



# REFLECTIONS



## New Physics Building Dedicated

September 9, 1994 was a beautiful Fall day. The afternoon sun was shining brightly on the physics building. A large crowd of current and former physics students, faculty and friends had gathered in front the newly constructed expansion of the physics building. With the flip of a switch UA Chancellor Ferritor and Physics Chair Gupta caused a lightning spark to travel up a 'Jacob's Ladder' to burn the ribbon in two. This traditional ribbon-cutting ceremony worthy of physicists marked the completion of renovation and expansion of the new Physics facilities. This renovation and expansion completes the phase I of the two-phase plan for the physics building.



The speakers at the grand opening ceremony included President of the University of Arkansas system, Dr. B. Alan Sugg; the Dean of the Fulbright College of Arts and Sciences, Dr. Bernard Madison; Chancellor of the University of Arkansas, Dr. Dan Ferritor, and Physics Department Chairman, Dr. Raj Gupta. Special guest and speaker at the grand opening ceremony was distinguished scientist, Professor Elsa Garmire, Director of the Center for Laser Studies at the University of Southern California.

Speaking at the opening ceremony Dr. Bernard Madison congratulated Physics Department on its new facilities. Citing many outstanding research accomplishments by the physics faculty and students that have gained worldwide recognition, he said that the College and the University take great pride in the many accomplishments of physics department.

Ferritor in his remarks said that the opening ceremony was not to celebrate a building but, a nationally recognized faculty. He said that the improved facility merely allows them to do the kind of work that they do best. "We finally have facilities that our students deserve," said Raj Gupta. He reminded the guests that the present building was originally intended as a temporary home for the physics department. He said that during the two years of construction day-to-day physics operations were strained but physics research continued. Gupta was praised by Dr. Michael Lieber, physics Vice Chairman for his services in the renovation. Prof. Elsa Garmire said that the recent advances in lasers and photonics only revealed the beginning of the capabilities physics students can reach with their new modern class-rooms and state-of-the-art laboratories.

The grand opening was followed by an open house. All physics facilities, including teaching and research laboratories, were open for visitors. There were powerful lasers, holograms, scattered photons, fluorescing atoms, superconductors - the stuff of science fiction movies, and scores of

displays illustrating principles of physics. The complete program included a general interest talk by Prof. Elsa Garmire, entitled "Photonics: Optics Impacting Information Technologies" in Giffels Auditorium, Old Main, on September 8. Prof. Garmire surveyed the rapid growth that has occurred in the area of photonics (information systems that use optics and lasers). She also spoke of technical challenges that must be met in order to continue the current pace of advances in photonics.

## **More on the Grand Opening and Renovation...**

### **Grand Opening Banquet**

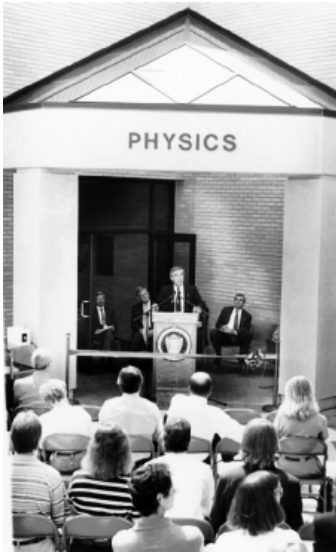
In the evening a banquet was held to greet friends, alumni, current and former faculty, and undergraduate and graduate students. Speaking on this occasion, Raj Gupta, Physics Chairman, said that Physics at the University of Arkansas has come a long way from its humble beginnings when it was taught as a second or third subject by instructors from other disciplines. He said that although Physics as a separate department was created in 1908, the University did produce its first physicist from its very first graduating class. The graduating class of 1876 included William J. Wagner, who later studied under such prominent physicists as Max Planck and von Helmholtz, and became the first Professor of Physics at the University of Colorado. Other banquet speakers included Drs. Sharrah, Anderson and Pederson.

Dr. Sharrah joined the department in 1942 and stayed with the department until his retirement in 1982. He was physics chairman from 1957 to 1969. In his remarks Dr. Sharrah traced the history of Physics Department with photographs of old building and facilities, former students and faculty.

Dr. Anderson, who contributed greatly to the department's teaching and outreach programs during his 23-year tenure with the Department, is currently the Director of the EPSCoR program at National Science Foundation. He fondly recalled his association with the department and said what matters most is not a building but people who work with you. It is the people who make the difference.

Dr. Pederson, a former Chairman of the department and currently the Vice-Chancellor for Academic Affairs, in his remarks commended physics faculty and students for their accomplishments. He said the current renovation and expansion improve the working conditions for physics teaching and research and reaffirmed the administration's support for the Phase II of physics building.

### **Pictures from the Grand Opening**



Dean Madison speaking at the dedication ceremony



Chancellor Ferritor at the physics ribbon cutting ceremony



President Sugg and Prof. Garmire touring the facilities



Physics Chairs gather at the opening ceremony: (from left to right) Paul Sharrah (1957-69), Charles Richardson (1975-78), Donald Pederson (1978-83), Mike Lieber (1983-86), Allen Hermann (1986-89), and Raj Gupta (1989-95). Steve Day (1969-75) could not attend the ceremonies.

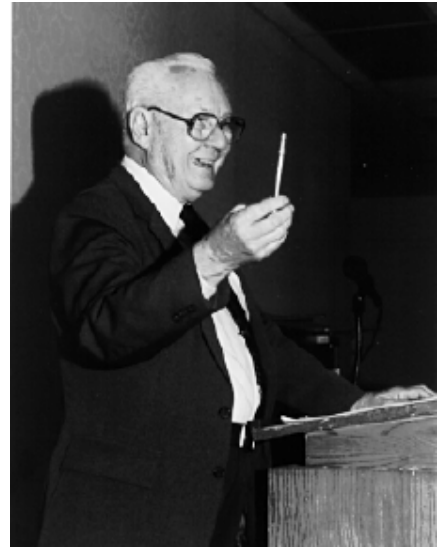


Friends, alumni, faculty, students and staff gather in front of the entrance to Physics Building. Seated in the front row are (from left to right) Rep. Louis McJunkin, UA Trustee Lewis Epley, Rep. Charles Stewart, Sen. David Malone, Allen Hermann, Ray Hughes, and Don Pederson.

## Pictures from the Grand Opening Banquet



At the banquet : (from left to right ) Sandra Johnsen, Raj Gupta, Gay Stewart, and Brad Shue. The banquet was attended by alumni, friends, graduate and undergraduate students, faculty and staff, area legislators, and the members of the Administration and the Board of Trustees.



Paul Sharrah making a point at the banquet



Richard Anderson speaking at the banquet

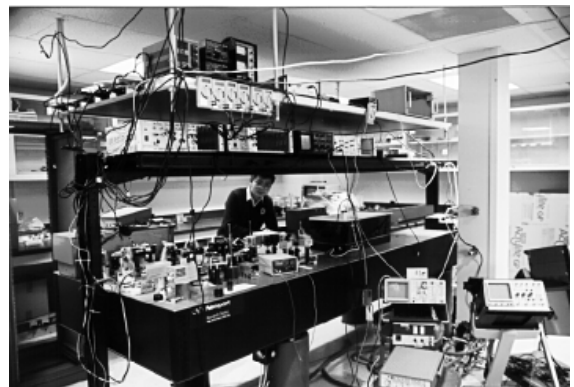


Vice Chancellor Pederson addressing the banquet gathering

## Results of the Renovation



A view of the new Physics Library. The library has a bookroom, a journal section, current journal display area, a reading area, and facilities for remote accessing various databases and library card catalog electronically. Graduate student Owczarzac consulting journals in physics library.



A renovated physics research laboratory. Dr. Y. Li working in Prof. Xiao's laboratory. Research laboratories are located in the research wing (renovated old building) of Physics Building.



A class in progress in the large lecture room in the teaching wing (new wing) of the physics building. This lecture room replaces the old Room 119 (nostalgia!) and is equipped with the state of the arts in audio-visual teaching aids. The teaching wing houses six instructional laboratories, two lecture rooms, instructional equipment room and the equipment curator's office.



A view of the north hallway and the new Dickson Street entrance to the renovated physics building. Physics office can be seen at the far end of the hallway. The research wing houses all research laboratories, laser and optics teaching laboratory, graduate student and faculty offices, undergraduate student lounge, computer room, physics library, and physics machine shop.

## Long March Toward Renovation

The long awaited renovation and expansion of the Physics Building was completed last summer. The renovation of the Physics building has a long history. The Physics Department moved *temporarily* into its present quarters, a building designed for the Physical Plant, in 1951. It lacked the most basic facilities common to other research and teaching programs, but it was never renovated. Lack of basic necessities made it extremely difficult to conduct research and presented an environment nonconductive to student learning. Absence of central air conditioning created intolerably high levels of humidity and dust. Power lines were poorly grounded and had unacceptable levels of radio frequency noise. Laboratories lacked adequate power, water, vibration-free tables, benches, shelves, and other essentials. One of its research laboratories, the superconductivity laboratory, was housed in an apartment complex and lacked the appropriate number of fume hoods. The Physics Building had concrete floors, warehouse lighting, ceiling open to fiberglass roof insulation, and painted blue factory-like windows.

The Department had outgrown the space years ago, and had only half the space it needed. In spite of these severe limitations, the department gained world-wide recognition for research in laser physics and quantum optics, and the university has received more than 20 patents for the world-record breakthroughs physicists have made in superconductivity. In recognition of the Department's achievements and potential, the Administration in 1989 made it a top priority to upgrade its facilities. Renovation and expansion of the physics facilities were made possible in part by a \$500,000 award from the National Science Foundation. It took two years to complete this project at a cost of approximately \$3.5 million. The construction on Phase I of the project started in June 1992, and was completed in the Summer of 1994.

The renovated building is being used for research laboratories, faculty and graduate student offices, a research library, and the departmental office. An 11,000 ft<sup>2</sup> extension of the building houses two classrooms and six instructional laboratories. All facilities have been brought to present-day standards and are a tremendous improvement over the previous facilities.

Although the renovation has improved the learning and research atmosphere substantially, physics is still very short of space. Phase II of the project, still unfunded, will add 17,000 ft<sup>2</sup> to the facility. It will house a lecture room, additional instructional laboratories, a modern planetarium and a hands-on discovery room where students from area elementary schools and colleges can enjoy and explore various science exhibits.

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## **From The Chair**

Dear Friends:

Greetings from the Physics Department. September 9, 1994 was a very special day for us, a day for which many of us had waited for a long time. The newly renovated and expanded building was formally reopened by Chancellor Daniel Ferritor. The Chancellor, in his address, said that we do not celebrate buildings; we celebrate people who work in the buildings. No one could have said it better. This was indeed a celebration of the accomplishments of our faculty, staff, students, and alumni, and the improved facilities will simply allow them to do even better in the future. These accomplishments, even just during the past few years, have been substantial indeed. To name just a few, Professors Harter and Hobson have been elected Fellows of the American Physical Society, Professor Salamo was awarded Alumni Distinguished Service Award for Research and has been appointed a University Professor, Professor Xiao was awarded the prestigious NSF Young Investigator Award, and Professor Sheng has received over 20 patents in superconductivity. Alumnus Robert Maurer was inducted into the National Inventors Hall of Fame for co-inventing the telecommunications grade optical fiber. The Department's externally funded expenditures have grown to about \$1.5 million per year. Moreover, we can look forward to continued progress, since our faculty is very young. We have filled seven tenure-track positions in the past six years. We are grateful to an administration that recognized our potential and has provided the necessary support.

After serving two three-year terms as chair, it is time for a change for me as well as for the Department. I am stepping down on June 30 to spend full-time on research and teaching. The past six years have been rewarding at times and difficult at other times. However, the support I have received from a very special faculty and staff has made even the difficult times rewarding. I know that the Department will benefit from the new ideas and enthusiasm that the new chair will bring. My best wishes to my successor in handling the challenges that lie ahead.

Finally, I thank all of you who have written, called, come by to visit, or contributed funds to the Department. We value your friendship, so please do keep in touch.

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*Raj Gupta, Chairman*

# News and Notes

## Faculty Notes

**William G. Harter**, Professor of Physics, was elected a fellow of the American Physical Society. Harter is a leading researcher in the area of Atomic and Molecular Physics. His citation reads "For the development of novel semiclassical and graphical theories which contributed to better understanding, analysis, and prediction of complex spectra of atoms and molecules, and high resolution rotation-vibration of symmetric polyatomic molecules."

**Gregory J. Salamo**, Professor of Physics won this year's Faculty Distinguished Achievement Award presented by the Arkansas Alumni Association. Salamo is a leading expert in optical signal processing and laser physics. His work in holography, laser applications and nonlinear optics has resulted in significant contributions to science. Prof. Salamo was also appointed a University Professor recently in recognition of his contribution to Physics and the University.

**Min Xiao**, Assistant Professor of Physics, won the prestigious NSF Young Investigator award. Professor Xiao's research spans atomic, optical, and solid state physics. The award carries up to \$500,000 in support of his research over a period of five years from the National Science Foundation.\*

## Undergraduate Student News

The department offers several merit scholarships worth \$500 each to undergraduate students. Scholarship recipients for the years 1994 - 95 are:

### Freshman Scholars:

Benjamin Bullock, Monticello HS, Monticello, AR; James Clem, County Line HS, Branch, AR; Michael Quinn, Cabot HS, Cabot, AR

### Upper Class Scholars:

Josh Adams, Ken Blevins, Collin Condray, James Harrington, Luke Post, Robert Quinn, River Ross

**Robert Quinn** is the winner of the **Bryson Scholarship**. **Kevin Fandre** is the winner of the **George Lingelbach Award** given annually to an outstanding physics major.

Our congratulations to all! \*

## Alumni News

**Alvin Goats** (BA 1980) worked at Welex, a Halliburton Co. as a Field Engineer. Then moved to the Dallas area and worked briefly for a hybrid microelectronics company, Micropac Industries, Inc. Left them to join Texas Instruments where he worked for 9 years as a Process and Product Engineer (Defense Systems and Electronics Group building IR detectors). After getting laid off there in February he went on to E-Systems as a Senior Integrated Product Development Engineer.

**Walter Keller** (BSEE, MS mathematics and physics 1948) worked at the National Bureau of Standards. He has made significant contributions to automatic control systems using semiconductors and medical electronics.

**James S. Stutheit** (MS 1951) spent an interesting professional career at Du Pont, Argonne National Laboratory, the Savannah River Plant, and then in a variety of assignments in the Wilmington, Delaware area.

**Garvin Wattuhewa** (Ph. D. 1991) received a grant from NASA to establish a laboratory at the University of South Alabama to deposit thin films using high power lasers. \*

## Graduate Student News

**Welcome new enquiring minds:** Robert Bumpas, Hussam El-Jammal, Gregory Fox, Debabrata Ghoshal, Scot Hawkins, Hangxing Meng, Jon Osborn, Collin Condray, Ken Silva, and Jing Liu entered the graduate program in physics during the 1994-95 academic year.

The following students will be awarded the **Doctor of Philosophy** degree in Physics at the commencement in May 1995.

Nianyu Bei  
Galen Duree  
Greg Finney  
Qifang He  
Yujiang Qu

Our hearty congratulations to all on their achievement and we wish them all the best in life ahead! \*

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## Robert D. Maurer Lecture Series Established

"Robert D. Maurer is truly the father of the optical fiber," said Roland W. Schmitt, President of the Industrial Research Institute on the occasion of presenting Maurer with the Institute's Achievement Award for 1986.



Bob, a native of Arkadelphia, received his B.S. Degree in Physics, with high honors, from the University of Arkansas in 1948. From there he went to graduate school at M.I.T., receiving his Ph.D. in Physics only three years later. He joined the research staff at Corning Glass Works, in Corning, New York, where he remained, becoming a senior research fellow, manager of applied physics, and manager of special projects. His research into the properties of very pure glasses led to the development of optical waveguides. These permit the transmission of information normally carried by electrical signals along wires, but with the wires replaced by very thin glass fibers, and light pulses replacing the electrical current. Optical fibers are revolutionizing the communications industry today. Bob retired from Corning in 1989, but he still goes into the lab once a week as a consultant to the group he formerly directed.

In 1980, the University of Arkansas awarded Bob an honorary LL.D. Degree. Although numerous honors have come his way -- induction into the National Inventors Hall of Fame; the John Tyndall Award for Industrial Applications of Physics (first winner) from the American Institute of Physics; the L.M. Ericsson International Prize for Telecommunications, awarded by the Swedish Academy of Engineering; the George Morey Award of the American Ceramic Society; and the Morris N. Liebmann Award of the Institute of Electrical and Electronics Engineers -- Maurer says he values his honorary LL.D. from the University of Arkansas most highly of all. - *contributed by M. Lieber*

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## First Robert D. Maurer Lecture Delivered

The first Robert D. Maurer Lecture was delivered by Dr. Sheila Tobias on Thursday, December 1, 1994 in Giffels Auditorium. She spoke on "Revitalizing Undergraduate Science: Why Some Things Work and Most Don't." Dr. Tobias is a distinguished researcher in the area of science and mathematics education. During her visit here she led discussions with groups of faculty and graduate assistants in several science departments. Her public talk was followed by a Physics Colloquium entitled "Moving the Mountain, How to Get the Physics Community to Change" on December 2.

A student of history and literature at Harvard, Tobias graduated magna cum laude and earned a doctorate in European history from Columbia. She is the author of 150 articles and seven books on the subject of science and mathematics education, including "Overcoming Math Anxiety," "Succeed with Math: Every Student's Guide to Conquering Math Anxiety," and "They're Not Dumb, They're Different: Stalking the Second Tier." Tobias has spent two decades working to reform science education in America. In April the American Physical Society





recognized her research by making Tobias an honorary member. Tobias is a consultant to the Research Corporation and the H. Dudley Wright Foundation for the Advancement of Science. She has served as Associate Provost at Wesleyan University and lectured in Eastern Europe as an American Specialist on feminism in the U.S. Tobias is also the author of *Women, Militarism and War* and in her lectures often addresses the status of women and minorities in science. Sheila Tobias attracts large crowds wherever she goes with her message: women are as capable as men in science, poor scores in mathematics do not reflect a failure of intellect in students, but rather a failure of nerve, and it's simply untrue that people are either good in science or in the language arts, but never in both.

Her work has progressed on three fronts: Empowering college-age students to pursue mathematics by demonstrating through interventions at the college level that theirs is not "a failure of intellect," but a failure of nerve; examining at close range what makes science and mathematics "hard" for otherwise able students; and revealing that it is the "disciplinary cultures" not the students' abilities that are the culprit.

Dr. Tobias began her lecture by observing that after years of efforts to reform science education we have not made much progress. She sketched the past efforts at reform and obstacles that continue to block the transformation of science education. Tobias noted that most efforts at reform have been centered around changes in curriculum, computer assisted technology and pedagogy. What has been absent from these attempted reforms is changes in ideology. Tobias said that a lot of science teachers see their students in an "us" and "them" fashion. The "us" group of students is perceived as younger versions of the teacher. They are seen as eager and attentive; they ask good questions. The other group, the larger portion of the class, is "everyone else." They are seen as slower to learn and reluctant to do the required work. Tobias takes exception to this narrow perception of science students. She believes there are five student categories ranging from the first tier of "us" students to the fifth tier of "unlikelies." The "unlikelies" are the ones that she said "no amount of beefing up their skills, changes in curriculum, nothing will make them interested in science."

Tobias continued with the second tier of students, who, she said, apply themselves and are good learners but find science not relevant and "unnecessarily tension-producing"; next are the utilitarians, who make up the majority and are mainly interested in the use of science in their everyday life and work experiences; these are followed by the underprepared students, who take remedial science classes, but never proceed to take more advanced courses. Tobias stressed that it is important for teachers to accurately perceive who they are teaching in order to better teach students. This inability to differentiate student tiers results in terrible loss of math and science students in early years.

Tobias believes that the elitism fostered by the "us" and "them" perception, the attitude that only the very best can do science and it requires single-minded devotion, is a leading cause of the resistance to reforming the ideology of science education. Another contributing factor is the idea that one is predestined for science, and one's ability will show up early if at all. Tobias thinks this concept is particularly detrimental to women, who might be seen as abnormal if early science interests are expressed. Tobias said that periods of intense productivity in science come at varying stages for women and nonstandard males.

She continued that, in addition to the bias about who can learn science, there is resistance to reform on part of the faculty due to concerns such as a loss of control, uncovered material and change, simply because it is new. More staff may become necessary but may not be economically feasible. Tobias said students also resist science education reform. The current teaching methods are predictable; students know the rules, grading systems and teacher expectations. Reform encourages more open-ended questions on the tests, more student participation and a less predictable teaching style. Although students, faculty and the current basic ideology is not conducive to change, Tobias believes the challenge can be met. She said a new paradigm must replace the old ideology quoting the following passage from Francis Bacon, "The scientific method allows ordinary people to do extraordinary things."

Dr. Tobias's visit to the University of Arkansas was made possible by the efforts of Prof. Gay Stewart who is the newest member of physics faculty working in the area of Physics Education.

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### PAUL C. SHARRAH SCHOLARSHIP

The Paul C. Sharrah Scholarship was established to honor Prof. Paul C. Sharrah's contributions to the Physics Department. Our goal for this year is to build an endowment of \$10,000 to be able to offer a four-year scholarship of \$500 to an entering undergraduate physics major. Many friends and alumni have contributed to this fund and we are nearing the half-way point. We acknowledge the generous gifts by the following friends to this fund during the past year:

*Richard Anderson, Charles J. Armentrout, Donald Avery, James J. Billings, Ernest G. Bylander, Patricia F. Campbell, Darrell W. Collier, Jack Dodd Jr., Jack G. Dodd, Raj Gupta, J. William Helbron, Allen Hermann, The family of Wallace A. Hilton, Raymond H. Hughes, Charles & Elaine Jones, J. Walter Keller Jr., Clarence G. Leonard, Michael Lieber, Larry D. Merkle, Peter W. Milonni, Ann Minnis, Charles B. Richardson, Louis A. Rosocha, Surendra P. Singh, M.L. Talmadge, Reeta Vyas, George K. Wallace, Richard C. Waring, Leon West Jr., and Robert D. Maurer. \**

### Thank You

Friends and alumni continue to support the department through their annual gifts. We acknowledge support from the following people during the past year:

*Ramona L. Bates, Elizabeth Brehen, Patricia F. Campbell, Darrell W. Collier, Gary Culp, John William Dixon, William Daniel Evans, Betty L. Gabriel, Hugh F. Gingerich, J. William Helbron, Alan Hughes, Philip B. Hurley, Clint Jacob, Charles and Elaine Jones, Hunter Judkins, David B. Kay, William C. Kiehl Jr., Frederick J. Koperski, William C. Meck, Robert Nunnally Jr., Howard Petefish, Arthur W. Pillow, Charles Scharlau IV, Azad Siahmakoun, Jim Spann Jr., Hardy Walton Jr., James Watson Jr., Nolen A. Webb, and Gregory L. Westbrook*

*Errors and omissions in these lists are sincerely regretted.\**