Nuclear Solutions for the 21st Century

The Cyclotron Institute

The Institute, a multidisciplinary research center with 13 faculty from Chemistry and Physics, is funded by the Department of Energy as a Center of Excellence. A superconducting cyclotron operates 24/7 for basic research and for testing electronics for space satellites.

Basic Nuclear Research

The Institute supports a world-class program in basic research covering topics that are of current interest around the world.

Radioactive Beams

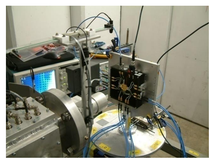
Using existing equipment, radioactive ion beams are created and used for research in a broad range of subjects including how stars evolve and the origin of the elements.

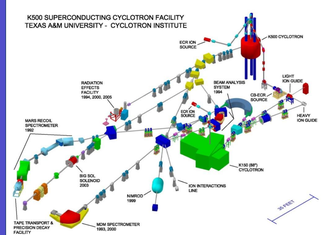
$5M Upgrade to Cyclotron Facilities

DOE is supporting a facility upgrade. When complete two cyclotrons will be used to greatly expand the capabilities for radioactive beams and also support a new program of applied research.

Nuclear Medicine

With a history of medical applications starting with a neutron cancer therapy program with M.D. Anderson in the 1970's and 1980's, new programs to develop on line diagnostics for proton therapy and radioisotope production are now being developed.





Strong International Connections

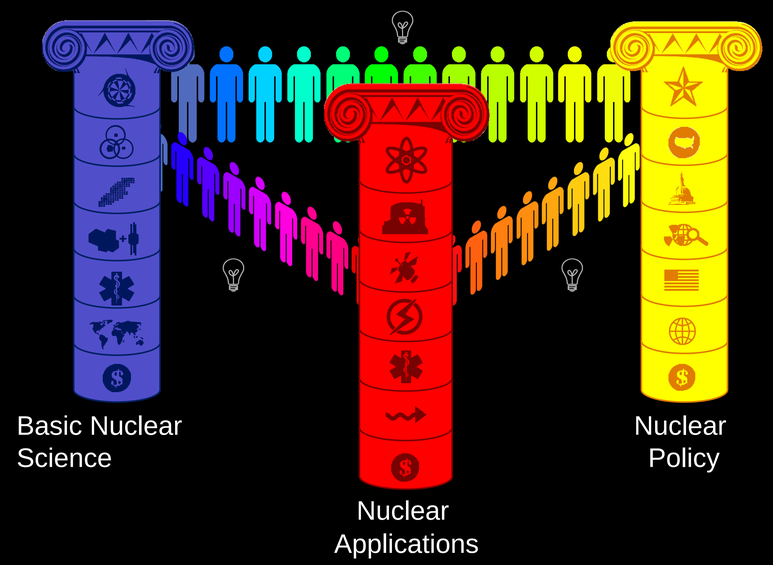
The basic nuclear science program is truly international. Institute members carry out research at home and at facilities around the world. Scientists from Europe and Asia travel to TAMU to use the Institute's facilities.

Investment:

$75 M capital, annual funding exceeds $6 M

Intersections and Innovations

- Scientists Engaged in Policy
- Policy Analysts Informed by Science
- Security-Driven Basic Research



Building on our Strengths . . .

Through investments in people and facilities, Texas A&M University has established strong foundations in the core areas of Basic Nuclear Science, Nuclear Applications, and Nuclear Policy. Participants include TAMU Distinguished Professors, winners of national and international awards, and key national and international leaders. Research facilities include state-of-the-art instrumentation and accelerators. Creating this Landmark Research Area will knit together these existing "pillars of excellence," and from this extensive cross fertilization will emerge a cohesive team that will produce new knowledge, new technologies, new policy solutions, and the new professionals needed to meet the challenges of the 21st century.

Bush School for Government and Public Service

The Bush School's International Affairs Program and its Scowcroft Institute engage multiple faculty, with a wide array of professional and academic backgrounds, in research and education addressing nuclear terrorism, deterrence in the 21st century, grand strategy, nuclear nonproliferation and arms control.

Integrative Center for Homeland Security (ICHS)

The ICHS explores the entire range of homeland security activities; identifies research, educational, and outreach needs; and helps match them against the world class capabilities of Texas A&M University in a way that promotes national level visibility, attracts outside resources and support, and encourages inside cooperation and collaboration.

College of Liberal Arts (CLA)

International relations (IR) scholars in CLA use cutting edge quantitative methods to understand the political and economic forms of international conflict and cooperation. They seek to produce useful theoretical and methodological innovations and train the next generation IR scholars.

Nuclear Security Science and Policy Institute (NSSPI)

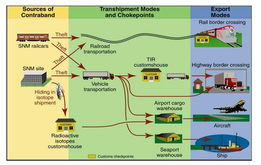
NSSPI advances science and technology to help prevent nuclear proliferation and guard against nuclear terrorism; it educates the next generation of leaders in the field of nuclear security sciences; and it develops nuclear security policy options, especially those affected by technological factors.

Institute for Science, Technology, and Public Policy (ISTPP)

This institute provides a core, interdisciplinary leadership and research team charged with linking the science and technological expertise of the various units of the TAMU system with the relevant public policy questions that their research engenders. ISTPP has worked on dozens of interdisciplinary teams with researchers from over 35 TAMU departments.

Institute for National Security Education and Research (INSER)

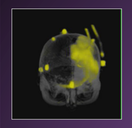
INSER forms partnerships between national-security laboratories and Texas A&M to execute research in support of laboratory missions and to develop and deliver educational programs that produce a more capable national-security workforce.

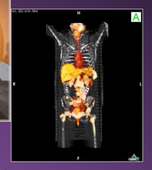


Investment:

$15 M since 2006, annual funding exceeds $7 M

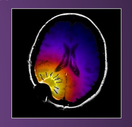
Intersections and Innovations





Life Sciences

- Nuclear Nanotechnology
- Nuclear Medicine and Nuclear Oncology
- Proton and Heavy Ion Radiotherapy
- Non-commercially Available Radionuclide Production

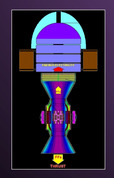


Nuclear Materials

- Radiation Tolerant Components
- Advanced Fuel Cycles for Nuclear Power
- Nuclear Waste Separations and Management

Nuclear Energy

- Clean and Sustainable Energy Systems
- Space Power and Propulsion Systems
- Systems Modeling

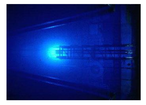


Largest Nuclear Engineering Department in US

The Nuclear Engineering program at Texas A&M is the largest in the nation with 257 undergraduate and 94 graduate students and was recently ranked among the top 5 nuclear education programs in the world (one of 2 in the U.S.) by the IAEA. The Nuclear Engineering Department faculty has a wide spectrum of expertise and research interest, and the department supports an impressive list of research facilities

Nuclear Energy Programs

Current research includes nuclear data, energy systems, nuclear waste incineration and design of surrogate experiments using ion sources. Capabilities are in place for coupled modeling and proof-of-principle experiments for advanced system engineering and prototyping as well as for simulation capabilities for design and analysis of advanced energy systems. Multi-function ultra-high vacuum chamber for proof-of-principles experiments for advanced energy systems and hybrid transmutation concept are in place and ready for use.



Nuclear Science Center

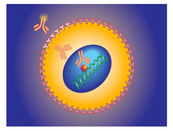
This facility has a one-megawatt TRIGA swimming pool reactor that can be pulsed. The NSC also possesses a variety of other features including experimental laboratories, a large irradiation cell, beam ports, a thermal column, and a pneumatic "rabbit" system. One of the best-equipped facilities of its type in the country, the NSC is used in our laboratory courses as well as in our research programs.

Radiation Damage Studies for Satellites

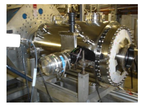
By bombarding circuit components with particle beams while the electronics operate, scientists at the Cyclotron Institute currently help over 30 companies and government labs ensure that cosmic ray interactions in space do not cause catastrophic failure in satellite electronics.

Medical Physics

Research is conducted in radiation oncology physics, radiotherapy physics, and proton and heavy ion therapy physics. Development of nuclear medicine and nuclear oncology strategies for therapy of cancer are pursued and have been implemented in practical therapy regimens. Cyclotron and reactor-based radioisotopes have been produced for diagnosis and treatment using functional probes and radio-labeled compounds. Combination products have been developed using functional biological agents and diagnostic systems.



Studies of Radiation Interactions with Materials



Low energy (0.1 to 10 Mev) accelerators are used in fundamental studies of radiation damage of solids and behavior of materials under extreme conditions. These experimental results are used as the basis for multiscale materials modeling studies. The behavior of nuclear fuels is studied via laboratory simulations.

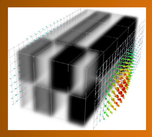
Research Funding:

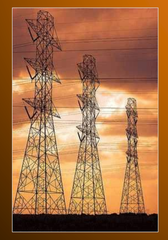
Over $5 M capital investment, annual research funding of $4.5 M

Intersections and Innovations

Nonproliferation

- Nonproliferation Monitoring
- Technology-Informed Treaty Verification
- Proliferation-Resistant Fuels
- Enhanced Nuclear Forensics
- Better Detection of Smuggled Materials
- Nuclear Deterrence in the 21st Century
- Optimized Performance of Layered Defenses
- Texas A&M's Unique Contribution:
  Nonproliferation Research at the Interface of Technology and Policy





Energy Policy

- Evaluation and Management of Risks
- Increased Public Awareness
- Identification of Major Issues of Nuclear Energy
- Global Warming Issues
- Renewable Energy Resources