

The Ronald E. McNair Building

Dedication Ceremonies

December 5, 1986

Massachusetts Institute of Technology

Program of Events

Dedication Symposium

The Space Frontier:
"Hanging It Over the Edge"
Huntington Hall, Room 10-250
10:00 am to 12:00 noon

Welcome

Gene M. Brown
Professor of Biochemistry
Dean, School of Science
Massachusetts Institute of Technology

Introductory Remarks

Gordon H. Pettengill
Professor of Planetary Physics
Director, Center for Space Research
Massachusetts Institute of Technology

Speakers

Philip Morrison
Institute Professor, Emeritus
Professor of Physics, Emeritus
Massachusetts Institute of Technology
"The Declaration of the Heavens"

Charles H. Townes
University Professor of Physics, Emeritus
University of California
"Man and Creation"

George R. Carruthers
Senior Astrophysicist
Space Science Division
Naval Research Laboratory
"The Future of Astronomy in Space"

Byron K. Lichtenberg
President
Payload Systems, Incorporated
"Opening the Space Frontier"

Dedication Ceremony

2:30 pm
Edgerton Lecture Hall
EG&G Education Center
50 Vassar Street

Presiding

David S. Saxon
Chairman of the Corporation
Massachusetts Institute of Technology

Remarks

Shirley A. Jackson
Physical Research Division
AT&T Bell Laboratories

Charles F. Bolden, Jr.
Colonel, US Marine Corps
Astronaut, National Aeronautics and
Space Administration

Michael S. Feld
Professor of Physics
Director, Spectroscopy Laboratory
Massachusetts Institute of Technology

Paul E. Gray
President
Massachusetts Institute of Technology

Cheryl M. McNair
Chairman of the Board
The Ron McNair Scholarship Foundation, Inc.
Atlanta, Georgia

MIT Gospel Choir
"Let Mount Zion Rejoice"

Reception

4:00 pm
Following the dedication ceremonies there will be a reception in the lobby of the Vannevar Bush Building. Music will be provided by The Semanya McCord Quartet and The Intermission Trio Plus, Samuel Jay Keyser, Leader.

A Symbol To A Whole Generation

Perhaps the best way for me to explain my hopes for you is to recall one of our graduates who was a shining example of the extraordinary quality we have come to expect of those who have been part of MIT.

I speak of Ronald E. McNair, one of the *Challenger* astronauts, who received his doctorate in physics from MIT just nine years ago. Ron's life was one of stellar achievement, bright promise, and clear vision. Speaking of his view of the earth from space – and he, if anyone, had a long view – he said:

Truly there is no more beautiful sight than to see the earth from space beyond. This planet is an exquisite oasis. Warmth emanates from the earth when you look at her from space. . . My wish is that we would allow this planet to be the beautiful oasis that she is, and allow ourselves to live more in the peace that she generates.

Ron gave much of himself to MIT and to the people of MIT, and he was a symbol to a whole generation of young people around the nation of the best qualities that I can hope for you.

In February, the MIT family came together to remember him. I am pleased today to report another form of recognition which we are privileged to give. This morning, the governing board of the Institute voted to name the building that houses MIT's Center for Space Research after Ronald E. McNair. The faculty, students, and staff in this Center are dedicated to exploring space and understanding the cosmos, and nothing could be more fitting than to have Ron's name, and his spirit, associated with that mission and this campus.

The McNair Building will stand as a permanent reminder to future generations at MIT of the grace and significance of extraordinary achievement tempered by an uncommon wisdom and an abiding love of humankind. I could wish no better model for you.

President Paul E. Gray
Charge to the Graduates
Massachusetts Institute of Technology
June 2, 1986

Ronald E. McNair

Ronald E. McNair received the Ph.D. degree in physics from MIT in 1977 and went on to become a scientist in space. In 1978, he was among the first three black Americans selected by the National Aeronautics and Space Administration for astronaut training, and he completed his first mission into space in 1984 aboard the orbital space shuttle *Challenger*. Two years later, on January 28, 1986, Ronald McNair perished in the explosion of the *Challenger*, at the start of what would have been his second mission into space.

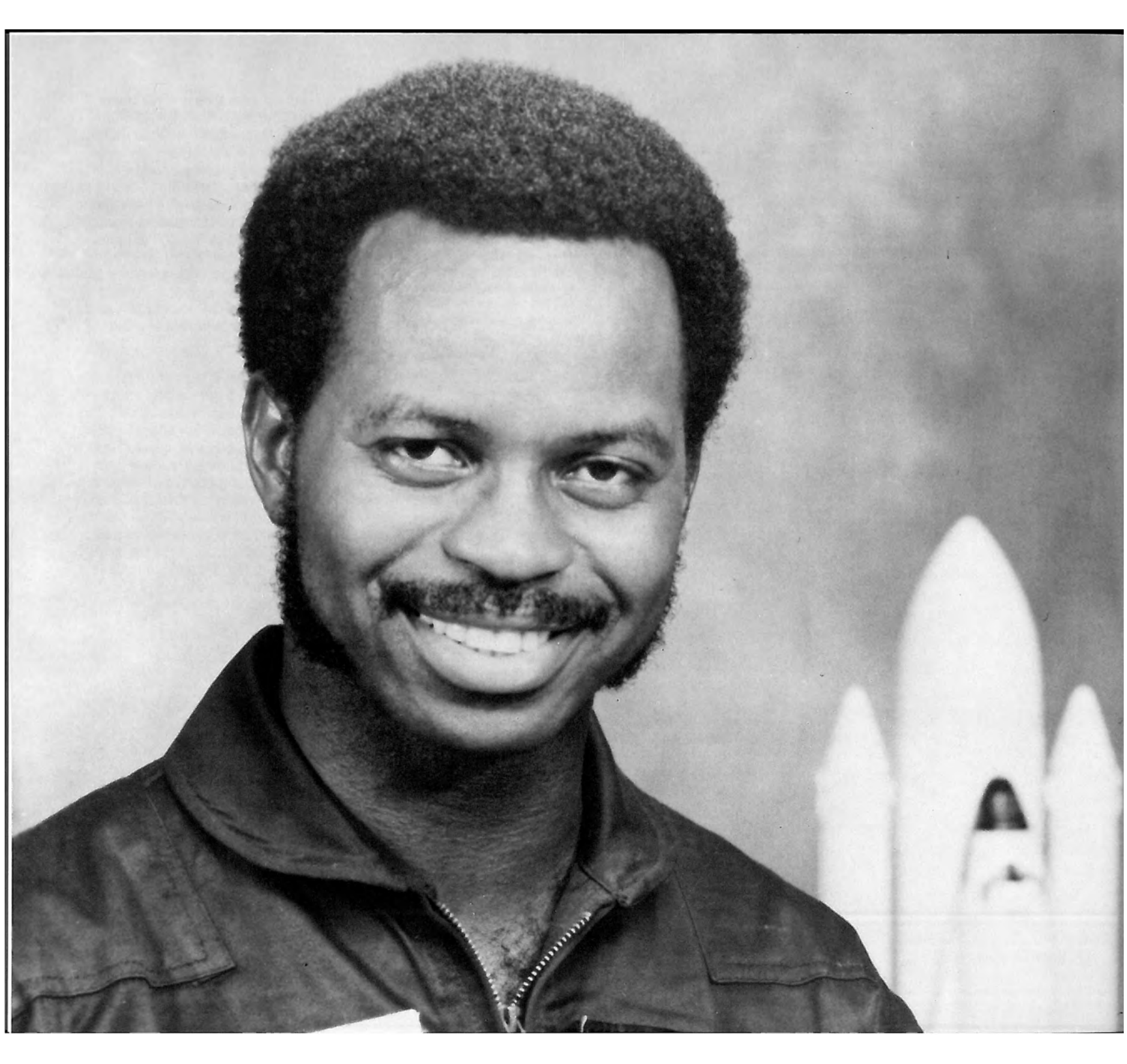
On June 2, 1986, the Corporation of the Massachusetts Institute of Technology, acting on the recommendation of its Executive Committee, directed that the building housing MIT's Center for Space Research be named in honor of Ronald E. McNair, so that future generations of students might be inspired by the qualities of his life and character.

Ronald McNair was a risk taker, always pressing forward on the limits of his own ability. He possessed a remarkable capacity for self-discipline and for self-education. He was a scholar and a scientist and an astronaut. He was an athlete and a musician. He had a strong family bond and a deep religious faith. He set high goals for himself and he welcomed the hard work necessary to reach those goals. In sum, he was an extraordinary man, a rare and exemplary inspiration for others who will follow in his path.

Ronald McNair was born on October 21, 1950 in Lake City, South Carolina, the second of three sons born to Pearl M. McNair, an elementary school teacher, and Carl C. McNair, an automobile mechanic. Born into the segregated society of the American rural south in the middle of the 20th Century, he overcame the barriers set by racial segregation and went on to become a winner – for himself, for his family, for his community, and for his nation.

In their preschool years, he and his brothers – the older Carl and the younger Eric – received home instruction from their mother, from an aunt, Mrs. Lela M. Austin, who was also a teacher, and from other members of their family. His father constantly challenged his sons and their friends to work hard and to succeed in school. A gifted student, Ronald was beginning to read by the age of three. When Lake City's schools declined to admit him at such an early age, his family arranged to have him enroll the next year in the first grade of a rural school outside of town, and he began the second grade in Lake City when he was five.

In high school, he was an outstanding student in all subjects, but was particularly adept in science and mathematics. Because his school on occasion could not afford to buy some of the substances used in laboratory experiments, Ronald and his fellow students sometimes had to bring common household chemicals from home to complete laboratory work. When his father was working in New York City, he would send home mathematics and science books that could not be obtained in Lake City. Ronald graduated, as valedictorian, from George Washington Carver High School in Lake City in 1967.



The strength of spirit and mind that Ronald McNair drew from his family and community nurtured his talents and encouraged his ambitions. His high school teachers remember him as hungry for knowledge, always pressing them for more work to do, and choosing the most challenging subjects. In addition, he was a student leader, an outstanding athlete in football and track, and, as a member of the high school band, an exceptionally talented saxophone player.

Upon graduation, he received a college scholarship from the state of South Carolina. Ronald's academic interests were in physics, but none of the black state colleges in South Carolina at that time offered degrees in that field, or in engineering for that matter. Rather than admit a black student to a white school, South Carolina authorities granted him the funds to attend college in another state where he could obtain a physics degree. As a result, he attended predominantly black North Carolina Agricultural and Technical State University.

In college, he also began the study of karate, a martial art that would become a principal extracurricular activity for him. While still in college he earned karate's highest rank, the black belt, and would go on to win the AAU gold medal in the sport. Later, he would teach the sport to young people through churches and schools wherever he lived. Those who knew him said that he was not so much attracted to karate as a means of self-defense, but rather as another way to heighten his sense of self-discipline and grace under pressure, traits that would prove invaluable in graduate school and in space.

Also in college, he gained additional recognition as a jazz musician, earning extra money playing saxophone in clubs and in bands that provided music for college and high school dances. He possessed rare musical talent and throughout his life he found solace and satisfaction in his playing.

Ronald McNair's connections with MIT began in early 1970 when he was in his junior year of college and took part in an exchange program between the Institute and a consortium of ten historically black colleges and universities. Nominated for the exchange program by his faculty advisor, Professor Thomas Sandin, Ronald decided to explore the academic challenges of a different kind of university in an entirely different part of the country. He spent the spring and summer terms of 1970 at MIT, working closely with his MIT advisor, Physics Professor Michael Feld. After graduating with the bachelor of science degree in physics *magna cum laude*, Ronald McNair entered MIT as a graduate student in the fall of 1971.

At MIT, Ronald found that he was not as well grounded academically as some other students, but he made up for this with determination, hard work, and the support of many colleagues and friends in MIT's black community—Shirley A. Jackson, John B. Turner, and Clarence G. Williams among them.

Professor Feld, whose research interests centered on lasers and spectroscopy, again became his advisor. Over the several years of their collaboration, Ronald carried out some of the earliest work in the development of hydrogen-fluoride, deuterium-fluoride, and high-pressure carbon monoxide lasers. His doctoral research dealt with the interaction of carbon dioxide laser radiation with methyl fluoride gas and provided new understandings of energy storage and transfer processes in laser-excited polyatomic molecules.

Throughout his years of graduate study at MIT, he held a Ford Foundation Fellowship, and in 1975, he also received a travelling fellowship from the North American Treaty Organization, which he used to spend several months studying laser physics at the French Institute for Theoretical Physics at Les Houches, France.

While a graduate student, Ronald became a member of the St. Paul A.M.E. Church in Cambridge, a few blocks from MIT, carrying on a family tradition of active involvement in the life of the church, and contributing to the church's ministry of music and teaching karate to young people.

It was through the church that he met and fell in love with Cheryl Moore, a public school teacher originally from New York City. They were married at the church in 1976 as he was completing his doctor's thesis. They would become the parents of two children—a son, Reginald, and a daughter, Joy, both born in Texas, after Dr. McNair had been selected as an astronaut.

In his last year of graduate school, the graduate student's ultimate nightmare occurred when someone stole his bag containing the notebooks with all the data for his thesis. Others who have suffered similar calamities often take an extra year to make up the loss. But with long hours and intense work in the laboratory, Ronald regenerated his lost data, submitting his thesis in the fall of 1976, in keeping with a schedule he had set for himself years earlier. In February, 1977, when the MIT faculty next met to approve degrees, Ronald McNair was awarded the Ph.D. in physics.

Following graduate school, he became a staff physicist in the laser physics laboratories of the Hughes Research Laboratories in Malibu, California. It was there that he worked on laser separation of chemical isotopes, on the use of lasers that can pump optical energy into chemical systems, and, later, on modulation of laser beams for space communications, on construction of detectors of infrared laser radiation, and on ultraviolet lasers as remote atmospheric sensors. Scientifically, it was exciting work.

It was at Hughes that Dr. McNair learned that the National Aeronautics and Space Administration was seeking scientist-astronaut candidates, individuals who manage scientific experiments in space. With accustomed confidence, Ronald felt certain he would qualify, but he first sought advice from his wife, his parents, his brothers, his childhood friends, his teachers, and colleagues. Their advice: Do it.

In January of 1978, NASA selected 35 new astronauts from among 8,000 applicants. Among those selected were NASA's first black astronauts – Dr. McNair, Colonel Guion S. Bluford, and Colonel Frederick D. Gregory. A fourth, Colonel Charles F. Bolden, Jr., who would become a close personal friend of the McNairs, was selected for the astronaut corps a year later.

Dr. and Mrs. McNair moved to Houston and NASA's Johnson Space Flight Center that summer for the start of a new career. By

August of 1979, Dr. McNair had completed the requisite one-year course of training and evaluation and became eligible for an assignment in space. Then followed the years of additional training, preparation, and study prior to his receiving, in 1983, his first space assignment. In February of 1984, he was mission specialist astronaut aboard the space shuttle, *Challenger*, orbiting the Earth for seven days.

Back on Earth, Ronald McNair—like all returning astronauts—became the center of celebration. When he returned to Lake City, the main street was renamed in his honor. He addressed the South Carolina legislature and received that state's highest award, the Order of the Palmetto. In Greensboro, he was honored on his return to North Carolina Agricultural and Technical State University and was given the keys to the city. In Boston, he appeared before the Massachusetts legislature, visited with MIT students and colleagues, and attended, again, the Cambridge church where he had worshiped earlier and where he and Cheryl had been married.

Everywhere he went, Ronald McNair took time out to meet and talk with students—at colleges and universities and at public schools, especially inner city schools. He felt a special obligation to share with students his experiences in achieving his goals. By an uncompromising commitment to achievement, he told them, they could succeed in whatever domain they chose.

In speeches and in conversations with lawmakers and public officials, Ronald McNair was unflagging in his appeals that poor and inner city public schools be given adequate

support, especially adequate salaries for teachers. There are in the inner city schools, he said, "black minds and talents, great minds and talents, with hands and skills to control a spacecraft or a scalpel with the same finesse and dexterity as they control a basketball. This talent must not be wasted."

In December 1984, Dr. McNair received his second space assignment. He was among the seven selected for what was formally designated Shuttle Mission 51-L, an orbital flight aboard the *Challenger* that was scheduled for early 1986. It was on that flight—on January 28, 1986—that the *Challenger* exploded only moments after launch from Cape Kennedy, Florida. All seven aboard perished.

Ronald Erwin McNair left us with a challenge. When he returned to MIT in April of 1984, following his first space mission, he gave a talk to MIT students and local high school students that he entitled: "Being A Winner... Hanging It Over the Edge." He urged his listeners to avoid complacency about their lives and careers, to take the extra step, to run the extra mile, as he had so often done. He said we all should be willing to take chances. "The unknown is mysterious... the unknown is frightening," he said. But we become winners only when we are willing to "step past our place of comfort... to walk over to the edge of our abilities and then move beyond that edge."

Ronald McNair spoke from experience. Ronald McNair was a winner.

Let Mount Zion Rejoice

Great is the Lord
Great is the Lord and greatly to be praised

Great is the Lord and greatly to be praised,
Praised, praised, praised.
Great is the Lord and greatly to be praised,
In the city of our God
In the city of our God
In the mountain of His holiness

Beautiful Beautiful
Beautiful the situation
The joy of the whole earth
Is Mount Zion

Great is the Lord

We have thought of Thy loving kindness
Thy loving kindness
Oh God, In the midst of Thy Temple
We have thought of Thy loving kindness

According to Thy name oh God
So is Thy praise to the ends of the earth.

Thy right hand is full of righteousness
Is full of righteousness

Thy right hand is full of righteousness
Is full of righteousness

Let Mount Zion rejoice, Let Mount Zion rejoice
Let Mount Zion rejoice,
And the daughters of Judah be glad

Walk about Zion, and go around about her
Tell of the towers, the towers thereof

Mark ye well, oh mark ye well her bulwarks
Consider, consider all her palaces

That ye may tell it to generations following

For this God is our God is our God forever

Forever and ever

He will be our guide even unto death,
Even unto death

He will be our guide
Even unto death.

*—From Psalm 48, The Holy Bible
The King James Version*



The McNair Building: Programs and Architecture

The six-story building named in honor of the late MIT alumnus, Ronald E. McNair, houses many of the activities at MIT that are concerned with reaching, exploring, understanding, and operating in space—from the near space of the Earth, the moon, the planets, and the interplanetary regions between them to the distant space of black holes, quasars, and pulsars that reach to the farthest edges of the universe.

The McNair Building, containing over 100,000 square feet of classroom, laboratory, and office space, includes the Center for Space Research together with elements of the Department of Aeronautics and Astronautics and the Department of Earth, Atmospheric, and Planetary Sciences. Biomedical engineering studies relating to people in space are pursued by the Man-Vehicle Laboratory, conducted jointly by the Center and the Department of Aeronautics and Astronautics. The Center and the Laboratory programs are supported primarily by the National Aeronautics and Space Administration, as are many of the departmental activities. The McNair Building also includes libraries and document rooms, classrooms and lecture halls, and a terminal room furnished with computer workstations that are available to students and form a part of MIT's campus-wide Project Athena information processing system.

Research areas in the Center include X-ray, optical, and radio astronomy, the physics of interplanetary plasmas and their interactions with planetary magnetic fields, properties of planetary surfaces and atmospheres, and the detection of gravity waves.

Departmental research found in the McNair Building ranges from work with exotic space-age materials to studies of turbulence in fluids, assembly of structures in space, new propulsion systems for space, the bombardment of spacecraft by space particles, and planetary astronomy.

Not surprisingly, two space travellers have come from among the research groups based in the McNair Building: Dr. Byron Lichtenberg, who is affiliated with the Man-Vehicle Laboratory, and Dr. Jeffrey Hoffman, who was a member of the Center's research staff when he was selected in 1978 to join the astronaut corps. Dr. Lichtenberg, America's first payload specialist, was aboard *Spacelab 1* that was carried into orbit by the shuttle spacecraft *Columbia*. Dr. Hoffman was a crew member aboard the orbiter *Discovery* in April of 1985. Over all, 18 MIT staff members and alumni have become astronauts or mission specialists since NASA formed the astronaut corps in the early 1960s.

Center For Space Research

The Center for Space Research, founded in 1963, occupies approximately half of the McNair Building. Over the years, scientists and engineers associated with the Center have made important contributions to space science. These have included:

The discovery and mapping of X-ray objects in our own and other galaxies using MIT instruments carried, at first, aboard sounding rockets and high-flying balloons and, later, aboard orbiting satellites.

The discovery and measurement of sources of gamma ray energy within our own Milky Way galaxy.

The discovery and measurement of the constituent parts of the interplanetary plasma—or solar wind—that flows from the sun outward throughout our solar system at hypersonic speeds.

The remote mapping of the lunar surface, using high resolution Earth-based radar.

The determination of the characteristics of the surfaces and the plasma environments of several of Earth's companion planets in the solar system, including Mercury, Venus, Mars, Jupiter, and Saturn, using, where possible, remote radar sensing from Earth as well as instruments placed aboard satellites and aboard space probes that pass very near the planets.

Research in the Center is supported principally by NASA and Center experiments are frequently included aboard NASA satellites and space vehicles. Pending NASA flight programs that involve the Center, for example, include: the sending of instrumented space vehicles to Venus (the *Magellan* radar mapping mission), and to Neptune (the *Voyager* plasma experiment); the placing into Earth orbit of a pair of advanced scientific satellites, Advanced X-ray Astrophysics

Facility and the X-ray Timing *Explorer*, that will measure characteristics of X-ray emissions from scores of celestial objects in detail; the launching of the Cosmic Background *Explorer* to detect and measure the remnant microwave background radiation that arose in the early moments of the creation of the universe; and a large-scale exploration of Earth's own solar plasma environment as part of the Global Geospace Study.

Ground-based Center research includes programs in theoretical astrophysics, space plasma physics, cosmology, and astronomy. The Center's astronomy program includes a search for optical counterparts to X-ray, gamma ray, and radio stars using the McGraw-Hill Observatory at Kitt Peak, Arizona, operated jointly by MIT, the University of Michigan, and Dartmouth. In addition, Center physicists have begun construction of an experiment using laser interferometers, one in Maine and one in southern California, in a transcontinental effort to detect the weak gravitational radiation from space that is predicted in the theory of general relativity, first advanced by Albert Einstein. (Each observatory will consist of an L-shaped gravity wave detector, or antenna, four kilometers on a side.)

The director of the Center is Dr. Gordon H. Pettengill, professor of planetary physics, an authority on the use of radar, from Earth stations and from space probes, to study the planets. Earlier directors were Professor John V. Harrington (1963-74), a space communications expert, now senior vice president of the Communications Satellite Corporation in Washington, D.C.; the late Professor John F. McCarthy, Jr., (1974-78), who left to become director of the NASA Lewis Research Center in Cleveland; and Professor Herbert S. Bridge (1978-84), a leader in discovering and measuring interplanetary plasma within Earth's solar system.

Man-Vehicle Laboratory

Teaching programs in the Man-Vehicle Laboratory are carried out through the Department of Aeronautics and Astronautics and its research programs are carried out under the aegis of the Center for Space Research. The Laboratory, directed by Professor Laurence Young, is concerned with understanding how the human biological system responds to and adapts to air and space travel, particularly the response and adaptation of the vestibular balance mechanisms in the inner ear and their relationships to such phenomena as motion sickness. The Laboratory has devices to rotate and accelerate human subjects and measure their physiological and perceptual responses.

In addition, the Laboratory prepares experiments that are sent into Earth orbit, such as the experiment that the Laboratory's own Dr. Lichtenberg operated in orbit in 1983 and the "space sled" experiment on the *Challenger* in November of 1985.

Department Of Aeronautics And Astronautics

The Department of Aeronautics and Astronautics, headed by Professor Eugene E. Covert, has a number of other activities housed in the McNair Building. These include the Technology Laboratory for Advanced Composites and the Molecular Beam Laboratory, elements of the Fluid Dynamics Laboratory, the Gas Turbine and Plasma Dynamics Laboratory, and the Space Systems Laboratory, as well as a computing cluster for the Computational Fluid Dynamics Laboratory.

Members of the Technology Laboratory for Advanced Composites work with new space-age structural materials such as graphites and epoxies to determine the extent to which they can be used for aeronautical and space structures, and, when used, how and why the materials might fail and how uniform quality control can be maintained in making them.

Professors and students in the Molecular Beam Laboratory employ a stream of high-speed charged particles to study why and how space vehicle outer surfaces degrade when bombarded by hypervelocity particles in space. This work includes studies on how bombardment can sometimes enshroud a space vehicle in a static electric charge that interferes with radio communications.

In the Fluid Dynamics Laboratory, scientists are studying turbulence in fluids, while in the Gas Turbine and Plasma Dynamics Laboratory work is underway on advanced propulsion systems for aircraft and spacecraft.

Professors and students from the Space Systems Laboratory are experimenting with the assembly of large structures in space.

The Planetary Astronomy Laboratory

The Planetary Astronomy Laboratory of the Department of Earth, Atmospheric, and Planetary Sciences, located on the fifth floor of the McNair Building, is headed by Professor James L. Elliot. Here astronomers, working with Center scientists close by, specialize in the study of planets when they pass in front of stars (occultations). Studying how star light is bent and absorbed as it encounters planetary atmospheres and rings helps scientists determine the physical properties of these structures. For these studies, the astronomers in the McNair Building have developed compact photometers and data recording systems. Their latest instrument is an imaging photometer—based on a charge-coupled device (CCD). These systems are used with the telescopes at MIT's Wallace Observatory in Westford, Massachusetts, and are deployed to optical observatories all over the world to record star-planet occultations.

Architecture Of The Building

The McNair Building—at 70 Vassar Street—was built between 1966 and 1968 at an original cost of \$4.3 million, three-fourths of which was provided by NASA as part of a program in the 1960s to encourage and strengthen space research in the nation's universities. The remainder of the cost came from gifts and grants to MIT's Second Century Fund.

The Building is one of four continuous glass and reinforced concrete structures that were built along Vassar Street on MIT's main campus between 1966 and 1973. Collectively, the four—together with the nearby five-story Vannevar Bush Building housing the Center for Materials Science and Engineering—were designed by Walter A. Netsch, Jr., an MIT alumnus, Class of 1943, and a member of the Chicago architectural firm of Skidmore, Owings & Merrill.

The six-story Gordon S. Brown Building at 60 Vassar Street, immediately next door to the McNair Building on the east, named for a former Dean of Engineering, was built at the same time as the McNair Building and the two are closely matched in appearance. The Brown Building now houses the university's Microsystems Technology Laboratory.

Other buildings in the series along Vassar Street are the six-story Sherman Fairchild Building that includes the headquarters for the Department of Electrical Engineering and Computer Science and an eight-story building that houses the headquarters of the Research Laboratory of Electronics Building. Both buildings are reached through a common glass atrium entry at 50 Vassar Street. The four-story Edgerton, Germeshausen, and Grier Education Center is also reached through 50 Vassar Street.

The exteriors of the several buildings lend a sleek and modern look to what is sometimes referred to as MIT's north face. Although contemporary in design, the buildings blend gracefully with the older limestone buildings that form MIT's center campus.

Building Plaque

RONALD E. McNAIR BUILDING
NAMED IN MEMORY OF
RONALD ERWIN McNAIR, Ph.D. 1977

Scientist Astronaut Alumnus

"My wish is that we would allow this
planet to be the beautiful oasis that she is,
and allow ourselves to live more in
the peace that she generates."

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
1986

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Program Text
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