



the leading edge

Western Kentucky University

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Dates To Remember:

- Jan. 22nd—Spring 2007 Semester Begins
- March 1st—
"Technology In Action EXPO"

Coming in Next Issue

- Special Edition
- "Technology In Action EXPO" Newsletter
- 16 Pages Featuring Each ARTP Center

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ICSET Director Received Distinguished University Scientist Award

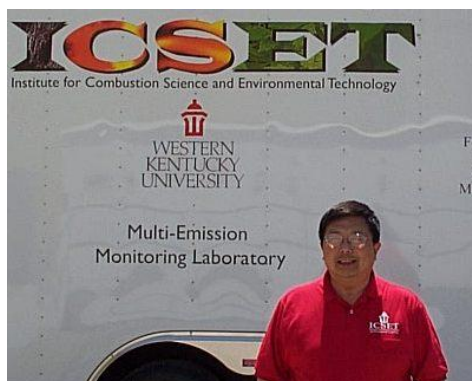
Dr. Wei-Ping Pan received the 2006 Kentucky Academy of Science Award for Distinguished College/University Scientist. Dr. Pan is an internationally-recognized leader in clean coal technologies that will help coal-fired power plants meet EPA's new, more stringent mercury emissions standards. He is a respected expert in thermal analysis, combustion science, and mercury emissions. Terry Kelly, President of TA Instruments – an international leader on thermal analysis with offices around the world, said Dr. Pan's research *"has benefited citizens, communities, and corporations in Kentucky and around the world by facilitating the development of cleaner, more efficient energy sources."* The Institute founded by Dr. Pan at Western Kentucky University, supports the Thermal Analysis Laboratory, the Combustion Laboratory, and the Mercury

Emission Control Laboratory. While Dr. Pan's work in the laboratory is superb and highly regarded, he values and enjoys teaching. He understands the importance of learning outside the classroom and provides both undergraduate and graduate students with an opportunity to work in his laboratory. Since joining the Western Kentucky University faculty, Dr. Pan and his students have presented over 300 research papers and published over 200 articles – with over 80 presentations at the Kentucky Academy of Science. In recognition of his distinguished scientific career, the Kentucky Academy of Science was pleased to present the 2006 Distinguished College/University Scientist

Award to Dr. Wei-Ping Pan during the annual KAS meeting banquet on November 10, 2006.

~Article reproduced
from the ICSET
December
2006 Newsletter

Dr. Wei-Ping Pan, Director of ICSET, Institute for Combustion Science and Environmental Technology, received the 2006 Distinguished University Scientist Award at the 2006 KAS Conference.



The Kentucky Climate Center: The Weather: A Hot Topic of Research



Dr. Rezaul Mahmood from the Kentucky Climate Center is doing research focusing on soil moisture using the Kentucky Mesonet as seen below.



The weather has always been a lively topic of discussion, but for Dr. Rezaul Mahmood, it is also the focus of his research.

It is not uncommon for Mahmood, associate professor of Geography, to be involved in several-- as many as four-- major research projects at once. It is this dedication that earned

him the University Faculty Award for Excellence in Research/Creativity.

When most people study the weather, they look to the sky, but Mahmood looks to the ground, specifically to soil moisture content. His research focuses primarily on soil moisture variability and its interaction with climate, a relatively new field of study. He said that researchers have only recently begun to see that moisture in the soil can have an impact on the atmosphere. Ultimately, the goal of his research is to use soil moisture content to predict climate and weather.

"If you look at the globe, two-thirds of our planet is covered by water," Mahmood said. "We have found that sea surface temperature can be a very good predictor of long term climate. The idea is that if water in the ocean can be a good predictor of long term climate, then what about in the land surface?"

As a component of his overall soil moisture research, he looked at irriga-

tion practices in the western Great Plains. He found that prolonged irrigation permanently enhances the level of soil moisture. He noticed a correlation between the soil moisture in those heavily irrigated regions and decreases in daily maximum temperatures. Solar radiation, or sunlight, he explained, evaporates water. "If you have more moisture in the soil, there will be more evaporation. If you have more evaporation, the sensible heat-- the thermometer reading-- will be lower because more of the sunlight is being used for evaporation."

This, he said, is why deserts can reach extremely high temperatures. Because there is no water, all the solar radiation is being used to heat the near surface atmosphere as opposed to evaporating water. The result of irrigation in the western Great Plains is just the opposite circumstance.

"The idea is that if it happens over a long period of time, we should see some footprint in the temperature record."

Mahmood has spent much of the last two to three years studying this land use change and its impacts on climate. As a result of this research, a special issue of the journal, *Global and Planetary Change*, will be published, dealing solely with this topic. Mahmood is the lead guest editor for the special issue, which will come out this month. He is the lead coordinator of another special issue on the same topic for the *Journal of Applied Meteorology and Climatology*.

Mahmood's research has ranged from the study of the monsoons in

India to flash flooding in eastern Kentucky. Most recently, he has been involved in the Kentucky Mesonet project, a statewide automated environmental monitoring network of approximately 100 stations that will collect real-time weather and climate observation data.

"The Mesonet is basically going to allow us to have highly dense meteorological and hydrological observation networks statewide," Mahmood said, and added that a key part of the Mesonet Project is the quality assurance of the data being collected.

He said the data collected can be used for a wide variety of purposes including weather forecasting, drought management, flooding and emergency management and agricultural assistance.

"We probably know very little of what we can do with the data," he said. "Somebody out there will use this data for something we have never thought of."

Mahmood said students play an important role in whatever research he is working on, and seeing them succeed, by going on to top postgraduate institutions or having their names on published articles, is a strong motivator, and helps him stay excited by his work. He said the students, along with support from home and from his colleagues in the department are critical to the success of any research he undertakes.

~by Kimberly Parsley
This article originally appeared in the November/December issue of Echo, www.wku.edu/echo/

API students received awards from American Physical Society to attend Nuclear Physics Conference

November 1--- Western Kentucky University students and faculty traveled October 25-28th to the Gaylord Opryland Resort and Convention Center in Nashville, Tennessee to attend the 2006 Annual Meeting of the Division of Nuclear Physics of the American Physical Society (APS). The Meeting has international scope and covers themes from theory of nuclear structure and nuclear astrophysics to applied nuclear physics and stewardship science.

API students received APS awards to attend this Meeting. It provides a "capstone" experience for undergraduate students who have conducted nuclear physics research. Students are able to present their extensive research to many professionals and other fellow students. The conference also provides a networking opportunity for students to interact with faculty and senior scientists from graduate institutions. Many attendees inquired about graduate school opportunities and future plans after completion of their undergraduate work from WKU.

Student Researchers from the Applied Physics Institute Jeremy Board, Eric Houchins, Chris McGrath, Kyle Moss, and Matt Nichols presented results of their independent research projects to other conference members. These projects covered different topics from nuclear physics and were outlined in a poster session. Dr. Phillip Womble and Dr. Alex Barzilov, API directors and physics faculty members, accompanied students and also presented research papers at the Meeting sessions.

Jeremy Board (Payneville,

KY): "Integrating Wireless Networking to Radiation Detectors"

Eric Houchins (Bowling Green, KY): "Pulsed Elemental Analysis using Neutrons"

Chris McGrath (Logan Co., KY): "The Utilization of Free-Running Digital Signal Processors as a Method of Multi-Channel Analyzers"

Kyle Moss (Greensburg, KY): "A Gamma Ray Spectrometer Based on Mobile Phone Technology"

Matt Nichols (Bowling Green, KY): "The Effect of Nuclear Cross-Section Data on the Measurement of Elemental Densities in Explosives Threat Analysis"

The American Physical Society was founded on May 20, 1899, when 36 physicists gathered at Columbia University for that purpose. They proclaimed the mission of the new Society to be "to advance and diffuse the knowledge of physics", and in one way or another the APS has been at that task ever since.

The Applied Physics Institute is a multidisciplinary center performing research and development projects in areas of nuclear physics, nuclear engineering, wireless data communications, homeland security, material science, and electronics. API researcher's interests cover virtually all aspects of applied science and technology.

*~Submitted by
Kelly Johnson
Press Release
From API*

*Approved by
Phil Womble,
Director
Applied Physics Institute*

Figure 1



Figure 2



Figure 3



Figure 1: Kyle Moss, Matt Nichols, Jeremy Board, Eric Houchins, Chris McGrath, and Dr. Phil Womble standing in front of research project posters.

Figure 2: Kyle Moss, Matt Nichols, Jeremy Board, Eric Houchins, Chris McGrath, and Dr. Alex Barzilov in-between poster sessions, where API Student Researchers shared their individual project posters with research professionals and fellow students.

Figure 3: Matt Nichols, Eric Houchins, Jeremy Boards, and Kyle Moss enjoying the Nuclear Physics Conference at the Gaylord Opryland Resort in Nashville, Tennessee.

WKU Physics Students Attend 17th Argonne Symposium for Undergraduates

"Students were accompanied by Dr. Ivan Novikov, assistant professor in the Department of Physics and API faculty member."

NOVEMBER 15---WKU physics students attended the seventeenth annual Argonne Symposium for Undergraduates in Argonne, IL. Student researchers, Eric Houchins, Chris McGrath, Matt Nichols, Ian Rice, Jeremy Board, Kyle Moss, Sarah McMurray, and Jeremy Maune shared their latest research projects with other students as well as professionals. Students were accompanied by Dr. Ivan Novikov, assistant professor in the Department of Physics and API faculty member.

The Argonne Symposium invites students to

sium attendee, Jeremy Board said: "The Argonne Symposium is a way to network yourself into the environment that you plan on working in the future, and this is a great opportunity to do that."

Students presented their latest research over several topics:

- *The Utilization of Free-Running Digital Signal Processors as a Method of Multi-Channel Analysis.* Chris McGrath, Matt Nichols, Phil Womble, Alex Barzilov, Ivan Novikov, Jeremy Board, and Jon Paschal.

- *The Effect of Nuclear Cross-Section Data on the*

Measurement of Elemental Densities in Explosives Threat Analysis. Matt Nichols, Phil Womble, Alex Barzilov, Eric Houchins, Jeremy Board, Jon Paschal, and J.R. Moore.

- *Design and Construction of the WKU Ion Beam Materials Analysis Laboratory.* Ian Rice, Phil

Womble, Alex Barzilov, Lindsay Hopper, Jon Paschal, Ryan Moore, Sara McMurray, Britton Wallace, Time Morgan, and Jonathan Craft.

- *Integrating Wireless Networking for Radiation Detection.* Jeremy Board, Alex Barzilov, Phil Womble, and Jon Paschal.

- *Pulsed Elemental Analysis Using Neutrons.* Eric Houchins, Alex Barzilov, Phil Womble, Tim Morgan, Ian Rice, Jeremy Board, Joe Howard.

- *Wireless Gamma Ray Spectrometer with Automatic Isotope Identification.* Kyle Moss, Phil Womble, Alex Barzilov, and Jon Paschal.

- *Mass Ranges of Neutrinos as Candidates for Dark Matter.* Sarah McMurray, Keith Andrew, David Barnaby, and Brett Bolen.

- *An Optical Study of Six Intermediate Bl Lacertae Objects.* Jeremy Maune, and Michael Carini.

Students visited major physics research facility, the Argonne Tandem-Linac Accelerator System (ATLAS). Physicists from all over the world use ATLAS to probe the structure of the atomic nucleus by studying the gamma rays and particles emitted when ion beams collide with targets. The 500-foot-long accelerator is capable of accelerating ions of any element up to uranium to energies as high as 17 million electron volts per nucleon — about 15 percent of the speed of light.

Students also visited Northwestern University (Evanston, IL) where Dr. Max Sukharev presented his latest research on theory of coherent control and its applications in nanotechnology. Coherent control approaches have been applied in recent years to a broad variety of problems, ranging from atomic physics and gas-phase molecular dynamics through solid-state physics and semiconductor device technology to solution chemistry and biology.

~Submitted by
Kelly Johnson

Press Release for API

Approved by

Phil Womble,

Director

Applied Physics Institute



WKU physics students at the Argonne National Laboratory in front of the Advanced Photon Source. From Left to Right: Alison Rohde, Ian Rice, Jeremy Maune, Sarah McMurray, Matt Nichols, Eric Houchins, Jeremy Board, Kyle Moss.

present papers at the Argonne National Laboratory on their research in Biology, Chemistry, Computer Science, Engineering, Geology, Mathematics, and Physics. The Argonne National Laboratory is one of the U.S. Department of Energy's largest research centers.

Students were also given the opportunity to network with professionals and listen to keynote speakers that presented on research within his or her field. Student researcher and symposium

CWRS: WATERS Lab Acquires Autoanalyzer

WATERS Laboratory recently acquired an Aquakem auto analyzer. This instrument is unique in that it performs discrete analysis rather than continuous flow like many other auto analyzers. The motivation for this addition to the lab was to efficiently handle the sample load for the upcoming Total Maximum Daily Load (TMDL) project. The AquaKem 200 model is a spectrophotometer with capacity for up to 200 tests per hour. Possible Aquakem analyses include:

- Alkalinity
- Aluminum
- Boron
- Bromide
- Calcium
- Chloride
- Chromium-6
- Cyanide
- Fluoride
- Iron
- Magnesium
- Nitrate
- Nitrite
- Phenols
- Phosphate
- Silica
- Sulfate
- Sulfide
- Total Hardness
- TKN
- Ammonia Nitrogen
- Total Phosphorus

The Aquakem is ideal for water quality in-

vestigations and research applications. Only two mL of sample is needed to run each test, which reduces reagent volumes and also decreases the amount of hazardous waste generated. All procedures follow EPA methods and generate precise measurements. The instrument is easy to use, time efficient, and performs multiple tests at one time. Stop by the lab for a demonstration on how the Aquakem can work for you!

*~Submitted by
Jana Fattic
WATERS Associate
Director
Center for Water
Resource Studies*

Figure 1



Figure 3



Figure 4

Figure 1: Aquakem is also used by government agencies such as the USGS and the USDA. WATERS purchased Aquakem from EST Analytical in the summer of 2006.

Figure 2: The instrument contains a thermally cooled reagent compartment and additional reagents may be loaded at any time without interrupting an on-going analysis.

Figure 3: No surfactants are needed to run chemistries with the Aquakem (discrete analysis), unlike most continuous flow systems. Small amounts of reagent are needed, so there is less handling of reagent and hazardous waste.

Figure 4: Large quantities of samples are analyzed for multiple chemistries simultaneously, and little sample volume is needed!

BIOTECH Loses One of its Members In Memoriam: Joseph Bilotta 1955-2006

"Joe received his college's award for Excellence in Research in 1996 and 2002, and the University Award for Excellence in Research in 2002."

The members of the Biotechnology Center lost a valued colleague and friend when Dr. Joseph (Joe) Bilotta died unexpectedly last year on January 2. We would like to take this opportunity to pay tribute to Joe and to his lasting legacy as an eminent scientist, professor, and mentor.

Joe was born October 21, 1955 in Niagara Falls, NY. His pathway in higher education began in 1975 with an Associates Degree in Mathematics from Niagara Community College, and continued with B.A. and M.A. degrees in Psychology from State University of NY College at Buffalo and Brockport respectively, an M.A. in Experimental Psychology from Brooklyn College, and a M.Phil in Experimental Psychology from City University of New York. In 1987, Joe went on to earn a Ph.D. in Experimental Psychology at the City University of New York, under the mentorship of Dr. Israel Abramov. His dissertation research was on

the spatial and spectral properties of the goldfish retina. Joe then completed a post-doctoral fellowship in the laboratory of Dr. Maureen Powers at Vanderbilt University, before joining the faculty at Western Kentucky University in August of 1991.

Joe had a distinguished career as a member of the Department of Psychology at Western, advancing from Assistant Professor to Full Professor in just ten years. He was a devoted teacher and was the recipient of the College of Education and Behavioral Sciences Award for Excellence in Teaching in both 1993 and 2000 and the University Award for Excellence in Teaching in 1993. Renowned as an excellent mentor, in his fifteen years as a professor, Joe trained numerous undergraduates and masters level graduate students in his research laboratory.

In recognition of his many scientific achievements in the field of fish visual neuroscience and psychophysics,

Joe received his college's award for Excellence in Research in 1996 and 2002, and the University Award for Excellence in Research in 2002. Joe was a member of the American Psychological Society, the Association for Research in Vision and Ophthalmology, the Society for Neuroscience, the Kentucky Academy of Science, and he served as President of Western Kentucky University's chapter of Sigma Xi in 1996-1997. Joe was also a charter member of the board of the Western Kentucky University Research Foundation, and in 2000, he became a highly productive member of the ARTP's Biotechnology Center. His participation broadened the scientific expertise of the center, provided exciting opportunities for student research in the field of visual neuroscience, and led to the establishment of a dedicated histology laboratory within the center. He was also a participant in the National Institutes of Health state-wide initiatives known as KBRIN (Kentucky Biomedical Research Infrastructure Network) and INBRE (IDeA Networks of Biomedical Research Excellence), which provided funding for his vision research. Joe reached international prominence in the vision science community and was serving on the Editorial Board of Visual Neuroscience at the time of his death. In Joe's memory, a special issue of the journal dedicated to fish visual neuroscience will soon be published.

Joe is survived by his wife of 23 years, Dr. Elizabeth Lemerise; his mother; a sister; two grandmothers; a niece; a nephew and numer-



Biotech: In Memoriam: Joseph Bilotta

numerous aunts, uncles, and cousins. A scholarship fund in Joe's name has been established at Western Kentucky University to continue to support his strong commitment to the transforming power of education. Those who wish to honor his memory may send a donation to the Joseph Bilotta Scholarship Fund, Department of Psychology, Western Kentucky University, 1906 College Heights Blvd. #21030, Bowling Green, KY 42101-1030.

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~Submitted by
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"Those who wish to honor his memory may send a donation to the Joseph Bilotta Scholarship Fund, Department of Psychology, Western Kentucky University, 1906 College Heights Blvd. #21030, Bowling Green, KY 42101-1030."



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