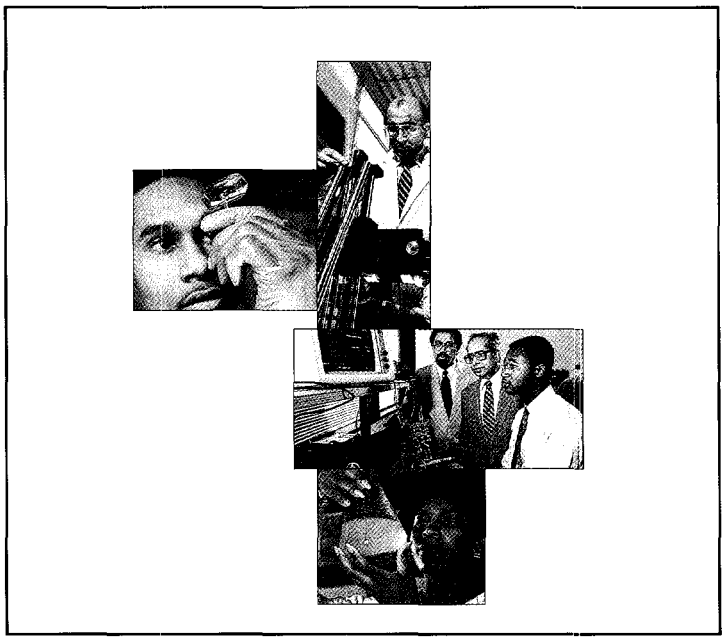
SCIENCE and ENGINEERING ALLIANCE

Alabama A&M University
Jackson State University
Prairie View A&M University
Southern University and
A&M College
Lawrence Livermore
National Laboratory

A New Resource for the Nation



About the front cover . . .

Caption Legend:

1. Crystals grown at Alabama A&M University have been utilized in research and development projects throughout the world.
2. Southern University and A&M College has a well-equipped laser laboratory for its physics and engineering research projects.
3. The engineering program at Prairie View A&M University utilizes the latest in computer hardware and software.
4. Innovative biomedical training and research projects are under way at Jackson State University.

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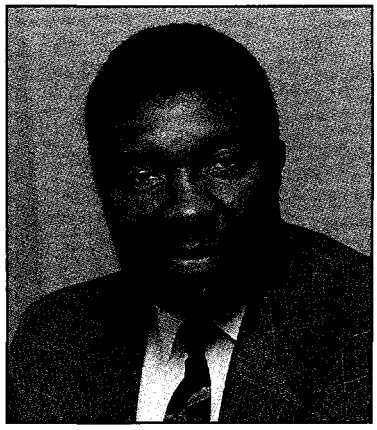
About the Alliance



The Science and Engineering Alliance is a not-for-profit Delaware corporation. It is governed by a board of directors composed of the four participating universities' presidents and the Laboratory associate director responsible for Alliance activities.

The Alliance was formed to help assure an adequate supply of top-quality minority scientists in the next century, while simultaneously meeting the research and development needs of the public and private sectors.

In signing the memorandum of understanding creating this research and training consortium, each of the presidents has fully committed the capabilities and resources of his or her institution to the mission of the Alliance.

For more information on how the Alliance can meet the research, training and development needs of your organization, please contact the Alliance's administrative offices or the SEA Headquarters in Washington, D.C.

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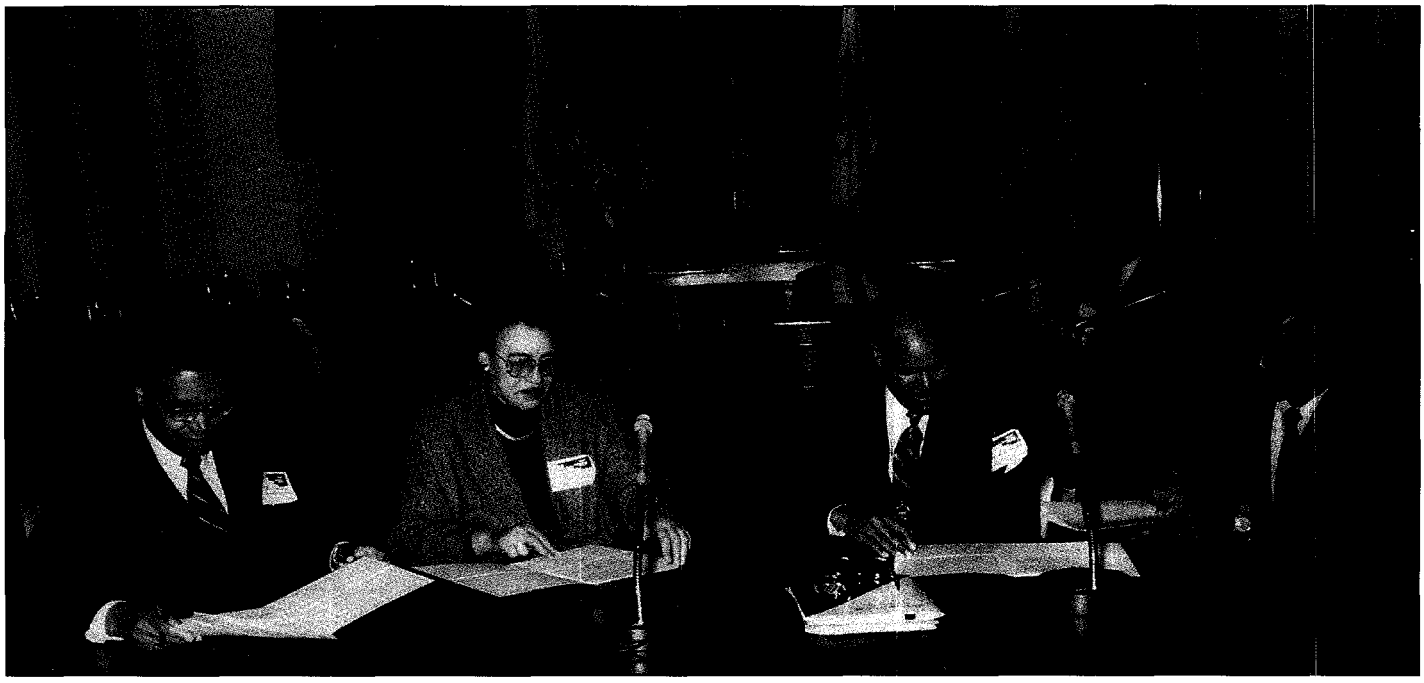
The Lawrence Livermore National Laboratory and four major Historically Black Colleges and Universities with strong research and development capabilities in science, engineering and computer technology have formed the Science and Engineering Alliance. Located in California, Alabama, Mississippi, Louisiana and Texas, each brings to the Alliance a tradition of research and development and educational excellence. This unique consortium is now available to perform research, development and training to meet the needs of the public and private sectors.

Science and Engineering Alliance

"The Science and Engineering Alliance represents a unique resource that combines the research and development capabilities of four Historically Black Colleges and Universities in addressing the science and engineering needs of our nation."

—Dr. James E. Lyons, Sr., President,
Jackson State University



On Feb. 21, 1990, the presidents of Alabama A&M University, Jackson State University, Prairie View A&M University, and Southern University and A&M College signed the agreement formally establishing the Science and Engineering Alliance. The signing ceremony was held in the Cannon House Office Building in Washington, D.C.

The Science and Engineering Alliance is America's newest resource for producing top-quality scientists and first-rate scientific research. An incorporated, not-for-profit consortium of four Historically Black Colleges and Universities (HBCUs) located in Alabama, Mississippi, Louisiana and Texas, the Alliance collaborates on research projects for government agencies, the private sector and other universities in a broad range of scientific and technical disciplines.

Alliance university members are Alabama A&M University (Huntsville, Ala.), Jackson State University (Jackson, Miss.), Prairie View A&M University (Prairie View, Tex.) and Southern University and A&M College (Baton Rouge, La.). These universities have a combined research faculty and staff of nearly 400 individuals who specialize in several major areas of science and technology. The senior staff has extensive experience in managing contracts, conducting scientific research projects and teaching. Sixty-nine percent of the Alliance faculty hold the doctorate degree, while thirty-one percent hold the master's degree.

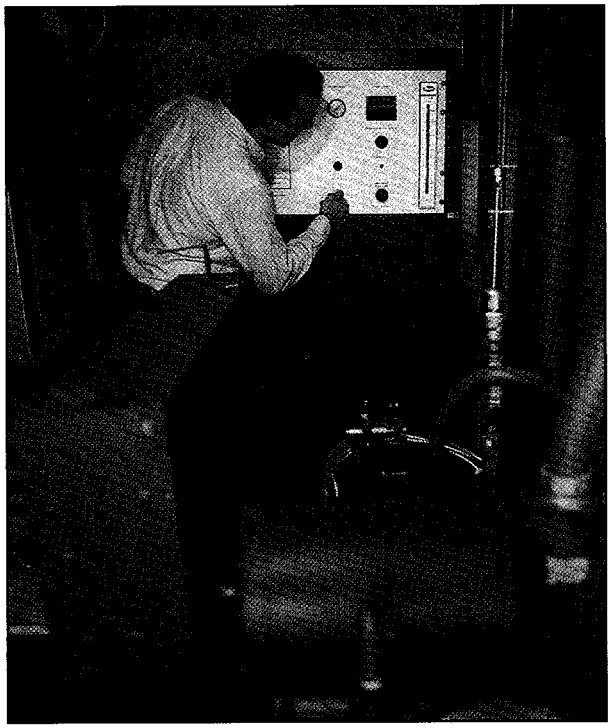
Fields of Expertise/Research Capabilities

Areas	Universities			
	AAMU	JSU	PV	SU
Materials Science	■			■
Environmental Sciences	■			■
Information Sciences	■			■
Life Sciences	■			■
Health Sciences	■			■
Physical Sciences	■			■
Optics/Electronics	■			
Engineering	■			■
Engineering Technology	■			■

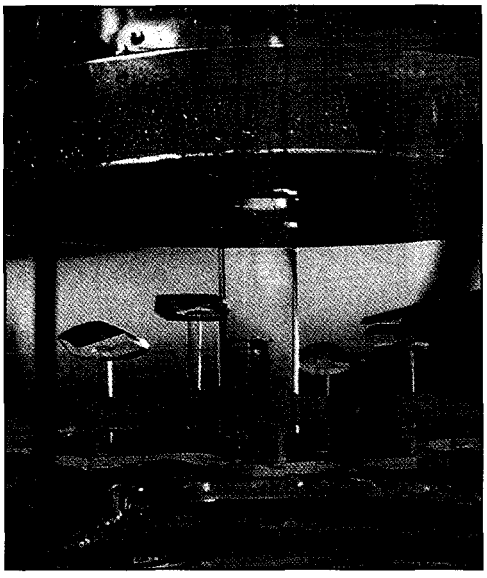
Research Experience and Facilities

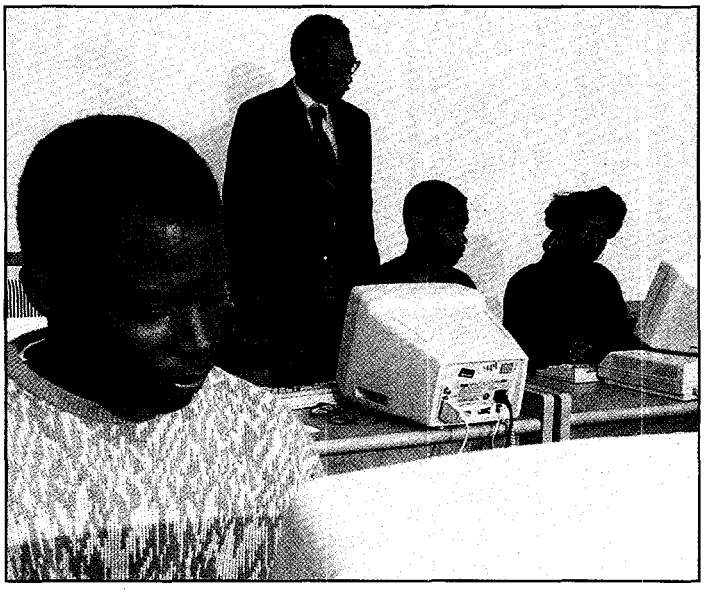
Alliance researchers are involved in a broad spectrum of research and training projects including:

- Biology and biotechnology—basic research capabilities
- Chemistry—analytical and theoretical
- Computer modeling—finite



Researchers at Alliance member institutions have distinguished themselves in a variety of fields ranging from biosciences (above), to the engineering of cooling tower systems and controls for power plants and industrial facilities (left).





Crystallography research at Alabama A&M University has achieved worldwide recognition (above left). Students at Jackson State use sophisticated computer networks in their studies (above right). Prairie View University's VAX computer laboratory reflects the most modern available hardware and software (bottom).

element methods and numerical modeling, computational fluid dynamics and physical mathematics

•Environmental sciences—environmental monitoring and analysis

•Physics—high energy collisions and theoretical nuclear physics

•Mathematics/Applied Mathematics—numerical analysis and simulation, statistical methods and applied probability

•Optics and lasers—laser spectroscopy, non-linear optics, free electron laser theory

•Materials science—condensed matter theory, solid mechanics, structural mechanics, structural analysis and design, crystal structure and growth, surface studies, super alloys and composites

•Sensing—remote sensing

•Systems artificial intelligence—system and control theory

•Optical interferometry—study of convective heat transfer

•Backbone and Local Area Network computer design and installation.

Alliance universities have significant resources for conducting research and training in science and technology. These resources include modern, well-equipped laboratories in optics, lasers, physical chemistry, biochemistry, energy and materials research.

Alliance facilities are available for studying flow boiling heat transfer, process control with computer simulation, high energy physics, surface physics, chemical manufacturing, and materials analysis.

Laboratories are equipped with IBM, Digital VAX, Burroughs, and AT&T minicomputers in addition to Xerox, Apple and IBM microcomputers. A network links Southern's mainframe and super-minicomputers. Southern and Jackson State have campus-wide local area networks.

Ongoing Work

At present, Alliance member universities serve government agencies,

national laboratories, private foundations, industries and other academic institutions. The extensive list includes such U.S. Department of Defense agencies as the Department of the Army (Army Research Office, Army Corps of Engineers), Department of the Navy (Office of Naval Research) and the Department of the Air Force.

Other work is under way for the U.S. Department of Energy, National Science Foundation, the U.S. Bureau of Mines, and the National Aeronautics and Space Administration.

In addition, work has been done for private corporations such as IBM, Raytheon, 3M, Martin Marietta, General Electric, General Motors, Honeywell and AT&T.

The Alliance also serves several national laboratories including Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Oak Ridge National Laboratory, Sandia National Laboratory and Lawrence Berkeley Laboratory.

Universities served include Texas A&M, Massachusetts Institute of Technology and Carnegie Mellon University.

Other Alliance resources

The Alliance receives support from several government entities including Lawrence Livermore National Laboratory in California. The Laboratory has a working relationship with all four Alliance members.

Members of the Alliance utilize, on an as-available basis, LLNL supercomputers, scientific and engineering equipment, training for faculty and staff, including seminars, workshops and conferences, and other support services.

Another important resource for the Alliance is the National Aeronautics and Space Administration Southern Industrial Applications Center. This unique facility provides information to researchers from over 500 databases worldwide. Southern University (Baton Rouge) is among only 10 sites for this program and is the only HBCU campus to have such a facility.

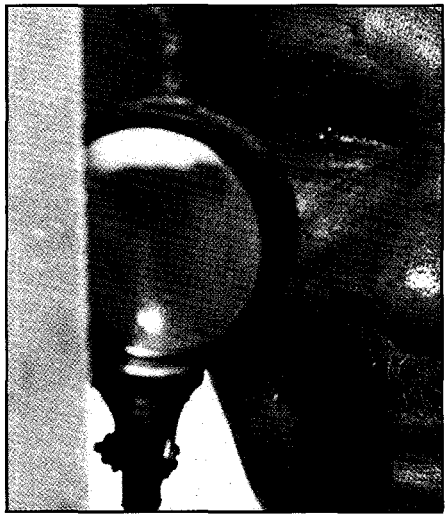
Prairie View has been selected by NASA to perform unique research assignments on energy sources for space exploration.

Researchers at Jackson State utilize electron microscopy to perform projects for the U. S. Department of Agriculture.

The Alliance has the laboratory resources of a Minority Research Center of Excellence for research in non-linear optics and optical materials at Alabama A&M University. Alabama A&M is also the only HBCU that is a partner in the NASA Center for the Commercial Development of Space, a research and development consortium consisting of universities and businesses. The center provides access to equipment and facilities not otherwise available to most universities and colleges.

In supporting materials science research, Alabama A&M and Jackson State belong to the EPSCoR Consortium funded by National Science Foundation and the state of Alabama.

Alabama A&M University, a member of the Alabama Space Grant Consortium, has the distinction of being the only HBCU to have successfully flown crystal growth experiments on two different NASA Space Shuttle missions, Spacelab III and the International Microgravity Laboratory-1 (IML-1) that was flown in January 1992.



Materials scientists at Southern University use precision equipment in their engineering research.

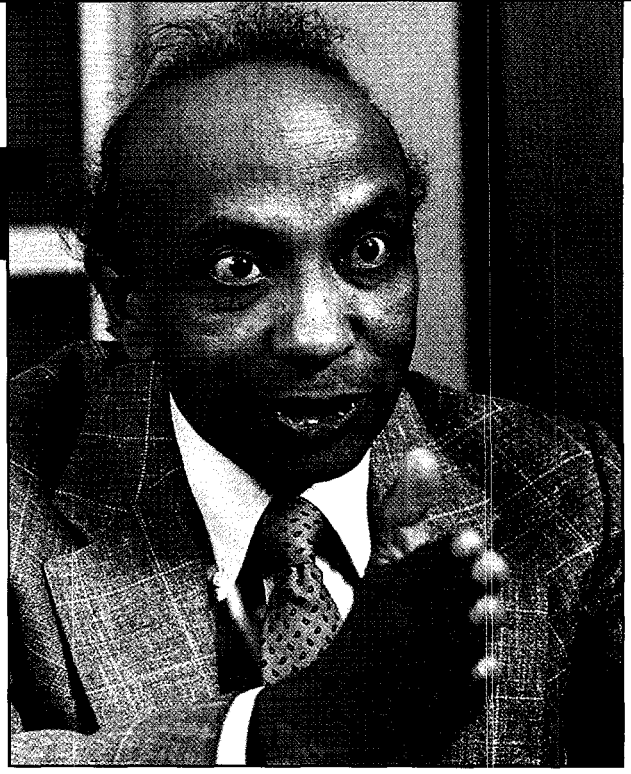
With a proven track record of managing research efforts in a wide range of technical and scientific areas, the Alliance is available for research projects for government, private industry and the academic community.

Faculty Education Level

	Universities							
		JSU		PV		SU		
Research Interests		M	D	M	D	M	D	
Engineering Sciences/ Technology		3	8	9	26	11	21	
		-	-	7	3	-	1	
Computer Sciences		10	2	8	3	13	7	
Physics		1	4	-	6	2	13	
Physics/Optics & Materials Science		-	-	-	-	-	-	
Mathematical Sciences		7	10	11	11	14	14	
Biosciences		2	20	2	8	9	17	
Chemistry		1	12	2	6	4	13	
TOTAL STAFF		24	56	39	63	72	86	

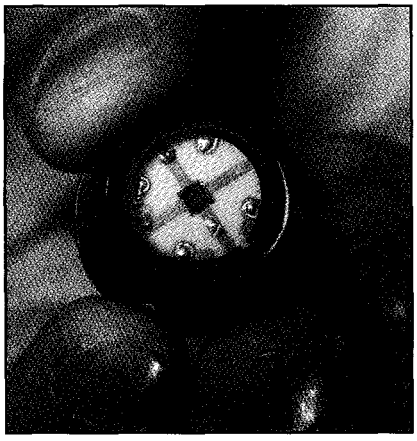
*Master's **Doctorate

Alabama A&M University



"The crystals we grow in our laboratories operate in some of the world's most sensitive thermal detection systems. We are developing new crystal technology that could some day be used in the nation's most powerful laser at Lawrence Livermore National Laboratory. We're also preparing experiments for a future NASA Space Shuttle mission."

—Dr. Ravindra B. Lal, Professor of Physics Alabama A&M University



Thermal detectors from the laboratories of Alabama A&M are used in ultra-sensitive detection equipment throughout the world (above). Graduate students at the university have helped design unique experiments, including one for the December 1990 NASA Space Shuttle mission (right).

Since joining the faculty of Alabama A&M University in 1975, Dr. Ravindra Lal has worked at the forefront of research in solid state physics and crystal growth.

"This university provides a stimulating environment for teaching and research which has allowed us to advance the technology of crystal growth and solid state physics," notes Lal.

Much of the technology developed in the Alabama A&M laboratories has proven extremely valuable for research and industrial applications.

For example, crystals from Alabama A&M have been used in sensitive thermal detectors (seen at left, below) which can measure temperature changes down to 0.1 degree C. This has proven especially useful for security devices, cancer diagnosis, and even in following the course of a forest fire by satellite.

In 1985, Alabama participated in the NASA Spacelab III experiments in which single crystals were grown under gravity-free conditions. Dr. Lal worked with NASA on the International Microgravity Laboratory (IMC-1) that was flown in January 1992.

In addition to working with NASA and Lawrence Livermore National Laboratory, where he is looking at crystal growth for laser applications, Dr. Lal is collaborating on crystal-related projects with Westinghouse, The Grumman Company, Boeing/Huntsville, EDO/Barnes Engineering Division and Teledyne Brown Engineering.

"There is a great sense of excitement about what we are doing here in our laboratories as our crystals become more and more sophisticated. The administration of Alabama A&M has been very supportive and provides an excellent climate for research and development," notes Lal.

Founded in 1875, Alabama A&M University is a major coeducational institution with an enrollment of over

5,000 students, including more than 1,500 graduate students. A land-grant institution, the university combines professional, vocational and liberal arts pursuits. Alabama A&M offers more than 70 degree programs in six academic schools: Agriculture and Home Economics, Business, Arts and Sciences, Education, Engineering and Technology, and Graduate Studies.

The university is located in Huntsville, one of the nation's fastest growing urban communities. Huntsville is a center for high tech industries and houses federal research facilities like NASA's Marshall Space Flight Center and the U.S. Army's Redstone Arsenal. The campus consists of 45 buildings sited on 2,000 acres of rolling countryside. Alabama A&M attracts students from 40 other states and 45 foreign countries.

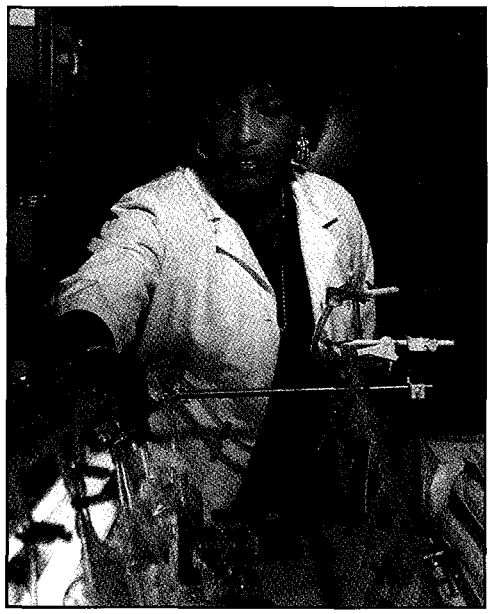
The institution offers the bachelor's, master's and doctorate degrees. (Alabama A&M is only one of two HBCUs offering the Ph.D. in physics.)

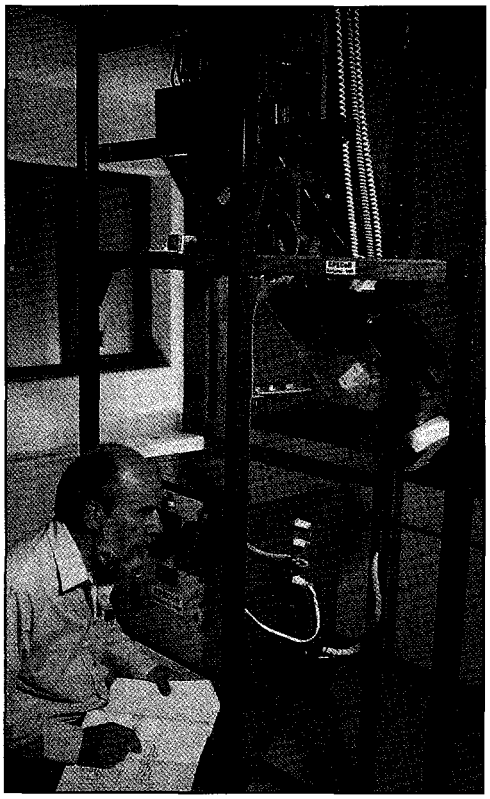
Alabama also offers Ph.D.s in Plant & Soil Sciences, Food Sciences, and Animal Industries.

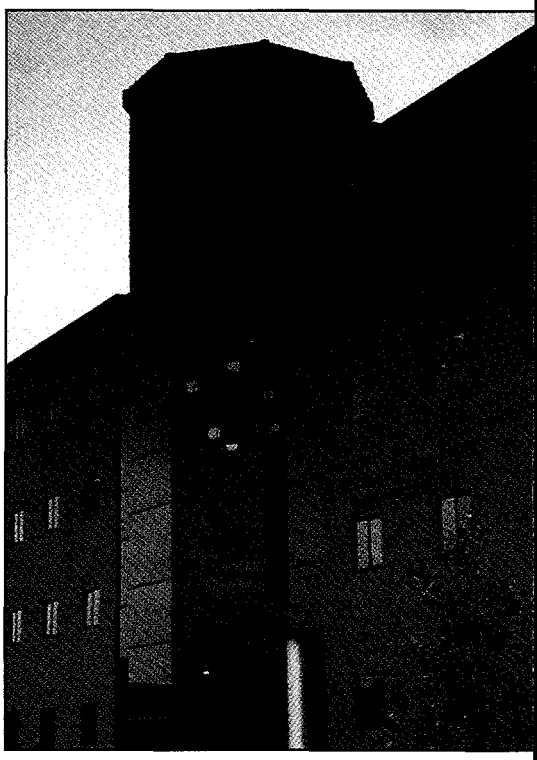
New and continuation faculty research in the five major schools totaled $15.7 million in externally funded grants and contracts for 1990-91. In addition, Alabama A&M University attracted over $6.6 million in related, other-sponsored programs. DOEd, USDA, NSF, DOD and NASA were the top five federal funding sources.

The university is professionally accredited by the Southern Association of Colleges and Schools, and by the Accreditation Board of Engineering Technology.

Alabama is a partner in the NASA Center for the Commercial Development of Space (CCDS), a high-level research and development consortium that provides access to sophisticated research equipment and facilities. In supporting materials research, the university belongs to the EPSCoR Consortium, which includes several other universities in Alabama. The consortium is funded by the National Science Foundation and the state of Alabama.





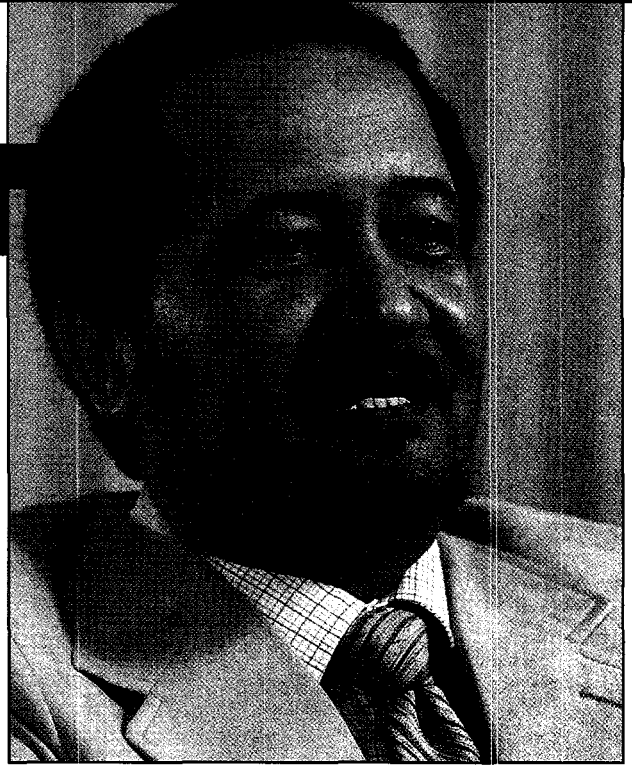


The new V. Murray Chambers science facility (below) is home to a wide variety of emerging scientific research projects now under way. Projects include everything from microbiological research (top, left) to materials development using a specially designed rocker furnace (bottom, left).

"Highly trained minority scientists are in great demand and will continue to be sought after," notes University President Dr. David Bernard Henson.

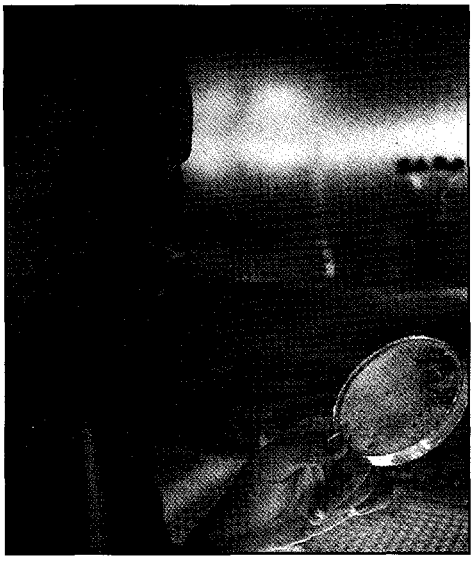
"In response to this demand, Alabama A&M has entered into a consortium of Historically Black educational institutions. Our common goal is to produce first-rate scientists prepared to take on a broad array of challenging R&D assignments."

Jackson State University



"At Jackson State University our biologists are experimenting with a unique way of using fungi to reduce our dependence on chemical pesticides."

—Dr. Abdul Mohamed,
Professor of Biology and
Dean, School of Science & Technology
Jackson State University



The university has a comprehensive biosciences graduate research program emphasizing laboratory investigations (above). A new science building houses teaching and research facilities for students and faculty (right).

For the past several years, Dr. Abdul Mohamed, his research colleagues and students have been looking for ways of using fungi, viruses and other naturally occurring organisms to reduce the need for chemical pesticides in agricultural applications.

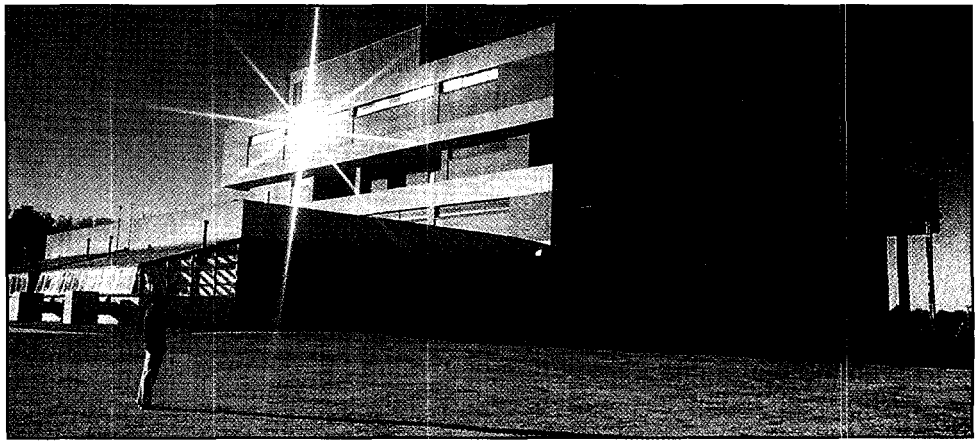
"There is a great deal of concern about the variety and quantity of chemicals used to control agricultural pests. We decided to identify a species of fungus that naturally inhibits the growth cycles of these destructive insects. We succeeded," says Mohamed.

Mohamed and his graduate students used ultraviolet radiation to create a more virulent mutant of a species of fungus. *Nomuraea rileyi* effectively inhibits insect pests that attack cotton and other agricultural crops, reducing or eliminating the need for chemical pesticides.

Mohamed carefully tested the fungus on mice to make certain it was not toxic to higher animals. As a demonstration, he will often taste the fungus to prove his point.

"This strategy of fighting harmful pests has also been used to fight carriers of disease such as mosquitoes," notes Mohamed.

In the case of mosquitoes, a variety of pathogen has been found which prevents the insect from growing beyond its larval stage, inhibiting its spread.



"We are engaged in some exciting bioscience here at Jackson State and are doing all we can to encourage science students to enter this field of research," says Mohamed.

"The pursuit of scientific excellence is one of our main goals. Here in Jackson and through the Alliance we are developing training and research programs in the sciences that are second to none."

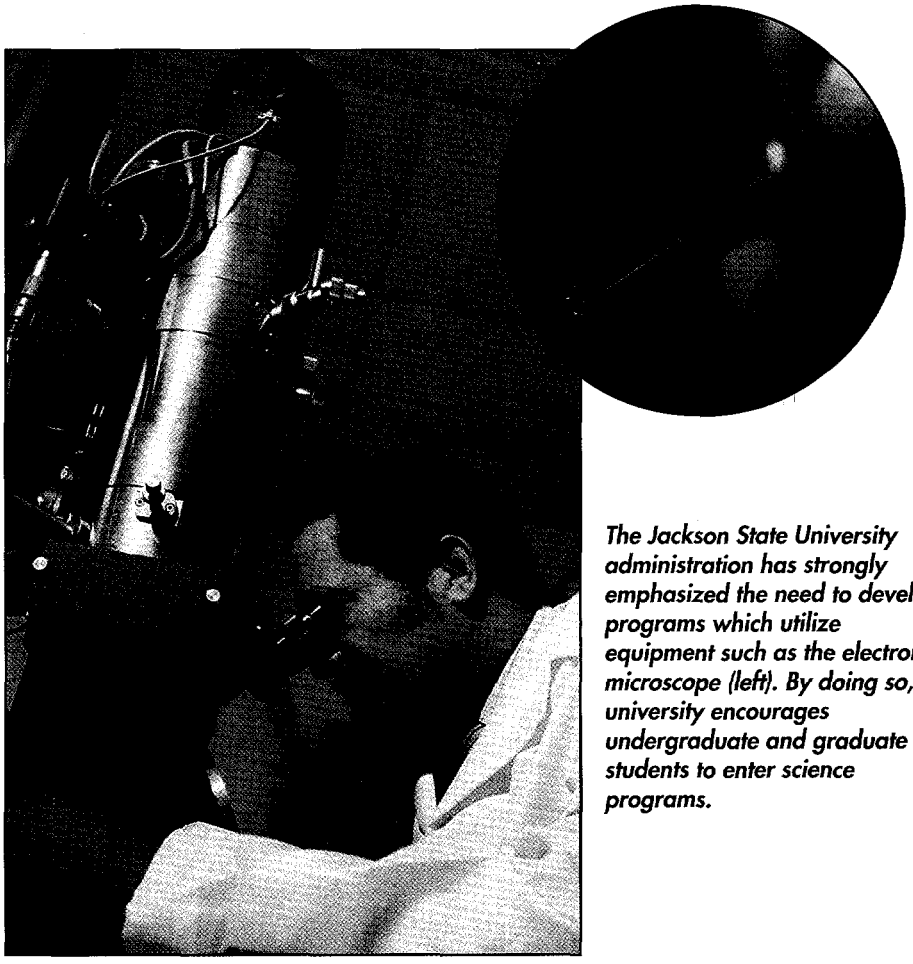
Founded in 1877, Jackson State University is the sixth largest among the historically black colleges. It has an enrollment of over 7,000 students.

Jackson State University is one of two HBCUs offering a program in marine science. It offers the only bachelor's degree in meteorology among the 116 HBCUs in the United States, and among all institutions in Mississippi and the nearby states of Alabama, Arkansas, Georgia, Kentucky and Tennessee.

The university has five schools: Liberal Arts, Education, Science and Technology, Business, and the Graduate School. Of its 350 full-time faculty members, 66 percent have earned doctorates.

Jackson State fosters and maintains cooperative relationships with business, industry, private and governmental agencies, national laboratories and academic institutions. Among others, the university has active research projects with five national laboratories (including the Lawrence Livermore National Laboratory), the U.S. Department of Energy, AT&T Bell Laboratories, American Cyanamid Company, NASA, and the Departments of the Army, Navy and Air Force.

The university is accredited by the Southern Association of Colleges and Schools, the American Chemical Society and several other professional organizations.



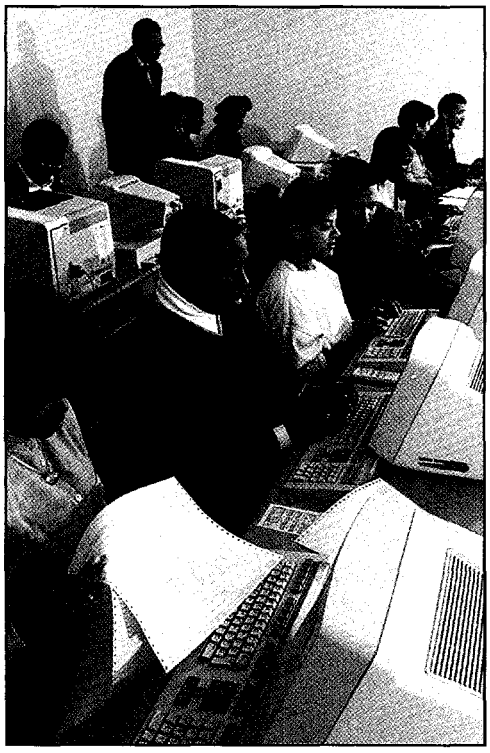
The Jackson State University administration has strongly emphasized the need to develop programs which utilize equipment such as the electron microscope (left). By doing so, the university encourages undergraduate and graduate students to enter science programs.

The computer center operates an IBM System 4381 with 16 megabytes of memory and a full range of hardware and software. The Academic Research Computing Center (ARCC) is equipped with two VAX 11/780 CPUs bound together in a VAX cluster. The cluster consists of a computer interconnect, which will allow the connection of a total of 16 devices. Jackson State University graduates more minorities in computer science than any other university in the United States.

Prairie View A&M University

"Imagine coming in close proximity to the sun without burning up. The thermal research work we are doing here at Prairie View may one day allow us to tap into unlimited sources of energy from fusion reactors."

—Dr. Ronald D. Boyd, Sr.
Department of Mechanical Engineering
Prairie View A&M University



In performing their work, Prairie View faculty and students are assisted by excellent research and computational facilities, including this VAX computer laboratory.

Fusion energy may have a promising future, but not until some very challenging technical problems are solved. At Prairie View A&M University, Dr. Ronald Boyd, Sr., and his research team in the Department of Mechanical Engineering are working toward meeting some fundamental thermal research challenges that may bring the practical use of fusion reactors closer to reality.

"Fusion reactors operate at very high temperatures, so the question becomes one of maintaining high heat fluxes in the reactor without destroying its components," says Boyd.

It's almost like designing a system that can touch the sun without getting burned.

The key, says Boyd, is to transfer the energy through the components of a fusion reactor quickly enough that the amount of energy deposited at any one time in any one place is not destructive to the reactor's components.

To do this, Boyd and his colleagues are conducting experiments to measure how energy is transferred between surfaces and flowing two-phase fluids.

"This will require flow boiling, and it may allow us to operate at very high temperatures, millions of degrees, without damaging our systems," adds Boyd.

Boyd is also studying free and mixed convective heat transfer in enclosures and plumes.

"Understanding how thermal stress and heat transfer affect energy generating systems will help play a major role in developing future energy technology," says Boyd.

Prairie View's president, Gen. Julius W. Becton, Jr., has joined in the dual challenge of meeting the nation's future technology needs while assuring an adequate supply of well-trained scientists and engineers.

Located about 40 miles northwest of Houston, Tex., Prairie View A&M University is the second oldest institution of higher education in the state. The university's current enrollment is about 5,500 students, including more than 700 post-baccalaureate and graduate students.

In 1984, Prairie View A&M University joined Texas A&M University and the University of Texas at Austin as a constitutionally designated "institution of the first class." The university's major academic divisions are the Colleges of Applied Sciences and Engineering Technology, Arts and Sciences, Business, Education, Engineering and Architecture, Nursing, the Benjamin Banneker Honors College, and the Graduate School.

The university's research sponsorship and alliances with private companies, federal agencies and national laboratories led to national recognition in 1986 by the White House Office of Science and Technology Policy and by the U.S. Department of Education. University researchers are at work on diverse projects, including research in high-energy particle physics and space exploration.

Prairie View has significant support from both private companies and public agencies, receiving two endowed chairs in the last two years from the AT&T Foundation and the Honeywell Foundation.

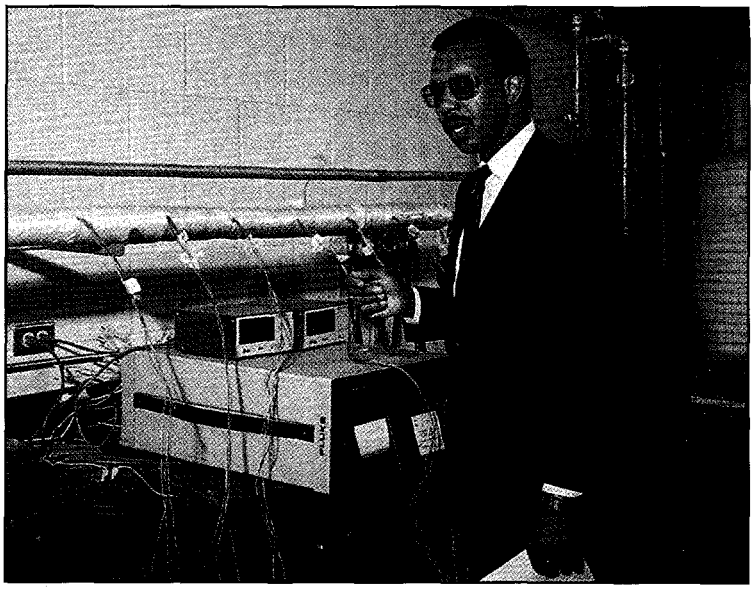
The university collaborates with General Motors, General Electric, and AT&T Bell Laboratories, which recently provided the university with over $80,000 worth of computer equipment for the College of Business and over $150,000 in scholarships for engineering students.

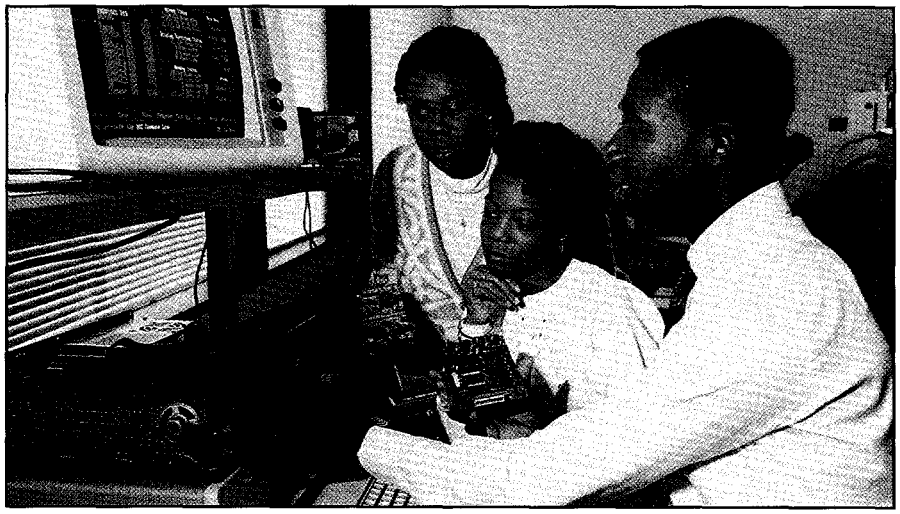
The university is involved in the Superconducting Super Collider (SSC) Project. The Prairie View A&M University Project, the Particle Detector Research Center (PDRC), provides leadership focusing on SSC particle detector research participation by faculty and students. The center will serve as a host facility for high energy experimental research at Historically Black Colleges and Universities and Minority Institutions (HBCU/MIs).

Dr. Dennis Judd, professor of physics and principal investigator for the project, believes that the project will help address the shortage of minorities in physics. "For us (minorities) to take part in the future of this country, we must take part in the science that creates it (the future)," he said.

The university has a continuing research interest in radiation effects on matter and is establishing a Laboratory for Radiation Studies (LRS). The mission of the laboratory is three-fold: (1) serve as a facility for conducting research in the area of radiation science, radiation detection, radiation shielding and radiation tolerance; (2) strengthen existing research relationships between PVAMU and other institutions and establish new ones; and (3) provide a pipeline for minority students to pursue the doctoral degree. Dr. Thomas Fogarty is the laboratory director.

Prairie View A&M University also is a member of the HBCU/MI Hazardous Waste Management Consortium.





At Prairie View, first-rate teaching and research facilities include a flow boiling laboratory (top) and electrical engineering training stations (bottom).

Southern University and A&M College

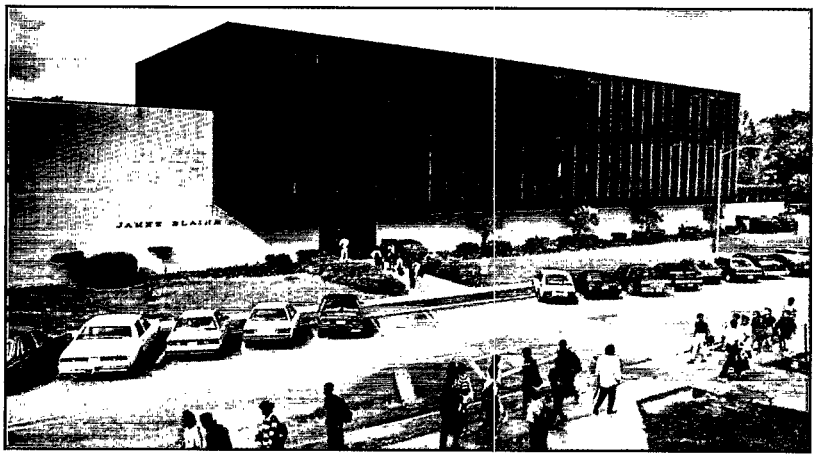
"We believe our research has put us at the forefront of the theoretical understanding of materials. This will lead to important advances in superconductor technology and may even reduce the cost of energy."

—Dr. Diola Bagayoko, Physics Department Southern University and A&M College

Dr. Diola Bagayoko is a solid state physicist at Southern University and A&M College in Baton Rouge, Louisiana. Over the past several years, his work and that of his colleagues in theoretical solid state physics has significantly increased the understanding of the electronic properties of metals and alloys.

"This is a very exciting field with tremendous possibilities, and we here at Southern University are doing some very important work," notes Bagayoko.

Working with colleagues, undergraduate and graduate students, Bagayoko has applied the general theory of quantum mechanics to express the properties of metals and alloys.



Southern University's facilities include the James Blaine Moore Engineering Building (above), which serves the dual function of teaching and research.

Through the use of supercomputers, Southern's faculty has provided calculations which can lead to the fabrication of superconductors with a wide variety of applications, including the transmission of low-cost electricity.

"As a result of our work, we can conceive of material structures and lattices that do not yet exist. When these materials are fabricated, they may some day revolutionize the aviation business or help us take a quantum leap forward in laser technology," says Bagayoko.

This involves the development of fundamental theory on the properties of alloys which can then be tested mathematically and ultimately applied to industrial uses.

As an example, recent studies of the electronic structure of the cobalt dimer represent the most complete theoretical description now available of the molecule formed by two atoms of cobalt. The findings will be confirmed by actual laboratory measurements.

"With our theoretical and computational power, the possibilities are unlimited," adds Bagayoko.

Southern University at Baton Rouge, one of the nation's largest HBCUs, is part of the Southern University System, which has two other campuses—at New Orleans and at Shreveport.

The world's only HBCU system has

an enrollment of approximately 15,100 students, which includes more than 1,244 graduate students. More than 10,500 students are on the Baton Rouge campus. Founded in 1880, it is a state-supported, coeducational institution that awards the associate, bachelor's, master's, specialist and doctoral degrees. The university also offers several cooperative and dual degree programs with Louisiana State University.

Southern University's research efforts total nearly $15 million. About half of the full-time faculty hold doctoral degrees and conduct research in robotics, computer-aided design, energy and environmental studies, hazardous waste management, materials science, and alcohol and drug abuse.

The accredited university is located on 512 acres with an additional 372-acre agricultural experimental farm nearby. The campus contains the Colleges of Agriculture and Home Economics, Arts and Humanities, Business, Sciences, Education, and Engineering, as well as the Schools of Architecture, Nursing, Public Policy and Urban Affairs, the Law Center, and the Graduate School.

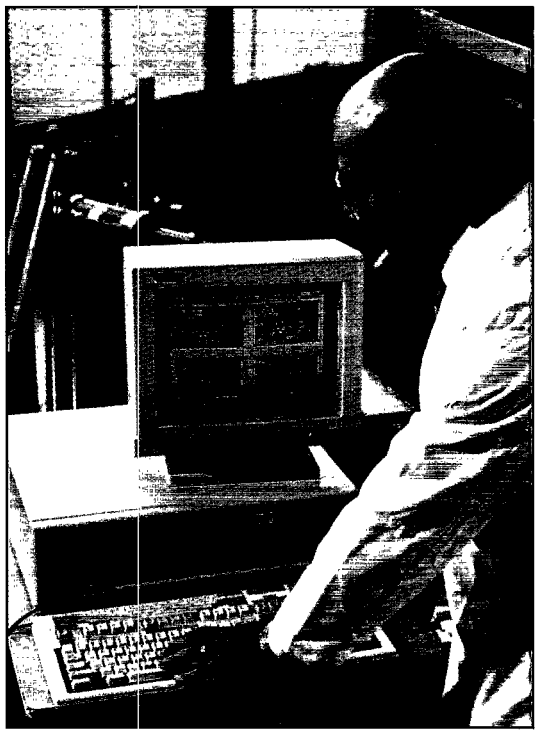
"Southern University is rapidly becoming a major research university through its involvement with various agencies which fund many of the university's research projects and programs," said Chancellor Marvin L. Yates. "As we move toward reaching this important milestone of research excellence, the collaborative efforts of the universities that make up the Alliance will prove to be an innovative model for others to emulate."

Funding agencies include NASA, the U.S. Departments of Energy, Agriculture and Education, the National Science Foundation and the National Institutes of Health.

The university is the site of a unique Industrial Applications Center, which offers significant research opportunities for education, business and industry.

The Industrial Applications staff works with clients to define problems, then finds the most appropriate solutions through access to over 500 on-line data bases or through appropriate technical expertise via networks of scientists and engineers.

The Center for Energy and Environmental Studies (CEES) emphasizes environmental education, training, research, technology transfer and policy study activities from the vantage of the university, industry, the regulatory agency, the public, the activist community and victims of environmental insult. Since its inception the center has been funded at a level in excess of $2 million from various sources. The activities associated with this funding range from the provision of college experiences for high school students to (1)training and development activities for pre-college, undergraduate and graduate students, faculty and staff; (2)curriculum development and (3)basic research. Currently there are approximately 14 faculty, nine staff, 17 undergraduate and four graduate students associated with the center.



A wide variety of research projects under way include investigations using lasers (top, left) and fundamental work in mechanical engineering and materials science laboratories (top, right).

"Highly trained minority scientists are in great demand and will continue to be sought after... Our common goal is to produce first-rate scientists prepared to take on a broad array of challenging R&D assignments."

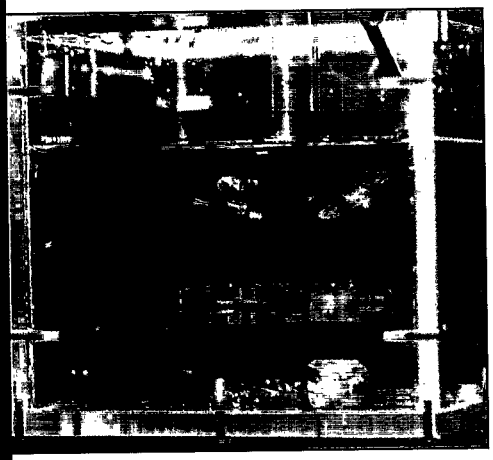
—Dr. David Bernard Henson, President
Alabama A&M University

The formation of the Science and Engineering Alliance has created important new opportunities for its member universities, students, faculty, and those in the public and private sectors who utilize its wide range of capabilities.

Each of the Alliance members has a dynamic array of science and engineering programs to train the researchers of the future while meeting today's R&D needs.

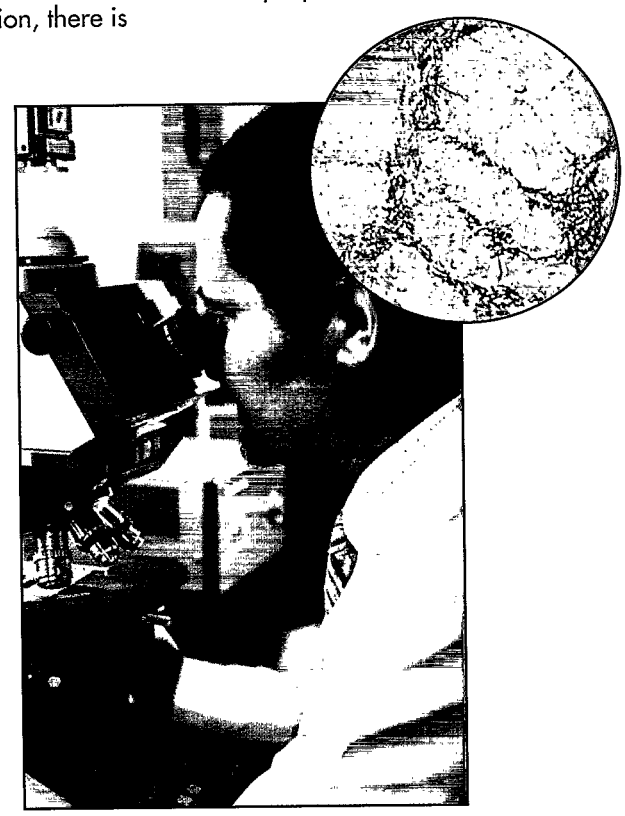
At each Alliance institution, there is a sense of excitement and commitment to the goal of expanding the horizons of scientific knowledge and applying new knowledge to solving tough technical problems.

Alliance research faculty and staff compose a team of highly qualified professionals in science and technology. Senior staff members have extensive experience in managing contracts and conducting scientific research projects.



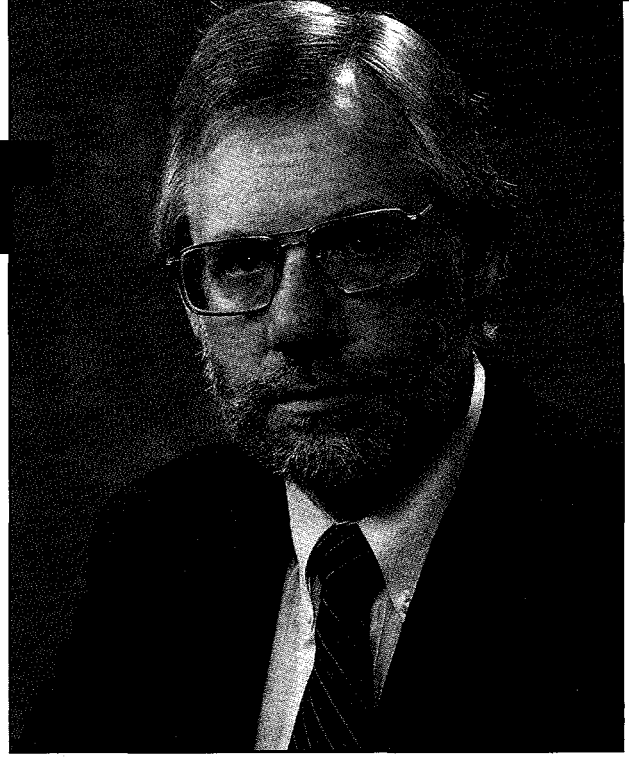
The engineering program at Prairie View encourages looking at ways to provide energy for the space missions of the future (top) that will more than likely utilize the crystal technology developed in the laboratories of Alabama A&M University (bottom).

Laser technology, studied and developed at Southern University and A&M College, will have important applications in engineering and physical science.



The bioscience research efforts now under way at Jackson State University have the potential of reducing our dependence on chemical pesticides by developing an understanding of how naturally occurring species of viruses and fungi can help eliminate insect pests.

Lawrence Livermore National Laboratory



"The goal of the SEA is straightforward — to help our nation and our people by strengthening the scientific and engineering programs at Alliance universities and the Laboratory."

—Philip E. Coyle III, Laboratory Associate Director, Lawrence Livermore National Laboratory.

Lawrence Livermore National Laboratory is a world-renowned research and development center operated by the University of California for the U.S. Department of Energy. Its mission is to serve as a national resource in applied science and engineering to meet America's needs.

The main laboratory site is on the eastern edge of Livermore, California, about an hour's drive southeast of San Francisco.

The laboratory was established in 1952 by E. O. Lawrence, Nobel laureate and a distinguished pioneer in managing large-scale, innovative research projects that combined the expertise of many disciplines.

Today Livermore is one of the largest research institutions in the world. Its prized staff of some 8,000 employees includes nearly 3,000 scientists and engineers and 3,000 crafts people and technicians. With a replacement value of about $5 billion, the laboratory's research complex includes world-class lasers, supercomputers, accelerators, and literally hundreds of laboratories and test facilities.

Livermore's major strengths include: nuclear science and technology; high-performance computation; high-performance lasers; advanced sensors and instrumentation; energy science and technology; space technology; plasma and accelerator physics and technology; environmental science and technology; earth science; atmospheric science; materials, processing and fabrication; and large-scale science systems.

Throughout its history, the laboratory has played a leading role in providing for the nation's defense. Today Livermore is making key contributions in nuclear weapons arms control and nuclear non-proliferation. The laboratory is also helping to achieve a much smaller nuclear stockpile with enhanced safety, security and reliability.

The laboratory is developing advanced energy technologies such as laser and magnetic energy fusion. The laser fusion program is centered around Nova, the most powerful laser in the world. Livermore is a member of America's team in the international effort to design and build the world's largest magnetic fusion reactor. The laboratory is also leading the development of laser isotope separation to create low-cost fuel for civilian nuclear power plants, and is developing renewable energy and transportation options.

The laboratory is a leader in the major revolution in biomedicine and is developing innovative ways to identify the genetic basis for human disease. As a national center for Human Genome Research for the Department of Energy, the laboratory has made outstanding progress in mapping more than 90 percent of chromosome 19. In collaboration with an international team, Livermore researchers identified the

genetic defect causing the most common form of muscular dystrophy.

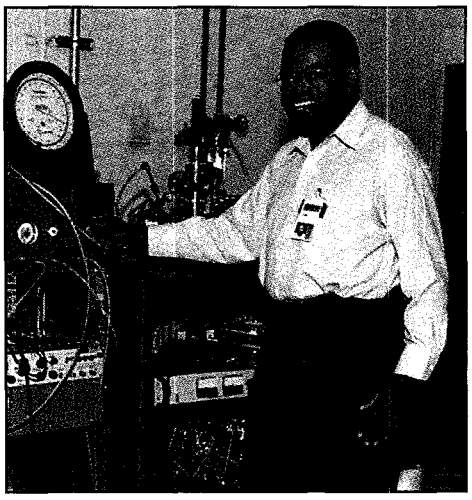
Many of the laboratory's environmental projects are aimed at finding new ways to restore the environment and treat existing wastes. Laboratory scientists have invented probes using fiber optics to measure pollutants and developed cost-effective water purification technologies and other *in situ* cleanup methods. The laboratory's atmospheric emergency response center uses sophisticated simulation models to show the extent and movement of atmospheric releases worldwide. As a center for global change research, Livermore is studying the climate effects of increasing concentrations of carbon dioxide and other greenhouse gases.

Laboratory leaders know that the future security of the nation will depend as much on economic strength as on national defense. Livermore is in partnership with American industry to bring the Laboratory's technological breakthroughs to the marketplace. The goal of these partnerships is to spur domestic economic growth and enhance the nation's economic competitiveness.

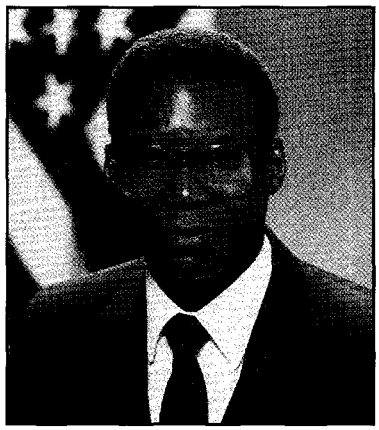
Throughout its history, the laboratory has made a special commitment to science education. Today there are more than 60 Livermore education programs dedicated to increasing students' understanding of science and technology, improving the skills of teachers and boosting the number of students pursuing careers in science, engineering and technical fields. The laboratory's Science Education Center has been hailed as a model for the nation.

In 1990, the laboratory signed a memorandum of understanding and intent with member universities of the Science and Engineering Alliance. The partnership was designed to foster and encourage collaborative research among the personnel of the Alliance and the laboratory, and serves as the primary vehicle for the exchange of students, faculty and staff members between the Alliance institutions and the Livermore lab.

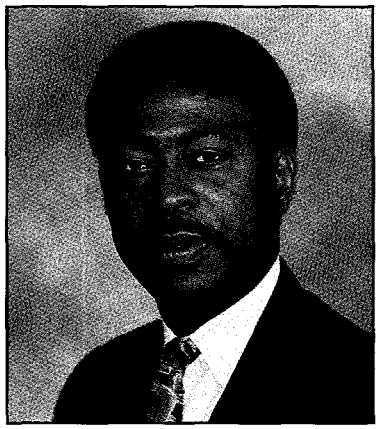
"The goal of the SEA is straightforward — to help our nation and our people by strengthening the scientific and engineering programs at Alliance universities and the Laboratory." said Laboratory Associate Director Philip E. Coyle. "By developing new methods to stimulate and inspire the minds of their outstanding students, SEA institutions are helping produce the researchers of tomorrow. Without question the SEA has been instrumental in helping LLNL meet its goal of encouraging female and minority students to pursue careers in science and engineering. "



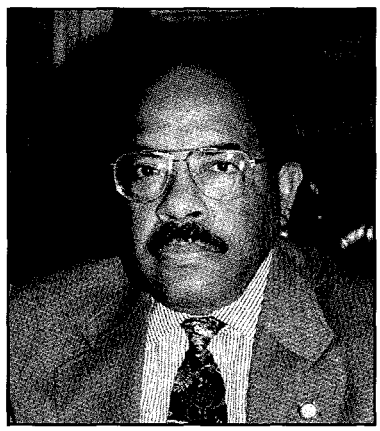
Floyd James (photo at right), a professor of physics at Jackson State University, reported excellent progress on a research project he conducted at the Laboratory with two of his students in the summer of 1992. During the 1992-93 academic year, the entire experiment was transferred to Jackson State University where Dr. James continues the research begun at Livermore. Above, James (third from left) and LLNL physicist Paul Ebert (far right) pose with students, many from Alliance universities, during the laboratory's 1992 summer program.



Gen. Julius W. Becton, Jr., President
Prairie View A&M University



Dr. James E. Lyons, Sr., President
Jackson State University



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SCIENCE and ENGINEERING ALLIANCE

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