

REFLECTIONS

Volume XIII, issue 1

Summer 2009

UNIVERSITY OF ARKANSAS

SPECIAL POINTS OF INTEREST:

- Students and alumni make the grade.
- Cutting edge research continues.
- Education expands and leads the state.
- Programs and lectures aim high.

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SOARING HIGH! ALUMNUS PROFILE: RICK FITTS (BA, 1970)

After graduating from the University of Arkansas with a BA in Physics in 1970, Rick Fitts' career with NASA began in March, 1971, while he was still in graduate school working toward a Master's Degree in Electrical Engineering.

"I was amazed to be interviewed and hired over the phone, but I later learned that's the way it was done in those days. I told the HR woman that I wouldn't graduate for at least another nine months, but they said my Physics degree qualified me just fine."

Fitts set off for Houston, and says, "I couldn't have made a better decision!"

As a NASA Flight Controller, he was one of the engineers who worked in Mission Control monitoring a subset of the spacecraft systems. He says it was a dream job for a 22-year-old boy from Arkansas. He was assigned as a Guidance, Navigation and Control Officer (GNC for short), and began his training during the Apollo 15 mission. Controllers work in either the "Front Room" (the one seen on TV) or in the "Back Room." For every person in the front room, there is a team of controllers in the back room for support. Fitts trained in the back room on Apollo 15, in the front room on Apollo 16, and



Rick Fitts (BA 1970)

expected to be assigned to work Apollo 17 (the last lunar landing). Instead, he was given the opportunity to move straight to the front room for the Skylab program.

Skylab was the first US space station, constructed from leftover parts originally intended for additional missions to the moon. While the Apollo missions were typically about two weeks long, Skylab would last at least a full year. "We had to support 24x7x365, but I didn't mind...I was part of NASA and in charge of my own team of controllers watching the station's GNC systems." Not only did he monitor and analyze data, but he also commanded Skylab to perform maneuvers and update navigation parameters.

The team faced many problems:

a broken solar array, a damaged heat shield, overheating rate gyros and lubrication failures on the big control gyros. However, they met each challenge and kept the program going. The final crew spent three months onboard, which was a human spaceflight record at the time.

Fitts says, "The thing we looked forward to the most were video downlinks from the crew. We had very limited ground coverage in those days, four or five-minute passes over ground stations. Depending on the earth's rotation and the spacecraft's position in orbit, we would have from one to eight ground stations every 90-minute revolution of the earth. It made us think fast. We'd often see data as the spacecraft came 'over the hill' and have to respond to it within four minutes before we went LOS (loss of signal)."

When Skylab ended in 1974, he was assigned to the Shuttle program, again as a GNC officer. While Skylab just went "round and round," the Shuttle was a fully cabable spacecraft with a launch phase, on-orbit operations, and a reentry to earth. His responsibility was ascent, the critical launch phase. "I'd never been on console for a launch," Fitts says, "so this was a real challenge." Powered ascent lasted only eight minutes, so everything happened fast. The mission was originally scheduled to go in 1978, so they began training in 1977. However, the launch did not happen until 1981 due to problems with the thermal tiles and the high power main



Rick Fitts on Skylab Project

engines. Fitts saw that delay as an opportunity to be better prepared. He recounts that he had participated in over 1000 simulated ascents before sitting for the real thing.

This was the first time ever in NASA's history that a new spacecraft was not tested unmanned before putting humans at risk. Since the Shuttle landed like an airplane, it needed a crew to fly it home. The autoland capability was unproven.

Fitts says, "Being a key part of the first launch was the highlight of my career. My heart rate was off-scale high just before we lit the solid rocket boosters. However, once the mission was underway, our training kicked in and we were very focused and alert. Thankfully the entire mission was a success. The sense of pride and accomplishment can't be described. It was a proud time for America's human space program."

After this triumph, Fitts was also on console for the Challenger disaster, and he helped his employees survive the Columbia loss. From there, he moved into management and spent his last eight years with the agency as Division Chief for Systems with responsibility for almost 500 Shuttle and Station flight controllers.

After thirty-three distinguished years, he left NASA in 2004 to pursue a second career in

industry. He is currently Vice President of Houston Operations for MDA Corporation, the company that makes the Shuttle and Station robotics.

"Looking back, I wouldn't change a thing," he says. "My physics training prepared me well for my work at NASA. I never thought I'd need all of the coordinate transformation math I studied while I was in school, but it turned out to be a big part of what I did in my technical career. I'm grateful to my professors at the University of Arkansas for their efforts. I certainly wasn't their star student, but I was able to apply my education to some unique problems."



Rick Fitts with Skylab

FACULTY PROFILE

John Stewart (physics education) and Daniel Kenefick (astronomy) will join the physics department as tenure-track assistant professors beginning July 1, 2009. This brings the departmental faculty count to a total of 21. Prof. Stewart was profiled in the 2006/7 newsletter. See below for a profile of Prof. Kenefick.



Prof. Daniel Kenefick will commence his duties as assistant professor in July, 2009. A native of Ireland, he grew up mostly in Cork, Ireland's second city. He received his B. Sc. in Physics from University College Cork in 1987 and, after a receiving masters in general relativity, also from Cork, he attended graduate school at Caltech from 1989 to 1997.

He received his doctorate working under Kip Thorne on gravitational waves, and he also completed a thesis on the history of gravitational waves.

As a post-doc, he continued to combine an interest in physics and the history of science working at Cardiff University in Wales, where he was both a National Science Foundation international postdoctoral fellow and a European Commission Marie Curie Fellow. He returned to Caltech as a Research Fellow, where he primarily worked on the Einstein Papers Project as an editor of the *Collected Papers of Albert Einstein*, published by Princeton University Press.

While at Caltech, Daniel continued to work on the physics of gravitational waves, especially waves emitted by binary systems containing supermassive black holes, such as are thought to exist at the centers of nearly all galaxies. This research is particularly relevant to the proposed NASA/ESA mission LISA, a space-based gravitational wave detector.

Since 2003 he has been a visiting assistant professor at the University of Arkansas. During that time he has completed a book on the history of gravitational waves, titled *Traveling at the Speed of Thought: Einstein and the Quest for Gravitational Waves*, published by Princeton University Press in 2007. The work has been favorably received by both physicists and science historians. He has also continued to work part time on editing scientific documents for the Einstein Collected Papers Edition, and to maintain an interest in other topics in the history of science, such as the 1919 English eclipse expedition to test General Relativity. In 2008, Daniel was elected a Fellow of the American Physical Society. Recently, he was

also elected to the advisory committee of the American Institute of Physics' Center for the History of Physics.

While he has maintained an interest in gravitational waves, Daniel has also become interested in the broader astrophysical role played by supermassive black holes. He is part of the AGES collaboration (Arkansas Galaxy Evolution Survey) with his wife, Julia Kenefick, Claud Lacy and Marc Seigar of Little Rock. He is also the Principal Investigator of a \$1.4M NASA EPSCoR grant. This collaboration was awarded in 2008 to study the mass function of supermassive black holes. The study involves counting these objects as a function of mass, to learn how many are relatively large, how many small, and so on. In particular, the collaboration seeks to learn how this mass function has evolved over cosmological time. This is a topic of special interest in astrophysics and cosmology, since there is strong evidence that these supermassive black holes evolve along with their host galaxies, and may even predate them. The collaboration has already achieved success with the discovery of a promising correlation between the mass of supermassive black holes in disk galaxies and the tightness (or pitch angle) of the spiral arm structure in those galaxies.

The AGES collaboration now consists of four faculty (three at Fayetteville, one at Little Rock), two postdocs and four graduate students, with undergraduate researchers also involved.

Faculty News

Laurent Bellaiche received the Alumni Association's 2009 **Faculty Distinguished Achievement Award in Research**. Laurent is the third faculty member to receive this award, the other two being Greg Salamo and Min Xiao.

Professor Emeritus Art Hobson has completed updates for the 5th edition of his book *Physics: Concepts and Connections*, in preparation for its January 2010 release.

Daniel Kennefick appeared in a new documentary about Einstein that aired in November on the History Channel. To learn more, visit <http://www.history.com/minisites/einstein>. In 2008, he was elected a fellow of the American Physical Society. The APS is the premier international society of approximately 45,000 professional physicists around the world, and election to APS fellowship is limited to less than 0.5% of its membership. Dan's election to the fellowship brings the number of APS fellows on the physics faculty to eight, which includes six current faculty members (Gea-Banacloche, Gupta, Harter, Kennefick, Singh, Xiao) and two emeritus faculty (Art Hobson and Ray Hughes).

Claud Lacy was selected to receive a Fulbright College Master Teacher Award for the 2008/09 academic year.

Greg Salamo earned a Baum Faculty Teaching Award for Teaching Excellence, the university's top honor for outstanding teacher of the year for 2007.

Surendra Singh, department chair, co-authored a graduate-level textbook entitled *Concepts in Quantum Mechanics* with Vishnu Swarup Mathur. The textbook is part of the *Pure and Applied Physics Series* published by CRC Press, a preeminent publisher in the physical and life sciences, medicine, engineering, business, mathematics, and statistics.

Min Xiao and Yanpeng Zhang published their book *Multi-wave Mixing Processes* in 2008. It was published jointly by Springer and Higher Education Press.

Former Research Associate News

Igor Kornev (2001-2007 with Prof. Bellaiche) accepted a full professorship at the prestigious Ecole Centrale of Paris (France), becoming one of the youngest persons to be appointed full professor there. Igor will be in charge of the Applied Physics program there and lead the research on multiferroics and ferroelectrics.

Inna Ponomareva (2004-2008 with Prof. Bellaiche) and **Sergey Lisenkov** (2005-2008 with Prof. Bellaiche) also joined the faculty of South Florida University.

Alumni News

Emad Almahmoud (Ph.D., 2007) was appointed assistant professor at Al-albait University in Jordan.

Shawn Ballard (BS, 2009) was accepted into graduate school at the University of Illinois (for her English major).

Saad Binomran (MS, 2004; Ph.D., 2008) was appointed assistant prof. at the College of Science at Riyadh in Saudi Arabia.

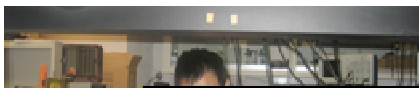
Jon Gardner (BS, 2009) was accepted into the physics graduate programs at the University of CA at Santa Barbara.

Kim Fook Lee (MA, 1997) was appointed assistant professor in the physics department at Michigan Tech University.

Amber Straughn (BS, 2002), received her Ph.D. from Arizona State University in 2008. In September 2008 she and her husband Matt moved to Maryland to begin her post-doc at the Goddard Space Flight Center.

Josiah Walton (BS, 2009) received a SPS 2007-2008 Leadership Award. It is a national recognition based on his outstanding academic performance and high level of SPS activity. He will receive a check for \$2000 in August and will be featured on the SPS website spsnational.org in the Scholarship section and possibly in an article in the *SPS Observer* or in the *Radiations* magazine. He has been accepted into graduate school in physics at the University of Illinois.

Student News



Haibin Wu (graduate student of Prof. Xiao) was awarded the **Aubrey E. Harvey Graduate Research Award** by the UA Chapter of Sigma Xi for his outstanding research. Haibin's research has led to seven publications in international journals. He was also awarded the **Hughes Graduate Fellowship**, the **highest recognition by the physics department to a graduate student**, in the spring of 2008.

Rachel Lee and **Matt Naglak**, students of Prof. Greg Salamo, were awarded prestigious **Barry M. Goldwater Scholarships**, the top national award for students in mathematics, science and engineering and **Colin Paul** received an honorable mention. They join previous physics winners Hannah DeBerg (2006), Justin Vines (2005), Ashley Altom (2003), Michael Barnes and David Norris (2002), Ben Hood (2001) and Laura Fields (2000). **Amee Salois**, a sophomore physics major and initial participant in our Howard Hughes Medical Institute (HHMI) grant has been accepted into the REU program at the MacDonald Observatory, UT Austin. **Joseph Snow** will attend the REU program at William and Mary University.

Sigma Pi Sigma Inductees: The local SPS chapter inducted 13 new members into Sigma Pi Sigma, the national physics honors society, this spring. The new members are Adam Barito, Ashley Stewart, Chris Sharp, Colin Paul, Josiah Walton, Matt Naglak, Rachel Lee, Scotty Bobbitt, Titus Morris, August Clark, Elaine Christman and Jason Lee.

SUNDIAL DEDICATED TO BOTANICAL GARDENS OF THE OZARKS



On behalf of its alumni, the Physics Department donated a sundial to the Botanical Garden of the Ozarks to commemorate 100 years of physics in Arkansas. A ceremony dedicating the sundial was held on June 21 in the Garden at solar noon.

"Moving shadows have been used at least 30 centuries as we know from a sundial excavated in Egypt. Stonehenge maybe, Mayan pyramids. There's a giant one standing in Jaipur, India. Dials large and small are on walls, in town squares, courtyards and backyards all over the globe. Sundials are timeless.

"Our place at this moment is at 94°7'8" west longitude in the Botanical Garden of the Ozarks. In a few minutes the line running NS will pass under the sun. In the Garden we are surrounded by clocks. The tomatoes over here are keeping tomato time, the Joe Pye weed is counting the days 'til butterfly season, the Western Red Cedar back there is making its 2009 ring. Today is the Summer Solstice, an ancient observation. Check your shadow today and again tomorrow when you'll see it is longer, as it was yesterday. Today is also SUNday, a nice coincidence. Now at 1h18m14s CDT as kept by those cesium atoms and relayed by those satellites definitely rotating about us we'll unveil the dial and let the shadow be cast."— **Emeritus Professor Charles Richardson**

The inscription will read:

A gift of the alumni to commemorate the hundredth anniversary of the Physics Department, University of Arkansas, 2007-2008.

G R O U N D - B R E A K I N G R E S E A R C H

HUMAN GENOME FOR \$1000!

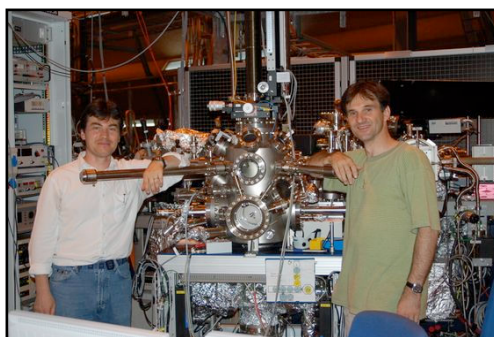


Prof. Jiali Li

Prof. Jiali Li won a highly prestigious \$830,000 3-year NIH grant. It is one of only eleven grants (totaling \$20 million) awarded by the National Human Genome Research Institute (NHGRI), part of the NIH, to develop innovative sequencing technologies that are both inexpensive and efficient enough to sequence a person's DNA as a routine part of biomedical research and health care. Revolutionary Genome Sequencing Technologies grants have as their goal the development of breakthrough technologies that will enable a human-sized genome to be sequenced for \$1,000 or less. (see above and to the right)

Prof. Li and her research team (Prof. David McNabb of Biology, and graduate students Ryan Rollings, Brad Ledden and Edward Graef) will explore Solid-state nanopore reading labeled linear DNA sequence. The goal of most nanopore-based sequencing platforms is to be able to sequence DNA without having to label or copy the nucleotides. However, this team will conduct basic research to develop a nanopore sensing system that labels nucleotides with a bulky group that is easy to detect, to better differentiate the electrical signal difference among DNA bases.

DESIGNING NANOMATERIALS



Prof. Jak Tchakhalian, left, and Jean-Marc Tonnerre from the National Centre for Scientific Research CNRS, Grenoble, France, the creator of the unique scattering chamber, at Swiss Light Source in 2007.

Prof. Tchakhalian and his colleagues found a novel way to "look" at atomic orbitals in complex oxides, and have directly shown for the first time that they change substantially when interacting at the interface of a ferromagnet and a high-temperature superconductor. This finding opens up a new way of designing nanoscale superconducting materials and fundamentally changes scientific convention.

Science, considered the most prestigious journal in the sciences, selected this research as one of the top 10 breakthroughs of 2007. Commenting on his work in the Dec. 21, 2007 issue, the editors said: "With almost limitless variation in these complex oxides, properties not yet dreamed of may be found where they meet."

2009 ROBERT D. MAURER DISTINGUISHED LECTURE



Prof. Joseph Taylor
James S. McDonnell
Distinguished Prof. of Physics,
Emeritus
Princeton University
Nobel Laureate in Phys. 1993

Nobel Laureate Joseph Taylor delivered the 2009 Robert D. Maurer Lecture on April 2 to a capacity audience in the Donald W. Reynolds Center.

Prof. Taylor's research focus is radio astronomy, especially the study of pulsars and their applications to experimental gravitation, a timely topic for celebrating the International Year of Astronomy. Pulsars are extremely dense neutron stars, strongly magnetized, rapidly spinning remnants of supernova explosions. They also appear to be nature's most precise clocks. Discovery of the first orbiting pulsar opened a new subfield of

astrophysics and offered an exciting opportunity to test the relativistic nature of gravity through precise comparisons of "pulsar time" with atomic time on Earth. Among other results, the experiments conducted by Prof. Taylor furnished persuasive proof of the existence of gravity waves, as Einstein predicted, a discovery important to both astrophysics and the study of gravity. For discovery of the first binary pulsar, Dr. Taylor shared the 1993 Nobel Prize in Physics with his graduate student Russell Hulse.

2008 CENTENNIAL REVISITED

Can you believe it has been over a year since the centennial celebration? Last year's newsletter focused on some centennial specifics. This year, we will recap the highlights and give you a link to check out updates to the website.

During the Fall 2007 semester, centennial events centered on two lectures. Professor Robert H. Austin from the Princeton University Department of Physics kicked off the series of five with his October 18 presentation *Ask Not What Physics Can Do for Biology, Ask What Biology Can Do for Physics*. He was followed by Robert Greenler, Professor Emeritus from the University of Wisconsin, Milwaukee. His November 8 talk on *Rainbows, Visible and Invisible* was a big hit with our public audience as well.

On February 7, Lawrence Krauss, the Ambrose Swasey Professor and Director of the Center for Education and Research in Cosmology and Astrophysics at Case Western Reserve University, presented *Einstein's Biggest Blunder? A Cosmic Mystery Story*. Following the same subject, Diana Buchwald, Director and General Editor of the Einstein Papers Project and Professor of History in the Division of the Humanities & Social Sciences at the California Institute of Technology, hosted a non-technical discussion of Einstein and his papers on March 13. Her presentation was entitled: *Working with Einstein: What His Manuscripts Can Tell*.

Professor Wolfgang Ketterle's lecture kicked off our three-day extravaganza, which we shared with current and former faculty, students, and staff. On Friday, April 4, Professor Rajendra Gupta opened events with his talk "A Century of Physics in Arkansas," a presentation tracking the history of the Physics Department. Highlighting current "frontier physics" research, several faculty members spoke on their specialties:

"A Dialogue with Dr. Feynman, or how I learned to love dwarf science," Jak Tchakalian

"Big Bangs, Small Bangs," Julia Kenefick

"A Shining Branch of Physics—Single Molecule Physics," Jiali Li

"Searching for an Ideal Optical Medium," Min Xiao

"Excellence in Physics Education," Lin Oliver

That afternoon, the department hosted a formal opening of the centennial exhibits, unveiling the "Odyssey of the Spheres," an Audiokinetic Sculpture by Bob McGuire of Creative Machines.

Provost Smith joined us, and the library hosted the reception. Afterward, Raj Gupta led a tour through the *A Century of Physics* poster exhibit and the historical equipment museum permanently housed in the first-floor lobby. Then graduate students assisted with leading groups to the research laboratories for the open house.

These events culminated in the evening gala at the Fayetteville Town Center, a dress occasion with good food and excellent company. Allen Hermann, Claudia Burson, Jim Greeson, and Darren Novotny opened the evening with jazz entertainment. After dinner, Surendra Singh, professor and chair, welcomed the crowd of over 400. Fulbright College Dean, Don Bobbitt, also spoke. And lastly, Chancellor-Designate David Gearhart spoke about the future course of the university.

Saturday brought a close to the three-day event with an alumni reunion, complete with stories and photographs. The memories we shared are forever! We invite you to revisit them all at <http://www.uark.edu/depts/physics/centennial/index.html>, the website devoted to preserving them.

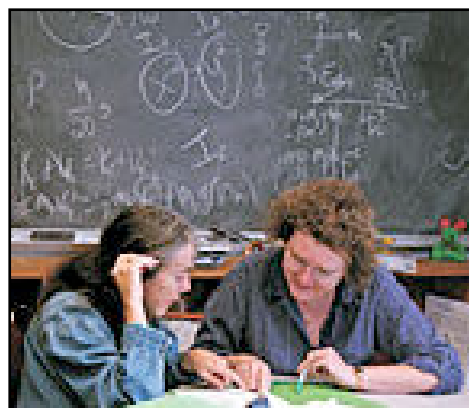
E D U C A T I O N : C O L L E G E R E A D Y I N M A T H A N D P H Y S I C S P A R T N E R S H I P

Gay Stewart (UA Physics) and Bernie Madison (UA Math) were awarded a five-year, \$7 million grant for the "College Ready in Math and Physics Partnership," an initiative that creates alliances among K-12 teachers and faculty in the sciences, technology, and engineering. "College Ready" is comprised of thirty-eight school districts in Arkansas and Oklahoma, the University of Arkansas at Fort Smith, and the University of Arkansas, Fayetteville, which will serve as the lead among these core partners. This new grant will allow Stewart and Madison to continue groundwork they have laid. "In the College Ready program, we intend to build learning communities of school and college faculty, help high school students become prepared to succeed in college and make effective learning materials available to students," said Stewart. "Ultimately, the program should lead to decreases in the number of students who come to college needing remedial classes as well as increases in the number of students who are enrolling in Advanced Placement math and physics courses." The program includes several physics and math faculty who will lead workshops and teach content courses for in-service teachers.

P H Y S I C S T E A C H E R E D U C A T I O N C O A L I T I O N P R O J E C T

The University of Arkansas excels at recruiting and advising physics teachers. The evidence is clear—in the 10 years prior to 2001, when the Physics Teacher Education Coalition project began at Arkansas, only one physics teacher graduated from the university. In the past three years, 20 teachers have graduated, and there is no sign of that number diminishing. At the heart of the Arkansas program is physics professor Gay Stewart, pictured at right in the photograph with one of her students. She used research-tested materials in redesigning the introductory physics sequence to emphasize interactive engagement, initiated a learning assistants program similar to those described in the main text and in box 2, paid individualized attention to students through advising, and helped build in the department a supportive social atmosphere that continues today. Stewart sums up her approach to teacher recruitment this way: "University of Arkansas' philosophy has been that you never know who is going to be a future teacher, so you should treat all students as if they might be, modeling good pedagogy in introductory physics classes. This has the beautiful side effect that if all students experience an intro class taught the way we would like future teachers to teach, you end up with more MAJORS! Further, the new teachers you have sent out start sending you new, well-prepared, prospective majors."

**Prof. Gay Stewart and
Belinda Hendley, Photo by Ken Vickers**



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2 0 0 6 - 2 0 0 7 P H Y S I C S P R O G R A M R E V I E W

In AY 2006-2007, a comprehensive ten-year review by a panel of external (Prof. Ryan Doezema, Physics Chair, U. Oklahoma and Prof. Soren Sorenson, Physics Chair, University of Tennessee) and internal reviewers gave us an opportunity to take a long-term view of our growth over time. Data gathered shows that the physics department has made significant improvements in all categories, increasing both the academic quality and reputation of its degree programs since the 1996 program review.

The number of physics majors has more than doubled. The number of undergraduate degrees awarded increased several fold, indicating a high level of retention and

degree completion. According to an APS, AAPT and AiP national task force, the increase in the number of 2003-2005 undergraduate physics degrees awarded by the University of Arkansas compared with 1997-1999 puts us third in percentage increase among MS/PhD schools in the US.

The external financial resources available to the department's research programs increased 3.7 times to approximately \$4 million per year.

The department's student body increased in size, quality, and gender diversity, especially at the undergraduate level. The department increased the diversity of its

faculty as well. Four out of eighteen faculty members in 2006 were women in professorial ranks, compared to two out of sixteen in 1996.

An area of increasing student interest and opportunity is biophysics, a complement to the department's strengths in lasers/optical physics, and condensed matter/nanoscience. Drs. Jiali Li and Eitan Gross form the current biophysics cluster, and the panel recommended for us to add two more faculty members in this area to allow the department to offer the necessary coursework in this area and provide more varied career choices to students of physics, microelectronics-photonics, and related disciplines. The panel also recommended expansion of research laboratory and office spaces available to the department.

G K - 1 2 O U T R E A C H

The University of Arkansas's GK-12 program, "K-12, I Do Science" or *KIDS*, is beginning its 8th year as a graduate fellowship program training future scientists to communicate their science to the public and bringing exciting inquiry based science teaching to Northwest Arkansas middle schools. The program is known nationally by its National Science Foundation (NSF) acronym, GK-12, for Graduate Teaching Fellows in K-12 Education. Locally, the program is directed by Dr. Morgan Ware, and is guided by Physics Professors Art Hobson, Greg Salamo, Gay Stewart, and Ken Vickers. The *KIDS* program draws graduate Fellows from all scientific and engineering disciplines across the university. Embracing the learning through doing paradigm, Fellows, with their passion for science and their real world laboratory experiences, are carefully trained to work in partnership with middle school teachers and their students. This training allows the Fellows and their partnered Teachers to bring an approach to the classroom that emphasizes student learning through their inherent wonder of how things work and their pursuit of answers to a scientific mystery. As a result of this outreach effort, the Fellows spend a year communicating science and breaking down high level concepts so that they may be taught to not only the Students, but the Teachers as well who gain a wealth of content knowledge they may not have ever been exposed to. Each year 10

Fellows work side-by-side with 20 science and math teachers, spending approximately 10 hours each week in the middle school classrooms using inquiry instruction to facilitate the learning of science and math and expose the students to the exciting world of being a scientist.

In addition to their role in middle school education, graduate Fellows also improve their communication, teaching, collaboration, and team building skills while enriching STEM learning and instruction in K-12 schools through interactions with the teachers and students and with other Fellows.

Initial evidence indicates that the *KIDS* program is making a difference. For example, standard evaluation reveals that: (1) Twice as many GK-12 Science/Math middle school students find careers in science "very interesting" as compared to a control group; (2) Middle school students in GK-12 classrooms (over 400 each year) have demonstrated a significant increase on state-wide test scores (at least 10%) between 4th and 6th grade while a control group of 498 students saw a roughly 10% decrease in scores. (3) While 20% of GK-12 Fellows had high confidence levels in communicating concepts in science, technology, engineering, and mathematics (STEM) prior to participation in the program, this number improved to 90% after going through the program; and (4) *KIDS* teachers experienced a 54% increase in the use of manipulative and active learning activities and a 60% increase in tech use.

At the 2008 NSF program meeting held annually in Washington D.C., the University of Arkansas's *KIDS* program earned "The Media Award" out of nearly 150 other programs from the NSF in large part for the production of a video about the university's efforts and the results. The video was produced by the media services department of the University of Arkansas Global Campus. As stated by the NSF, this award is for "Bringing national prominence to the GK-12 program". "We are delighted that the video is bringing national awareness to such a wonderful program here at the University of Arkansas," said Chris Erwin, producer of the video which was made through support for the program from NSF, UA, and the UA Alumni Association.

The video is structured as a special news bulletin on the "Crisis in Education in America" – about the decreasing number of young students who are choosing science and engineering as a career and the dangerous consequence to America as the world's innovation leader. Our leadership depends on our ability to produce the next generation of innovative scientists and engineers who create the best ideas for new products and then put them into the marketplace. Through the University of Arkansas's Physics Department, the *KIDS* program is trying to do its part to contribute to that "innovation key" by training the next generation of scientists to contribute to society at a grass-roots level and engage the public about science.

Letter from the Chair

Dear Friends,

The current academic year has been exciting despite the current economic challenges the country faces. Starting in July 2009, John Stewart in physics education and Daniel Kennefick in astrophysics will join the physics department as tenure-track assistant professors, bringing the number of physics faculty to 21. Physics faculty members have won a number of significant grant awards. Jak Tchakalian won the prestigious NSF-CAREER award.

Jiali Li won one of only eleven grants awarded by the National Human Genome Research Institute (NHGRI), part of the NIH, to develop innovative DNA sequencing technologies. Daniel Kennefick (group leader), Julia Kennefick, Claud Lacy and Marc Seigar (UALR), who have formed the Arkansas Galaxy Evolution Survey (AGES) group, were awarded a \$1.4 million NASA grant. The National Science Foundation has awarded a grant of \$ 2.7 million in support of the project "College Ready in Math and Physics Partnership" under the direction of a group of UA faculty members led by Gay Stewart. This is part of a 5-year award totaling \$7 million.

A year has passed since the department's centennial in 2008. The year-long celebration included a series of lectures, ending with a series of events during the week of April 3 -5. More than 200 alumni, former faculty and guests traveled from different parts of the US and, indeed, the world to join in the celebration. That so many of you came made this a memorable event. We are immensely grateful for it. The details of various events related to the centennial and downloadable pictures can be found at <http://www.uark.edu/depts/physics/centennial/>.

Once again, our sincere thanks. Please do keep in touch.

Sincere regards,

Surendra Singh
Professor and Chair



The generosity of many of our former students and friends enables the department to award scholarships, invite distinguished lecturers, etc., that cannot be funded through our normal budget. Below are the names of contributors from July 2006 through June 2008. Please forgive any oversights, as we have had a complete staff position change over since the last newsletter! All of you have made a difference. The funds are indicated by (B)=Admiral Bryson scholarship fund, (H)=Hughes Graduate Research Fund/Fellowship, (L)=Lingelbach Memorial, (M)=Maurer Research Fund, (S)=P.C. Sharrah Scholarship Fund. Those for which no fund is indicated donated to the general departmental fund.

Dr. and Mrs. Timothy Burt
 Dr. Thomas O. Calloway
 Dr. Darrel W. Collier
 Colonel Gary Culp
 Mr. John Dixon
 Ms. Leslie D. Embrey
 Dr. William D. Evans
 Prof. Julio Gea-Banacloche
 Dr. Allen M. and Mrs. Leonora Hermann

Dr. Alan Hughes (H)
 Mr. Randall Hughes (H)
 Dr. Raymond H. and Mrs. Jane Hughes (H)
 Dr. Tacy M. Joffe-Minor
 and Mr. Raymond Minor
 Mr. Daniel and Mrs. Ruby Lingelbach (L)
 Mr. Kenneth J. Phillips
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