





ASSOCIATED UNIVERSITIES, INC.

unites the resources of universities, research organizations, and the Federal Government in the planning, construction, and operation of forefront scientific facilities that promote discovery and education while expanding our knowledge of the physical world.





AUI CHARTER

THE CORPORATION WAS ESTABLISHED in 1946 as a non-profit educational organization dedicated to research, development, and education in the physical, biological and engineering sciences. It was granted an absolute charter by the Board of Regents of the State of New York Education Department; the charter called for AUI to “acquire, plan, construct and operate laboratories and other facilities” that would unite the resources of universities, other research organizations and the Federal Government. It was envisioned that AUI would create facilities and laboratories so large, complex, and costly as to be outside the scope of a single university. These facilities were to be made available on a competitive basis to all qualified scientists without regard to affiliation, as well as to resident scientific staff.

Nine northeastern universities joined in sponsoring AUI in 1946: Columbia University, Cornell University, Harvard University, The Johns Hopkins University, Massachusetts Institute of Technology, the University of Pennsylvania, Princeton University, the University of Rochester, and Yale University. Over the years, AUI has taken on a broad international character with a diversified Board of Trustees drawn from a larger pool of universities, research institutions, industry and business.

The Role of AUI

As advanced research requires ever more complex and large-scale facilities, the task of designing, developing, maintaining, and operating such facilities requires technical, scientific and management capabilities often beyond the scope of individual research groups. AUI provides the oversight and management to ensure the success of these challenging enterprises while maintaining the scientific focus desired by the community.

We recruit and maintain professional staffs of the highest competence at our facilities, and provide a work environment that is conducive to personal and professional growth.

Over its 60-year history of providing the community with tools at the forefront of research, enabling six Nobel prizes, AUI has performed with great success. In all its endeavors, AUI has always stressed excellence, from its style of governance to its execution of projects.

Our Board of Trustees, drawn from universities, research institutions, industry, and business, provides a close link with the research community to ensure its involvement and to provide oversight as we pursue programs of the highest scientific caliber. We recognize that in addition to the pursuit of pure knowledge, we have a responsibility to provide returns to the nation in the form of innovation, improved technical expertise and processes, and importantly, in the education of students and of the general public.

DR. ETHAN J. SCHREIER



DR. ETHAN J. SCHREIER
President

Dr. Schreier is President and Chief Executive Officer of AUI, and is an Adjunct Professor in the Department of Physics and Astronomy at the Johns Hopkins University. Prior to joining AUI in 2001, Dr. Schreier was a tenured astronomer at the Space Telescope Science Institute (STScI) in Baltimore where, since 1981, he held senior management positions including Chief Data and Operations Scientist, Associate Director for Operations, and Associate Director for the Next Generation Space Telescope. Prior to coming to STScI, he was a senior scientist at the Harvard-Smithsonian Center for Astrophysics in Cambridge. Dr. Schreier's research has focused on the study of X-ray emission from neutron stars, black holes, and extragalactic jets, and he has overseen operations and data analysis systems for space-based telescopes. Recently, he has played a leadership role in the establishment and governance of the National Virtual Observatory. Born and raised in New York City, Dr. Schreier received his Ph.D. in Physics from MIT.



EXPERIENCE





Brookhaven National Laboratory

IN 1946, AUI WAS FORMED as a nonprofit corporation to establish a new nuclear science facility, and it chose a surplus army base “way out on Long Island” as the site. Thus, Brookhaven National Laboratory was born. On March 21, 1947, the U.S. War Department transferred the site of Camp Upton on Long Island to the U.S. Atomic Energy Commission (AEC), which was the federal agency that oversaw the founding of Brookhaven National Laboratory and which was a predecessor to the present U.S. Department of Energy (DOE). The AEC provided the initial funding for Brookhaven’s research into the peaceful uses of the atom, with the goal of improving public well-being. Brookhaven Lab was conceived to promote basic research in the physical, chemical, biological and engineering aspects of the atomic sciences. An equally important concept was the establishment of a national laboratory in the Northeast to design, construct and operate large scientific machines that individual institutions could not afford to develop on their own. AUI’s vision was for a national laboratory that would resemble a university to the greatest extent possible. Six Nobel prizes have been awarded for discoveries made at the Brookhaven National Laboratory that AUI operated from its founding in 1947 until 1998.



National Radio Astronomy Observatory

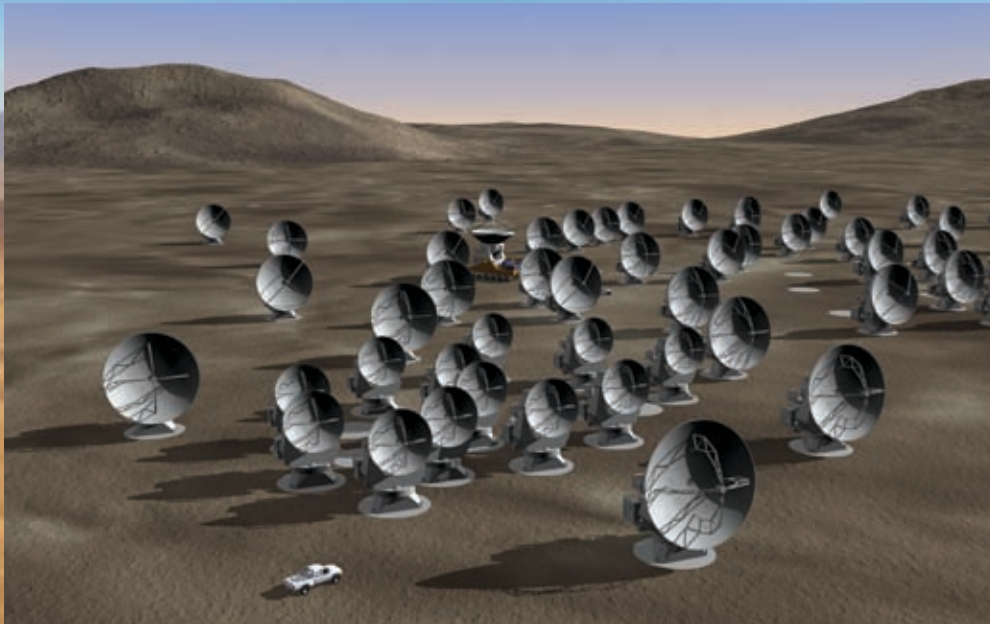
IN 1955, AUI PROPOSED to the National Science Foundation the establishment of a national facility for radio astronomy. Based upon that proposal, AUI was awarded a contract to establish, build and operate the National Radio Astronomy Observatory (NRAO). The Howard E. Tatel Radio Telescope, built in Green Bank, West Virginia, was the first major radio telescope at NRAO. It began regular observations in February, 1959 and did much of the pioneering radio astronomy at NRAO. In 1964 when NRAO decided to build an interferometer, the Tatel Telescope became the fixed element in the NRAO 3-element interferometer. Today, Green Bank is the site of the largest fully steerable radio telescope, the Robert C. Byrd Green Bank Telescope (GBT). NRAO also operates the 27-antenna Very Large Array (VLA) telescope near Socorro, New Mexico, and the Very Long Baseline Array (VLBA) of 10 radio antennas on sites stretching from Hawaii to the Virgin Islands.

ALMA Project

THE ATACAMA LARGE MILLIMETER/SUBMILLIMETER ARRAY (ALMA) is the largest, most capable ground-based astronomy project under construction in this decade. ALMA is a single research instrument composed of an array of 54 high-precision 12-meter antennas and an additional compact array of twelve 7-meter antennas, all located 5050 m above sea level on the Chajnantor plain of the Chilean Andes. It will operate at wavelengths of 0.3 to 9.6 millimeters with a resolution as fine as 0.005 arcseconds, a factor of ten better than the Hubble Space Telescope. ALMA will enable transformational research into the physics of the cold Universe, regions that are optically dark but shine brightly in the millimeter portion of the electromagnetic spectrum. ALMA will probe the first stars and galaxies, and directly image the formation of planets.



ALMA is an international partnership of the United States, Europe, and Japan, in cooperation with the Republic of Chile, and with participation by Canada and Taiwan. Associated Universities, Inc. is the North American Executive for ALMA. AUI played a vital role in developing the international agreements and governance arrangements for ALMA, and it is overseeing the National Radio Astronomy Observatory activities in the civil construction, labor contracting, instrument development, and operations for this \$1.3 billion dollar project.



AUI HAS A BROAD SCOPE OF EXPERTISE in building and managing large national and international scientific facilities. AUI supervised the construction and managed the Brookhaven National Laboratory on Long Island, funded by the Department of Energy and its predecessor agencies. AUI constructed and managed the National Radio Astronomy Observatory, funded by the National Science Foundation, with headquarters and laboratories in Charlottesville, Virginia, and with observing facilities at numerous sites. The scientific breakthroughs at these national facilities have resulted in numerous awards for basic research as well as patents for technology applications. AUI also brings the benefits of the scientific research at its facilities to the public via innovative programs and partnerships in education and public outreach.

EXPERTISE

AUI Management Expertise



Management of Recent Large Construction Projects

\$1.3 billion ALMA Telescope in Chile (2012 completion). AUI's antenna acquisition for ALMA on behalf of North America is the largest single procurement ever funded by NSF

\$93 million Expanded Very Large Array project in New Mexico (2012 completion)

\$75 million Robert C. Byrd Green Bank Telescope (GBT) in West Virginia (full-time operations began in 2003)



Management of International Consortia

Designated by NSF as the North American Executive for ALMA, a partnership between the U.S., Europe, Japan, Chile, Canada, and Taiwan

Developed pioneering legal and managerial framework within which the ALMA consortium operates in Chile

Hires and manages all Chilean staff for the international ALMA partners in Chile

Developed and maintains effective relationships at the ministerial and ambassadorial levels within the Chilean government



Operations of Large Scientific Facilities

Operated the multi-disciplinary Brookhaven National Laboratory from its inception in 1947 to 1998

Managed the National Radio Astronomy Observatory from its inception in 1957 to the present, with current facilities at numerous sites:

- > Charlottesville, VA (Headquarters, NRAO Technology Center, North American ALMA Science Center)
- > Green Bank, WV (Robert C. Byrd Green Bank Telescope and many smaller radio telescopes)
- > Socorro, NM (VLA, EVLA, ALMA Test Facility, Array Operations Center)
- > Ten states/territories from Hawaii to U.S. Virgin Islands (VLBA)
- > Atacama, Chile (ALMA)



Facilitation of Scientific Research

Provides complex, cutting edge facilities used by thousands of scientists from the U.S. and abroad. These unique facilities have enabled forefront research for 60 years in physics, astrophysics, biology, medicine, engineering, and related fields.

Develops advanced technology at AUI-managed facilities, a core competence for the nation. It keeps these facilities in the vanguard and enables new technologies and equipment to be supplied to other institutions and countries.



Coordination with Federal Agencies and the Congress

Maintains corporate headquarters in Washington, D.C. to facilitate regular communications with the NSF and other federal agencies, and to maintain a national profile

Works closely with the Congress and other branches of government on funding for research



Education and Public Outreach

Contributes to developing a scientifically literate, diverse society via a forward-looking portfolio of education and public outreach (EPO) programs

Maintains popular science centers in Green Bank, West Virginia and at the VLA site in New Mexico

Conducts “town meetings” to communicate scientific achievements and status of NRAO facilities

Operates innovative web sites

Conducts Legacy Imagery Project of compelling visual images to convey NRAO’s mission and science

Conducts innovative educational outreach programs for students and teachers, including new cooperative programs with schools in Chile



SCIENCE

Discoveries from National Radio Astronomy Observatory

Bending of radio waves by the Sun, confirming General Relativity

High precision measurements of General Relativity parameters via pulsar timing

A black hole (Sgr A*) at the center of the Milky Way

The first interstellar organic molecule

Pioneering detection of giant molecular clouds in the Milky Way and other galaxies; discovery of cosmological giant molecular cloud complexes (in the Epoch of Reionization)

Micro-quasars - superluminal sources in the galaxy

Constraints on changes in fundamental physical constants from cosmologically-distant OH absorber/emitter

Measurement of size and black hole mass of NGC 4258 using H₂O mega-masers; geometric measurement of distance to calibrate distance scale of universe

Measurement of Gamma-Ray Burster sizes

Rotation and proper motion of nearby galaxy M33

Precise (1%) distance measurement to the nearest star forming complexes

Discoveries from Brookhaven National Laboratory

Six Nobel Prizes enabled by BNL research:

- > Parity violation
 - > J/psi particle
 - > CP Violation
 - > Muon neutrino
 - > Solar neutrino detection
 - > Cell chemistry
-

Courant-Snyder strong focusing principle, critical to all modern particle accelerators

Large-scale studies of the effect of increased carbon dioxide on ecosystems

Synthetic insulin

L-dopa, used to treat Parkinson's disease

Salt-hypertension correlation

INNOVATION & TECHNOLOGY

Innovation and Technology Development

Examples from National Radio Astronomy Observatory

Homology principle of antenna design, allowing antennas to retain shape under gravity as they move

Cryogenically-cooled, low-noise amplifiers and noise models to greatly improve receiver sensitivity

Very Long Baseline Interferometry technology in use worldwide

Advanced amplifiers for Wilkinson Microwave Anisotropy Explorer (WMAP), helping enable proof of dark energy

Invention of FORTH computer language, widely used in microprocessor control

Contributions to LINUX operating system development

Laser metrology techniques to measure structural deformations with accuracy of tens of micrometers over hundreds of meters

Radio telescope design and construction techniques enabling great precision in extremely large mechanical structures

Advanced photonic local oscillator system for ALMA

Holography feed for measuring ALMA antennas

Design of circular polarizer that operates over a full waveguide bandwidth

Examples from Brookhaven National Laboratory

PET medical imaging

Magnetically levitated train technology

Green-Chasman lattice design for electron storage rings implemented at BNL National Synchrotron Light Source and adopted by many of the world's synchrotron radiation facilities

First protein databank

Early irradiation facilities for food safety

Thallium-201 for heart stress tests

Light water reactor technology

Detection and verification technology for safeguarding nuclear material

Neutron activation technology for art and archeological artifacts

Polymer concrete

World's first video game



