

Science with a Mission



U.S. DEPARTMENT OF ENERGY

Advancing the Energy, Economic, and National Security of the United States

Our Legacy

The Department of Energy's Office of Science is heir to the revolutionary work of Albert Einstein, Enrico Fermi, and E.O. Lawrence.

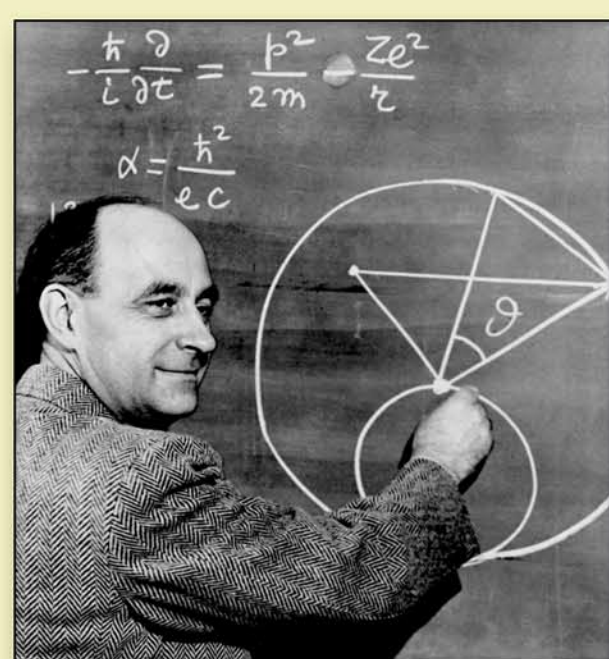
The Office of Science makes history every day because we sustain their tradition of innovative basic scientific research that improves people's lives.

Going back to the earliest days of the Manhattan Project, the Department of Energy and its predecessor agencies have blended cutting-edge research and innovative problem-solving to keep the United States in the forefront of scientific discovery for decades.

Estimates are that fully half of the growth in the U.S. economy in the last 50 years was due to funding of scientific and technological innovation. American taxpayers have received great value for their investment in the basic research sponsored by the DOE Office of Science.

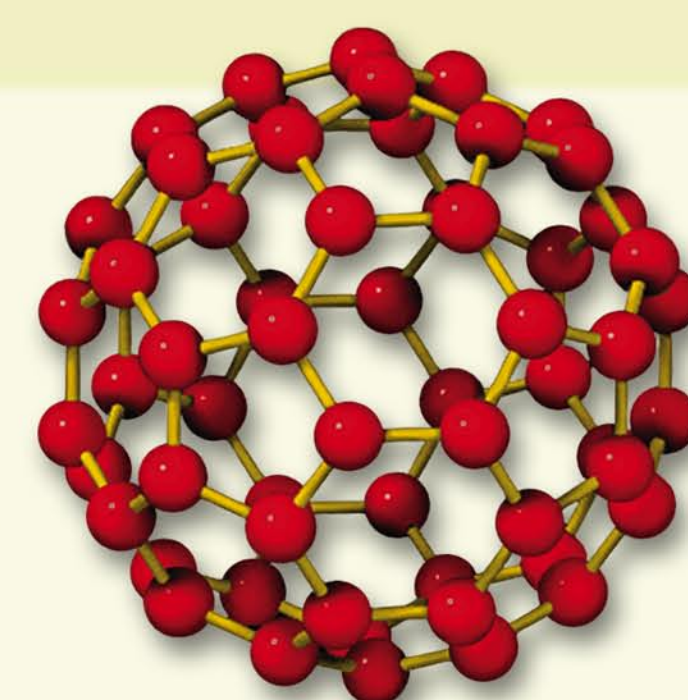
As testimony to the high quality and impact of the research DOE underwrites, more than 80 Nobel Laureates have been supported by or affiliated with the Department of Energy and its predecessor agencies.

The Office of Science has a vital tradition of funding fundamental research that focuses on critical national challenges – and produces important scientific breakthroughs and contributes to our Nation's well-being:



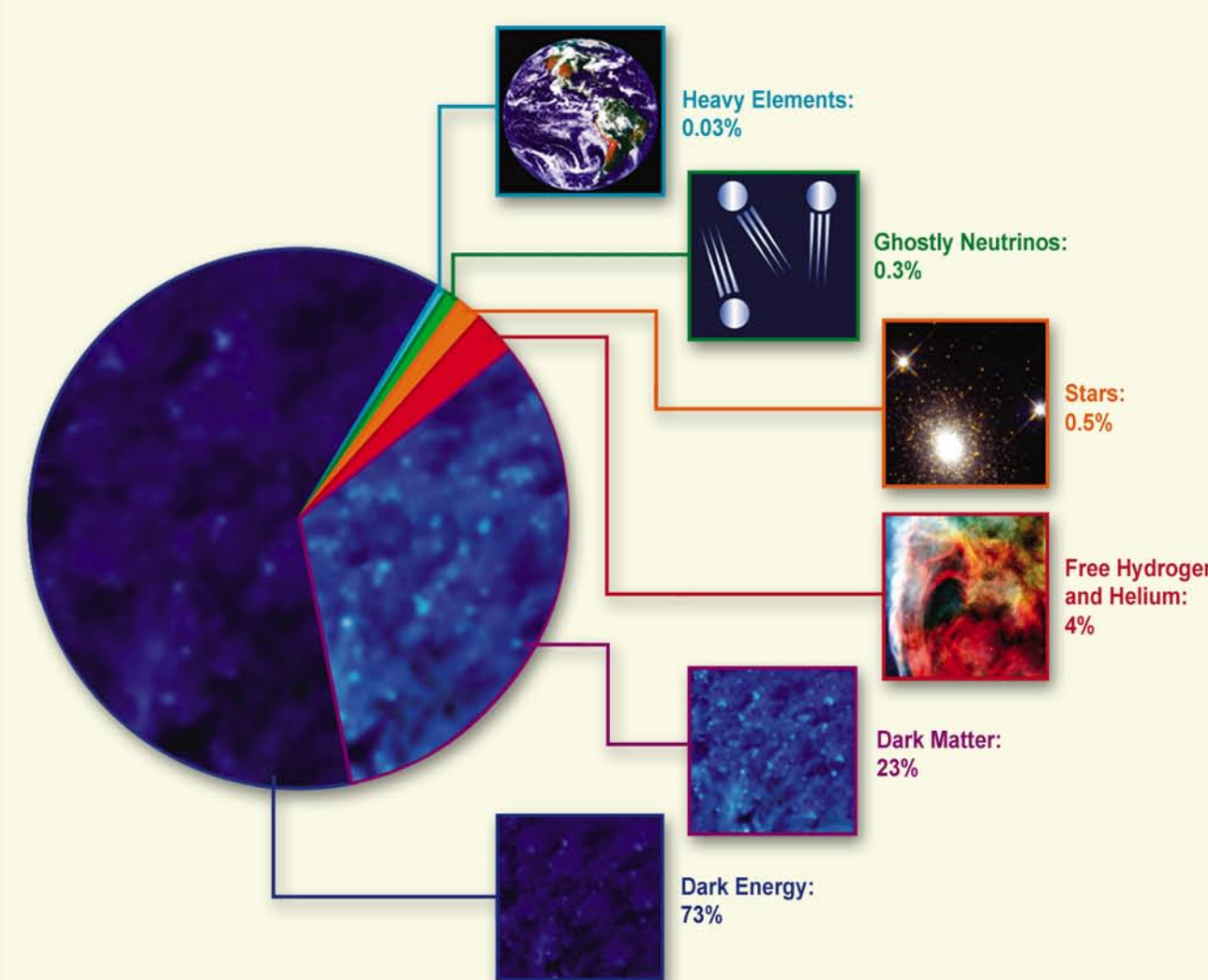
A Revolution in Carbon Chemistry

- Supported the 1996 Nobel Prize-winning discovery of a new form of carbon, the buckminsterfullerene or "buckyball," which has spurred a revolution in carbon chemistry and can be manipulated to produce superconducting salts, new three-dimensional polymers, new catalysts, and biologically active compounds



Dark Energy

- Funded research leading to the discovery that about 70 percent of the universe is composed of "dark energy," an unidentified form of energy not included in the Standard Model, physicists' current theory of matter and the forces of nature – and that the expansion of the universe is accelerating, rather than slowing due to gravity as expected



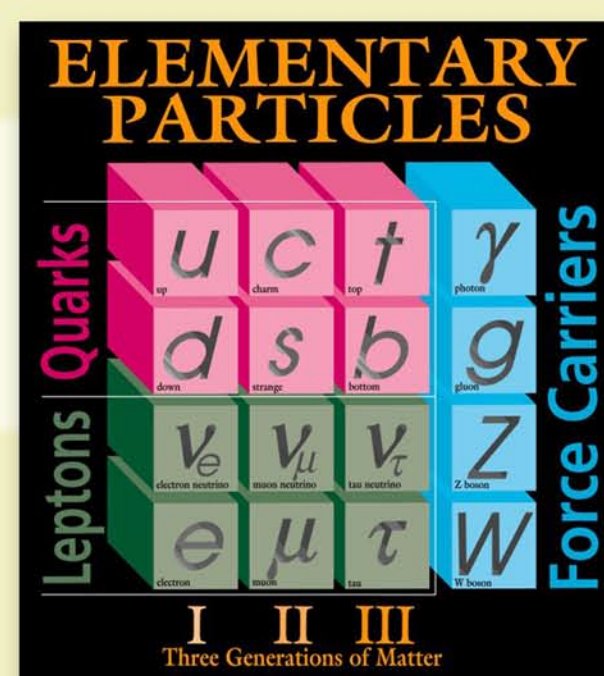
Facilities for Discovery – and Progress

- Supported the construction and operation of accelerators, from cyclotrons to light sources to colliders, for fundamental research; these are used for a wide range of applications, such as fabricating semiconductors and microchips, studying the structure of viruses, and designing new drugs



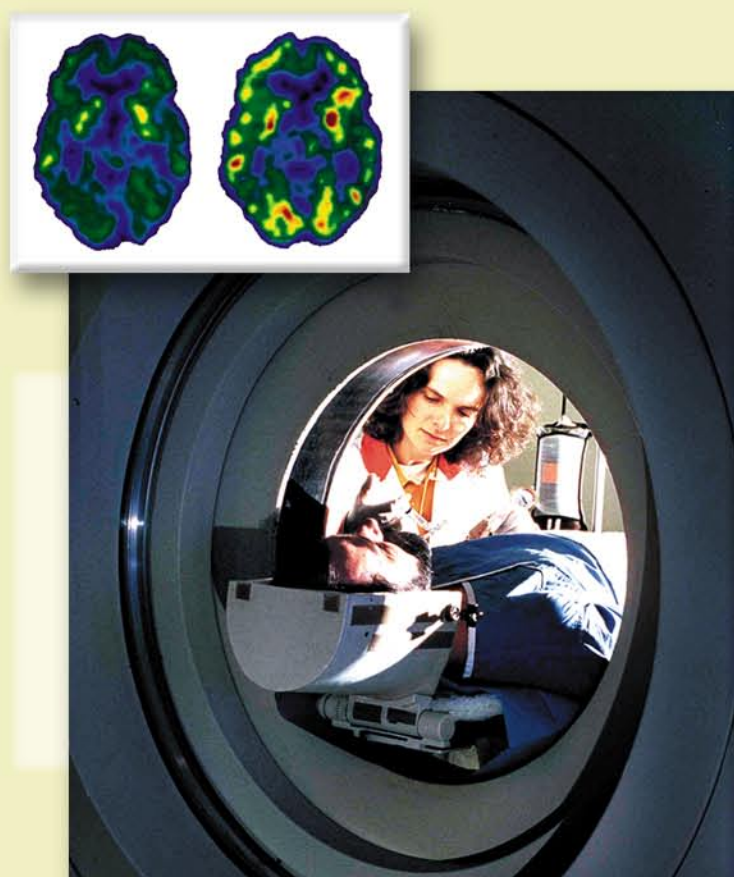
Quarks and Leptons

- Sponsored research leading to the discovery of quarks and leptons, the most fundamental constituents of matter, resulting in 13 Nobel Prizes



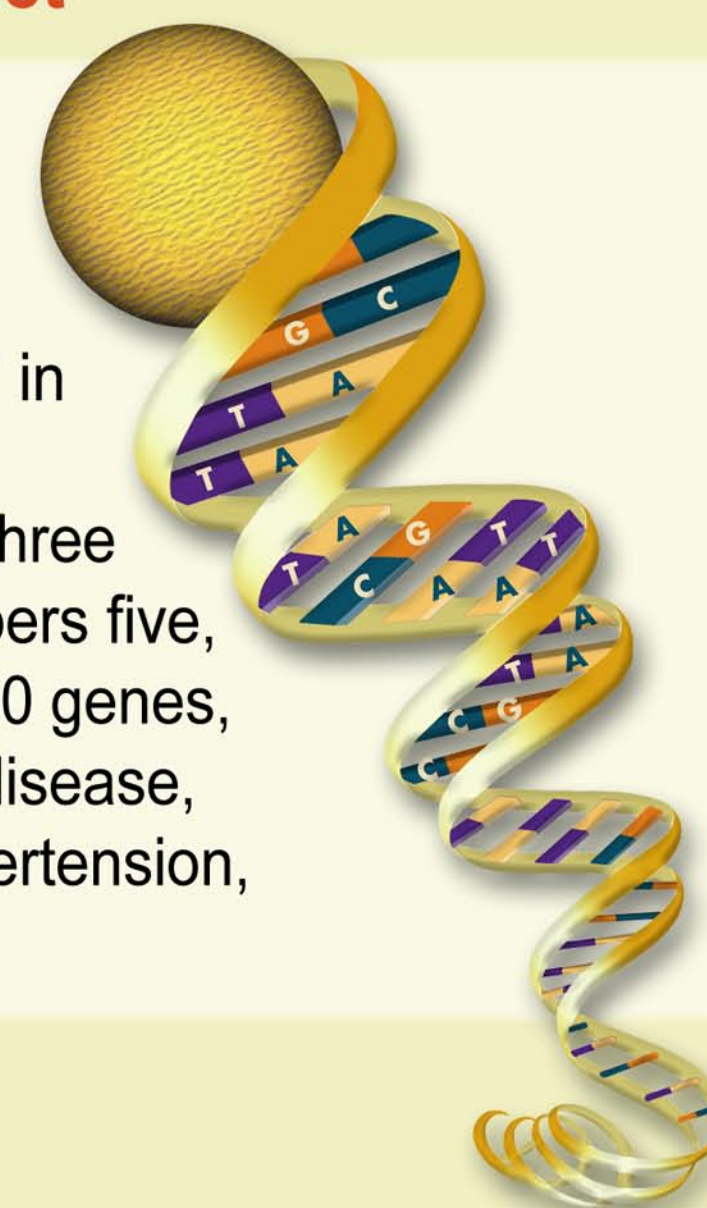
Medical Diagnosis and Treatment

- Helped develop new tools for the non-invasive diagnosis and treatment of disease, including PET scans, MRIs, and nuclear medicine cancer therapies



Pioneering the Human Genome Project

- Launched the human genome program in 1986 and developed the cost-effective DNA sequencing and computational technologies that made it possible to finish the "book of life" in 2003; also founded the DOE Joint Genome Institute, which completed the sequencing of three of the human genome's chromosomes – numbers five, 16 and 19 – which together contain some 3,300 genes, including those implicated in forms of kidney disease, prostate and colorectal cancer, leukemia, hypertension, diabetes, and atherosclerosis



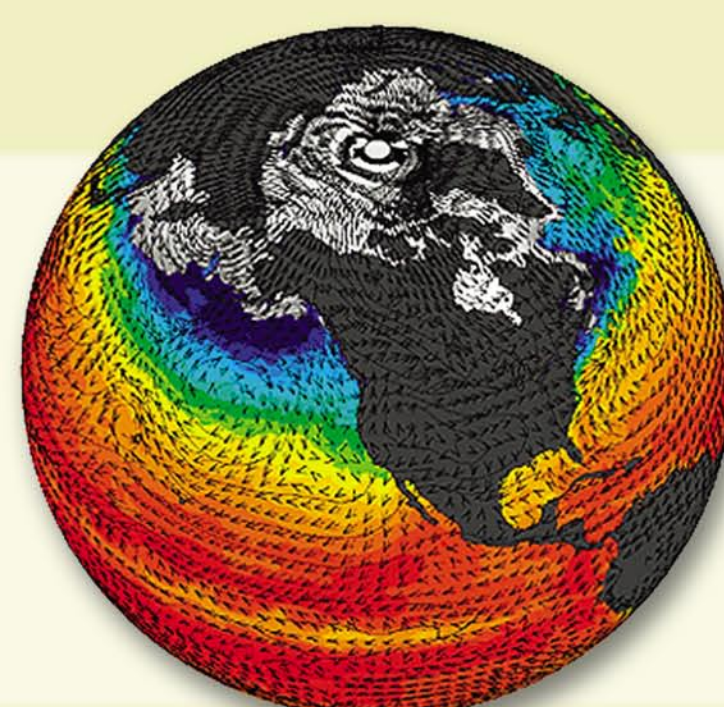
Detecting Neutrinos

- Sponsored research resulting in the Nobel Prize-winning detection of atmospheric and solar neutrinos, which in turn led to research determining that the mysterious elementary particles have mass and oscillate among three "flavors" as they travel through space



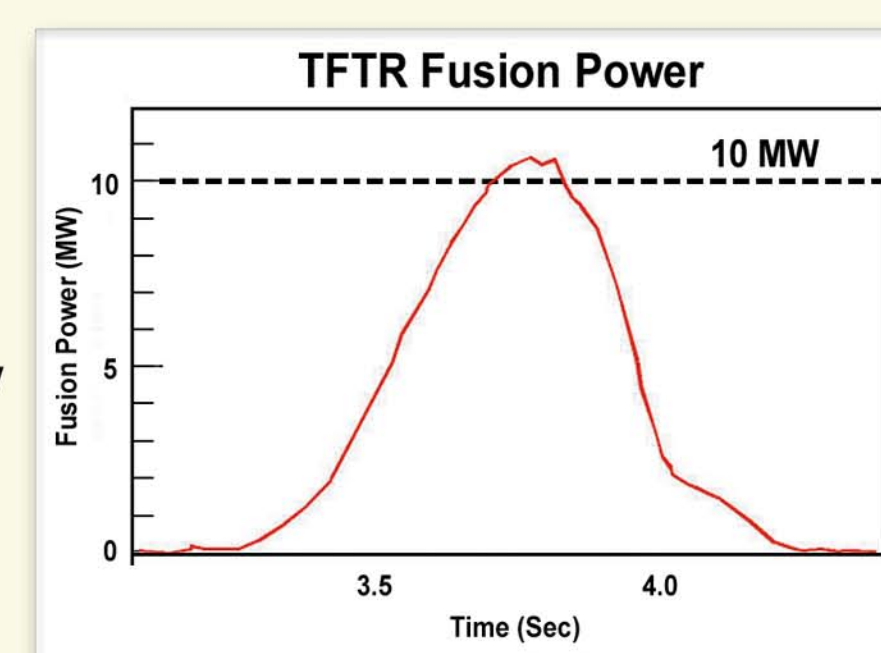
Climate Change Science

- Launched the first research program in the U.S. to study climate change in 1978; using computer software and computer systems that model and simulate environmental conditions and project climate change under varying emissions scenarios



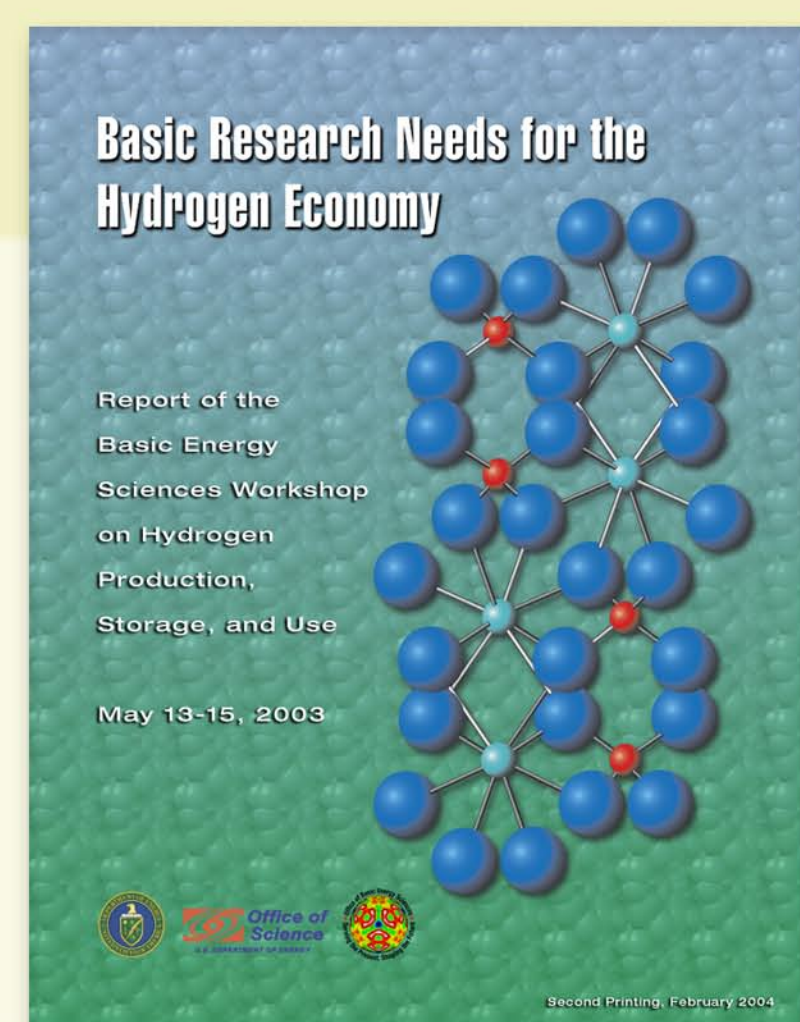
A Fusion Science Milestone

- Produced a record 10.7 million watts of fusion power at the Princeton Plasma Physics Laboratory's Tokamak Fusion Test Reactor in 1994, an outcome promoting fusion as an attractive energy source; if converted to electricity, the amount of fusion power produced in the experiment would meet the needs of 3,000 average-sized homes



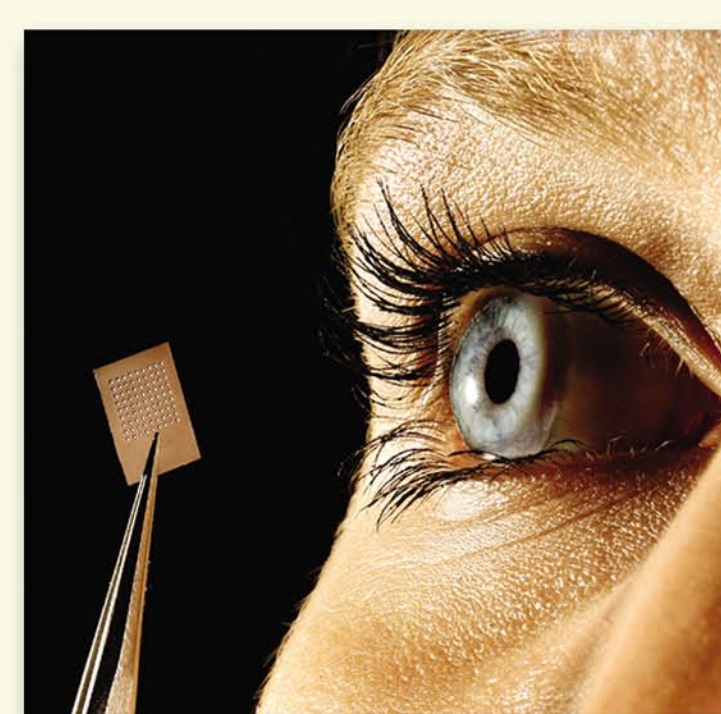
Basic Research in Support of the Hydrogen Economy

- Conducted a workshop in 2003 to determine the basic research required to turn the promise of a hydrogen economy into a reality; now the Office of Science is funding an innovative long-range program of basic research, coupled and coordinated with applied programs, to achieve critical revolutionary breakthroughs in hydrogen production, storage, and use



Restoring Sight – and More

- Sponsoring research and development of an artificial retina, which can restore sight in blind patients with macular degeneration, retinitis pigmentosa, and other eye diseases; the technology that is being developed in the artificial retina project may be adapted to help persons with spinal cord injuries, Parkinson's disease, deafness, and almost any other neurological disorder disorders



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