

12. The Decades of the Eighties and Nineties

by Rajendra Gupta

With the introduction of the Ph.D. program in 1959, the Department, under the leadership of Paul Sharrah, experienced rapid growth. In spite of the difficulty in recruitment in the post-Sputnik era, the faculty grew from about 4 in 1959 to about eleven in 1969. The department's strength was primarily in atomic, molecular, and condensed matter physics. The decade of 70s seems to have been one of the slow growth (with the faculty size reaching thirteen by 1979); however, the department was consolidating its research infrastructure, which eventually led to the research expansion of the eighties and nineties. The technical staff consisted of one; the position was filled by an instructional laboratory curator (this position was traded for a machinist position in 1982). The secretarial staff consisted of two, one in the office and the other in the Physics Library.

There was one event in 1975 that, perhaps more than any other, substantially influenced the future direction of the Department. That event was the hiring of Gregory Salamo. Salamo argued, successfully, that the Department should grow in the area of lasers and quantum optics. With this direction in mind, Gupta was recruited in 1978, followed by Milonni, Singh, and Carmichael in the early eighties. The Department started gaining national reputation in quantum optics. With the optics group well established, the Department tried to diversify somewhat and hired Larry Merkle in optical properties of solids in 1983, and William Harter in molecular structure, dynamics and spectroscopy in 1985.

Graduate course offerings in optics grew in parallel with the growth of faculty in this area. New courses in quantum optics, laser physics, laser spectroscopy, applied nonlinear optics, optical coherence theory, optical properties of solids, and laser physics laboratory were introduced.

Donald Pederson had become the chair of

physics in 1978 and most of the growth of the Department in the early eighties took place under his leadership. However, he stepped up to become the Associate Dean of Fulbright College in 1983. The Dean decided to have a national search for a new chair. While the search was on, Michael Lieber was appointed the chair. As a result of the search, Allen Hermann was appointed as the new chair starting in 1986. Hermann, working in condensed matter physics, was a group leader at Jet Propulsion Laboratory, and was a former faculty member at Tulane.

Shortly after Hermann joined the Department, high-temperature superconductivity was discovered by Müller and Bednorz, and Hermann got interested in it. He learned of Zhengzhi Sheng, who had recently received a Ph.D. in chemistry under Paul Karoda and who was also interested in high-temperature superconductivity. Hermann hired Sheng as a post-doc. Sheng, working in Hermann's laboratory, discovered a thallium-based superconductor with a critical temperature of 125K, which was the highest-temperature superconductor known at that time, and was to remain so until 1994. The history of superconductor research at U of A is described more fully in Chapter 8. This discovery, and Hermann's skills in public relations, brought enormous publicity to Hermann, Sheng, the Department, and the University. The discovery of Tl-superconductor was covered by popular press such as (some of them more than once), *New York Times*, *Wall Street Journal*, *Newsweek*, and in science magazines such as *Science*, *Science News*, *Nature*, *Physics Today*, and *Chemical and Engineering News*. The discovery received extensive coverage in Arkansas media, radio, television and newspapers. The initial discovery, and the subsequent work continued to attract extensive media coverage and Governor Clinton awarded a special grant of one million dollars to Hermann and Sheng to continue the work. They became something of a folk heroes. Eventually, over twenty patents were awarded for this work and



Jean Eaton, Office Manager, at her desk in 1992. Jean has been with the Department for about 20 years.



Sandra Johnsen, receptionist, secretary, and technical typist, is the front-line person in the Physics Office.

some of the patents were licensed by the University for over one million dollars to Superconductor Technologies, Inc. Hermann left the Department in 1989 to move to University of Colorado. Sheng was appointed a Research Professor in the Department and has continued research on high-Tc superconductors.

While all eyes were focused on Hermann and Sheng, serious problems were beginning to develop in the Physics Department. Its once well-known optics program was crumbling. Peter Milonni, who had been on leave at Los Alamos National Lab, resigned from his position in the Department. Carmichael resigned to join University of



Eileen Fletcher, secretary and typist, takes care of the Physics Library and typing.

Oregon, and it looked like Singh was going to follow suit. Salamo had been on leave at a DOD laboratory, and it was not clear if he was going to return. Anderson resigned to join NSF and Larry Merkle re-signed to join a DOD laboratory. Hughes was due to retire at the end of 1989-90 academic year. Unless new people were hired, the faculty was going to be reduced to ten. The Department was finding it hard to recruit graduate students, and almost all new graduate students to join the Department in 1988 and 1989



Front part of the Physics Building (North Wing) as viewed facing east in 1992 (before renovation).

were from China. Against this background, Gupta was appointed the new chair in May 1989. The Dean promised to fill all vacant faculty positions and support the Department in rebuilding itself. An additional secretarial position was given to the Department (bringing the secretarial staff to three). Persistent arguments by the



Rear of the Physics Building as viewed facing north in 1992. Blue factory-like windows characterized the building.

Department eventually led to opening the laboratory curator position in 1991 (bringing the technical staff up to two), and after a national search, the position was filled by J. Brad Shue in the summer of 1992.

Besides the immediate task of recruiting new faculty and improving graduate recruitment efforts, the Department was facing the critical problem with its physical facilities. This was, of course, not a new problem. The Building, built in 1952, was never renovated. Moreover, the

Building was totally inadequate for the needs of the Physics Department. For example, it did not have a large lecture room, where large physics courses (College Physics, University Physics, Physics and Human Affairs, and Astronomy) could be taught. These courses had to be taught in many lecture rooms all over the campus and it was practically impossible to carry lecture demonstration equipment back and forth to these lecture rooms. Thus the students in introductory courses were missing, and are still missing, a vital component in their education and this situation is likely to continue for some time to come. The space for introductory laboratories was very limited also. For example, Physics and Human Affairs and Physics for Architects had to share a laboratory, which created many scheduling problems. The Physical Science laboratory had to be moved out of the Physics Building in the early 80's for lack of space and eventually the course was dropped. The situation was even worse for the research laboratories. In the late 70's and 80's when the Department was trying to build a strong group of researchers in quantum optics and laser physics area the new faculty in experimental areas had to wait for a long time to get laboratory space. This seriously compromised their competitive position to obtain research grants and recruit graduate students. Allen Hermann and Zhengzhi Sheng had to use two apartments in a nearby apartment building (Dickson Street Annex) for their superconductivity research! In addition to the lack of space, the quality of space was completely unsuitable for modern state-of-the-art research. The laboratory rooms had inadequate electrical power, inadequate cooling water, and lack of environmental control.

The Physics Library had totally outgrown the space. Journals were stacked up to the ceiling, and one had to use a tall ladder to access many of the journals. As the need for stack space grew, more and more of the seating space was taken away for stacking journals. Eventually, the library became



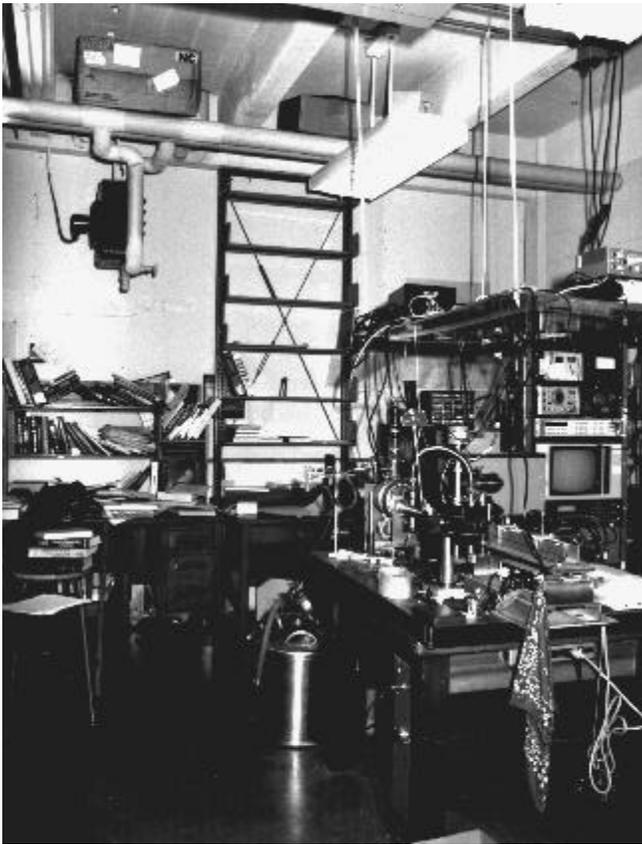
Physics Lecture Room (Room 119) where four generations of physics majors and graduate students had their classes. The lecture room, like the rest of the building, had warehouse lighting and ceiling open to fiberglass insulation. The air conditioning unit (hanging from the ceiling) seldom worked.



Physics and Human Affairs/Physics for Architects instructional laboratory. The laboratory, in the northwest corner of the Building, had large painted windows and would get so hot during summer afternoons that there were instances of students fainting. The exhaust fan helped some, but not enough.



University Physics instructional laboratory on the ground floor of the Building. Warehouse lighting and concrete floors which existed throughout the Building can be clearly seen. This room was equipped with a window a/c unit -- a luxury that not all instructional laboratories had.



A typical unrenovated research laboratory. Exposed plumbing and lack of environmental control were typical of the Building.



A view of the east hallway on the ground floor. The hallways had exposed utilities and were dimly lit by incandescent lights.



A view of the Physics Library before the renovation. The library had totally outgrown the space and looked like a book warehouse with journals stacked to the ceiling and very little seating space. Ceiling open to fiberglass roof insulation and warehouse lighting connected by extension cords can also be seen.

like a warehouse, with almost nonexistent seating space.

The appearance of the Building could only be described as disgraceful. It had blue factory-like windows, concrete floors, warehouse lighting, no central A/C and exposed fiberglass ceiling. The fiberglass posed a serious health hazard, as exposure to fiberglass has been shown to cause cancer in laboratory animals.

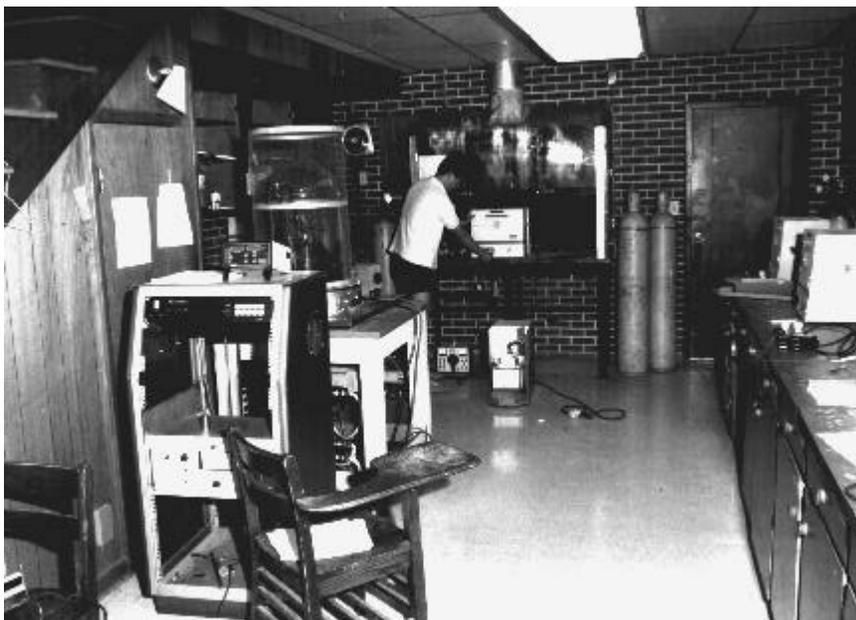
The Physics Department did not have the use of the entire Physics Building until about 1985 when, largely due to Don Pederson's efforts, Geology was moved out of the Building. Also, through Pederson's efforts in the early 80's, several improvements in the infrastructure were made.

Additional power was brought into the building to power the new ion lasers that the Department had acquired, chilled water was brought into the building and a few fan-coil units were installed in some of the laboratories, and a closed-cycle laser cooling water system was installed. Moreover, several of the research laboratories were renovated. While these improvements did make it possible for the Department to meet its research mission, although with considerable difficulty, they were only the patchwork solutions to a very difficult and pervasive problem. Moreover, it did nothing to improve the instructional space.

There had been many attempts throughout the years to get the Physics Building renovated and find additional space for physics. Some of these attempts are described in a report, first part of that report was written by Pederson and the second by Gupta, and the report is stored in the Special Collections department of the University's Mullins Library. The Department's building problems gained the attention of the Administration in the 1988-89 period due to the media publicity received by the Department's superconductivity work. There was an attempt to get legislative funding in Spring 1989 for a joint Physics and Chemistry research building. Under this plan, Physics and Chemistry research laboratories would have been housed in a new building attached to the Chemistry Building. This Building would have been only for the research laboratories; Physics faculty offices, physics library, instructional laboratories and classrooms were to remain in the Dickson Street Building. Eventually, when funds became available, Physics was going to be moved to the space vacated by Chemistry in the old Chemistry Building. However, the old Chemistry Building did not have enough space to fully accommodate the needs of Physics, and no solution seemed possible to solve the problem of a large lecture

room where physics demonstrations could be carried out. The research building was projected to cost \$16-17 million, but only \$3 million were appropriated by the legislature, most of them in the B-category. Physics protested this plan, and finally in the Fall of 1989 the Administration agreed to renovate the Physics Building and build an extension to the south of about 30,000 GSF. The extension was to be build in two phases, Phase I was to be build immediately, and Phase II in about five years. Most of this progress toward solving the Physics' space problem was made possible by the leadership of Gerry Bomotti, the newly appointed Vice-Chancellor for Finance and Administration.

In the Spring semester of 1990 planning for the renovation and Phase I expansion started. Meanwhile, the NSF announced plans to award \$19 million for modernization of academic research facilities. Gupta wrote a proposal to the NSF to obtain funding for the renovation. Physical Plant estimated the total renovation cost to be \$1.7 million, out of which \$1.14 million was for research laboratories. The proposal for \$1.14 million was submitted to the NSF (\$572K from the NSF and \$572K from the University), with John Hehr, Associate Dean of the Fulbright College as P.I., and Gupta as co-P.I.



Superconductivity research laboratory where the world record in high-temperature superconductors was established by the discovery of thallium-based superconductors. This laboratory had to be housed in an apartment building because there was no space in the Physics Building.



The Department's research continued in the Physics Building in spite of problems created by the construction.

In January 1991 Physics was granted \$500K by the NSF. (Out of a total of 425 proposals, 78 were funded). While the NSF application was pending, the planning for renovation and Phase I expansion was supposed to have been going on. However, there was very little movement. No one in the Physical Plant bureaucracy was will-



A typical view of a hallway under renovation. While this work was going on in one part of a building, state-of-the-art optics research was being carried on in another part of the building.



The new wing under construction.

ing to make the necessary decisions. Once the NSF grant was received, however, things started moving. Because the grant had a deadline, people who could not make decisions some weeks before, suddenly started making decisions. In retrospect, it is clear that the renovation would probably never have taken place without the leverage of the NSF funds.

The next year-and-a-half, from January 1991 to May 1992, were spent in the planning. The Little Rock architectural firm of Wellborn Henderson Associates was hired. Gerry Bomotti gave a budget of \$2.77 million for the whole (renovation plus Phase I expansion) project. This funding level turned out to be wholly inadequate. The Physical Plant's original estimate of \$1.7M for renovation was at least a million dollars short. There were numerous meetings between the architect and the Building Committee (Hehr, Gupta, Richardson, Salamo) to work out the details, make compromises to reduce the cost, etc. Whereas the faculty had agreed in principle to reduce the scope of the renovation, they found it difficult to make specific cuts. Compromises had to be made on many things, including some things that were specifically funded by the NSF grant, in order to get the project moving. The design was finally completed, and the bid was advertised on May 15, 1992 and opened on June 2, 1992. The total cost of the project, including architect's fees, contingency, telephone and local area networking, asbestos removal, geological studies, laser



The renovated north hallway with its new central entrance on Dickson Street. The Physics Library is to the right and Physics Office is at the far end.



Study area in the lobby of the new wing.

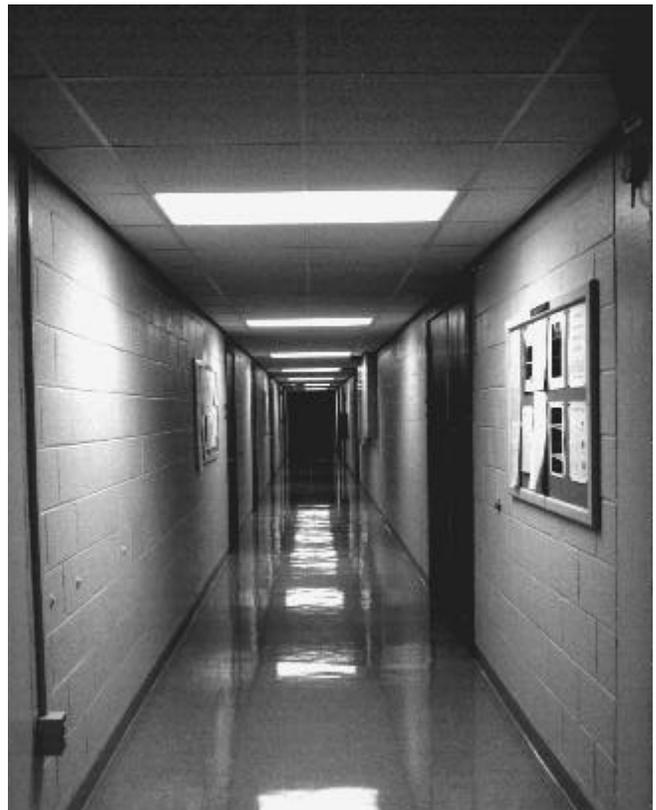
tables, furnishings, etc. turned out to be approximately \$3.9 million dollars. The construction started on July 21, 1992.

To facilitate the work, the renovation was done in stages, while Physics was occupying part of the Building. All of the Department's instructional activities (including all of the laboratories) were moved temporarily to the SE Building and Bell Engineering Center. This turned out to be not-so-easy a task. It took about a year to find appropriate space and to modify it to suit Physics' needs. By far the most difficult part turned out to be to keep the Department's research activities going during the renovation. There were continual problems with construction dust and heavy metal fumes from welding getting into optics research laboratories, interruption of power and laser water, vibration of floors and walls, etc. This period may well have been the most difficult period in the history of Physics Department.

The renovation and Phase I expansion was completed in the summer of 1994. The new wing (Phase I expansion) consists of instructional space -- six introductory physics laboratories, a small classroom, a 70-seat lecture room, a stock room and laboratory curator's office. The old building was converted to research laboratories, faculty and graduate student offices, Physics Library and the Physics administrative office. The new floor plan is shown on pages 144 and 145. The renovation was so extensive that the renovated building had the look of a newly con-

structed building. Classes were offered in the new wing starting the second summer session of 1994.

The Phase II of the Physics Addition will have, among other things, a 1600 sq. ft planetarium, a discovery room (hands-on science museum), a 250 seat lecture room with attached lecture



East hallway on the ground floor of the Building after renovation. The same hallway before the renovation is shown on page 140.

FIRST FLOOR
Physics Building
(as remodeled and renovated in
1952)

SECOND FLOOR
Physics Building
(as remodeled and renovated in
1952)



Front view of the renovated Physics Building. Dickson Street is in the foreground.

demonstration room, an undergraduate student lounge, a computer room for the use of undergraduate students, intermediate level laborato-



The entrance to the new wing.

ries (optics, laser physics, modern, electronics), and an additional classroom. Phase II is unfunded as of this writing.

A grand opening ceremony was held on September 9, 1994. Chancellor Dan Ferritor did the traditional "ribbon-cutting" by flipping a switch which caused a lightning spark to travel up a Jacob's ladder to burn the ribbon in two. The grand opening ceremony was attended by Bernard Madison, Dean, Fulbright College, Don Pederson, Vice-Chancellor for Academic Affairs, B. Alan Sugg, President of the University of Arkansas system, special guest Professor Elsa Garmire, Director of the Center of Laser Studies at the University of Southern California, various administrators, members of the legislature and Board of Trustees, current and former faculty, students, alumni, staff, and friends. The grand opening ceremony was followed by an open house. All facilities, including the research laboratories were open for the visitors to tour. In addition, special exhibits and demonstrations were set up. The festivities were concluded with a banquet in the evening at the Fayetteville Hilton.

The renovation of the Physics Building, although very significant, was not the only exciting thing that was going on in the nineties.



The east wing of the Building and the new addition to the south of it. The new landscaped entrance leads directly to the new wing.

The Department, after losing six of its faculty members in 1989, had started rebuilding itself. Reeta Vyas and Julio Gea-Banacloche (theoretical quantum optics) and Min Xiao (experimental

quantum optics) were hired between the 1989-90 period. With the return of Greg Salamo, and hiring of the above three people, the optics group emerged stronger than before. With the



Graduate student Joe Owczarzak studying in new Physics Library. Compare with the old library shown on page 140.



A typical research laboratory in the renovated building. Dr. Li at work in Professor Min Xiao's quantum optics research laboratory.

The new Astronomy Laboratory.

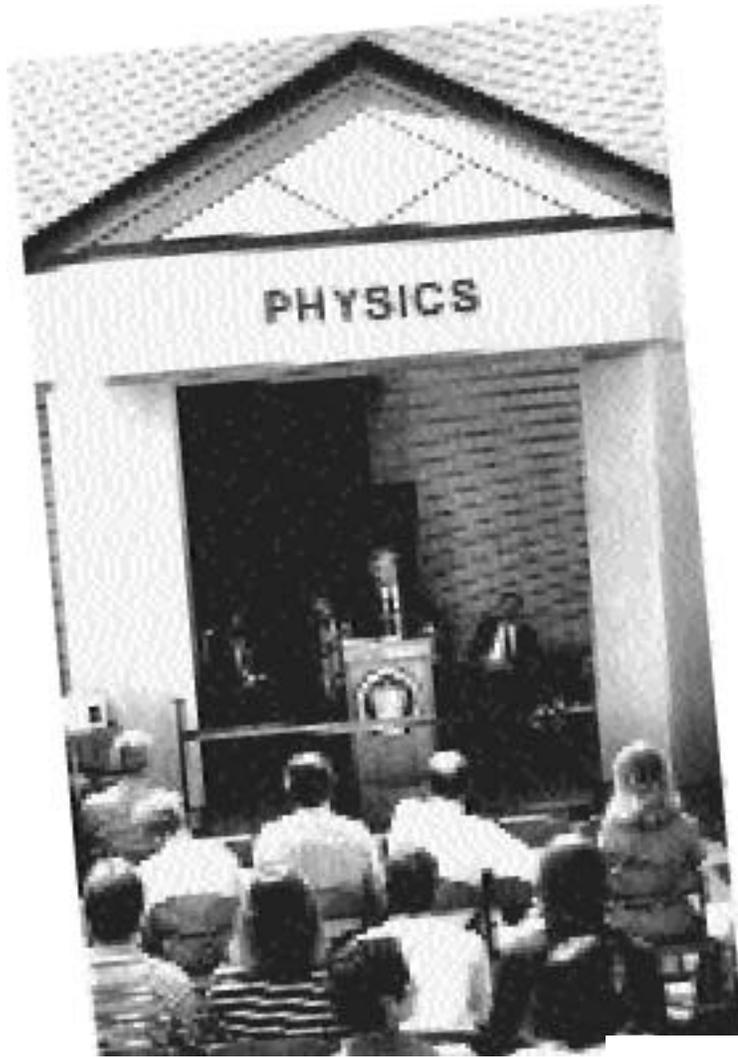




Teaching assistant Ken Silva teaching in the new 70-seat lecture room in the new wing of the Physics Building. This replaces the old Room 119 shown on page 139.

New conference room





Grand Opening Ceremony of Physics Building

Dean Bernard Madison presiding over the grand opening ceremony.

The traditional "ribbon-cutting" was performed by Chancellor Daniel Ferritor. He flipped a switch which caused a spark to travel up a Jacob's ladder and burn the ribbon in two.





Chair Rajendra Gupta (above) thanked all those who made the renovation and expansion of the Building possible. He also thanked the faculty, staff, and students for their patience during the renovation. Professor Elsa Garmire (right), Director of Center for Laser Studies at USC, and the Guest-of-Honor at the grand-opening, complimented the Department for developing an excellent research program in optics.



The grand opening was followed by an “open house.” Dr. B. Alan Sugg, President of the University of Arkansas system, and Professor Garmire touring the facilities.



The grand opening ceremony was attended by members of the Board of Trustees, State Legislature, Administration, faculty, staff, students, alumni, and friends.





Guest-of-honor Elsa Garmire and her husband Bob Russell (third from left) with Min Xiao and wife Xu Hua at the Banquet.



Former Physics Chair Allen Hermann with Margot Harter, Frank Sperandio, William Harter, and Mark Filipkowski at the banquet (left to right).



A banquet was held at the Fayetteville Hilton in the evening to celebrate the grand opening. Emeritus Professor Sharrah reviewed the history of Physics buildings at the University. The audience honored Professor Sharrah by a standing ovation for his life-long contributions to the Physics Department.



Vice-chancellor for Academic Affairs and a former physics chair, Donald Pederson, renewed the Administration's commitment to Phase II of the Physics project.



Former faculty member Richard Anderson, in an emotional speech, reminisced his years with the Department.

President Sugg and members of the legislature visiting Professor Oliver's research laboratory during the open house.





Sandra Johnsen, Raj Gupta, Gay Stewart and Brad Shue at the banquet (left to right).



Former student Ernest Bylander chatting with Don Pederson (left) and Paul Sharrah at the banquet.



In a surprise deviation from the scripted program, Sandra Johnsen presented Chair Gupta with a plaque in recognition of his contributions to the renovation of the Building.

Many physics exhibits were set up during the open house. Here visitors are watching a demonstration of superconductivity.

