slough** is a recipient of the Outstanding Graduate Student Teaching Award. Slough was nominated by the Department of Physics based on very high student evaluations from the large class PH2100 - University Physics I - Mechanics. The award is presented by the Michigan Tech Graduate School.

Recent Degree Recipients

2011

Amalia Anderson, PhD
Jessica Galbraith-Frew, MS
Partha Pal, PhD
Paul Rojas, MS

Renee Batzloff, BS
Nick Black, BS
Kyle Gorkowski BS
Matt Guthrie, BS
Valerie Hallfrisch, BS
Karl Meingast, BS
Dan Miller, BS
Eric Petersen, BS
Erin Scanlon, BS
Anthony Szedlak, BS
Justin Wojdula, BS

2010

Sanjay Karna, MS
Chee Hui Lee, PhD
Jiang Lu, PhD
Archana Pandey, PhD
Zhuoyuan Wu, PhD

Destination

Hendrix College, Arizona
University of Utah
University of Michigan
Colorado State University

Univ. of MN Duluth
Michigan Tech Physics
Los Alamos National Lab
Univ. of Texas at Austin

Michigan Tech Forestry
UMBC
University of Illinois
Georgia Tech
Michigan State University
Univ. of Nevada, Reno

University of North Texas
Case Western Reserve U
Michigan Tech Physics
Univ. of Alberta, Canada
Seagate Technology

From all over the state, what makes Michigan great — *Winter Carnival 2012 Theme*

Astro Outreach

Professor of Physics **Robert Nemiroff** gave three talks this year about APOD, Astronomy Picture of the Day. 2010 year highlights from this online gallery were presented at the Franklin Institute Science Museum in Philadelphia, at the American Museum of Natural History in New York City, and for Google Tech Talks in Mountain View, California. Nemiroff also gave a talk and led a Star Party at Fort Wilkins Historic State Park in Copper Harbor. Undergraduate physics majors **Justin Holmes** and **Ryan Connolly** assisted at the Star Party, which attracted about 40 stargazers.



Dean's List

Spring 2011 4.00

Adler, Michael C	JR	SPH
Beaulieu, Travis W	SR	SPH
Dobbs, Jeremy S	SR	SPH
Furlich, Greg D	JR	SPH
Gockenbach, Mark S	SR	SPH
Hallfrisch, Valerie A	SR	SPH
Leonard, Edward M	SR	SPH
Petersen, Eric A	SR	SPH
Wilm, Joseph D	SR	SPH

Spring 2011 3.50-3.99

Black, Nicholas A	SR	SPH
Brennan, Mackenzie P	SR	SPH
Connolly, Ryan P	SR	SPH
Fan, Xin Xin	SR	SPH
Guthrie, Matthew W	SR	SPH
Jacobson, Darcy M	JR	SPH
Knecht, Carlo A	SR	SPH
Kralapp, Charles W	FR	SPH
Laxo, Adam N	SO	SPH
Makoutz, Emily A	JR	SPH
Meingast, Karl M	SR	SAP
Nelson, Arin D	SR	SPH
Nerem, Matthew P	SR	SPH
Nicklas, Brent C	SR	SPH
Plamondon, Tyler J	SR	SPH
Radermacher, Matthew S	FR	SPH
Scanlon, Erin M	SR	SPH
Solfest, Peter M	SR	SPH
Sutton, Katelyn P	SR	SPH
VanderLaan, Derek J	JR	SPH

Michigan Tech is listed among the top universities in the nation in US News & World Report's 2012 edition of "Best Colleges."

Alumni

Michael C. Coleman '69
 Pamela '66 & Floyd Croy
 Andrew Drews '84 & Sue Inderhees
 John '50 & Eugenia Evans
 Walter '48 & Edith Gabriel
 Kenneth '79 & Lynn Genutis
 Thomas '63 & Dona Gould
 Joel Graber '87 & Lindsay Shopland
 Frank '58 & Shirley Hastedt
 Philip Kaldon '88 & Deborah Morrow
 Walter '64 & Margaret Kauppila
 James '59 & Carole Kauppila
 Wayne '97 & Regina Keranen
 Clyde '50 & Gertrude Kimball
 James '66 & Kathleen Kortge

Arne '52 & Joyce Koskela
 Jack '62 & Kaethe Labo
 Norman '61 & Sara-Jo Larsen
 Robert '61 & Eugenia '64 Lind
 Robert '70 & Nancy '73 Martin
 David '61 & Terri McLaughlin
 Ronald '64 & Hermine Meyer
 Samuel '63 & Brenda Ochodnick
 Lin Pan '08 & Hong Wei Yu
 Thomas '69 & Sharon Plutchak
 Gary E. Rhoney '65
 Joseph '76 & Anne Root
 Joseph Roti Roti '65 & Stephanie Pagano (dec)
 William '88 & Kathryn Siskaninetz
 Burris '64 & Katherine Smith

C. John '64 & Kathryn Umbarger
 Roger '66 & Linda Urbaniak
 SriramaSwaminat Venkataraman '98
 William '78 & Kathleen '77 Wilson
 David E. Woon '84

Friends

Gary P. Agin
 Keith & Wilma Baldwin
 Paul & Elsie Hinzmann
 John & Sherry Jaszczak
 Edward & Nina Nadgorny
 David Nitz & Mary Marchaterre
 Terrence & Susan Wilm

Graduate Spotlight

Saikat Mukhopadhyay



I joined the Department of Physics in the Fall of 2007 as a doctoral student. I am privileged to have Professor Ravindra Pandey as my advisor. Till spring 2009, I worked on three different areas of research: metal and metal oxide clusters, nano-bio interactions and quantum transport in mesoscopic systems. Presently, I am investigating the challenges and possible usages of nano-structured materials in bio-medical applications.

It is well known that nano-structured materials can be used in many applications, but interfacing the biological macromolecules (for example DNA/RNA) with nano-materials has been a challenge. This is due to the lack of the knowledge about the physics and chemistry behind these interactions and also to the size of the biomolecules. Therefore, I started to build up a basic understanding about the interaction of nano-materials with the building blocks of the macromolecules such as nucleobases and amino acid molecules. Our results were well accepted in the scientific community and got selected as a highlighted article in [nanotechweb] Lab Talk. Currently, I am applying the knowledge derived from my earlier projects to design biosensors out of nano-bio conjugates. During the summer (2011), I worked at the Los Alamos National Laboratory, where I applied my experience on the mesoscopic transport phenomenon to the problems in polymer physics.

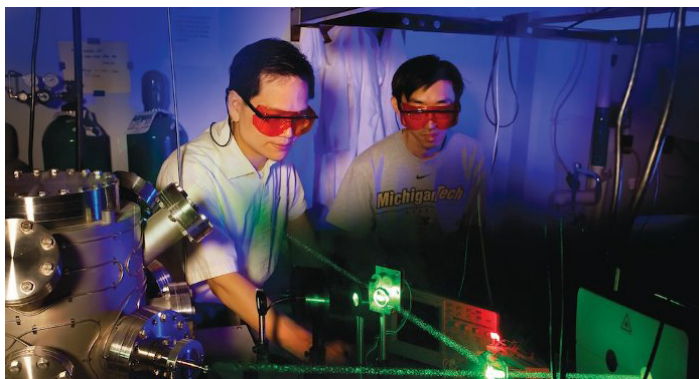
I am an active member of the American Physical Society for the past three years and attend meetings and conferences that they organize. My other activities include playing badminton, volleyball, racquetball and soccer. Additionally, I enjoy the beauty of Upper Peninsula and like to travel to different places.

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.

Yoke Khin Yap & Chee Huei Lee

Bhakta Rath Research Award



Yoke Khin Yap (left) and Chee Huei Lee (right) have received Michigan Tech's Bhakta Rath Research Award for their groundbreaking work in nanotechnology. Professor Yap and now-graduated PhD student Lee invented a technique for synthesizing boron nitride nanotubes. These materials are strong, perfectly insulating, and superhydrophobic. The collaboration between Yap and Lee has led to nano-carpets of these nanotubes for potential use as high-strength composites and ceramics.

This is the second Bhakta Rath Research Award. The new award is named in honor of Bhakta B. Rath, Michigan Tech alumnus '58, who dedicated years to promoting science and engineering research. The award recognizes those who conduct exceptional scientific and technological research in anticipation of the future needs of the nation.

Mineral Museum Reopens

The A. E. Seaman Mineral Museum was dedicated at its new site on Sharon Avenue last August by the Michigan Tech Board of Control. The project was made possible by 1957 Michigan Tech alumnus Tom Shaffner. Grandchildren of A. E. Seaman attended the event. The museum is open now, with two galleries and a gift shop ready. More galleries will be added. Professor of Physics John Jaszczak is adjunct curator of the museum.



Nothing is too wonderful to be true if it be consistent with the laws of nature.

—Michael Faraday

Michael Meyer

Distinguished Teaching Award



Senior Lecturer Michael R. Meyer was honored in the Lecturer, Professor of Practice, or Assistant Professor category for 2011. Meyer was recognized for his sweeping improvements to introductory physics labs, including new sections, technology utilization, and insightful pedagogical approaches. He has led the development of online courses, supervised dozens of teaching assistants, and trained high school physics teachers. A typical comment about Meyer from a student was "He is the friendliest, funniest, and most enthusiastic professor I've ever had."

Senior Spotlight

Greg Lau



Greg Lau is a 5th year physics and computational mathematics dual major. He has been on the Dean's List for numerous semesters and was inducted into Sigma Pi Sigma in Spring 2010. Greg is an active member of the Society of Physics Students, helping out with such events as Family Physics Night. Early in his academic career, he did computational electrostatics work under the guidance of Dr. John Jaszczak. The project is still ongoing. During the Spring 2011 semester, Greg was studying abroad at Australia National University. There he did work on fitting a model of the plasma formed in the H1 fusion reactor to experimental data obtained from the reactor. Greg plans on obtaining his PhD in physics via computational research, though he currently has no specific field in mind. His knowledge of physics would not be what it is today without the great friends he has found in both faculty and students, and he is immensely thankful for their help.



In Memoriam

Robert A. Janke
Aurilee R. Smith
Donald Yerg

MichiganTech

Physics News

Michigan Technological University
1400 Townsend Drive
Houghton, Michigan 49931-1295

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Physics Faculty 1977/1978

Standing (L to R): Mike Sorochman, David Lucas, Dave Chimino, Charles McEwan, Sung Lee, Paul Shandley, Keith Baldwin, Don Daavettila, Bob Mount, Marilyn Hanson, Dave Kallainen, Jeanne Musich. Seated: Charles Mandeville, Vasant Potnis, Phil Parks, D. O. Wyble, Gary Agin, Ian Shepherd (from 1978 Keweenawan, MTU Archives and CCHC).
