Science

Proposed Appropriation Language

For Department of Energy expenses including the purchase, construction and acquisition of plant and capital equipment, and other expenses necessary for science activities in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or facility or for plant or facility acquisition, construction, or expansion; and the purchase of not to exceed [58] *25* passenger motor vehicles for replacement only, [$3,186,352,000] *$3,159,890,000,* to remain available until expended. *(Energy and Water Development Appropriations Act, 2001, as enacted by section 1(a)(2) of P.L. 106-377.)*

[For an additional amount for "Science", $1,000,000, to remain available until expended, for high temperature superconducting research and development at Boston College.] *(Division A, Miscellaneous Appropriations Act, 2001, as enacted by section 1(a)(4) of P.L. 106-554.)*

Office of Science
FY 2002 Executive Budget Summary

The Office of Science (SC) requests $3,159,890,000 for Fiscal Year 2002 in the "Science" appropriation, an increase of $4,436,000 over FY 2001, to invest in thousands of individual research projects at hundreds of research facilities across the Nation, primarily at DOE's national laboratories and the Nation's research universities. Within the "Energy Supply" appropriation, SC requests $8,970,000 for Technical Information Management. The SC FY 2002 request will support: continuing construction of the Spallation Neutron Source to recapture world leadership in neutron science; understanding nanoscale (1,000 times smaller that a human hair) assemblies of materials; bringing the Genomes to Life for DOE mission applications; finding the Higgs boson (thought key to understanding mass); creating computational tools for scientific discovery; providing the Nation with state-of-the-art, scientific facilities; and contributing to the supply of the next generation of scientific and technological workers.

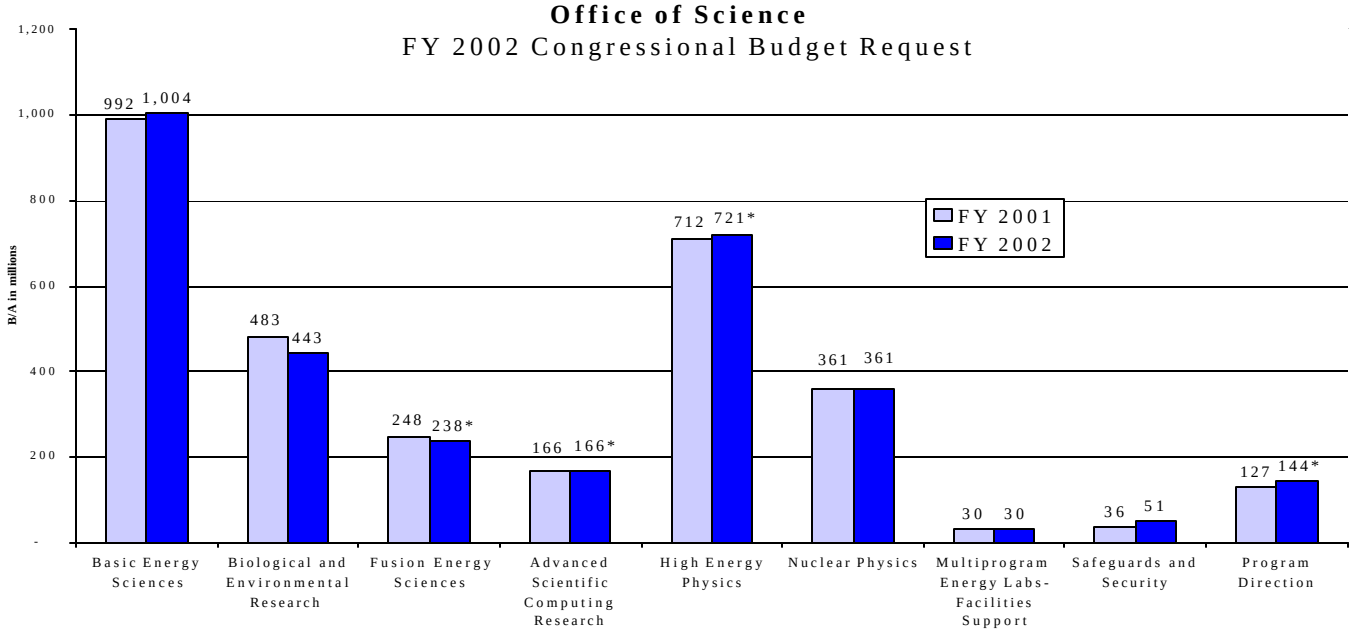
"How is this remarkable economic machine to be maintained, and how can we better ensure that its benefits reach the greatest number of people?

Certainly, we must foster an environment in which continued advances in technology are encouraged and welcomed. …(we) must push forward to expand our knowledge in science and engineering."

- Alan Greenspan, June 10, 1999

Balanced National Research Portfolio:

Knowledge drives the Information Technology Age, and the U.S. Department of Energy's Office of Science programs are one of the Nation's most prominent sources of new knowledge in the physical sciences, computation, mathematics, environmental and energy research, and other vital scientific areas. Our investments in research and forefront scientific facilities help to maintain the U.S. leadership position in many key scientific disciplines. This enables U.S.



*A Pending Budget Amendment transferring $10M to Fusion Energy Sciences from Advanced Scientific Computing Research, High Energy Physics, Energy Research Analyses and Science Program Direction will be submitted shortly.

Figure 1

researchers to move quickly to capitalize on scientific developments worldwide. These investments rely on talented people, stable resources, and the commitment of knowledgeable management. A key decision is how best to sustain the major advances in scientific knowledge that have enabled economic growth and advanced our national security.

Scientific knowledge, economists agree, leads to technological improvements that increase the quality of life for all Americans, ensure economic security, and advance national security. This scientific knowledge is generated through investments that span research fields and academic disciplines to make the most of the synergies between scientific disciplines.

Investments in Office of Science research programs - which comprise one of the most diverse research portfolios in the Federal Government - are an essential part of a balanced national research portfolio that will maintain our gains in knowledge creation and produce new intellectual capital.

The Department of Energy is a Science Agency

Top Five Government Research Organizations for*:

Physical Sciences	Mathematics & Computing	Engineering	Life Sciences	Environmental Sciences**
1. Energy (1,732)	1. Energy (739)	1. DOD (2,169)	1. HHS (13,523)	1. NASA (1,015)
2. NASA (959)	2. DOD (673)	2. NASA (1,964)	2. USDA (1,313)	2. NSF (522)
3. NSF (558)	3. NSF (409)	3. Energy (1,038)	3. DOD (609)	3. Interior (371)
4. DOD (382)	4. HHS (147)	4. NSF (482)	4. NSF (435)	4. DOD (352)
5. HHS (233)	5. Commerce (81)	5. Trans. (300)	5. Energy (313)	5. Commerce (313)

** Numbers are FY 2000 Dollars in Millions - Source: NSF*
*** DOE is Sixth in Environmental Sciences with $306 million in FY 2000*

The Office of Science is the dominant supporter of the physical sciences (i.e. physics, chemistry, etc.) in the U.S. and plays a major role in supporting other scientific fields, including life sciences, mathematics, computation, engineering and environmental research. In addition, SC has been a principle supporter of graduate students and postdoctoral researchers in their early careers, and is the steward of a vast network of major scientific facilities that are essential to the vitality of the U.S. research community.

Past investments in SC programs continue to pay off handsomely for the U.S. taxpayer. Researchers funded by these programs have resolved some of the major questions of our time including basic research that is helping us to understand the origins and fate of the universe and changes in our global climate. In addition, major advances in medical diagnostic tools, microelectronics, advanced materials, nanoscience, computation, lasers, and other scientific innovations supported by Office of Science programs continue to improve the lives of millions of Americans and have added greatly to our store of knowledge.

For example, publication of a complete draft of the Human Genome sequence in February 2001 was the culmination of work initiated in 1986 by the Biological and Environmental Research program in the Office of Science. This blueprint for humanity holds the promise of curing major diseases and understanding the aging process, while it continues to teach us about our origins and our potential. Fundamental discoveries in catalytic phenomena, supported by the Office of Science have provided detailed insights into the relationship between structure and chemical reactivity, which have improved major, energy-intensive industrial processes.

Advances in one field of science can often have unexpected impacts on other, seemingly unrelated fields. For example, breakthroughs in the physical sciences have often enabled rapid advances in medical and life sciences, communications and information technology.

Companies developing new medicines often depend on computer-based modeling and theoretical advances in chemistry and physics supported by the Office of Science.

"Medical advances may seem like wizardry. But pull back the curtain, and sitting at the lever is a high-energy physicist, a combinational chemist or an engineer."

Harold Varmus, Nobel Laureate and Director of the National Institutes of Health

X-ray crystallography is an excellent example of the interdependence of scientific disciplines at the forefront of medical research. A grant from NIH may fund a research team that includes biologists, but may also include a materials scientist or solid-state physicist, an optics expert, a computational scientist or a biochemist. The work of such a team relies upon the availability of a high intensity light source, a neutron source or a state of the art nuclear magnetic resonance imaging machine. All of these instruments, powerful probes of organic and inorganic materials, were the result of research in the physical sciences and the Office of Science pioneered their development and use. In fact, the Office of Science develops, constructs, and operates nearly all of the light sources and all of the neutron sources available in the U.S..

This growing interdependence between the sciences is evident at SC's scientific user facilities. For example, only 100 (6% of users) of the researchers at SC's synchrotron light sources in 1990 were from the life sciences. Today, there are more than 2,400 life science researchers (40% of users) at these facilities.

Tens of thousands of the leading research scientists in the U.S. – representing virtually every scientific discipline – depend on the major scientific instruments found only at SC laboratories and user facilities. All of SC's scientific user facilities receive more high quality proposals for research than can be accommodated and the demand for new or upgraded facilities remains pervasive.

In FY 2002, sustained investments in research sponsored by the Office of Science will support the work of thousands of university researchers and the scientists at DOE's national laboratories. The knowledge base will be expanded and scientific breakthroughs will be generated in nanoscience, physics beyond the Standard Model, terascale computing, fusion and plasma physics, functional genomics, proteomics (the study of the composition and functions of an organism's proteins), climate change, and a host of other scientific research areas that are important to DOE missions and to the Nation's prosperity.

The Office of Science has a long-standing and critical role in ensuring the flow of young scientists, engineers and technicians into the U.S. research enterprise. Unique research experiences at national laboratories are often a stepping stone to successful careers in science.

World-class research facilities attract many young researchers who conduct a single experiment or choose to spend their careers at an Office of Science laboratory. Expanding efforts to attract the best and brightest our Nation has to offer, while promoting diversity in the scientific workforce, is a major goal of the Office of Science. To accomplish this

"Although U.S. fourth graders did relatively well in both math and science, by twelfth grade… U.S. students were among the very worst in the world, and in some areas, such as physics, were last. This evidence indicates that our schools are not preparing our students adequately for today's knowledge-based, technologically rich society or to become future scientists and engineers."

President George W. Bush – FY 2002 Budget Blueprint

goal, the Office of Science formed a partnership with the National Science Foundation to leverage our investment and the unique capabilities of the national labs in training U.S. science educators and students.

Performance Evaluation:

The Government Performance and Results Act (GPRA) calls for accountability from all Federal programs. The Office of Science has always relied upon external peer review, independent construction management review, and regular program reviews, to ensure the excellence and relevance of our research portfolio. These effective evaluation tools will continue.

In addition, the Office of Science has embraced the recommendations of the National Academy's Committee on Science and Engineering in Public Policy (COSEPUP) report *"Science, Technology and the Federal Government: National Goals for a New Era"* that calls for the U.S. to maintain a leadership position in key areas of science and to be "among the world leaders" in all areas of research. This enables the U.S to quickly absorb and build upon breakthroughs in science worldwide. Therefore, the Office of Science will evaluate its programs for scientific excellence, relevance to DOE mission areas, scientific leadership and management excellence. This will be accomplished through a variety of mechanisms, that may include: external review by peers, review of prizes and awards to SC's researches, citation analysis, and a characterization of the significance and impact of the research as recognized at international conferences and Advisory Committee evaluations.

SC is widely recognized for its world-class research and for the construction and operation of major scientific facilities. Demand for these facilities has steadily increased and calls for new or improved facilities greatly exceed budgetary resources. To ensure that the proper balance is maintained between laboratory research and facility operations, and between new and existing facilities, the Office of Science relies upon the advice of external Advisory Committees, on feedback from the facility User Groups, and on the results of the merit review process.

Critical to ensuring the excellence, relevance and leadership of SC's research is the human and physical infrastructure that enables world-class science. The Office of Science will continue to evaluate the health and utility of its laboratory infrastructure through on-site institutional reviews, program reviews, and through merit evaluation. A continuing supply of talented researchers in critical subfields will be ensured through fellowships, support of graduate students within research grants, and through student use of research facilities.

Specific performance goals that will be tracked throughout SC include:

- At least 80% of all new research projects supported by SC will be peer reviewed and competitively selected, and will undergo regular peer review merit evaluation. In FY 2000, 96% of new research projects supported by SC were peer reviewed and competitively selected.
- Upgrades and construction of scientific user facilities will stay within 10%, on average, of cost and schedule milestones. In FY 2000, construction of scientific facilities were kept within 10%, on average, of cost and schedule milestones.
- The SC scientific user facilities will be operated and maintained so that unscheduled operational downtime will be kept to less than 10%, on average, of total scheduled operating time. In FY 2000, SC

scientific user facilities operated, on average, 96% of the scheduled time.

- The Office of Science will ensure the safety and health of the workforce and members of the public and the protection of the environment in all SC program activities.

A History of Success:

The Office of Science has developed a list of the "Top 100" contributions to science from the basic research programs of the Department of Energy. These contributions are available on our website at www.sc.doe.gov.

Each year, many of the principal investigators funded by the Office of Science win major prizes and awards sponsored by professional societies, industry, academia, and governments worldwide. In addition, many are elected to membership in such prestigious organizations as the National Academy of Sciences, the National Academy of Engineering, and to fellowship in the major professional societies.

The long history of scientific contributions from the Office of Science continues in FY 2000 and FY 2001 with discoveries such as the following.

- Office of Science investments in high energy and nuclear physics continue to move us closer to a complete picture of the fundamental particles and interactions that dictate the nature of matter and energy and explain a myriad of natural and man-made phenomena.
- A newly developed class of nanostructured materials have been developed that can selectively filter molecules by their size and chemical identity. This achievement involved creating self-organizing precursors, controlling the pore size, and employing a novel evaporation process that promotes self-assembly. As a result, we may one day wear "breathing" fabrics that block hazardous chemicals while admitting benign species like oxygen.
- Quantum dots – nanometer-size particles in which electrons are confined in a relatively small volume – have recently been shown to emit light at multiple wavelengths, blinking on and off on a time-scale of seconds. This remarkable behavior, attributed to luminescence from different electronic states, may one day lead to nano-scale computers and/or portable analytical instrumentation.
- Combining state-of-the-art ultrafast laser systems with evolutionary computer algorithms has led to an important new source of ultrafast, coherent soft x-rays for studies of materials properties and chemical physics.
- Office of Science investments in plasma physics and fusion energy sciences continue to expand our understanding of how to generate, control and harness the energy of high energy, high density plasmas here on earth.
- In 1990, computers were able to model only fragments of separation agents such as simple ether. With advances in computation power, and through targeted investments by the Office of Science's Advanced Scientific Computing Research Program, researchers are now able to model real-world separation agents – advancing DOE's remediation efforts and basic research.
- Completion of the draft map of the human genome was made possible by DOE's Biological and Environmental Research Program initiative, sequencing technologies and the combined efforts of NIH and the national labs.

Program Priorities for FY 2002:

Advances in computation have changed the lives of millions of Americans. They have also changed the ways in which scientific research is conducted today and will evolve throughout the new century.

The **Advanced Scientific Computing Research** (ASCR) program's mission, which is primarily carried out by the Mathematical, Information, and Computational Sciences (MICS) subprogram, is to discover, develop, and deploy the computational and networking tools that enable scientific researchers to analyze, model, simulate, and predict complex physical, chemical, and biological phenomena important to the Department of Energy. In FY 2002, ASCR will continue to invest in research that advances the next generation of high performance computing and communications tools that are critical to the Department's scientific missions.

The MICS subprogram will support research in applied mathematics, computer science, electronic collaboratory tools and network research. Competitively selected partnerships will continue to work toward discovering, developing, and deploying key enabling technologies for scientific research. These partnerships, called Integrated Software Infrastructure Centers, play a critical role in providing the software infrastructure that will be used by the Scientific Discovery through Advanced Computing (SciDAC) applications teams. Other MICS investments include fundamental research in networking and collaboratory tools, partnerships with key scientific disciplines, and advanced network testbeds for electronic collaboration tools.

In FY 2002 the Laboratory Technology Research subprogram will continue to support basic research at SC labs that will advance innovative energy applications.

In FY 2000, a Federally-chartered advisory committee was established for the ASCR program that is charged with providing advice on: promising future directions for advanced scientific computing research; strategies to couple advanced scientific computing research to other disciplines; and the relationship of the DOE program to other Federal investments in information technology research. This advisory committee will play a key role in evaluating future planning efforts.

The **Basic Energy Sciences** (BES) program is a principal sponsor of fundamental research for the Nation in the areas of materials sciences and engineering, chemistry, geosciences, and bioscience as it relates to energy. This research underpins the DOE missions in energy, environment, and national security; advances energy related basic science on a broad front; and provides unique user facilities for the scientific community.

For FY 2002, a very high priority is the continuation of construction of the Spallation Neutron Source (SNS) to provide the next-generation, short-pulse spallation neutron source for neutron scattering. The project, which is to be completed in June 2006, is on schedule and within budget.

Enhancing U.S. research in neutron science, in preparation for the commissioning of the SNS, is also a program priority. A common finding among BES Advisory Committee studies has been the importance of establishing a large and well-trained user community by the time the SNS is fully operational in the 2008-2010 timeframe. To this end, funding will be provided for teams of scientists to participate in the development of neutron scattering instruments and for support for the neutron science/scattering programs at the host institutions of the BES facilities. Additional operations funds will be provided to HFIR and

IPNS to ensure that these facilities are available to the scientific community.

In the areas of nanoscale science, engineering, and technology (NSET) research, BES will continue the new research directions initiated in FY 2001 and will explore concepts and designs for Nanoscale Science Research Centers (NSRCs). NSRCs will be user facilities similar in concept to the existing BES major scientific user facilities and collaborative research centers. They will provide unique, state-of-the-art nanofabrication and characterization tools to the scientific community. NSRCs will enable research programs of a scope, complexity, and disciplinary breadth not possible through the support of individual investigators or small groups. Significant partnerships with regional academic institutions and with state governments are anticipated.

The response of the scientific community to the FY 2001 NSET initiative has been strong. University researchers submitted 745 pre-applications, 313 of which received encouragement letters from BES inviting the submission of full proposals. The DOE Labs were restricted to four Field Work Proposals per laboratory and 46 proposals were received. Proposals were also received for pre-conceptual design of NSRCs from ANL, BNL, LBNL, ORNL, and Sandia/LANL. All proposals will undergo peer review to determine which will be funded in FY 2001.

The **Biological and Environmental Research (BER)** program develops the knowledge needed to identify, understand, anticipate, and mitigate the long-term health and environmental consequences of energy production, development, and use.

As the founder of the Human Genome Project, BER will maintain a critical role in the International Human Genome Consortium that includes the National Institutes of Health.

A redirected effort entitled, "Genomes to Life," will support research and computational tools that will lead to an understanding of complex biological systems. It will incorporate research to develop a comprehensive understanding of the Microbial Cell that will be used to engineer microbes for DOE mission applications such as environmental cleanup. In FY 2002, BER Microbial research will provide DNA sequences for four additional microbes important in bioremediation, clean energy, or global carbon cycling. BER studies of low dose radiation will lead to new standards for determining the health risks of low dose ionizing radiation and includes investments in scientific infrastructure at the laboratories.

The Atmospheric Radiation Measurement (ARM) program will improve radiative transfer models, including cloud and water vapor effects on climate, to reduce uncertainty in predicting the effect of greenhouse gases on future climates. Carbon cycle and sequestration research will help to assess current carbon sinks and to develop methods of enhancing natural processes for terrestrial and ocean sequestration of carbon. Ecological research will provide data to develop and test robust models to predict the effects of changes in climate and atmospheric composition on important ecological systems and resources.

BER will continue research in environmental bioremediation focusing on research at the Field Research Center in Oak Ridge Tennessee. The Environmental Molecular Sciences Laboratory (EMSL), a national scientific user facility provides analytical and experimental capabilities to address the complex scientific barriers to restoring our environment. The EMSL computational facility will upgrade its computing capability

by leasing a high performance computer in FY 2002. This will enable the simulation of key environmental and molecular processes.

Medical Sciences Research will develop advanced technology and instrumentation to image single molecules, genes, cells, organs, and whole organisms in real time with a high degree of precision. These technological achievements have a broad impact on biomedicine, in particular the fields of cell and developmental biology and on more accurate medical diagnoses and effective treatments.

The resources of the DOE National Labs enable rapid advances in our programs in biophotonics, lasers in medicine, biological and chemical sensors, and advanced imaging instrumentation. BER and the National Institutes of Health (NIH) have developed a partnership in which the advanced technologies, instrumentation, and computational modeling capabilities developed in the DOE National Labs will be applied to specific biomedical problems of high importance in the NIH intramural program. Cooperation will facilitate rapid application of advances in the biophysical sciences to solve clinical problems of national importance.

The **Fusion Energy Sciences** (FES) program's mission is to advance plasma science, fusion science and technology. The program emphasizes the underlying basic research in plasma and fusion sciences, with the long-term goal of harnessing fusion as a viable energy source. The program centers on the following goals: understanding the physics of plasmas; identification and exploration of innovative and cost effective development paths to fusion energy; and exploration of the science and technology of energy producing plasmas, as a partner in international efforts.

In FY 2002, the program will incorporate the recommendations of reports by the National Research Council, the Secretary of Energy Advisory Board and recommendations of the Fusion Energy Science Advisory Committee. The FY 2002 FES program includes basic research in plasma science in partnership with NSF, plasma containment research, and investigation of tokamak alternatives along with continued operation of DIII-D, Alcator C-Mod, and the National Spherical Torus Experiment. Research on alternate concepts is pursued to develop a fuller understanding of the physics of magnetically confined plasma and to identify approaches that may improve the economical and environmental attractiveness of fusion.

The inertial fusion energy activity will continue exploring an alternative path for fusion energy that would capitalize on the major R&D effort in inertial confinement fusion that is carried out by NNSA for stockpile stewardship purposes. Ongoing theory and modeling efforts, aimed at developing a predictive capability for the operation of fusion experiments, will continue as will enabling technology development.

The **High Energy Physics** (HEP) program's mission is to understand energy and matter at a fundamental level by investigating the elementary particles and forces between them. Until the Large Hadron Collider (LHC) at CERN is completed in 2006, the U.S. will be the primary center of activity for experimental research in the field of high energy physics. There is the potential for exciting new discoveries, and the program needs to position itself to take advantage of these opportunities.

The HEP program will concentrate on utilization and upgrading of its facilities, including direct support for research scientists. In FY 2002, Fermilab will begin a five-year campaign to discover the Higgs particle (thought key to understanding mass) and other

new particles predicted by current theories. The B-factory at SLAC will begin a three-year campaign to make important contributions toward understanding the preponderance of matter over antimatter in the universe.

A small HEP program continues at the Alternating Gradient Synchrotron (AGS). The muon g-2 experiment recently announced results that showed a higher magnetic strength for the muon than that predicted by the Standard Model. If confirmed, these findings could lead science into exciting new territory beyond the Standard Model.

Appropriately focused support for university and laboratory based physics theory and experimental research will be emphasized in FY 2002. The experimental programs are performed by university (primarily) and laboratory based scientists. These scientists construct, operate, and maintain the detectors and analyze the resulting data as well as train the new generations of scientists.

An important element of the program is successful completion of construction and major capital equipment projects. Continued participation in the LHC is a high priority as is construction of the Neutrinos at the Main Injector (NuMI) project at Fermilab and its detector, MINOS. When NuMI/MINOS is completed in 2004, it will provide a world-class facility to study neutrino properties and make definitive measurements of masses.

In partnership with NASA, the HEP program will continue two particle astrophysics projects -- the Alpha Magnetic Spectrometer (AMS) and the Gamma-Ray Large Area Space Telescope (GLAST). The experiments are expected to lead to a better understanding of dark matter, high energy gamma ray sources, and the origin of the universe.

Accelerator R&D is important to the future of the HEP program. Research continues on accelerator-related technologies aimed at reducing costs and improving performance.

The mission of the **Nuclear Physics** (NP) program is to advance our knowledge of the properties and interactions of atomic nuclei and nuclear matter in terms of the fundamental forces and particles of nature.

The NP program is the major sponsor of nuclear physics research in the U.S., providing about 85% of federal support. The program educates and enlarges the Nation's pool of technically trained workers and facilitates the transfer of knowledge and technology.

With the new Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory (BNL) researchers have a unique opportunity to create and characterize the quark-gluon plasma, a phase of matter thought to have existed in the very early stage of the universe. Initial data from gold-gold collisions have yielded results that show aspects of possible plasma formation; the FY 2001- FY 2002 run will provide the first opportunity to explore this exciting new physics in depth.

New knowledge and insights on how quarks and gluons bind together to make protons and neutrons are being gained using high intensity electron beams from the Continuous Electron Beam Accelerator Facility (CEBAF) at the Thomas Jefferson National Accelerator Facility. In FY 2002, the G0 Detector, a joint DOE-NSF project, will be completed and will provide an opportunity to map quark contributions to the structure of the nucleon.

Measurements of the solar neutrino flux by the Sudbury Neutrino Observatory (SNO), constructed by a collaboration of Canadian, British and U.S. supported scientists in a deep underground nickel mine in Ontario, Canada, will provide first results shortly on the "appearance" of oscillations of electron

neutrinos into other neutrino flavors. Such evidence would confirm indications that neutrinos have mass, an observation that would force a re-evaluation of the existing Standard Model of particle physics.

The search for new super-heavy elements will continue in FY 2002, focusing on the techniques developed in the recent discovery of elements 116 and 118 at Lawrence Berkeley National Laboratory. Future studies will focus on the search for neighboring elements and will work to understand the surprising observation of enhanced stability for these very heavy elements.

In FY 2002, R&D activities will be supported for the proposed Rare Isotope Accelerator (RIA) facility. This facility would produce beams of highly unstable nuclei that can explore the limits of nuclear existence and measure reaction rates. These data are critical to computer modeling of the dynamics of supernovae explosions and other aspects of stellar evolution and to understanding the origins of elements.

The **Science Program Direction** (SCPD) budget supports three subprograms: Program Direction, Field Operations, and Science Education. Program Direction is the funding source for SC's Federal staff responsible for managing and supporting the scientific disciplines. Field Operations provides funding for the daily operations and administrative functions performed at the Chicago and Oak Ridge Operations Offices that support the departmental programs, projects, laboratories, facilities, and grants under their purview. Science Education sponsors programs designed to promote interest in science, math, engineering, and technology fields for college and university students and faculty.

In FY 2002, SC will continue to focus on strategic human capital management and planning with the goal of building and sustaining a talented and diverse workforce. SC needs to attract, recruit, and retain highly skilled employees to offset the existing and projected shortfall in the scientific and technical workforce, and to continue to manage its programs in a safe, efficient, and effective manner.

SC will also support the DOE Corporate R&D Portfolio Management Environment (PME) project, that will modernize and streamline the Department's R&D management processes. Process improvements and automation will enable electronic "cradle-to-grave" tracking of research projects, that is critical to DOE corporately sharing and reporting energy-related research across programs. In addition, SC will continue to standardize, integrate, and invest in information technology that will improve management processes and promote efficient use of resources among SC Headquarters and Field counterparts, e.g., increase remote accessibility to corporate systems, and enhance cyber security.

Beginning in FY 2002, funding for safeguards and security functions at the Oak Ridge Operations Office is included in SCPD, all part of congressional direction to align such functions with line management.

In FY 2002, the Science Education subprogram will support research experiences at our National Labs for a diverse group of competitively selected undergraduate students. In collaboration with the National Science Foundation, an effort is underway to attract a wider cross section of students to this program and a system is being created to document student career paths. In FY 2002, this partnership will be expanded.

The Office of Science also manages and supports the National Science Bowl© for high school students from across the country and provides the students and teachers a forum to receive national recognition for their talent

and hard work. In FY 2000, Saturday seminars on scientific topics were added to the National Science Bowl© weekend. In FY 2002, Students participating in the National Science Bowl© will be tracked to document the long-term impact on their academic and career choices.

The **Multiprogram Energy Laboratories - Facilities Support** (MEL-FS) program's mission is to support the general purpose infrastructure of the five Office of Science multiprogram national laboratories by funding line item construction to rehabilitate, renovate and replace laboratory and offices buildings, utilities systems and other structures. This support helps enable high technology scientific research that is conducted in a reliable, cost effective and safe manner. Together, these laboratories have over 1,600 buildings (including 500 trailers) with 15.5 million gross square feet of space and an estimated replacement value of over $10 billion. The total DOE and non-DOE research program funding for these laboratories is over $3 billion a year.

In FY 2002, MEL-FS will support Project Engineering and Design Funding for the initiation of three new line item construction projects and construction funding for six ongoing line item construction projects.

The request also supports SC's landlord responsibility at the Oak Ridge Reservation and DOE facilities in the town of Oak Ridge, including Payments in Lieu of Taxes (PILT) at this and two other sites.

The **Technical Information Management** (TIM) program leads DOE's e-government initiatives for disseminating information resulting from the Department's $7.5 billion annual research and development (R&D) program. The Office of Scientific and Technical Information (OSTI) manages the TIM program that provides electronic access to worldwide energy science and technical information to DOE researchers, industry, academia, and the public.

In FY 2002, the TIM program will make 70 percent of DOE's scientific and technical literature searchable and retrievable through e-government systems such as the DOE Information Bridge (www.osti.gov/bridge), PubSCIENCE (www.osti.gov/pubscience), PrePRINT Network (www.osti.gov/preprint), and the R&D Project Summaries Database (www.osti.gov/rdprojects).

Closing:

The Office of Science plays an important role in a balanced federal science portfolio. In FY 2002, Office of Science investments in the physical sciences, major scientific user facilities, and other critical areas of basic research will advance the technically challenging mission of the Department of Energy while making major contributions to the Nation's R&D infrastructure.

Dr. James Decker

Acting Director

Office of Science

Table 1

OFFICE OF SCIENCE
FY 2002 PRESIDENT'S BUDGET REQUEST TO CONGRESS
(B/A in thousands of dollars)

	FY 2000 Comparable Approp.	FY 2001 Comparable Approp.	FY 2002 Pres. Request	
Science				
Basic Energy Sciences	752,031	991,679	1,004,705	
Advanced Scientific Computing Research	122,338	165,750	165,750	*
Biological and Environmental Research	416,037	482,520	442,970	
Fusion Energy Sciences	238,260	248,493	238,495	*
High Energy Physics	683,050	712,001	721,100	*
Nuclear Physics	340,869	360,508	360,510	
Energy Research Analyses	950	976	1,300	*
Multiprogram Energy Laboratories-Facilities Support	29,557	30,174	30,175	
Science Program Direction	120,491	126,906	144,385	*
Small Business Innovation Research and Small Business Technology Transfer	83,962	-	-	
Subtotal	2,787,545	3,119,007	3,109,390	
Safeguards and Security				
Safeguards and Security	42,569	41,569	55,412	
Reimbursable Work	(5,266)	(5,122)	(4,912)	
Total, Safeguards and Security	37,303	36,447	50,500	
Total	2,824,848	3,155,454	3,159,890	
Energy Supply				
Technical Information Management	8,751	8,732	8,970	
Small Business Innovation Research and Small Business Technology Transfer	4,555	-	-	
Total	13,306	8,732	8,970	

* A Pending Budget Amendment transferring $10M to Fusion Energy Sciences from Advanced Scientific Computing Research, High Energy Physics, Energy Research Analyses and Science Program Direction will be submitted shortly.

Table 2

OFFICE OF SCIENCE
FY 2002 PRESIDENT'S BUDGET REQUEST TO CONGRESS
(B/A in thousands of dollars)

	FY 2000 Comparable Approp.	FY 2001 Comparable Approp.	FY 2002 Pres. Request
Global Climate Change	112,964	119,140	120,679
High Performance Computing and Communications	113,914	175,985	176,092
Microbial Cell Research/Genomes to Life	-	9,591	19,470
Nanoscience Engineering and Technology	46,304	82,829	87,013
Partnerships for a New Generation of Vehicles	5,000	4,934	4,934
Science Education Programs	4,472	4,460	6,460

Table 3

OFFICE OF SCIENCE
FY 2002 PRESIDENT'S BUDGET REQUEST TO CONGRESS
(B/A in thousands of dollars)

Major Site Funding	FY 2000 Comparable Approp.	FY 2001 Comparable Approp.	FY 2002 Pres. Request
AMES LABORATORY			
Advanced Computational Scientific Research	1,957	1,668	1,668
Basic Energy Sciences	18,105	16,967	16,753
Biological and Environmental Research	948	652	690
Safeguards and Security	254	264	397
Science Program Direction	-	-	50
Total Laboratory	21,264	19,551	19,558
ARGONNE NATIONAL LABORATORY			
Advanced Computational Scientific Research	12,861	10,447	10,047
Basic Energy Sciences	151,026	155,902	159,149
Biological and Environmental Research	13,700	24,939	17,184
Fusion Energy Sciences	2,321	2,406	2,009
High Energy Physics	10,828	8,858	9,990
Multiprogram Energy Labs-Facilities Support	4,980	6,611	2,833
Nuclear Physics	17,912	17,782	16,568
Safeguards and Security	10,678	11,807	15,355
Science Program Direction	602	430	750
Total Laboratory	224,908	239,182	233,885
BROOKHAVEN NATIONAL LABORATORY			
Advanced Computational Scientific Research	1,847	1,566	1,266
Basic Energy Sciences	73,569	72,005	57,089
Biological and Environmental Research	21,723	16,948	18,169
Energy Research Analyses	50	-	-
High Energy Physics	38,778	26,507	32,595
Multiprogram Energy Labs-Facilities Support	6,881	6,444	6,063
Nuclear Physics	136,462	139,450	140,429
Safeguards and Security	9,585	9,428	10,986
Science Program Direction	558	420	650
Total Laboratory	289,453	272,768	267,247

	FY 2000 Comparable Approp.	FY 2001 Comparable Approp.	FY 2002 Pres. Request
FERMI NATIONAL ACCELERATOR LABORATORY			
Advanced Computational Scientific Research	59	60	60
Energy Research Analyses	-	22	-
High Energy Physics	294,627	289,507	314,878
Nuclear Physics	50	-	-
Safeguards and Security	2,294	2,490	2,765
Science Program Direction	-	50	100
Total Laboratory	297,030	292,129	317,803
IDAHO NATIONAL ENGINEERING LABORATORY			
Basic Energy Sciences	2,748	2,220	1,710
Biological and Environmental Research	1,713	1,440	1,486
Fusion Energy Sciences	1,568	2,210	2,082
Science Program Direction	-	40	100
Total Laboratory	6,029	5,910	5,378
LAWRENCE BERKELEY NATIONAL LABORATORY			
Advanced Computational Scientific Research	57,069	54,501	54,151
Basic Energy Sciences	65,048	70,760	72,586
Biological and Environmental Research	48,869	54,231	43,277
Energy Research Analyses	60	100	100
Fusion Energy Sciences	5,534	5,171	4,767
High Energy Physics	45,376	37,782	35,170
Multiprogram Energy Labs-Facilities Support	6,133	2,113	4,400
Nuclear Physics	18,060	18,213	17,899
Safeguards and Security	3,612	3,492	4,709
Science Program Direction	613	445	750
Total Laboratory	250,374	246,808	237,809
LAWRENCE LIVERMORE NATIONAL LABORATORY			
Advanced Computational Scientific Research	2,884	3,068	3,068
Basic Energy Sciences	5,966	5,316	4,628
Biological and Environmental Research	30,784	30,869	33,561
Fusion Energy Sciences	14,894	14,714	14,189
High Energy Physics	1,185	1,425	1,357
Nuclear Physics	792	732	672
Total Laboratory	56,505	56,124	57,475

	FY 2000 Comparable Approp.	FY 2001 Comparable Approp.	FY 2002 Pres. Request
LOS ALAMOS NATIONAL LABORATORY			
Advanced Computational Scientific Research	11,637	5,020	5,020
Basic Energy Sciences	23,696	22,721	22,927
Biological and Environmental Research	20,082	20,594	16,685
Fusion Energy Sciences	6,741	6,826	7,629
High Energy Physics	1,375	711	661
Nuclear Physics	10,714	9,479	9,798
Total Laboratory	74,245	65,351	62,720
NATIONAL RENEWABLE ENERGY LABORATORY			
Basic Energy Sciences	5,177	4,873	4,535
Biological and Environmental Research	99	-	-
Fusion Energy Sciences	50	-	-
Science Program Direction	-	120	100
Total Laboratory	5,326	4,993	4,635
OAK RIDGE NATIONAL LABORATORY			
Advanced Computational Scientific Research	12,016	10,563	10,223
Basic Energy Sciences	212,663	370,312	384,317
Biological and Environmental Research	30,805	36,545	39,761
Energy Research Analyses	64	-	-
Fusion Energy Sciences	18,369	16,116	16,412
High Energy Physics	536	327	307
Multiprogram Energy Labs-Facilities Support	1,101	6,627	7,620
Nuclear Physics	15,910	15,720	15,376
Safeguards and Security	8,970	9,162	15,024
Science Program Direction	642	-	-
Total Laboratory	301,076	465,372	489,040
PACIFIC NORTHWEST NATIONAL LABORATORY			
Advanced Computational Scientific Research	2,844	2,038	1,738
Basic Energy Sciences	12,072	11,846	11,398
Biological and Environmental Research	75,292	67,142	66,172
Energy Research Analyses	381	320	365
Fusion Energy Sciences	1,369	1,427	1,317
Multiprogram Energy Labs-Facilities Support	-	-	880
Science Program Direction	293	-	100
Total Laboratory	92,251	82,773	81,970

	FY 2000 Comparable Approp.	FY 2001 Comparable Approp.	FY 2002 Pres. Request
PRINCETON PLASMA PHYSICS LABORATORY			
Advanced Computational Scientific Research	38	-	-
Basic Energy Sciences	561	-	-
Fusion Energy Sciences	65,784	70,589	66,702
High Energy Physics	157	394	364
Safeguards and Security	1,680	1,735	1,829
Science Program Direction	-	110	100
Total Laboratory	68,220	72,828	68,995
SANDIA NATIONAL LABORATORY			
Advanced Computational Scientific Research	4,961	3,889	3,889
Basic Energy Sciences	23,740	22,967	22,843
Biological and Environmental Research	2,597	3,139	2,756
Energy Research Analyses	100	99	99
Fusion Energy Sciences	3,249	3,181	2,996
High Energy Physics	-	4	-
Nuclear Physics	-	4	-
Total Laboratory	34,647	33,283	32,583
STANFORD LINEAR ACCELERATOR CENTER			
Advanced Computational Scientific Research	590	234	234
Basic Energy Sciences	24,098	33,691	33,991
Biological and Environmental Research	3,060	3,489	4,300
Fusion Energy Sciences	49	-	-
High Energy Physics	152,858	158,681	164,343
Safeguards and Security	1,774	1,814	2,152
Science Program Direction	-	125	150
Total Laboratory	182,429	198,034	205,170
THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY			
Advanced Computational Scientific Research	49	-	-
Biological and Environmental Research	56	100	-
High Energy Physics	90	5	5
Nuclear Physics	72,779	73,336	73,830
Safeguards and Security	480	492	947
Science Program Direction	-	45	100
Total Laboratory	73,454	73,978	74,882